Federal Energy Regulatory Commission

Office of Energy Projects

December 2014

Sabine Pass Liquefaction Expansion, LLC

Sabine Pass Liquefaction, LLC, and Sabine Pass LNG, L.P. **Docket No. CP13-552-000**

Cheniere Creole Trail Pipeline, L.P. **Docket No. CP13-553-000**

Sabine Pass Liquefaction Expansion Project and

Cheniere Creole Trail Pipeline Expansion Project

Environmental Assessment

Washington, DC 20426

Cooperating Agencies:

United States Army Corps of Engineers
Galveston and New Orleans Districts

United States Environmental Protection Agency

United States Department of Transportation

United States Department of Energy
(Docket Nos. 13-30-LNG, 13-42-LNG, 13-121-LNG

Adopted 6/26/2015 as DOE/EA-1983

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 2
Sabine Pass Liquefaction Expansion, LLC,
Sabine Pass Liquefaction, LLC, and
Sabine Pass LNG, L.P.
Sabine Pass Liquefaction Expansion Project
Docket No. CP13-552-000
Cheniere Creole Trail Pipeline, L.P.
Cheniere Creole Trail Pipeline Expansion Project
Docket No. CP13-553-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Sabine Pass Liquefaction Expansion Project (SPLE Project), proposed by Sabine Pass Liquefaction Expansion, LLC, Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P. (collectively referred to as Sabine Pass) and the Cheniere Creole Trail Pipeline Expansion Project (CCTPL Expansion Project), proposed by Cheniere Creole Trail Pipeline, L.P. (CCTPL) in the above-referenced dockets. Sabine Pass requests authorization to expand the existing Sabine Pass Liquefied Natural Gas Terminal in Cameron Parish, Louisiana. CCTPL is proposing to expand and extend its existing pipeline system within the following parishes in the State of Louisiana: Cameron, Calcasieu, Beauregard, Allen, and Evangeline. Together, the SPLE Project and the CCTPL Expansion Project are referred to as the Projects.

The EA assesses the potential environmental effects of the construction and operation of the Projects in accordance with the requirements of the National Environmental Policy Act (NEPA). The FERC staff concludes that approval of the proposed Projects, with appropriate mitigating measures, would not constitute a major federal action significantly affecting the quality of the human environment.

The U.S. Environmental Protection Agency, Department of Energy, U.S. Army Corps of Engineers, and U.S. Department of Transportation participated as cooperating agencies in the preparation of the EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

The SPLE Project involves constructing two new LNG liquefaction trains (referred to as Trains 5 and 6) and would increase the terminal's capability to liquefy natural gas for export by 503 billion cubic feet per year (Bcf/y) (251.5 Bcf/y per liquefaction train). The CCTPL Project involves expanding and extending the existing CCTPL pipeline system to enable it to provide up to an additional 1.5 billion cubic feet per day of firm reverse flow capacity on the existing CCTPL pipeline system. The new pipeline facilities would consist of approximately 104.3 miles of new 42-inch and 36-inch-diameter pipeline (loop, mainline extension, and laterals) in Cameron, Calcasieu, Beauregard, Allen, and Evangeline Parishes, Louisiana, and 53,000 horsepower of additional compression at the new Mamou Compressor Station in Evangeline Parish.

The FERC staff mailed copies of the EA to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; newspapers and libraries in the project area; and parties to this proceeding. In addition, the EA is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies of the EA are available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that your comments are properly recorded and considered prior to a Commission decision on the proposal, it is important that the FERC receives your comments in Washington, DC on or before **January 12, 2015.**

For your convenience, there are three methods you can use to submit your comments to the Commission. In all instances please reference the project docket numbers (CP13-552-000 and CP13-553-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8659 or efiling@ferc.gov.

(1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting brief, text-only comments on a project;

(2) You can file your comments electronically using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You must select the type of filing you are making. If you are filing a comment on a particular project, please select "Comment on a Filing"; or

(3) You can file a paper copy of your comments by mailing them to the following address:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18CFR 385.214).[1] Only interveners have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervener status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervener status, but you do not need intervener status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP13-552). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

[1] See the previous discussion on the methods for filing comments.

In addition, the Commission offers a free service called eSubscription which allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/esubscribenow.htm.

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Abbreviations and Technical Acronyms

$\mu g/m^3$	micrograms per cubic meter
AEGL	Acute Exposure Guidelines Level
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
amsl	above mean sea level
ANR	ANR Pipeline Company
AOI	area of influence
APE	area of potential effects
Applicants	Sabine Pass Liquefaction, LLC, and Sabine Pass LNG, L.P.; and Cheniere Creole Trail Pipeline, L.P
AQCR	Air Quality Control Regions
ASME	American Society of Mechanical Engineers
ATWS	additional temporary work space
BACT	best available control technology analysis
Bcf	billion cubic feet
Bcf/d	billion cubic feet per day
Bcf/y	billion cubic feet per year
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
Btu/ft^2-hr	British thermal units per square foot-hour
CAA	Clean Air Act
CAMx	Comprehensive Air Quality Model with Extensions
CCS	carbon capture and sequestration
CCTPL	Cheniere Creole Trail Pipeline, L.P.
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGT	Columbia Gulf Transmission Company
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2-eq	carbon dioxide equivalent
Commission	Federal Energy Regulatory Commission; *also* FERC
CWA	Clean Water Act
dB	decibel

dBA	decibels on the A-weighted scale
DMPA	dredged material placement area
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment
EFH	essential fish habitat
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
ERPG	Emergency Response Plan Guidelines
ESA	Endangered Species Act
FE	Office of Fossil Energy
FEED	front-end engineering design
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission; *also* the Commission
ft^3	cubic feet
FTA	Free Trade Agreement
GHG	greenhouse gas
GMFMC	Gulf of Mexico Fishery Management Council
gpm	gallons per minute
GWP	global warming potential
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HAZOP	hazard and operability
HCA	high consequence area
HDD	horizontal directional drill; *also* horizontal directional drilling
hp	horsepower
HUD	United States Department of Housing and Urban Development
ICE	internal combustion engines
IPCC	Intergovernmental Panel on climate Change
LAC	Louisiana Administrative Code
LDEQ	Louisiana Department of Environmental Quality
L_{dn}	day-night averaged sound level

LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
L_{eq}	equivalent sound level
LFL	lower flammability limit
LNG	liquefied natural gas
M&R	metering and regulating
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act of 1918
MLV	main line valve
MP	milepost
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAVD 88	North American Vertical Datum of 1988
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NGA	Natural Gas Act of 1938
NGLs	natural gas liquids
NGPL	Natural Gas Pipeline Company of America
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NNSR	Nonattainment New Source Review
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries
NOI	Notice of Intent to Prepare an Environmental Assessment for the Planned Sabine Pass Liquefaction Expansion Project and Cheniere Creole Trail Pipeline Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings
NO_X	nitrogen oxide
NRCS	Natural Resources Conservation Service
NSA	noise-sensitive area
NSPS	New Source Performance Standard
OEP	Office of Energy Projects

OSHA	Occupational Safety and Health Administration
P&ID	piping and instrument diagram
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	The Federal Energy Regulatory Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan (2013)*
PM	particulate matter
PM_{10}	particulate matter of 10 microns in diameter or less
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PPEC	Pine Prairie Energy Center
ppm	parts per million
Procedures	The Federal Energy Regulatory Commission's *Wetland and Waterbody Construction and Mitigation Procedures (2013)*
Projects	SPLE Project and CCTPL Expansion Project
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
PSM	Process Safety Management
RCW	red-cockaded woodpecker
ROI	region of influence
RV	recreational vehicle
Sabine Pass	Sabine Pass Liquefaction Expansion, LLC, Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.
Secretary	Secretary of the Commission
SEP	surface emissive power
SH	State Highway
SHPO	State Historic Preservation Office
SIL	significant impact level
SO_2	sulfur dioxide
SPLE Project	Sabine Pass Liquefaction Expansion Project
SPLNG Terminal	Sabine Pass LNG Terminal
SPRP	spill prevention and response procedures
TCEQ	Texas Commission on Environmental Quality
TGT	Texas Gas Transmission
tpy	tons per year
UFL	upper flammability limit
USACE	U.S. Army Corps of Engineers

U.S.C.	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGCRP	United States Global Change Research Program
USGS	United States Geological Survey
VISCREEN	Visibility Screening
VOC	volatile organic compound
WMA	wildlife management area
WSA	waterway suitability assessment

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1 PROPOSED ACTION

1.1 Introduction

On September 30, 2013, Sabine Pass Liquefaction Expansion, LLC, Sabine Pass Liquefaction, LLC, and Sabine Pass LNG, L.P. (collectively referred to herein as Sabine Pass), filed an application in Docket No. CP13-552-000 with the Federal Energy Regulatory Commission (Commission or FERC) pursuant to Section 3(a) of the Natural Gas Act of 1938 (NGA) and Part 157 of the Commission's regulations. Sabine Pass requests authorization to expand its existing facilities by siting, constructing, and operating additional liquefied natural gas (LNG) export facilities at the existing Sabine Pass LNG (SPLNG) Terminal[1] in Cameron Parish, Louisiana. This project is referred to herein as the Sabine Pass Liquefaction Expansion Project (SPLE Project), or Stage 3. The SPLE Project consists of two new LNG liquefaction trains (referred to as Trains 5 and 6) and would increase the terminal's capability to liquefy natural gas for export by 503 billion cubic feet per year (Bcf/y) (251.5 Bcf/y per liquefaction train).

Concurrently, Cheniere Creole Trail Pipeline, L.P. (CCTPL) filed in Docket No. CP13-553-000 a request under Section 7(c) of the NGA for authorization to construct, own, and operate a new interstate natural gas pipeline and compression and related facilities in the State of Louisiana. Known as the CCTPL Expansion Project[2], this would provide up to an additional 1.5 billion cubic feet per day (Bcf/d) of firm reverse flow capacity on the existing CCTPL pipeline system. In addition, the CCTPL Expansion Project would provide up to 2.0 Bcf/d of firm transportation capacity, which would extend the CCTPL pipeline system to new receipt points providing access to the systems of the Columbia Gulf Transmission Company (CGT), Pine Prairie Energy Center (PPEC), ANR Pipeline Company (ANR), and Texas Gas Transmission, LLC (TGT). The new pipeline facilities would consist of approximately 104.3 miles of new 42-inch and 36-inch-diameter pipeline (loop, mainline extension, and laterals) in Cameron, Calcasieu, Beauregard, Allen, and Evangeline Parishes, Louisiana, and 53,000 horsepower (hp) of additional compression at the new Mamou Compressor Station in Evangeline Parish. Prior to filing their applications, Sabine Pass and CCTPL participated in the Commission's pre-filing process under Docket No. PF13-8-000.

On February 27, 2013, Sabine Pass filed an application with the U.S. Department of Energy's (DOE's) Office of Fossil Energy (FE) for authorization to export domestic LNG from the SPLNG Terminal, in a volume up to the equivalent of 101 Bcf/y of natural gas, to both free trade agreement (FTA) countries and non-FTA countries, pursuant to an LNG Sale and Purchase Agreement with Total Gas & Power North America, Inc. (FE Docket No. 13-30-LNG). Sabine Pass requested authorization for a 20-year term beginning on the date of the first commercial delivery from Train 5 or eight years from the date the authorization is issued by DOE. The DOE's authority to regulate the exports of natural gas, including LNG, is explained under Section 3 of the NGA. This authority has been delegated to the Assistant Secretary for the FE in Redelegation Order No. 00-002.04F, issued July 11, 2013. The DOE

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1 The SPLNG Terminal was previously evaluated and assessed by FERC for various project components in FERC Docket Nos. CP04-47-000, CP04-38-000, CP04-39-000, and CP04-40-000 (Sabine Pass LNG and Pipeline Project); CP05-396-000 (Sabine Pass LNG Terminal Phase II Project); CP04-47-001 and CP05-396-001 (Sabine Pass LNG Export Project); CP11-72-000 (Sabine Pass Liquefaction Project); and CP13-2-000 (Sabine Pass Modification Project).

2 The CCTPL Expansion Project is in areas previously evaluated and assessed by FERC in FERC Docket Nos. CP04-47-000, CP04-38-000, CP04-39-000, and CP04-40-000 (Sabine Pass LNG and Pipeline Project); CP05-360-000, CP05-357-000, CP05-358-000, and CP05-359-000 (Creole Trail LNG Terminal and Pipeline Project); and CP12-351-000 (Creole Trail Expansion Project).

granted Sabine Pass an authorization to export LNG to FTA countries on July 11, 2013, in Order No. 3306.

On April 2, 2013, Sabine Pass filed an application with the DOE's FE requesting long-term, multi-contract authorization to export domestic LNG from the SPLNG Terminal, in a volume up to the equivalent of 88.3 Bcf/y of natural gas, to both FTA and non-FTA countries, pursuant to a Sale and Purchase Agreement with Centrica plc (FE Docket No.13-42-LNG). Sabine Pass requested this export authorization for a 20-year term beginning on the date of the first commercial delivery from Train 5, or 8 years from the date the authorization is issued by DOE. The DOE granted Sabine Pass authorization to export LNG to FTA countries on July 12, 2013, in Order No. 3307.

On September 10, 2013, Sabine Pass filed an application with the DOE's FE requesting long-term, multi-contract authorization to export domestic LNG from the SPLNG Terminal, in a volume up to the equivalent of 314 Bcf/y of natural gas, to both FTA and non-FTA countries (FE Docket No.13-121-LNG). Sabine Pass requested this export authorization for a 20-year term beginning on the earlier of the date of first export or 8 years from the date the authorization is issued by DOE. The DOE granted Sabine Pass this authorization to export LNG to FTA countries on January 22, 2014, in Order No. 3384.

We[3] prepared this environmental assessment (EA) to address the potential environmental impacts of the SPLE Project and the CCTPL Expansion Project (Projects) in compliance with National Environmental Policy Act (NEPA) requirements and regulations issued by the Council on Environmental Quality (CEQ) at Title 40 of the Code of Federal Regulations (CFR) Parts 1500-1508, and the Commission's regulations at 18 CFR 380. The DOE, the United States Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Transportation (DOT) participated as cooperating agencies in the preparation of this EA. Our EA is an integral part of the Commission's decision on whether to issue Sabine Pass and CCTPL authorizations to construct and operate the proposed facilities. Our principal purposes in preparing this EA are to:

- identify and assess potential impacts on the natural and human environment that could result from implementation of the proposed action;
- identify and recommend reasonable alternatives and specific mitigation measures, as necessary, to avoid or minimize project-related environmental impact; and
- facilitate public involvement in the environmental review process.

1.2 Purpose and Need

Applicants' Stated Purpose and Need: Sabine Pass and CCTPL (together referred to as the Applicants) state that the proposed liquefaction facilities and associated pipeline expansion and subsequent exportation of domestic natural gas to the global market would provide a market solution to allow further development of unconventional (particularly gas-bearing formation) sources in the United States. The Applicants indicate that the Projects would result in the benefits to the public interest listed below:

- stimulation of the local, state, regional, and national economies through creation of jobs;
- increased economic activity and tax revenues and increased trade with neighboring countries;

3 "We," "us," and "our" used throughout this EA refer to the environmental staff of the FERC's Office of Energy Projects.

- improved domestic natural gas capacity and encouragement of solidarity in natural gas pricing; and
- diversification of global natural gas supplies that will promote national security and those of U.S. allies.

Section 3 of the NGA, as amended, requires that authorization be obtained from the DOE prior to importing or exporting natural gas, including LNG, from or to a foreign country. For applicants that have, or intend to have, a signed gas purchase or sales agreement/contract for a period of time longer than 2 years, long-term authorization is required. Under Section 3 of the NGA, the FERC considers, as part of its decision to authorize natural gas facilities, all factors bearing on the public interest. Specifically, regarding whether to authorize natural gas facilities for importation or exportation, the FERC shall authorize the proposal unless it finds that the proposed facilities will not be consistent with the public interest.

Under Section 7(c) of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decisions on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

1.2.1 Basic Project Purpose and Water Dependency Determination

Basic Project Purpose and Water Dependency Determination: According to USACE definitions, the basic project purpose is to discharge fill material into wetlands for the construction of a facility to liquefy and export domestic natural gas as LNG to the global market. The project is not water-dependent because the project does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic need and purpose.

Overall Project Purpose: For USACE permit consideration, the overall project purpose is to discharge fill material into wetlands in order to construct Trains 5 and 6 and associated equipment and facilities necessary for the production of additional LNG.

1.2.2 U.S. Department of Energy Purpose and Need

The DOE's FE must meet its obligation under Section 3 of the NGA to authorize the import and export of natural gas, including LNG, unless it finds that the import or export is not consistent with the public interest. The purpose and need for DOE action is to respond to the February 27, April 2, and September 10, 2013 applications for authority to export LNG from the SPLNG Terminal filed by Sabine Pass with the FE (FE Docket Nos. 13-30-LNG, 13-42-LNG, and 13-121-LNG).

The DOE is conducting its review under Section 3 of the NGA to evaluate the applications submitted by Sabine Pass for long-term, multi-contract authorization to export up to 503.3 Bcf/y of domestic natural gas as LNG for a 20-year period, beginning on the earlier of the date of first export or 8 years from the date of issuance of the requested authorization. Sabine Pass seeks to export the LNG from the SPLNG Terminal to (1) any nation that currently has or in the future develops the capacity to import LNG and with which the United States currently has or in the future enters into an FTA; and (2) any other country with which trade is not prohibited by U.S. law or policy and that has, or in the future develops, the capacity to import LNG.

1.2.3 U.S. Department of Transportation Purpose and Need

The DOT has prescribed the minimum federal safety standards for onshore LNG facilities in compliance with 49 United States Code (U.S.C.) 60101. Those standards are codified in 49 CFR 193 and apply to the siting, construction, operation, and maintenance of onshore LNG facilities. The National Fire Protection Association (NFPA) Standard 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas*, is incorporated into these requirements by reference, with regulatory preemption in the event of conflict. The DOT is a cooperating agency with the FERC, serving as a subject matter expert on its federal safety standards for siting, construction, operation, and maintenance of onshore LNG facilities codified in 49 CFR 193. The DOT does not issue a permit or license but, as a cooperating agency, assists FERC staff in evaluating whether an applicant's proposed design would meet the DOT siting requirements.

1.3 Cooperating Agencies

As indicated above, the DOE, DOT, and USACE are cooperating agencies in the preparation of this EA. The involvement of the DOT and DOE are described above in sections 1.2.2 and 1.2.3, respectively. The involvement of the USACE is described below.

The USACE must verify compliance with both the Clean Water Act (CWA) and NEPA before issuing a permit for the Projects. The USACE has chosen to participate as a cooperating agency in the NEPA process conducted by the FERC because it has jurisdictional authority pursuant to Section 404 of the CWA (33 U.S.C. 1344), which governs the discharge of dredged or fill material into waters of the United States, and pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), which regulates any work or structures that potentially affect the navigable capacity of a waterbody. The USACE will issue a separate decision document on the CWA Section 404 permit for the Projects that will incorporate the environmental analyses from this EA. The USACE must also carry out its public interest review process before it can issue a standard permit. This EA does not serve as a public notice for any USACE permits or take the place of the USACE's permit review process.

The Projects are within the USACE's Galveston District and New Orleans District regulatory boundaries. The SPLE Project and a portion of the CCTPL Expansion Project would affect areas in the USACE's Galveston District. The majority of the CCTPL Expansion Project would affect areas in the USACE's New Orleans District. The Galveston District is the lead USACE District for the SPLE Project and Loop 1 of the CCTPL Expansion Project; the New Orleans District is the lead for the remainder of the CCTPL Expansion Project.

The CWA Section 404(b)(1) Guidelines provide substantive criteria that the USACE uses to determine whether a proposed site is suitable for discharge of dredged or fill material and whether a proposed discharge of dredged or fill material (activity) is eligible for authorization under Section 404. Central to the guidelines is a tiered approach designed to minimize impacts on wetlands and other waters of the United States. Specifically, applicants are required to (1) avoid impacts where possible; (2) minimize unavoidable impacts; and (3) compensate for any remaining impacts that can neither be avoided nor minimized such that overall project impacts on the aquatic environment are minimal on both an individual and cumulative basis.

1.4 Public Review and Comment

On March 8, 2013, we granted Sabine Pass' and CCTPL's request to use the pre-filing process and assigned Docket No. PF13-8-000 to activities involved with the Projects. The pre-filing process ended on September 30, 2013.

Sabine Pass and CCTPL hosted open house information sessions for landowners, agencies, and other interested stakeholders on April 30, 2013, in Johnson Bayou, Louisiana; May 1, 2013, in Mamou, Louisiana; and May 2, 2013, in Kinder, Louisiana. These open houses provided stakeholders an opportunity to learn about the Projects and ask questions in an informal setting. Notifications of the open houses were mailed by the Applicants to stakeholders and published in local newspapers. Sabine Pass also established a 24-hour landowner hotline and a Project Website.

On June 7, 2013, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned Sabine Pass Liquefaction Expansion Project and Cheniere Creole Trail Pipeline Expansion Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (NOI). This NOI, which identified a 30-day public comment period and instructed interested parties on how to comment on the Projects, was mailed to federal, state, and local government representatives and agencies; elected officials; Native American tribes; potentially affected landowners and other interested individuals and groups; conservation organizations; local libraries and newspapers; and other parties to this proceeding. Scoping meetings were held by FERC on June 18, 2013, in Sulphur, Louisiana, and on June 19, 2013, in Kinder, Louisiana.[4]

On November 21, 2013, the USACE published a Public Notice to inform the public of the proposed work. This notice, which identified a 30-day public comment period and instructed interested parties on how to comment on the project, was mailed to federal, state, and local government representatives and agencies; elected officials; Native American Tribes; potentially affected landowners; and other interested individuals and groups.

During the review process we received six comments about the Projects, including one comment supporting the Projects, one comment from a public interest group, one request to intervene from citizens/interested parties, and letters from the U.S. Fish and Wildlife Service (USFWS) and the USACE. Table 1.4-1 lists the issues identified during the public comment process that are within the scope of the environmental analysis and identifies the applicable sections of the EA that address each issue.

Preparation of an EA versus an EIS

We received comments during the scoping period recommending that an environmental impact statement (EIS), rather than an EA, be prepared to assess the impact of the Projects. An EA is a concise public document that a federal agency may prepare to provide sufficient evidence and analysis for determining a finding of no significant impact. The Commission's regulations under 18 CFR 306(b) state that "if the Commission believe that a proposed action . . . may not be a major federal action significantly affecting the quality of the human environment, an EA, rather than an EIS, will be prepared first. Depending on the outcome of the EA, an EIS may or may not be prepared." In preparing this EA, we are fulfilling our obligation under NEPA to consider and disclose the environmental impacts of the Projects. This EA addresses the impacts that could occur on a wide range of resources should the Projects be approved and constructed. Also, the DOE, USACE, and DOT have special expertise with respect to certain environmental impacts associated with the Applicants' proposal and assisted in preparing this EA. Based on our analysis, the extent and content of comments received during the scoping period, considering that the SPLE Project would be adjacent to the existing Sabine Pass LNG Terminal within the existing leased 853-acre leased terminal site, and that the CCTPL Expansion Project is co-located for the extent practicable for the majority of the route, we conclude in Section 2.9 that the impacts associated with these Projects can be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted.

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4 The transcripts of the public scoping meetings and all written scoping comments are part of the public record for the Projects and are available for viewing on the FERC Internet website (http://www.ferc.gov). Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., PF13-8 and CP13-552 or CP13-553). Select an appropriate date range.

Programmatic EIS for LNG Exports

The Sierra Club commented that a programmatic EIS that considers the cumulative impacts of all LNG export terminals that are pending or approved by the DOE should be developed. It avers that other LNG projects will affect the same resources as the SPLE Project. Sierra Club raised similar issues in the proceeding for the Cameron LNG, LLC and Cameron Interstate Pipeline, LLC application filed in FERC Docket Nos. CP13-25-000 and CP13-27-000 for LNG terminal (Liquefaction Project) and related pipeline facilities. In the order approving the Cameron proposals issued June 19, 2014, the Commission found:

> …no merit in Sierra Club's arguments. In short, it seeks a programmatic EIS for a program which is not before the Commission. With respect to programmatic EISs, the CEQ regulations state that major federal actions for which an EIS may be required include "...programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program…"
>
> The Liquefaction Project does not meet this definition for broad proposals. The proposal concerns construction and operation of an LNG export terminal and pipeline facilities that will deliver gas to the export terminal. Moreover, the Commission considers proposed projects on their own merits, based on the facts and circumstances specific to the proposal. We conclude that the EIS properly fulfills its purpose, which is to disclose the potential environmental impacts of the Liquefaction Project, and to set forth measures to mitigate, minimize, or eliminate any potential impacts.

Similar to the those projects, this EA for the SPLE Project and the CCTPL Expansion Project has considered the cumulative impacts of construction and operation of other proposed LNG projects in the vicinity (see section 2.9 and table 2.9-1), therefore reasonably foreseeable liquefaction and export projects are considered herein.

During the pre-filing process, we conducted biweekly conference calls with Sabine Pass and CCTPL to discuss progress, and identify and address issues and concerns that had been raised. Interested federal and state agencies were invited to participate on these calls. These calls continued once the applications were filed. Summaries of our biweekly conference calls after the September 30, 2013 filing and written scoping comments are part of the public record for the Projects and are available for viewing on the FERC website (http://www.ferc.gov).

TABLE 1.4-1

Concerns Identified During Scoping

Issue	EA Section Where Addressed
GENERAL	
Purpose and Need	1.2
Environmental Impact Statement vs. Environmental Assessment	1.4
Indirect impacts, including natural gas production and cumulative impacts	2.9
Mitigation	2
WATER RESOURCES	
Jurisdictional wetlands, waters of the United States	2.2
Spill prevention and response, including frac-out contingency plans	1.7.1 and 2.2.1, appendix 2
Restoration/re-vegetation and dredging of wetlands	2.2 and 2.3
Ballast water discharges	2.1 and 2.2
AIR RESOURCES	
Air emissions	2. 7
SOCIOECONOMICS	
Socioeconomic effects on local resources	2.5 and 2.9.1.4
Effects on local communities and homeowners	2.5 and 2.9.1.4
Traffic	2.5.5
WILDLIFE AND VEGETATION	
Threatened and endangered species	2.3
Migratory birds	2.3
Bald eagles	2.3
Colonial birds	2.3
SAFETY	
Tanker traffic	2.8
Safety analysis	2.8
ALTERNATIVES	
No-Action Alternative and Alternative sites	3

1.5 Proposed Facilities

The SPLE Project and CCTPL Expansion Project facilities are described in this section. Figure 1 is a general location map. Figure 2 is an aerial view of the liquefaction facilities. Detailed U. S. Geological Survey (USGS) maps are provided in appendix 1.

Sabine Pass Liquefaction Expansion Project

The SPLE Project has been designed to process about 1.4 Bcf/d of pipeline-quality natural gas that would be delivered to the SPLNG Terminal through the interconnecting CCTPL system. Natural gas would be liquefied and stored in the SPLNG Terminal's five existing metal, double-walled, single containment storage tanks with secondary impoundment. LNG would be exported from the terminal by LNG carriers that would arrive at the SPLNG Terminal via the Sabine Pass Channel. The proposed liquefaction facilities consist of two ConocoPhillips Optimized Cascade® LNG Process Technology Trains (LNG Trains 5 and 6), each capable of processing up to 251.5 Bcf/y (or 0.7 Bcf/d) of natural gas, with an average liquefaction capacity of 4.5 million tons per annum. All proposed facilities would be constructed and operated within the existing, leased 853-acre terminal site, as shown on figure 2. The SPLE Project includes the following key facilities:

- two liquefaction trains, including the pre-treatment and liquefaction facilities described below (each train would include six LM2500+ G4 gas turbine-driven refrigerant compressors);
- one hydrogen sulfide (H_2S) removal system for acid gas removal, including a thermal oxidizer unit, in each of the two liquefaction trains;
- one heavies removal unit and associated equipment, including a condensate stabilizer system in each of the two liquefaction trains;
- one wet flare and one dry flare for Trains 5 and 6;
- five boil-off gas recycle compressors;
- one 71,842-gallon (working) amine storage tank;
- one 240,493-gallon condensate storage tank and one 100-gallons per minute (gpm) condensate pipeline send-out pump;
- one condensate send-out meter station that would send stabilized condensate through the 4-inch-diameter send-out pipe previously approved under Docket No. CP11-79-000 that would connect to an existing condensate pipeline;
- two LM2500+DLE (dry low emissions) gas turbine generators to supply additional electrical power;
- two diesel-powered standby generators;
- one 1.53-million gallon demineralized water tank;
- a single 42-inch-diameter pipeline linking the existing Stage 1 and 2 pipeline feed gas meter interconnect to the Stage 3 pipeline feed gas meter interconnect;
- interconnections to existing facilities;
- modifications and additions to existing utilities and infrastructure to accommodate the two additional trains; and
- new buildings.

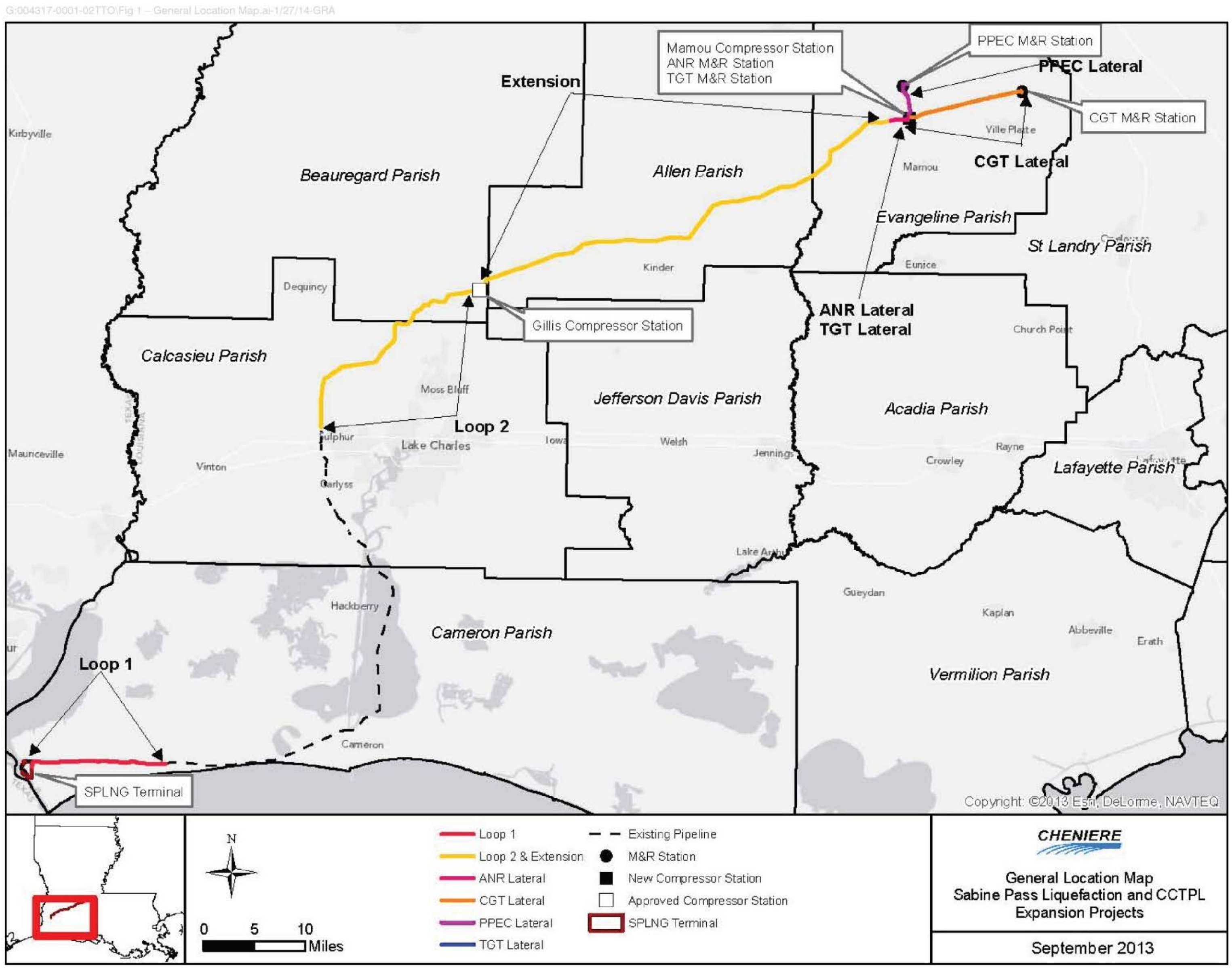

Figure 1 General Location Map of the Proposed Projects

G:004317-0001-02TTO\Fig 2 – Location of Liquefaction.ai-1/24/14-GRA

Figure 2 **Location of Liquefaction Facilities (Aerial View)**

No additional marine facilities would be required for the SPLE Project. No modifications would be required for the LNG loading arms, berthing equipment, basin, or other portions of the marine terminal. The number of ships using the SPLNG Terminal would not increase from the number of ships previously analyzed for the SPLNG Terminal. (The waterway was examined for a maximum of 400 ships that could call on the terminal per year.) Because loading rates proposed for the SPLE Project would be the same as the unloading rates for the SPLNG Terminal, no increase in the previously analyzed ship traffic is expected. Except for the required tie-ins to the existing SPLNG Terminal facilities, no modifications of the existing LNG vaporization facilities would be necessary.

CCTPL Expansion Project

CCTPL proposes to add 1.5 Bcf/d of capacity to its existing pipeline system, sufficient to provide feed gas and fuel to Trains 5 and 6. With this addition in service the line capacity would be 3.0 Bcf/d. To provide the capacity increase, CCTPL would add about 104.3 miles of new pipeline (see table 1.5-1). Figure 1 illustrates the general location of the proposed pipeline and associated facilities, which include the following:

- **Loop 1:** About 13.9 miles of 42-inch-diameter pipeline in Cameron Parish, Louisiana. The pipeline would be installed next to existing road/pipeline rights-of-way for 100 percent of its length.[5]
- **Loop 2:** About 24.5 miles of 42-inch-diameter pipeline in Calcasieu and Beauregard Parishes, Louisiana. The pipeline would be installed next to existing pipeline/power line rights-of-way for 100 percent of its length.[6]
- **Extension:** About 48.5 miles of 42-inch-diameter pipeline in Beauregard, Allen, and Evangeline Parishes, Louisiana. The pipeline would be installed next to existing pipeline/power line rights-of-way for approximately 62 percent of its length.[7]
- **Four laterals** (all in Evangeline Parish, Louisiana):
    - The **CGT 36-inch-diameter lateral** would be about 11.5 miles long and extend east from the Mamou Compressor Station to the new CGT metering and regulating (M&R) Station and an interconnection with CGT. The CGT M&R Station would be about 5 miles north of Ville Platte, Louisiana. About 89 percent of the lateral pipeline would be installed next to existing pipeline rights-of-way.
    - The **PPEC 42-inch-diameter lateral** would be about 4.0 miles long and extend north from the Mamou Compressor Station to the new PPEC M&R Station and an interconnection with PPEC. About 30 percent of the lateral would be installed next to existing pipeline rights-of-way.
    - The **ANR 36-inch-diameter lateral** would be about 1.7 miles long and begin at the new ANR M&R Station and extends west to an interconnection with ANR. The entire lateral would be installed next to the Extension and existing pipeline rights-of-way.
    - The **TGT 36-inch-diameter lateral** would be about 0.2 mile long and begin at the new TGT M&R Station and extends west to an interconnection with TGT. The entire lateral would be installed next to the Extension and existing pipeline rights-of-way.

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5 Authorized by the USACE on November 25, 2013, under USACE Nationwide 14, SWG-2013-00898.

6 Currently under evaluation as a Standard Permit by USACE New Orleans District, MVN-2013-02522.

7 Currently under evaluation by USACE New Orleans District.

- **Mamou Compressor Station:** The proposed new Mamou Compressor Station in Evangeline Parish, Louisiana, consists of three 10,836 hp Taurus 70 turbine/compressor units and one 20,617 hp Titan 130 turbine/compressor unit. It would be at the eastern end of the Extension, near milepost (MP) 142.4.
- **Four M&R Stations:** The TGT and ANR M&R stations would be in the new Mamou Compressor Station. The CGT and PPEC M&R stations would be at or near the end of the CGT and PPEC laterals, respectively, in Evangeline Parish.
- **Mainline Valves and Other Facilities:** Mainline valves and launchers and receivers would be installed along the new pipelines at various locations along each loop, the Extension, and the laterals.

Sabine Pass and CCTPL anticipate beginning construction of the SPLE Project in June 2015 and pipeline construction to begin June 2017. Sabine Pass expects Train 5 of Stage 3 to be operational by December 2019. Construction and the start-up of Train 6 would begin when commercially feasible. CCTPL expects construction of the CCTPL Expansion Project to be operational by the end of 2018.

TABLE 1.5-1

Facilities Associated with the CCTPL Expansion Project

Pipeline Facility Name	Pipeline Diameter (inches)	Beginning MP	Ending MP	Parish	Length (miles)
Loop 1	42	1.8	15.7	Cameron	13.9
Loop 2	42	69.4	85.7	Calcasieu	16.3
		85.7	93.9	Beauregard	8.2
				Sub-Total	***24.5***
Extension	42	93.9	95.4	Beauregard	1.5
		95.4	130.3	Allen	34.9
		130.3	142.4	Evangeline	12.1
				Sub-Total	***48.5***
CGT Lateral	36	0.0	11.5	Evangeline	11.5
PPEC Lateral	42	0.0	4.0	Evangeline	4.0
ANR Lateral	36	0.0	1.7	Evangeline	1.7
TGT Lateral	36	0.0	0.15	Evangeline	0.2
				Total	**104.3**

1.6 Non-jurisdictional Facilities

No non-jurisdictional facilities are associated with the Projects.

1.7 Construction, Operation, and Maintenance Procedures

The project facilities would be designed, constructed, operated, and maintained to conform to or exceed federal standards that are intended to adequately protect the public by preventing or mitigating

LNG and natural gas pipeline failures or accidents and ensure safe operation of the facilities. The liquefaction facilities would be constructed according to the standards outlined by the DOT's *Federal Safety Standards for Liquefied Natural Gas Facilities* in 49 CFR 193 and the NFPA's *Standards for the Production, Storage, and Handling of LNG* (NFPA 59A).

The pipeline facilities would comply with DOT regulations at 49 CFR 192, *Transportation of Natural or Other Gas by Pipeline: Minimum Federal Safety Standards*. These regulations specify material selection, design criteria, corrosion protection, and qualifications for welders and operation personnel. Additionally, CCTPL would comply with the Commission's regulations at 18 CFR 380.15 regarding the siting and maintenance of pipeline rights-of-way.

Sabine Pass and CCTPL have incorporated, in whole, the FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan [FERC 2013a]) into their construction and operating specifications for upland areas that would be affected by the Projects. In their applications, Sabine Pass and CCTPL requested five alternative measures to the FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures [FERC 2013b])[8] relative to construction and operation in wetland and waterbody areas and incorporated these modifications into their Procedures. The project-specific procedures are provided in appendix 2. See table 2.2-4 in section 2.2.1 for additional review of the Applicants' proposed alternative measures.

1.7.1 Construction Procedures

For purposes of quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and project specifications, Sabine Pass and CCTPL would be represented on-site by a chief inspector and one or more craft inspectors and one or more environmental inspectors. Sabine Pass and CCTPL would require their contractors to observe and comply with all federal, state, and local laws, ordinances, and regulations that apply to the conduct of their work. The Applicants would provide environmental training to all construction personnel. The level of training would be appropriate for the duties performed. Training would be provided before the start of construction and throughout the construction process, as needed. The environmental training program would cover the measures outlined in the FERC Plan and Sabine Pass's and CCTPL's Procedures, and in the *Spill Prevention and Response Procedures*, the *Horizontal Directional Drilling (HDD) Mud/Frac-out Contingency Plan*, job-specific permit conditions, company policies, and any other project requirements.

Liquefaction Plant Construction Sequencing

The SPLE Project would involve modifications to the existing SPLNG Terminal facilities and the construction of new infrastructure. The site construction area would be about 401.15 acres, and new infrastructure and modifications would include installing required construction power, communications, and water. About 153.53 acres would be subject to USACE permitting under Section 404 of the CWA.

The process facilities for the SPLE Project would be northeast of the existing LNG storage tanks. Part of the process area is in relatively good soil that would require only clearing, grubbing, and rough grading. The remaining portion of the process area would be in an existing dredged material placement area (DMPA), also known as Mitigation Area C, where soils would require considerable improvement and stabilization to provide a load-bearing surface for construction. The site would be graded and filled and all soil stabilization procedures executed before installing infrastructure. Sabine Pass would improve the soils by using techniques similar to those used during construction of the existing SPLNG Terminal

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8 Copies of the FERC's Plan and Procedures may be accessed on our website at http://www.ferc.gov/industries/gas/enviro/guidelines.asp or obtained through our Office of External Affairs at 1-866-208-3372.

facilities and Stage 1 and 2 liquefaction trains,[9] e.g., various stabilizers, including portland cement, fly ash, and other mixtures. Where needed, it would also use appropriate geogrids, geotextiles, and aggregates (imported gravel and crushed stone) to level and finish the project areas. Materials for site improvement, such as gravel and stone surfacing, would be imported via barge or trucks. All equipment and building materials would be delivered to and staged on-site.

The LNG liquefaction area would be filled about 3 feet above existing ground surface. The total settlement as a result of placing fill of this thickness is expected to be about 17 inches. About 25 percent of the predicted total settlement would occur during fill placement. The balance of the settlement would occur at a decreasing rate over a period of about 30 to 50 years. Numerous settlement observation points would be identified before placing the fill. The settlement of these points would be monitored at various times during and following fill placement to verify the predicted amount of settlement.

Construction traffic would access the site via Louisiana State Highway (SH) 82. Once at the site, construction traffic would use Duck Blind Road (which parallels the western boundary of the SPLNG Terminal property) Center Levee Road, or Lighthouse Road (which is the SPLNG Terminal main entrance road that parallels the property's eastern boundary).

Materials would be delivered by truck using SH 82. Heavy or more major equipment would be delivered via SH 27 to SH 82 or by barge. An existing construction dock at the SPLNG Terminal would accommodate barge deliveries. Maintenance dredging at the existing construction dock was conducted in June 2012 and it is expected that maintenance dredging would likely be necessary again to restore the required depth of 17 feet. Maintenance dredging is authorized under Nationwide Permit 35 (SWG-2004-00465), re-issued on March 19, 2012, and Coastal Use Permit P20071705, issued by the Louisiana Department of Natural Resources (LDNR).

Pipeline Construction Sequencing

The CCTPL Expansion Project would involve constructing pipelines, a compressor station and other aboveground facilities, access roads, and contractor/pipe yards.

The pipeline and aboveground facilities would be designed, constructed, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Construction and restoration would use standard pipeline construction techniques and residential construction techniques in accordance with CCTPL's best management practices (BMPs). The BMPs include the Plan, CCTPL's Procedures, CCTPL's *Spill Prevention and Response Procedures*, and CCTPL's *Horizontal Directional Drill (HDD) Drilling Mud/Frac-Out Contingency Plan*. Appendix 2 provides the Projects' BMPs. We have determined that the BMPs, including CCTPL's alternative measures to the FERC's Procedures, are acceptable and would provide an equal or greater level of environmental protection. Table 1 in appendix 2 lists the locations where extra workspaces within 50 feet of wetlands and waterbodies would be required and their justification.

CCTPL generally would use a 120-foot-wide construction right-of-way when installing the loops, extension, and laterals. However, along some segments of the CCTPL Expansion Project, CCTPL would install the mainline and lateral pipelines in abutting right-of-way. A 150-foot-wide construction right-of-way would be used where the Extension and ANR Lateral are installed next to each other. A 180-foot-wide construction right-of-way would be used to install the 0.2-mile-long TCT Lateral in a construction

9 See the FERC EA posted in Docket No. CP11-72-000 for additional information.

right-of-way that also includes the Extension and the ANR Lateral. Also, CCTPL is proposing a wider right-of-way at some locations to address issues related to soils with high moisture content, especially in agricultural fields where rice or crawfish are harvested and where the soils are frequently flooded. We agree that wider construction rights-of-way may be used in these instances.

A standard pipeline construction sequence begins with civil survey, followed by marking/staking the construction right-of-way for the clearing crew. CCTPL would mark existing utilities, other sensitive resources, and use the "One Call" system to identify other buried facilities in the area.

The clearing crew, using mechanical or hand cutting, would remove any trees or brush within the right-of-way that would interfere with construction. Clearing would be limited along the construction right-of-way in open or agricultural areas. CCTPL would install temporary erosion-control devices as required. After that, the right-of-way would be graded. Typically, bulldozers would provide rough grading needed to allow for the safe passage of equipment to prepare the work surface for pipeline installation. Topsoil would be separated from subsoil in agricultural/residential areas (or in other areas requested during the easement negotiations). Heavy equipment such as backhoes or trenching machines would then dig the trench to a depth that would allow the minimum of 3 feet of cover above the top of the installed pipe. No blasting is expected for the CCTPL Expansion Project. Because the soils are highly erodible, dust mitigation may be required throughout construction. To reduce impacts associated with dust, CCTPL would reduce vehicle speeds on unpaved access roads and would apply water to active construction areas when necessary.

After clearing and grading, pipe stringing begins along the right-of-way, lined up next to the trench. The pipe segments would be bent to fit the trench and then welded together. CCTPL would have all welds tested per regulations (49 CFR 192). Any welds that do not meet the requirement of the DOT regulations would be repaired and replaced before placing the pipe in the trench. The trench would be backfilled using all suitable material excavated from the trench. In some instances, additional fill would be brought in from off-site. Subsoil would be returned to the trench then covered with topsoil.

CCTPL would have the pipeline cleaned and then hydrostatically tested to ensure that the pipe can meet its intended service and operating design pressure without leaks. This test would use water from waterbodies crossed by the pipeline or from municipal supply sources. After the test, the water would be discharged into a dewatering structure to minimize erosion. No additives would be used in the hydrostatic test water.

CCTPL would ensure that construction debris is removed and the right-of-way re-graded and seeded within six working days after final grading. Temporary and permanent erosion-control devices would be installed within 20 days after the trench is backfilled. After the right-of-way has revegetated the temporary erosion-control devices would be removed.

Specialized Pipeline Construction

CCTPL would use specialized construction techniques where warranted by site-specific conditions (e.g., road crossings, waterbodies, wetlands, and residential/commercial/industrial establishments). Generally, CCTPL would cross all federal and major state roads using a horizontal bore or HDD. Smaller state and local roads would be open cut and would be completed in accordance with applicable state and local permits. When crossing roadways using the open-cut method, at least one lane of traffic would be kept open on or across from residential streets. During the brief period when a road would be completely cut, steel plates would be available on-site to cover the open area to permit travel by emergency vehicles. All temporary access roads used for construction and restoration would be restored in accordance with landowner agreements.

Wetland crossings would be conducted in accordance with applicable permits and CCTPL's Procedures. Wetland areas would be restored to preconstruction-grade contours, and seeding would be completed in non-inundated areas with approved wetland seed mix. Construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oil, and petroleum products would not be parked, stored, or serviced within 100 feet of any waterbodies or wetlands. All equipment would be checked for leaks by a company inspector before work begins in waterbodies or wetlands.

CCTPL would cross wetlands in a manner similar to the standard construction techniques already described. However, some additional measures to protect the wetlands would include using low ground pressure equipment and temporary board or timber mats and erosion control measures such as silt fences, interceptor dikes, straw bale structures, and trench plugs.

Crossing saturated wetlands (wetlands with standing water) would include using equipment mats or timber mats to support equipment movement through and working within the saturated wetland. In addition, topsoil would not be segregated. The push-pull method, which involves digging the trench, then pushing or pulling the fabricated segment of pipeline along the trench through the wetland, also may be used.

CCTPL would cross all waterbodies in accordance with applicable permits, rules, and guidance for crossing method and timing. Waterbodies that are not flowing at the time of construction and that would remain without any water flow during the time of construction would be crossed using standard upland construction techniques. Conventional excavator-type equipment for wet-crossing (open-cut) techniques would be used when there is noticeable flow at the time of the crossing. This open-cut technique is similar to the conventional upland open-cut trenching. It would involve excavating the pipeline trench across the waterbody, installing the pipeline, and backfilling the trench with native material. Equipment would operate from the banks of the stream or, if necessary, within the waterbody but would be limited to that needed to complete the crossing.

Mitigation measures as identified in CCTPL's Procedures would be used to minimize impacts on the aquatic environment during construction. CCPTL would schedule waterbody crossings so that the trench is excavated immediately before pipelaying. In accordance with CCTPL Procedures, the duration of the in-stream construction across waterbodies would be limited to 24 hours for minor waterbodies (less than 10 feet wide) and to 48 hours for intermediate waterbodies (more than 10 feet and less than 100 feet wide). CCPTL would restore banks to as near to pre-construction conditions as soon as possible or within 24 hours of completion of each waterbody crossing. Pipelines would have a minimum of 3 feet of cover from the waterbody bottom to the top of the pipeline.

Table 1.7-1 shows the 14 locations where CCTPL would use HDD techniques to cross roads, railroads, waterbodies, and wetlands. This construction method allows the pipeline to be installed between two points by drilling rather than trenching. HDD is an advanced boring method that drills a small-diameter hole, or pilot hole, along a predetermined path. The pilot hole is then gradually enlarged, sufficient to accommodate the pipeline diameter. The pipeline may or may not be installed concurrently with the pilot hole enlargement depending on the final diameter of the enlarged hole and the soil conditions encountered. A large area of additional temporary workspace at both the drill entry and exit sites is needed when using an HDD. An HDD is used only in areas where boring and conventional open-cut methods are not suitable, or in an effort to avoid certain environmental features and to reduce potential impacts. We have reviewed CCTPL's *HDD Drilling Mud/Frac-Out Contingency Plan* and find it is suitable for use and in the event of a drilling mud release or failure of the HDD.

Three residences and commercial or industrial establishments are less than 50 feet from the proposed construction right-of-way. CCTPL would notify homeowners notified in advance of construction activities and any known disruption of household utilities. Topsoil would be conserved or imported, as necessary. Disruptions would be minimized to the greatest extent possible. Following completion of major construction, the property would be restored in accordance with any agreements between CCTPL and the landowner.

The CCTPL Expansion Project crosses agricultural fields (e.g., areas cultivated for rice or raising crawfish). Construction through these areas would be similar to that of the standard conventional pipeline construction and would include segregation of topsoil from either the entire construction work area or from the ditch plus spoil side in cultivated or rotated croplands, managed pastures, residential areas, hayfields, and other areas, if necessary, and as agreed upon with the landowner. At least 3 feet of cover above the pipeline would be used in active cropland areas unless otherwise agreed upon with the landowner. No known drain tiles exist along the proposed pipeline routes, but if encountered during construction they would be identified and repaired, as necessary.

TABLE 1.7-1

Horizontal Directional Drill Locations for the CCTPL Expansion Project

Feature	Approx. Entry MP	Approx. Exit MP	Length (feet)	Diameter (inches)
Loop 1 – None				
Loop 2				
Houston River Canal	71.0	71.3	1,694	42
Houston River	73.4	73.9	2,892	42
U.S. 27/Bankens Road/Railroad **a/**	76.3	76.8	2,317	42
Little River **a/**	77.3	77.7	2,149	42
West Fork Calcasieu River **a/**	81.0	81.6	3,130	42
Indian Bayou/Camp Edgewood Road	86.7	87.1	1,725	42
Marsh Bayou	90.1	90.5	1,772	42
Extension				
Barnes Creek **a/**	96.7	97.2	2,607	42
Whiskey Chitto Creek	108.8	109.6	3,734	42
Calcasieu River **a/**	112.7	112.2	2,502	42
Highway 165 **a/**	114.4	114.9	2,350	42
Highway 10 **a/**	139.0	139.6	2.908	42
CGT Lateral				
Wetland WCGTLTA016	10.8	11.1	1,463	36
PPEC Lateral				
East Fork Bayou Nezpique	2.1	1.6	2,829	42

a These HDD locations also include crossings of smaller waterbodies such as ditches and unnamed tributaries.

Aboveground Facilities Construction Sequencing

Construction of the aboveground facilities would begin by surveying to define the boundaries of the construction area and would continue with clearing any existing vegetation and grading to create a level surface for construction. Erosion and sediment control mitigation measures (e.g., silt fence and straw bales) would be installed to minimize soil runoff and sedimentation into off-site sensitive areas.

Excavation for building foundations and pipe supports would begin, as needed, and CCTPL would have them tested to verify compliance with building specifications and design strength. Machinery, buildings, and piping would be installed at the same time. The compressor building would be properly insulated and built to decrease noise. Installation of the piping systems would be similar to the upland pipeline construction. This process includes transporting piping, valves, and fittings to the site, trenching, and then welding, inspecting, and coating the piping for corrosion protection, and placement into the trench. The piping would be backfilled and any aboveground portions would have supports (concrete or metal).

Structures, equipment, piping, and electrical conduit systems would be connected and tested appropriately along with controls and safety devices. CCTPL would conduct final stabilization of the aboveground facilities in accordance with site-specific plans.

1.7.2 Operating Procedures

Natural gas would be delivered to the SPLNG Terminal via the CCTPL pipeline system. It would be metered and enter the gas pre-treatment section of the liquefaction facilities to remove components in the gas stream in preparation for liquefaction. The removed components include solids, carbon dioxide, sulfur, water, and mercury.

The dry gas would be fed to the refrigeration systems where it would go through a combination of heat exchangers and pressure-reduction processes, which use propane and ethylene refrigerants and methane. The LNG would then be pumped to the LNG storage system.

The SPLNG Terminal is a bi-directional facility, capable of loading and unloading LNG cargo, liquefying natural gas from the pipeline to produce LNG, and vaporizing stored LNG and sending the natural gas into the pipeline. The terminal would also be capable of certain simultaneous operations normally associated with regasification or liquefaction, including the following:

- liquefying natural gas received from the CCTPL pipeline while also vaporizing LNG and sending out natural gas;
- unloading an LNG ship while liquefying natural gas; and
- loading an LNG ship while vaporizing LNG.

Some simultaneous operations, such as unloading one LNG ship while simultaneously loading a different LNG ship on the other dock, are unlikely to occur for commercial reasons. Sabine Pass has not contemplated this in its design. LNG berthing operations would remain unchanged from current processes.

Additional operating procedures would be developed for the new liquefaction facilities. Training in accordance with the DOT minimum federal safety standards specified in 49 CFR Parts 192 and 193 would be required for the additional 120 operational personnel needed for the SPLE Project. The control and monitoring system for the SPLE Project would interconnect with the existing SPLNG Terminal distributed control system for transferring critical data and would interface for total plant monitoring and control. An independent safety instrumented system would be installed to allow the safe, sequential shutdown and isolation of the liquefaction trains and common support facilities.

The existing hazard detection and fire protection systems provide alarm-signaling and notification when a hazardous condition or fire is present. The fire and gas detection system for the existing SPLNG Terminal would be expanded to protect the new liquefaction facilities and would perform as a continuous monitoring system. The SPLE Project would tie into and expand the existing fire protection for the SPLNG Terminal.

The emergency shutdown system for the new facilities would consist of separate shutdown sequences that would either be manually initiated by push buttons, located in the field and control room, or automatically initiated. The system would be designed to allow for areas of the liquefaction facilities to be shut down without necessarily shutting down the entire SPLNG Terminal.

The SPLE Project would also expand the existing site security system of the SPLNG Terminal. Sabine Pass would install security fencing around the new liquefaction facilities.

CCTPL would operate and maintain the pipeline facilities in accordance with applicable DOT safety standards (49 CFR 192). Routine patrols would be conducted along the pipeline to identify possible leaks, construction activities, erosion, exposed pipe, population density, possible encroachment, or other potential problems that may affect the safe operation of the pipelines.

1.7.3 Maintenance Procedures

Facility maintenance would be conducted in accordance with 49 CFR 193, Subpart G. Full-time terminal maintenance staff would provide routine maintenance and minor overhauls. Trained contract personnel would handle major overhauls and other major maintenance. All scheduled and unscheduled maintenance would be entered into a computerized maintenance management system. Routine maintenance of safety and environmental equipment, and instrumentation would be scheduled.

Maintenance along the permanent CCTPL right-of-way would follow the FERC Plan and the CCTPL Procedures and would include periodic seasonal mowing, repair of eroded areas, and periodic inspection of waterbody crossings. CCTPL would install cathodic protection units along the pipelines to meet or exceed DOT regulations associated with pipe-to-soil potential.

Maintenance at all the facilities would include regularly scheduled gas leak surveys and corrective actions needed to repair any potential leaks, including repair or replacement of pipe segments as needed. CCTPL would paint or replace all fence posts, signs, marker posts, aerial markers, and decals to ensure that the pipeline locations would be visible from the air and ground. Maintenance would also include periodic inspection and greasing of all valves.

1.8 Land Requirements

Table 1.8-1 summarizes the land requirements for the construction and operation of the Projects. The SPLE Project and the CCTPL Expansion Project, in combination, would affect about 2,097.6 acres during construction. A total of 785.9 acres would be permanently affected by the Projects.

About 401.2 acres of the existing 853-acre SPLNG Terminal site would be affected by construction, of which 156.3 acres would be permanently affected during operation. Of these 156.3 acres, 153.5 acres would be wetlands. The SPLE Project would affect the existing wetland compensatory mitigation site within the LNG Terminal site, previously permitted under USACE Permit SWG-2004-02523, formally DA Permit 02523(04), and which totals about 110.6 acres (Mitigation Site C). See sections 2.2.3 and 2.4.1 for additional information. About 11.5 acres of existing access roads at the SPLNG Terminal would be used during construction. No new temporary or permanent access road would be needed (see table 1.8-1).

About 1,696.5 acres would be affected by the construction of the CCTPL Expansion Project: 1,473.34 acres for construction of the pipeline, 44.9 acres for the aboveground facilities, 78 acres for access roads, and 100.2 acres for contractor/pipe yards. Generally, the pipeline would be installed within a 120-foot-wide construction right-of-way with additional temporary workspace located at road, railroad, and pipeline crossings and some wetland and waterbody crossings. As mentioned previously, where parallel to existing rights-of-way in certain situations, the CCTPL Expansion Project would use up to 180 feet for the construction right-of-way. Following construction, CCTPL would retain about 629.6 acres for operation of the pipeline and aboveground facilities.

TABLE 1.8-1

Land Requirements for the SPLE Project and the CCTPL Expansion Project

Facility	Acres Affected by Construction	Acres Affected During Operation
SPLNG Terminal		
Trains 5 and 6 and associated facilities	389.68	156.30
Existing SPLNG Terminal Access Roads	11.47	0
Sub-Total	*401.15*	*156.30*
CCTPL Pipelines and Aboveground Facilities		
Pipelines	1,473.34	582.25
Aboveground Facilities	44.95	44.95
Access Roads	77.98	2.37
Contractor/Pipe Yards	100.19	0
Sub-Total	*1,696.46*	*629.57*
Total	**2,097.61**	**785.87**

Additional temporary workspace (ATWS) would be needed at road, railroad, and pipeline crossings, including some wetland and waterbody crossings. ATWS would be at least 50 feet away from waterbodies and wetlands, where practicable, except in active agricultural areas or other disturbed areas. In some instances, Sabine Pass and CCTPL have requested exceptions to the 50-foot setback. These are listed in the *Project-specific Wetland and Waterbody Construction and Mitigation Procedures* in appendix 2.

Table 1.8-2 lists the four contractor/pipe yards that have been proposed for use during construction of the CCTPL Expansion Project. The Johnson Bayou Yard was reviewed and approved for this type of activity in the past, associated with the Cheniere Sabine Pass Pipeline, L.P. in the FERC Docket No. CP04-38. No permanent land use impacts would result from using these yards.

TABLE 1.8-2

Proposed Contractor/Pipe Yards in Louisiana

Facility Name	Parish	Current Land Use	Acreage
Johnson Bayou Yard ***a/***	Cameron	Open maintained grassland; an M&R station with partially paved area and access road	35.01
Kim Street Yard	Calcasieu	Open and disturbed area; partially paved with dirt roads	7.99
Klump Yard	Allen	Open and partially disturbed area; partially paved with dirt roads and existing industrial building structures	19.65
Cabot Yard	Evangeline	Open and maintained agricultural/grassland area; dirt roads	37.54
		Total	**100.19**

a This location received USACE authorization under SWG-2013-00989.

CCTPL would use 112 access roads with a combined length of 55.6 miles during construction. Table 1.8-3 lists the numbers of temporary and permanent access roads that would be used during construction and operation of the CCTPL facilities. All of the temporary access roads are existing roads. CCTPL would retain 10 of the access roads permanently for operation of the aboveground facilities. Seven of these permanent access roads are existing access roads. Three would be new roads. Two of the new permanent access roads are associated with the Extension and one is associated with the PPEC Lateral. Appendix 3 lists the access roads for pipeline construction and their proposed modifications. Access roads may require modifications such as tree clearing or trimming, gravel placement, or widening.

TABLE 1.8-3

Access Roads for the CCTPL Expansion Project

Facility Name	Parish	Number of Temporary Access Roads	Number of Permanent Access Roads	Total Number of Access Roads
Loop 1	Cameron	16	2	18
Loop 2	Calcasieu and Beauregard	24	3	27
Extension a/	Beauregard, Allen, and Evangeline	43	3	46
CGT Lateral	Evangeline	17	1	18
PPEC Lateral	Evangeline	2	1	3
Totals		**102**	**10**	**112**

a The Extension and the ANR Lateral would both use an access road included with the Extension totals.

Note: No access roads are proposed for the TGT Lateral.

1.9 Required Consultation, Approvals, and Permits

Table 1.9-1 lists the federal, tribal, state, and local regulatory agencies that have permit or approval authority or consultation requirements and the status of that review for portions of the SPLE Project and the CCTPL Expansion Project. Sabine Pass and CCTPL would be responsible for obtaining all necessary permits, licenses, and approvals required for their respective Projects, regardless of whether or not they are listed in table 1.9-1.

TABLE 1.9-1

Permits and Consultations for the SPLE Project and the CCTPL Expansion Project

Agency	Permit/Consultation	Status
Federal		
Federal Energy Regulatory Commission	Section 3 and Section 7 Application - Natural Gas Act	Application Filed September 30, 2013
U.S. Army Corps of Engineers, Galveston District	SPLNG: Section 404 - Clean Water Act Permit Loop 1: Section 404 – Clean Water Act Permit	Application filed September 30, 2013 Authorized under Nationwide Permit 14, SWG-2013-00898
U.S Army Corp of Engineers, New Orleans District	CCTPL Expansion Project (minus Loop1): Section 404 – Clean Water Act Permit	Application filed September 30, 2013.
U.S. Fish and Wildlife Service	Section 7 Consultation – Endangered Species Act Migratory Bird Treaty Act	Concurrence Letter received November 14, 2013
U.S. Coast Guard	Letter of Intent and Waterway Suitability Assessment	Concurrence Letter received February 19, 2013
U.S. Environmental Protection Agency Region VI	Clean Water Act Consultation	Application filed September 30, 2013
	Clean Air Act Consultation	Application filed September 20, 2013
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Section 7 Consultation – Endangered Species Act	No Action Determination accepted May 9, 2013
Bureau of Indian Affairs	Section 106 – National Historic Preservation Act	Pre-Filing Notification June 4, 2013
State		
Louisiana Department of Environmental Quality	Section 401 - Clean Water Act, Water Quality Certification	Application filed September 30, 2013
	Louisiana Pollutant Discharge Elimination System Construction Storm Water Permit	Application anticipated to be filed May 2014
	Air Permit	Application filed September 20, 2013 Addendum filed September 11, 2014
Louisiana Department of Natural Resources, Coastal Management Division	Coastal Management Plan Consistency Determination	Consistency determination letter received June 27, 2014
	Coastal Use Permit	Permit received June 27, 2014
Louisiana Department of Wildlife and Fisheries	Sensitive Species/Habitats Consultation	Consultation concluded with No Effect Determination March 15, 2013
	State Scenic River Crossing Permit (Barnes Creek, Whiskey Chitto Creek, and Calcasieu River)	Application expected to be filed January 2015

TABLE 1.9-1

Permits and Consultations for the SPLE Project and the CCTPL Expansion Project

Agency	Permit/Consultation	Status
Louisiana State Historic Preservation Office	Section 106 - National Historic Preservation Act	SPLE Project Concurrence with finding of No Historic Properties Affected on August 31, 2013. CCTPL Expansion Project Concurrence with a conditional finding of No Historic Properties Affected if archaeological site 16AL49 is avoided by HDD on October 3, 2013
Local		
Cameron Police Jury	LNG Terminal – Building permit/construction in floodplain	Application expected to be filed January 2015
Cameron Parish	Building Permits and Road Crossing Permits	Application expected to be filed January 2015
Calcasieu Parish	Building Permits and Road Crossing Permits	Application expected to be filed January 2015
Beauregard Parish	Building Permits and Road Crossing Permits	Application expected to be filed January 2015
Allen Parish	Building Permits and Road Crossing Permits	Application expected to be filed January 2015
Evangeline Parish	Building Permits and Road Crossing Permits	Application expected to be filed January 2015
Railroads	Railroad Crossing Permits	Application expected to be filed January 2015

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2 ENVIRONMENTAL ANALYSIS

2.1 Geology, Foundations, Natural Hazards, and Soils

2.1.1 Geology

The Projects are entirely within the West Gulf Coastal Plain physiographic section of the Coastal Plain physiographic province (USGS, 2009). This physiographic section is relatively flat. Elevations in the SPLE Project area range from 2 feet to less than 20 feet above mean sea level (amsl) and in the CCTPL Expansion Project area range from 2 feet to 120 amsl. The portion of the West Gulf Coastal Plain that comprises the project areas consists of Pleistocene and Holocene fluvial, tidal, and deltaic sediments that dip gently toward the Gulf of Mexico (Hoffman, 1996).

Surficial geology within the project areas is characterized by the following geomorphic types: the Prairie Terraces, Deweyville Terraces, and Intermediate Terraces, which are broad gulfward-sloping inland Pleistocence-age terraces; a belt of Holocene age coastal marshland called the Chenier Plain (saline marsh and fresh marsh); and Holocene-age alluvium along current and historic waterways (USGS, 2005). Most of the project areas lie in the Chenier Plain and the Prairie Terraces.

The SPLE Project lies within the Chenier Plain, which is composed of gray to brown to black clay and silt (of moderate organic content in the Chenier Plain saline marsh and high organic content in the Chenier Plain fresh marsh) with areas of accretion by longshore currents from major delta complexes. Although the SPLE Project falls physiographically within the Chenier Plain, the site is a former DMPA consisting of two dredge spoil containment areas filled to or near capacity with dredged material. DMPAs are confined (or diked) areas that are used to place sediments removed from the bottom of coastal waters, rivers, or lakes during dredging operations. Confinement is necessary to contain these materials, which consist of large volumes of water mixed with solids.

Loop 1 of the CCTPL Pipeline also lies in the Chenier Plain. The remaining CCTPL Expansion Project pipelines would be primarily within the Intermediate and Prairie Terrace which are composed of clay, sandy clay, silt, and sand, with some gravel. A minor portion of the CCTPL pipelines would be underlain by the Deweyville Terrace, which consists of clay, silty clay, sand, and gravel.

To address the difficulties associated with installation of large diameter pipe in Type C soils, CCTPL would use a 120-foot-wide construction right-of-way to install the loops, extensions, and laterals. As these soils tend to slough, it is difficult to maintain the trench or stack spoil within a narrow workspace, and heavy loadbearing equipment needs to be supported with additional counterweights and matting. While Type C materials present challenges when installing large- diameter pipe for many reasons, the ability of these soils to support 42- or 36-inch-diameter pipe is not reduced, as evidenced by the numerous other existing pipelines of the same diameter that have been previously constructed and operated for years in the region.

The Mamou Compressor Station would be underlain by clay, mud, silts with sand, and some gravel.

Mineral and Paleontological Resources

No non-energy mineral resources, mining activities, or paleontological resources are within 0.25 mile of the Projects; therefore, they would not be affected by construction or operation of the Projects.

Oil and Gas

Numerous oil and gas fields would be crossed by or would be near the CCTPL Expansion Project: Johnsons Bayou and West Johnsons Bayou would be crossed by Loop 1; Sulphur Mines, Southwest Gordon, Dunn Ferry, and Beckwith Creek are near Loop 2; and Barnes Creek, Reeves, Bunchy Creek, South Harmony Church, Kinder, Oberlin, Castor Creek, Riddell, Pine Prairie, Ville Platte, etc., are near the Extension and the laterals. More than 200 wells are within 0.25 mile of the SPLNG Terminal and the proposed CCTPL pipelines. Oil and gas well locations were as reported in the LDNR Strategic Online Natural Resources Information System (SONRIS) database, which in most cases relies on well locations as filed by the operator of the well. Most of these wells are reported as plugged and abandoned. Per the requirements of Louisiana Administrative Code (LAC) 43:XlX.137, plugged and abandoned wells must have a 30-foot cement plug at the top of the well and the casing must be cut 2 feet below plow depth (or 10 feet below the mud line in water locations), but older wells that pre-date these requirements may be plugged and abandoned to less stringent requirements. Most of these wells are more than 100 feet from the proposed pipeline centerline and would not be affected by pipeline construction.

CCTPL would mark any abandoned wells found in the construction work areas to allow visual identification by construction personnel and would maintain marking for the duration of the construction activities. If construction activities damage an abandoned oil well, CCTPL would implement its Spill Prevention and Response Procedures (SPRP), which describe measures to contain the release and the appropriate notifications (see appendix 2). CCTPL would then re-plug the abandoned well in accordance with LDNR requirements.

Oil and gas production would not likely affect or be affected by construction and operation of the Projects.

Blasting

A review of USGS and USDA Natural Resources Conservation Service (NRCS) documents indicates that blasting would not be needed for the projects because of the depth to shallow bedrock and the unconsolidated sediments that comprise the surficial geology (USDA NRCS, 2012; USGS, 2005).

2.1.2 Foundation Conditions

CCTPL's geotechnical investigation of the SPLE Project site indicates that differential settling of the new liquefaction trains at the SPLNG Terminal is possible and, therefore, design measures need to be taken. As described in section 2.1.1, the SPLE Project site is a former DMPA consisting of two dredged spoil containment areas filled to or near capacity with dredged material. The DPMA was used between 1940 and 1998 by the USACE to dispose of dredged spoils generated from the creation and maintenance of the Sabine Pass Channel. The DPMA was used again in 2007 to dispose of dredged materials from the construction of the SPLNG Terminal marine berth and construction dock. As a result of an inherent lack of physical structure and shear strength in the soils and underlying sediments in the DPMA, as well as on-going organic decomposition, sediments high in organic materials tend to readily and unevenly settle across the landscape, particularly under the weight of machinery and structures. Sabine Pass incorporated measures to support the LNG tanks and other facilities, such as deep-driven pile foundations, into its design to avoid destabilization or other effects of subsidence.

To further mitigate for subsidence at the SPLE Project site, Sabine Pass proposes to stabilize soils in situ to an average depth of 4 feet. The stabilized soil would help distribute the imposed vertical fill load on the soft underlying soils. The soft underlying soils are typically slightly over-consolidated and contain layers and seams of silts and shells, which are less compressible. The silt and shell seams would quickly dissipate the excess pore pressures resulting from the weight of the fill, and consolidation would occur more quickly as a result of multiple layers with variable drainage path lengths. Based on these mitigation measures, the total settlement of stabilized soils resulting from the load of fill placement is estimated to be less than 1 inch. The amount of settlement could be reduced by using lightweight aggregate fill with a unit weight of about 50 percent or less of the unit weight of stabilized on-site soil. The 3 feet of fill to be placed above the existing ground surface is expected to have a total settlement of approximately 17 inches, with about 25 percent of the predicted total settlement occurring during fill placement, and the balance of the settlement occurring at a decreasing rate over a period of about 30 to 50 years.

The major structures and equipment for deep foundations would be supported on driven 14-inch or 18-inch square precast, pre-stressed concrete piles. The piles would be installed after soil stabilization is completed and would be driven into the bearing sand, typically located in a 5- to 10-foot thick layer, at a depth range of 55 to 100 feet. The pile lengths required for each area can be estimated based on 2 to 3 feet of penetration into the bearing sand. The calculations for axial capacities and pile group settlement and the anticipated practical refusal elevation were based on a 2-foot penetration into the bearing sand. In pile groups[10] the penetration could be less as the sands become denser with compression. Sabine Pass would use selected piles for high-strain dynamic testing during pile installation.

In some locations outside the process area, the sand layer could be discontinuous or of insufficient thickness. In these areas, the piles would be predominantly friction piles and would have lower capacity than piles driven into the bearing sand. Note that lengths of about 100 to 120 feet are considered the practical limits for 14-inch and 18-inch square concrete piles cast in one section. Longer pile lengths could be achieved with a splice. Settlement of single piles would be minimal; settlement of pile groups would be a function of group dimensions, sustained loads, and soil conditions. As detailed design proceeds, comprehensive geotechnical analyses would be needed to assess the differential settlements between adjacent mat foundations supported on pile groups.

Construction and operation of the SPLE Project would not materially alter the geologic conditions of the project area, and the SPLE Project would not affect mining of resources during construction or operation. Blasting is not anticipated. The SPLE Project would not be affected by any significant geologic hazards, including areas of seismic activity or subsidence. Based on Sabine Pass's proposal, including implementation of the FERC Plan and Sabine Pass's and CCTPL's Procedures, CCTPL's SPRP (appendix 2), and our recommended mitigation measures, we conclude that impacts on geological resources would be adequately minimized and would not be significant, and that the potential for impacts on the SPLE Project from geologic hazards would also be minimal.

The design of the facility is currently at the front-end engineering design (FEED) level of completion. A feasible design has been proposed, and Sabine Pass would conduct a significant amount of detailed design work if the project is authorized by the Commission. Information regarding the development of the final design would need to be reviewed by FERC staff in order to ensure that the final design addresses the requirements identified in the FEED. Therefore, **we recommend that:**

- **Sabine Pass file the following information, stamped and sealed by the professional engineer-of-record, with the Secretary of the Commission (Secretary):**

  a. <u>prior to site preparation</u>: site preparation design drawings, specifications, and quality control procedures that will be used for design and construction; and

  b. <u>prior to their construction</u>: structure and foundation design drawings and calculations of the liquefaction facilities.

  In addition, Sabine Pass should file, in its Implementation Plan, the schedule for producing this information.

10 Pile groups consist of multiple piles that are driven into the ground at prescribed horizontal spacing so that they serve as a foundation to support a large load of weight.

2.1.3 Natural Hazards

Geologic hazards that could potentially affect the SPLNG Terminal facility include earthquake ground motions and faulting, soil liquefaction, landslides, and subsidence. Other natural hazards of concern include hurricane winds as well as storm surge-related flooding.

Earthquake Ground Motions and Liquefaction

The expected peak ground acceleration in the project area on a rock site, expressed as a percentage of the acceleration of gravity, is 1 percent to 2 percent for a 10 percent probability of exceedance in 50 years and 2 percent to 6 percent for a 2 percent probability of exceedance in 50 years (USGS, 2008). This is indicative of a low seismic hazard. While some soils and surficial sediments within the project area are susceptible to liquefaction, the low peak ground acceleration indicates a low liquefaction potential within the project area. Therefore, earthquakes and liquefaction are not likely to affect construction or operation of the Projects.

Faulting

Listric growth faults cross Loop 2 and the Extension between MPs 85 and 86, run parallel to within 1 mile north of the Extension between MPs 118 and 130, and cross the Extension between MPs 130 and 131 (USGS, 2005). Movement along these listric growth faults is related to a process of gradual creep as opposed to the sudden breaking of rock associated with earthquakes (Stevenson and McCulloh, 2001). Hazards associated with these faults include gradual cracking of buildings, pavements, and sediments that straddle surficial faults (as opposed to the sudden movement and release of seismic energy associated with faults in hard rock). Faulting is not likely to affect construction or operation of the Projects.

Ground Subsidence

Subsidence is downward ground movement of near-surface material as a result of geologic or manmade-induced processes. Typical causes of localized subsidence include karst-related voids or sinkholes, underground mines, groundwater or other subsurface gas or fluid withdrawal, and dewatering and settlement of recent deposits. There are no karst features or underground excavation mines in the project areas. All structures of the SPLE Project would be supported on deep foundations to minimize surface subsidence effects as described in section 2.1.2, Foundation Conditions, of this EA.

Solution mining has occurred west of Loop 2 between MP 69.4 and MP 70 and at the end of the PPEC Lateral. Although the pipelines would cross oil and gas fields, these are older, deeper fields that are not current targets for cyclic steam stimulation or other near-surface enhanced oil-recovery methods that may cause localized subsidence. Appreciable localized subsidence is not expected at the Mamou Compressor Station.

Subsidence is not likely to affect construction or operation of the Projects.

Landslides

The USGS National Landslide Hazards Program's Landslide Inventory Map indicates the Projects are in an area of low landslide incidence (less than 1.5 percent of the area has experienced landslides) and low landslide susceptibility (USGS, 2002). Localized slumping could occur in areas of steep sloped banks of local waterways. CCTPL would follow the recommendations in FERC's Plan and CCTPL's Procedures to mitigate localized slope failure hazards.

Wind

The facilities at the SPLNG Terminal have been designed to satisfy the design wind speed requirements in 49 CFR 193.2067; therefore, we do not consider that construction or operation of the SPLE Project would be significantly impacted by wind speeds.

Flooding

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, effective February 16, 2012, show that the area around the SPLNG Terminal is in Zone AE, with base flood elevations of 12 to 13 feet above the North American Vertical Datum of 1988 (NAVD 88) for the 1 percent annual chance flood (the 100-year flood) (FEMA, 2012). The maps, which indicate that the SPLNG Terminal is in the Coastal Barrier Resources System unit S11, appear to have used topography mapped prior to 2005, pre-dating the SPLNG Terminal's construction. The bottom of all points of support for the SPLE Project cryogenic pipe and process equipment would be elevated to 18.5 feet above sea level. The finished floor of critical buildings would be elevated to 19 feet above sea level. All roads within the facility would be elevated to 17.5 feet above sea level. Mean sea level is 9 centimeters above NAVD 88 in the vicinity of the SPLNG Terminal (National Oceanic and Atmospheric Administration [NOAA], 2012). Crown elevations of the plant roads are to be at 17.5 feet NAVD 88. Unimproved areas would remain at the existing elevation.

During hurricanes Rita (2005) and Ike (2008) the peak storm surges at the SPLNG Terminal were 9.35 feet and 14 feet amsl, respectively, based on the observed debris line on known structures. The NOAA sea lake and overland surge from hurricanes model predicts that the maximum envelope of water from a Category 5 hurricane crossing the Sabine Basin northwest at 10 mph and at mean tide could produce a storm surge of up to 22.5 feet amsl at the SPLNG Terminal site (NOAA, 2012). The hurricane surge model results represent the worst-case scenario (e.g., worst storm path, approach speed, tide level, etc.) for multiple parallel tracks of a particular hurricane category. The facility is designed for a 100-year storm surge level in Port Arthur/southern Sabine Lake of 14 feet amsl (USACE, 1968). This is roughly equivalent to the anticipated maximum envelope of water from a Category 3 hurricane crossing the Sabine Basin northwest at 10 miles per hour at mean tide (NOAA, 2012). Based on this information, it appears the SPLNG Terminal design elevations are sufficient for a 100-year flood event and Category 3 hurricane storm surge.

Flooding can increase the buoyancy of pipelines, causing them to rise toward the land surface where they may be exposed. Risks of increased buoyancy would be reduced by implementing normal construction techniques for crossing wetlands and streams, including using concrete-coated pipe or concrete weights, installing the pipeline using HDD, and maintaining a minimum of 3 feet of cover over the pipeline as required by the DOT. Flooding can also increase the potential for stream scour, potentially exposing the pipelines in stream crossings over time. As part of routine maintenance, CCTPL would monitor the pipeline for exposed areas of pipe and would repair such areas promptly.

We conclude that construction and operation of the Projects would not likely be adversely affected by flooding.

2.1.4 Soils

SPLNG Terminal

The SPLNG Terminal liquefaction trains would affect about 401.15 acres of land, including 156.3 acres of previously undisturbed land within the leased terminal site and 244.85 acres of previously disturbed industrial land. About 110 acres of the undisturbed land is currently a mitigation area (Mitigation Area C) and the remaining undisturbed land and entire acreage of the previously disturbed land are classified as DMPAs.

Trains 5 and 6 would be on areas with subsurface soils containing very soft to soft clays. These soils are udifluvents and have extremely poor load-bearing capabilities that likely would not support heavy equipment or materials (see section 2.1.2 for additional information about soil improvements and mitigative actions that would be needed to stabilize the site before construction could begin.

CCTPL Pipeline

Construction of the CCTPL pipeline system would affect about 104 miles of soil throughout Cameron, Calcasieu, Beauregard, Allen, and Evangeline Parishes, Louisiana. Appendix 4 details each soil mapping unit encountered along each section of the pipeline and potential soil hazards the soil map units may have. Below are brief descriptions of attributes common in soils that would be encountered by the CCTPL Expansion Project.

Loop 1

Loop 1 would cross 13.9 miles of flat, very deep, mostly poorly drained, loamy to clay soils. These soils are mostly in areas of low elevation, have slow to moderate permeability, and are prone to frequent flooding.

Loop 2

Loop 2 would cross 24.5 miles of soils that are nearly flat, very deep, somewhat poorly drained to poorly drained, loamy soils. These soils are primarily along terraces and have slow to moderate permeability.

Extension

The Extension would cross about 49 miles of nearly flat, very deep, somewhat poorly drained to poorly drained, sandy loam or silt loam soils. Runoff is slow to moderate and flooding is occasional to frequent.

CGT Lateral

The CGT Lateral would cross about 12 miles of flat to moderately sloping, very deep, mostly poorly drained, loamy soils. Runoff is slow to moderate and flooding is occasional to frequent. These soils are primarily along terraces and have slow permeability.

PPEC, ANR, and TGT Laterals

The PPEC, ANR, and TGT Laterals would cross nearly 6 miles of flat, very deep, somewhat poorly drained to poorly drained, silt loam soils. Runoff is slow to moderate and flooding is occasional to frequent. These soils are along terraces and some depressional areas and have slow permeability.

Aboveground Facilities

Soils underlying the Mamou Compressor Station and four M&R facilities (TGT, ANR, CGT, and PPEC M&R stations) consist of very deep, somewhat poorly to moderately drained, very slowly permeable, nearly level, silt loam soils.

Soils in this region typically have four limiting factors that could impact construction and operation issues: compaction potential, highly water-erodible soils, severe wind erosion, and poor/very poor revegetation potential. Tables 2.1-1 and 2.1-2 summarize the impacts of these factors and significant soil characteristics, e.g., soils such as the prime farmland and hydric soils that are found in the CCTPL Expansion Project area.

TABLE 2.1-1 **Summary of Soil Characteristics Crossed by the CCTPL Expansion Project Pipelines**							
Facility	**Linear Miles**	**Prime Farmland (miles)**	**Hydric (miles)**	**Compaction-Prone (miles)**	**Highly Water-Erodible Land (miles)**	**Wind Erodibility Group (miles)**	**Poor/Very Poor Revegetation Potential (miles)**
Loop 1	13.9	0.29	7.02	8.21	0.0	0.0	6.65
Loop 2	24.5	18.33	18.23	0.0	0.0	0.11	0.0
Extension	48.5	38.13	30.80	0.1	0.81	0.71	0.0
CGT Lateral	11.5	11.22	9.53	1.12	0.16	0.0	0.0
PPEC Lateral	4.0	3.27	2.52	0.0	0.51	0.0	0.0
ANR Lateral	1.7	1.62	0.68	0.0	0.0	0.0	0.0
TGT Lateral	0.2	0.20	0.0	0.0	0.0	0.20	0.0
Total	**104.3**	**73.06**	**68.78**	**9.43**	**1.48**	**1.02**	**6.65**
Source: NRCS 2013							

TABLE 2.1-2 **Summary of Soil Characteristics at CCTPL Expansion Project Aboveground Facilities**							
Facility	**Total Acres**	**Prime Farmland (miles)**	**Hydric (miles)**	**Compaction-Prone (miles)**	**Highly Water-Erodible Land (miles)**	**Wind Erodibility Group (miles)**	**Poor/Very Poor Revegetation Potential (miles)**
Mamou Compressor Station <u>**a**</u>/	39.6	39.6	28.0	0.0	0.0	0.0	0.0
CGT M&R Station	0.9	0.9	0.8	0.0	0.0	0.0	0.0
PPEC M&R Station	3.4	2.8	0.0	0.0	0.6	0.0	0.0
a Includes the ANR and TGT M&R stations. Source: NRCS 2013							

Prime Farmland

About 70 percent (73.06 miles) of the soils that would be affected by pipeline construction and nearly 100 percent of soils affected by the aboveground facilities are considered prime farmland. The CCTPL Expansion Project pipelines would have temporary impacts on prime farmland. The aboveground facilities would permanently impact about 39.6 acres of prime farmland at the Mamou Compressor Station, 0.9 acre of prime farmland at the CGT M&R Station, and 2.8 acres of prime farmland at the PPEC M&R Station. For construction of the pipelines, all temporarily affected prime farmland soils currently used for active cropland would be mitigated through topsoil segregation and use of BMPs consistent with the FERC Plan and the CCTPL Procedures. Topsoil and subsoil would be disturbed by right-of-way grading, trench excavation, and by heavy equipment moving along the right-of-way. CCTPL would segregate topsoil from either the full work area or from over the trench and the trench spoil storage area. The topsoil would be segregated from subsoil and would be replaced in the proper order during backfilling during final grading in uplands. In areas with high moisture content, especially where rice or crawfish are harvested, topsoil would not be segregated. Instead, the push-pull method, which involves digging the trench then pushing or pulling the fabricated segment of pipeline through the crawfish or rice fields, may be used. We conclude that topsoil segregation and the use of the BMPs during construction and restoration of the CCTPL Expansion Project would minimize impacts on prime farmland soils to the extent practicable.

Hydric Soils

About 66 percent of the soils that would be affected by pipeline construction and nearly 65 percent of the soils used for the aboveground facilities are considered hydric. CCTPL would minimize rutting of hydric soils by implementing the measures in the FERC Plan and the CCTPL Procedures. Special construction methods such as using concrete-coated pipe and/or installing pipe weights along the pipeline would be used as necessary to overcome potential buoyancy hazards during operation of the pipeline. In accordance with CCTPL's Procedures, equipment mats or timber mats would be used to facilitate equipment movement within wetlands and saturated soils during or after prolonged periods of rainfall. In addition, temporary slope breakers and erosion control devices (e.g., silt fence, straw bales) would be used as necessary to divert runoff away from work areas. We conclude that use of the FERC Plan and CCTPL Procedures would minimize impacts on hydric soils.

Compaction-Prone

About 9 percent of the soils that would be affected by pipeline construction are prone to compaction. The highest percentages of compaction-prone soils occur along Loop 1 in Cameron Parish. Excessive compaction impacts would be mitigated during restoration by plowing with a paraplow or other deep tillage tool to alleviate subsoil compaction. Unsaturated topsoil in wetlands (and agricultural areas) would be segregated and later returned to its original horizon. In areas where topsoil has been segregated, plowing with a paraplow or other deep tillage implement would alleviate subsoil compaction before the topsoil is replaced. This would be consistent with the soil compaction mitigation procedures in the FERC Plan. Timber equipment mats may be used where necessary to minimize rutting and excessive compaction within saturated wetland soils, consistent with CCTPL's Procedures. Grading to restore natural site contours and repair rutted areas would be completed prior to final revegetation, seeding, and mulching, which would initiate natural restoration of soil structure and bulk density. This would be done in a manner consistent with the FERC Plan and the CCTPL Procedures. We conclude that use of measures described in the FERC Plan and the CCTPL Procedures during construction and restoration would address issues related to soil compaction.

Erosion by Water and Wind Impacts and Mitigation

About 1.5 percent of the soils along the CCTPL pipelines are considered highly water erodible. To minimize or avoid potential impacts from soil erosion and sedimentation, CCTPL would use various erosion and sedimentation control methods described the FERC Plan including slope breakers, temporary sediment barriers, permanent trench plugs, timing, revegetation, and mulch.

The effectiveness of revegetation and permanent erosion-control devices would be monitored by CCTPL operating personnel during the long-term operation and maintenance of the pipeline system. Except in active agricultural areas, temporary erosion-control devices would be maintained until the right-of-way is revegetated successfully. Following successful revegetation of construction areas, temporary erosion control devices would be removed.

About 1 percent of soils that would be crossed by the CCTPL pipelines have been determined to be highly erodible by wind. CCTPL would reduce impacts associated with fugitive dust and in areas prone to wind erosion during construction by reducing vehicle speeds on unpaved access roads and by watering active construction areas when necessary. The amount and timing of water applied would depend on site-specific conditions and the frequency of precipitation during construction.

We conclude that CCTPL's measures to control dust and the use and maintenance of the erosion and sedimentation control measures described in the FERC Plan would mitigate impacts from wind and erosion by water.

Soil Contamination

A review of various federal and state databases, including the EPA Facility Registry Service and the Louisiana Oil Spill Coordinator's Office, indicates that no known potentially contaminated sites would be crossed by the CCTPL Expansion Project pipelines.

Project-related soil contamination may result from hazardous materials or fuel spills during construction. If contamination does occur , CCTPL would implement the measures contained in its SPRP (provided in appendix 2) to minimize accidental spills of materials that may contaminate soils and to ensure that inadvertent spills of fuels, lubricants, or solvents are contained, cleaned up, disposed of and reported as quickly as possible and in an appropriate manner. We have reviewed the SPRP and have determined it is adequate.

2.2 Water Resources, Fisheries, and Wetlands

2.2.1 Water Resources

2.2.1.1 Groundwater

The project components would be in the coastal lowlands aquifer system, specifically, over the Chicot aquifer. The Chicot aquifer system consists of fining upward sequences of gravels, sands, silts, and clays of the Pleistocene Prairie, intermediate, and high terrace deposits of southwestern Louisiana. The medium to coarse-grained sand and gravel aquifer units dip and thicken toward the Gulf of Mexico, thin slightly toward the west into Texas, and thicken toward the east where they are overlain by alluvium of the Atchafalaya and Mississippi Rivers. The aquifers are confined, have a finer texture, and are increasingly subdivided by silts and clays southward from the northern limit of the outcrop area in southern Vernon and Rapides Parishes (Louisiana Department of Environmental Quality [LDEQ], 2009). The maximum depths of occurrence of freshwater in the Chicot range from 100 feet above sea level, to 1,000 feet below sea level. The range of thickness of the fresh water interval in the Chicot is 50 to 1,050 feet (LDEQ, 2009). Wells within the Chicot aquifer range from 50 to 800 feet deep and yield 500 to 2,500 gpm (LDEQ, 1989). Freshwater in the Chicot and other southwestern Louisiana aquifers is separated from fresh water in southeast Louisiana by a saltwater ridge along the western edge of the Mississippi River valley. Salt water occurs within the Chicot along the coast and in isolated bodies north of the coast (LDEQ, 2009). The Chicot Aquifer is considered a sole-source aquifer by the EPA and underlies the entire project area (EPA, 1988).

Concentrations of dissolved solids in the coastal lowlands aquifer system are related to flow and proximity to estuarine or marine shorelines (Renken, 1998). Concentrations of dissolved solids are lower in inland areas and increase in salinity with proximity to the coast. This is the result of mixing with seawater and minerals in the aquifer dissolving into the groundwater. The flow of groundwater near the coast is very slow and saltwater is not flushed from the aquifer (Renken, 1998).

The dissolved constituents in coastal lowlands aquifer systems vary with proximity to the coast. Inland areas and those along the Mississippi River alluvial aquifer contain calcium bicarbonate; the

Chicot aquifer contains sodium bicarbonate; and the coastal areas contain sodium chloride (Renken, 1998).

Louisiana has established drinking water protection areas around potable water wells. The size of the protection area varies with the depth of the well. There are no groundwater withdrawal areas within 0.5 mile of the SPLNG Terminal and no wellhead protection areas at or near the terminal. Four wells would be within 150 feet of construction workspaces for the CCTPL Expansion Project, and two of these would be within the construction right-of-way (see table 2.2-1) (LDNR, 2012). One wellhead protection area would be crossed by the CCTPL Extension Project between MPs 124.5 and 126.7.

TABLE 2.2-1

Water Wells Within 150 Feet of the Centerline of CCTPL Expansion Project Pipelines

Facility	Approximate MP	Direction from Centerline	Distance From Centerline (ft)	Type	Status
Loop 1	4.86	South	30	Water	Inactive
Extension	142.2 **a/**	South	103	Water	Active
CGT Lateral	2.6	South	108	Water	Active
	6.06	South	69	Water	Active

a This well is also 73 feet (south) of the centerline of the ANR Lateral (MP 0.15) and 133 feet (south) of the TGT Lateral (MP 0.15).

Note: Water wells are defined as wells used for dewatering, domestic, hydraulic fracturing, industrial, irrigation, public supply, replacement, and drill uses.

Construction impacts on groundwater associated with the CCTPL Expansion Project are expected to be temporary and minor. Potential impacts may include changes in water quality and water level immediately next to pipeline trenching activities and changes in shallow groundwater flow and recharge during construction as a result of vegetation clearing or soil compaction. Areas with a shallow water table may be encountered during trenching and associated construction activity. Trenching and dewatering activities have the potential to alter water level, water quality, or groundwater flow patterns in the area immediately surrounding the trench. These impacts may affect nearby groundwater wells temporarily during the construction. Blasting would not be required. Therefore, we do not anticipate significant impacts on or modifications of water quality or groundwater recharge.

The wells within the proposed construction right-of-way would be taken out of service during construction and the wellhead barricaded. If a well within the right-of-way must be taken out of service during construction, CCTPL would either provide an alternate water supply or develop a mitigation plan with the well owner to offset adverse impacts. CCTPL would conduct pre- and post-construction monitoring at all potable wells within 150 feet of the construction area. If damage to a potable water supply source occurs as a result of construction, CCTPL would provide a temporary water supply and either repair the damaged well or replace it with an equivalent, potable water source.

In areas of shallow groundwater, CCTPL would implement its Procedures for trench dewatering. To minimize impacts from trench dewatering, CCTPL would discharge water from the trench to either a vegetated upland area or a dewatering structure.

Soil compaction from operating heavy equipment, clearing vegetation, and grading may reduce water infiltration through surface soil. The area of disturbance associated with the CCTPL Expansion Project pipelines would be only a small percentage of the total area of groundwater recharge. After the pipelines are constructed, areas cleared within the construction right-of-way and ATWS would be allowed to naturally revegetate to pre-construction conditions. The permanent right-of-way would be maintained with a grass or similar herbaceous cover. Areas outside of the permanent maintained right-of-way would be allowed to revert to pre-construction vegetation cover. Once vegetation cover has been re-established, groundwater recharge and flow are expected to return to pre-construction conditions.

In some areas, soil permeability may be increased within the pipeline trench. This may alter flow patterns of shallow groundwater. Trench breakers would be installed in accordance with the CCTPL Procedures, which would reduce the ability of groundwater to flow along the trench. Most wells extend to depths below shallow groundwater and would not be affected by hydrology changes at trench excavation depth, including wells within the Chicot aquifer.

If an accidental leak or spill of hazardous materials occurs during construction, there may be short-term and/or long-term impacts on groundwater quality. If spilled substances (e.g., gasoline or other fluids from refueling or maintenance of vehicles) are carried by surface water, storm water runoff, or groundwater, then waters outside the work area may be affected. Sabine Pass and CCTPL would use BMPs from their spill plans to minimize the risk of accidental leaks and spills and to address cleanup if they occur during construction or operation.

After considering the characteristics of the underlying aquifers in combination with CCTPL's proposal to co-locate 78 percent of the pipeline expansion project with existing rights-of-way, and the commitment of Sabine Pass and CCTPL to implement the proposed construction, operation, and procedures, we have determined that constructing and operating of the facilities would not significantly alter groundwater or water well supplies including those wells within the sole-source Chicot aquifer.

2.2.1.2 Surface Water

SPLNG Terminal

The SPLE Project would be within the Sabine Lake Watershed (Hydrologic Unit Code 1040201) and along the Sabine Pass Channel. This watershed covers an area of 1,040 square miles in Texas and Louisiana and is part of the larger Galveston Bay-Sabine Lake Watershed. Sabine Pass channel provides a narrow tidal inlet and is the outlet for this bay-estuary system to the Gulf of Mexico. The bay-estuary has a small diurnal tidal range of 1.6 feet. More significant in this area are wind-generated tides, which affect most bay and estuary environments and produce wind-tidal flats and marshes. Sources of fresh water into the bay-estuary system include streams and runoff; municipal, industrial, and agricultural return flow; and direct precipitation. The Sabine and Neches River Basins represent about 85 percent of the total freshwater inflows to the Sabine-Neches Estuary.

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. According to Fisher, et al. (1973), salinities generally range from less than 10 parts per thousand in the upper part of the lake and between 10 and 20 parts per thousand in the tidally influenced lower part. The dynamic hydrologic nature of the estuary results in continuous changes to ambient physio-chemical water parameters.

The LDEQ designated water uses for Sabine Pass Channel as primary contact recreation, secondary contact recreation, fish and wildlife propagation, and oyster production (LDEQ, 2002). The Texas Commission on Environmental Quality (TCEQ) evaluated Sabine Pass Channel in its Water Quality Inventory and found that contact recreation, aquatic life, and general uses are fully supported within the estuary (TCEQ, 2002).

The State of Louisiana has not assessed the designated uses of the Sabine Pass Channel in recent Louisiana Section 305b water quality inventories (LDEQ, 2002). No sensitive surface waters are within the SPLE Project's vicinity.

There would be no direct effects on surface waterbodies from work within the facility footprint at the SPLNG Terminal. The Sabine Pass Channel is an active channel with frequent ship and barge traffic. The existing construction dock at the terminal currently is used for barge deliveries and unloading heavy equipment. Maintenance dredging of the dock area would continue to ensure that water depths are at 17 feet around the dock. This work would be done under an existing USACE Permit (SWG-2004-00465). Construction-related activity would occur within the Sabine Pass Channel as part of construction of facilities at the SPLNG Terminal. Barge traffic to and from the construction dock while transporting construction equipment and supplies would increase during the construction period and would have only temporary effects, which may include suspension of sediment from tug propeller wash or unintentional grounding in the dock area.

Storm water runoff associated with the new facilities at the SPLNG Terminal would be directed to outfalls west and north of Trains 5 and 6. To slow water flow, discharge would pass over riprap before draining into the Sabine Pass Channel. Some of the other areas affected would be graded to move storm water into existing drainages, which also drain into the Sabine Pass Channel. Erosion and storm water runoff associated with construction would be managed in accordance with the FERC Plan and the Sabine Pass Procedures. These measures would include installing temporary erosion control measures immediately after initial disturbance of the soil and using sediment barriers (e.g., silt fence, staked hay or straw bales, sand bags or compacted earth) to avoid impacting Sabine Pass Channel, the inlet to the Channel, and the drainage ditch located at the site.

No additional work would be done to maintain the marine basin at the SPLNG Terminal. Maintenance dredging would occur at the same frequency that currently occurs, about once every 18 to 24 months.

The number of ships traveling to and from the SPLNG Terminal would not increase beyond the number of vessels previously analyzed for the existing terminal. No increase in ballast water discharge is expected. There would also be no increase in the amount of cooling water used while the ships are at the terminal because there would be no change in ship traffic above the number previously analyzed. Therefore, we do not anticipate significant impacts on or modifications of surface water quality due to ship traffic.

CCTPL Pipelines and Aboveground Facilities

The CCTPL pipelines cross seven sub-basins (Sabine Lake, Lower Calcasieu, West Fork Calcasieu, Upper Calcasieu, Whiskey Chitto, Mermentau Headwaters, and Bayou Teche) and 24 sub-watersheds (Louisiana State University Agricultural Center, 2013). The Mamou Compressor Station and the PPEC, ANR, and TGT M&R Stations would be within the Mermentau sub-basin. The CGT M&R Station would be within the Bayou Teche sub-basin.

The waterbodies that would be crossed by or would be along the CCTPL pipelines and aboveground facilities were identified using USGS topographic maps, publicly available aerial photographs, and field surveys completed by CCTPL. The CCTPL Expansion Project would cross 109 waterbodies (see appendix 5). Table 2.2-2 identifies the types of waterbodies that would be affected. There are no wetlands or waterbodies within the proposed compressor or M&R station sites.

A total of 14 HDDs would be used to install the pipeline, crossing under a total of 21 waterbodies. All other waterbody crossings would be completed by open cut or dry-ditch methods.

Nine of the waterbodies that would be crossed by the CCTPL Expansion Project pipelines are considered sensitive surface waters. Six of these waterbodies are considered to be sensitive because they are on the Section 303(d) list, one is a Louisiana and National Rivers Inventory Scenic River, and two are both on the 303(d) list and designated Louisiana and National Rivers Inventory Scenic Rivers (table 2.2-3). The CWA requires that each state prepare a list (known as the 303(d) list) of impaired waters for submission to the EPA every two years. Waterbodies on the 303(d) list are those waterbodies where pollution controls are not enough to reach or maintain water quality standards (EPA, 2012). Reasons for impairment at each of the eight impaired waterbodies are one or more of the following: dissolved oxygen, lead, fecal coliform, mercury in fish tissue, and low pH. Five of the eight impaired waterbodies have more than one cause of impairment. Six of the eight impaired waterbodies would be crossed by HDD. Bayou Blue (MP 120.8), impaired due to lead; and Castor Creek (MP 129.5), impaired due to lead, fecal coliform, and dissolved oxygen, would be crossed by an open cut method.

TABLE 2.2-2

Summary of Waterbodies Crossed by the CCTPL Expansion Project Pipelines

Classification a/	Rivers, Bayous, and Streams			Ponds	Canals or Ditches	Total
	Perennial	Intermittent	Ephemeral			
Major	4	0	0	0	0	4
Intermediate	21	5	2	2	11	**41**
Minor	1	13	29	0	21	**64**
Total	**26**	**18**	**31**	**2**	**32**	**109**

a Major – crossings more than 100 feet wide. All would be crossed using HDD.
Intermediate – crossings between 11 and 100 feet wide.
Minor – crossings 10 feet wide or less.

The three rivers crossed are designated as Louisiana and National Rivers Inventory Scenic Rivers: Barnes Creek (MP 97.1), Whiskey Chitto Creek (MP 109.0), and Calcasieu River (MP 112.4). They would be crossed by an HDD. Whiskey Chitto Creek is also listed on the National Rivers Inventory for its recreational opportunities, including camping, swimming, fishing, and floating opportunities. Site-specific crossing plans have been developed for each crossing. We have reviewed these and find them acceptable.

Constructing the pipeline facilities would have temporary impacts on waterbodies during construction. Operating the CCTPL pipelines would not affect waterbodies. Construction methods for waterbody crossings would vary by crossing. Table 5-1 in appendix 5 lists the proposed methods CCTPL would use to cross each waterbody. Methods include open cut, dam and pump, flume, and HDD. Disturbance of upland areas next to waterbody crossings has the potential to increase erosion in upland areas and sedimentation in surface water. This could result in increased turbidity and sediment loads within the waterbody. Impacts associated with land disturbance would be managed with temporary and permanent erosion control measures developed in accordance with the FERC Plan and the CCTPL Procedures.

In-water activity has the potential to disturb and suspend sediment within a waterbody, which may cause increases in the construction and downstream areas and could temporarily alter or degrade in-stream habitat. Mobile organisms would avoid areas of in-water construction activity. Some less mobile or sessile aquatic organisms may be adversely affected or lost during construction activity. The area and time of disturbance would be limited and conditions would quickly return to their pre-construction state;

therefore, we do not anticipate long-term impacts on water quality or aquatic organisms. In areas with impaired sediments, contaminants could re-suspend in the water column. To minimize environmental impacts on major waterbodies, 14 HDDs would be used for 21 waterbody crossings, including 6 of the waterbodies on the 303(d) list. Use of HDD avoids disturbing a waterbody and thus would not affect water quality or habitat within the waterbody unless there is an inadvertent release of equipment fluids or drilling mud. CCTPL has developed an HDD Contingency Plan (see appendix 2) that would be implemented in the event of an inadvertent release. We have reviewed the HDD Contingency Plan and find it acceptable. The remaining two waterbodies (Bayou Blue and Castor Creek) on the 303(d) list would be crossed using an open cut. The source of contamination in these two creeks is not the result of contaminated sediment and no additional mitigation measures would be required by the LDEQ.

TABLE 2.2-3

Summary of Sensitive Surface Waters

Waterbody Name	Milepost	303(d) List	Crossing Method
Houston River	73.4	X	HDD
Little River	77.5	X	HDD
West Fork Calcasieu River	81.2	X	HDD
Indian Bayou	86.9	X	HDD
Barnes Creek **a/**	97.1	X	HDD
Whiskey Chitto Creek **a/**	109.0		HDD
Calcasieu River **a/**	112.4	X	HDD
Bayou Blue	120.8	X	Open cut
Castor Creek	129.5	X	Open cut

a Louisiana and National Rivers Inventory Scenic River

To avoid and minimize effects on waterbodies, CCTPL would use the measures contained in its Procedures. This includes implementing CCTPL's erosion and sediment control plan, the SPRP Plan, and all other project-specific plans as well as all applicable federal and state permit requirements. These measures include:

- using HDD for sensitive waterbodies;
- scheduling trench excavation within the waterbody to as close to pipe laying as possible;
- completing construction across minor perennial waterbodies (less than 10 feet wide) in 24 hours and across intermittent waterbodies within 48 hours;
- stockpiling spoil at least 10 feet from the water's edge or in an approved ATWS and surrounding the stockpile with sediment-control devices;
- maintaining a 50-foot buffer around stream banks for ATWS where feasible; and
- restoring stream banks to as near pre-construction conditions as possible following open cut crossings.

Sabine Pass and CCTPL proposed several alternative measures to the FERC's Procedures. Table 2.2-4 provides a general overview of the alternative measures. CCTPL has identified several areas where site-specific conditions necessitate these alternative measures, which are provided by milepost in appendix 2, tables 1, 2, and 3. We have reviewed these locations and conclude that they are justified for the construction of the Projects.

TABLE 2.2-4

Sabine Pass and CCTPL's Requests for Modifications from FERC Staff's Procedures for Waterbody and Wetlands

Section	Modification Request	Conclusion
I.B.1.d	Include the definition that "ditches" are primarily man-made drainage features that include agricultural ditches and canals in fields and pastures and roadside drainage ditches. Ditches are not considered part of stream systems mapped in the USGS hydrographic database and are not intermittent or perennial stream systems or channelized portions of these stream systems. As such, they typically do not fall under the jurisdiction of the USACE. Ditches are temporary in nature and are used to facilitate agriculture practices.	We conclude that this is reasonable.
V.B.2.b	Locate extra work areas within 50 feet of a waterbody in site-specific locations. CCTPL would implement all applicable protection measures, e.g., installation of silt fencing and hay bales along extra work area limits to prevent off-site sedimentation, and any other measures appropriate for stabilizing the ATWS during and after construction.	We conclude that this is reasonable.
VI.A.2	Install the loops at a greater than 25-foot offset from the existing pipeline for Loop 1 and Loop 2 due to the diameter of the pipeline (42 inches) at site-specific locations and the unconsolidated soils found in the CCTPL Expansion Project area.	We conclude that this is reasonable.
VI.A.3	Use a construction right-of-way wider than 75 feet within the boundaries of a wetland due to the installation of a large diameter pipeline (42 inches). The size of the equipment and the soil conditions require a wider trench to manage potential slumping of soil.	We conclude that this is reasonable.
VI.B.1.a	Locate extra work areas within 50 feet from the wetland edge or within the wetland at site-specific locations.	We conclude that this is reasonable.

Based on the characteristics of the waterbodies that would be crossed by the pipeline facilities, CCTPL's commitment to implement its proposed waterbody crossing methods and additional minimization procedures, we have determined that constructing and operating of the pipeline facilities would not significantly affect surface waters.

2.2.1.3 Hydrostatic Testing

SPLNG Terminal

Sabine Pass would have the LNG piping at the SPLNG Terminal tested to ensure structural integrity before the facility is placed into service. Hydrostatic testing would be completed on non-cryogenic piping, and pneumatic testing would be completed on cryogenic piping. Hydrostatic test water would be withdrawn from surface water sources. Surface water withdrawals would be conducted in accordance with its Procedures to maintain sufficient downstream flow for aquatic life and existing downstream water uses and withdrawals. All withdrawals would also comply with the conditions of any applicable permits. No chemicals would be added to the hydrostatic test water during testing. After hydrostatic testing is complete, test water would be discharged into an on-site vegetated area in accordance with LDEQ permit conditions. Impacts from hydrostatic testing at the SPLNG Terminal would be negligible and temporary.

CCTPL Pipelines and Aboveground Facilities

CCTPL would have the CCTPL pipelines and associated aboveground facilities hydrostatically tested to ensure that the pipeline could be safely operated at design pressure. The source and volume of all withdrawals of hydrostatic test water is provided in appendix 5, table 5-2. Surface water would be withdrawn through a screened intake to prevent fish and other aquatic organisms from being collected with hydrostatic test water. CCTPL would ensure that surface water withdrawal rates would allow sufficient flow so that downstream aquatic life and water uses are not adversely affected. After each segment of pipe is tested, test water would either be pumped to the next segment or discharged in accordance with LDEQ permit conditions and project-specific plans and procedures. Erosion-control measures may include discharge to energy dissipation structures constructed of straw bales, filter bags, and splash blocks to minimize erosion and sedimentation. With the implementation of the above-mentioned BMPs, impacts from hydrostatic testing of the CCTPL Expansion Project would be negligible and temporary.

2.2.1.4 Floodplain Management

Executive Order (EO) 11988: Floodplain Management, issued on May 24, 1977, requires federal agencies to avoid adverse effects on the 100-year floodplain, when possible. Growth and development within the floodplain should not be encouraged, unless there are no alternatives, and functions and habitat associated with floodplains should be protected.

EO 11988 defines floodplains as "the lowland and relatively flat areas adjoining inland and coastal waters, flood prone areas of offshore islands that, at a minimum, are subject to a one percent or greater chance of flooding in any given year." In other words, the 100-year floodplain is an area with a one percent chance of meeting or exceeding the base flood elevation in a given year.

SPLNG Terminal

About 41 percent (343 acres) of the existing SPLNG Terminal is in the mapped 100-year floodplain (FEMA, 2014). Work at the SPLNG Terminal associated with the SPLE Project would not be within the mapped 100-year floodplain. Development of liquefaction trains 5 and 6 would occur northeast of the existing LNG tanks at the site. Some of the workspace and operational area affected by the SPLE Project would extend to areas next to the 100-year floodplain but would remain outside of it. During construction, Sabine Pass would use and maintain appropriate erosion and sedimentation measures to prevent the movement of disturbed materials off construction workspaces. As described in section 2.2.1.2, design of the facilities includes storm water management measures to control runoff, erosion, and sedimentation during operation. These measures would minimize impacts on floodplains. We conclude that construction and operation of the SPLE Project would comply with EO 11988.

CCTPL Pipelines and Aboveground Facilities

Based on existing FEMA maps (FEMA, 2014), about 53 percent of the CCTPL pipelines would be within the 100-year floodplain. During construction, CCTPL would use and maintain appropriate erosion and sedimentation measures to prevent the movement of disturbed materials off construction workspaces. The pipelines would be installed underground and the disturbed soil in construction workspaces would be restored to pre-construction or similar grades, which would maintain existing flood storage capacity. No change to the 100-year floodplain is expected as a result of construction or operation of the CCTPL pipelines.

The Mamou Compressor Station and the M&R stations would be outside the mapped 100-year floodplain (FEMA, 2014). As described in section 2.2.1.2 above, design of the facilities includes storm water management measures; therefore, storm water runoff would not alter the floodplain. We conclude that construction and operation of the CCTPL Expansion Project would comply with EO 11988.

2.2.2 Fisheries and Essential Fish Habitat

2.2.2.1 Fisheries

SPLNG Terminal

There are no waterbodies within the existing SPLNG Terminal, although the terminal is adjacent to the Sabine Pass Channel. The channel is classified as a warmwater marine or estuarine waterbody. Species common in the Sabine Pass Channel include Gulf menhaden (*Brevoortia patronus*), killifishes (*Fundulus* spp.), sheepshead minnow (*Cyprinodon variegatus*), mosquitofish (*Gambusia affinis*), silversides (*Menidia beryllina*), striped mullet (*Mugil cephalus*), Atlantic croaker (*Micropogonius undulatus*), spot (*Leiostomus xanthurus*), hardhead catfish (*Arius felis*), North American silver perch (*Bairdiella chrysora*), hogchoker (*Trinectes maculatus*), puffer (*Sphoeroides parvus*), ladyfish (*Elops saurus*), and various shrimp and crab species. Coastal pelagic marine species may also be found in Sabine Pass Channel. These include the following families of fish: requiem sharks (*Carcharhinidae*), ladyfish (*Elopidae*), anchovies (*Engraulidae*), herrings (*Clupeidae*), mackerels and tunas (*Scombridae*), jacks and scads (*Carangidae*), bluefish (*Pomatomidae*), and cobia (*Rachycentridae*). Coastal pelagic species traverse shelf waters of the region throughout the year. Some species form large schools, e.g., Spanish mackerel (*Scomberomorus maculatus*), while others travel singly or in smaller groups, e.g., cobia. Dominant benthic species that support fisheries in the area include gastropods such as oyster drill (*Thais haemastoma*) and moon snail (*Lunatia lewisii*), and decapod crustaceans such as hermit crabs (*Clibanarius vittatus*), mud crabs (*Rhithropanopeus harrisii*, *Neopanope texana*, and *Panopeus herbstii*) and blue crab (*Callinectes sapidus*). Sessile invertebrates that are likely to be found in the area on hard surfaces (e.g., pilings, rock jetties, and other structures) include sea pansy (*Renilla mulleri*) and acorn barnacles (*Balanus* sp.) (Hoese and Moore, 1977).

There would be no in-water impacts associated with the SPLNG Terminal that are specific to the SPLE Project. There would be no direct effects on surface waterbodies from work within the facility footprint at the SPLNG Terminal. However, routine maintenance dredging would continue in the Sabine Pass Channel as needed and under an existing USACE Permit (SWG-2004-00465). The Sabine Pass Channel is an active channel with frequent ship and barge traffic. Currently, there is a construction dock area that is used for barge deliveries and unloading heavy equipment. Maintenance dredging of the dock area currently occurs and will continue to ensure that water depths are at 17 feet around the dock. This work will occur even without approval and construction of the SPLE Project. A temporary increase in barge traffic to and from the construction dock would be associated with the transportation of construction equipment and supplies. Barge traffic would occur primarily during the construction period and would have only temporary effects, which may include suspension of sediment from tug propeller wash or unintentional groundings in the dock area. While barge traffic may temporarily increase disturbance to the water column and disturb sediment in the vicinity of the construction dock, these impacts are consistent with the active shipping area.

No additional work would be done to maintain the marine basin at the SPLNG Terminal as a result of construction and operation of the SPLE Project, and routine maintenance dredging would continue.

The number of LNG ships traveling to and from the SPLNG Terminal would not increase beyond 400, the analyzed number of vessels. No increase in ballast water discharge is expected. There would also be no increase in the amount of cooling water used while the ships are at the terminal beyond the amount currently evaluated. There would be no impacts on fisheries from operation of the new facilities. There would be no effect on fisheries as a result of work at the SPLNG Terminal as part of this Project.

As described in section 2.2.1.3, the LNG piping at the SPLNG Terminal would be tested to ensure structural integrity before the facility is placed into service. Hydrostatic test water would be withdrawn from surface water sources in accordance with CCTPL's Procedures. After testing, hydrostatic test water would be discharged in accordance with LDEQ permit conditions and CCTPL's Procedures. Impacts associated with hydrostatic testing are expected to be temporary and negligible.

Based on the characteristics of the identified fisheries, our review of hydrostatic test water withdrawal and discharge methods, and implementation of impact minimization methods, we have determined that constructing and operating the SPLNG Terminal would not significantly affect fisheries.

CCTPL Pipelines and Aboveground Facilities

Loop 1 of the CCTPL pipelines would cross warmwater, estuarine fisheries. The remaining portions of the CCTPL pipelines would cross warmwater, freshwater fisheries. Species found in the warmwater estuarine areas are similar to those described above for the Sabine Pass Channel. Families of freshwater fish that may be found in the freshwater waterbodies include gars (*Lepisosteidae*), bowfins (*Amiidae*), catfishes (*Ictaluridae*), freshwater eels (*Anguillidae*), minnows and carp (*Cyprinidae*), and sunfishes, basses, and crappies (*Centrarchidae*) (Gosselink et al., 1979).

For most waterbody crossings, CCTPL would use the open cut crossing method, which has the potential to impact fisheries. As described in section 2.2.1, short-term, temporary impacts on waterbodies could result by temporarily increasing the suspended solids (turbidity) in the water column during active in-stream work. Standard open-cut techniques may temporarily cause elevated concentrations of suspended solids over short distances downstream of the crossing. Temporary increases in suspended sediment concentrations may increase invertebrate drift, impair fish feeding activities, and lead to sediment deposition in downstream habitats. Turbidity associated with the suspension of sediments during in-stream construction has the potential to reduce light penetration and photosynthetic oxygen production. Re-suspension of organic and inorganic materials may result in an increase in biochemical oxygen demand. This would cause a decrease in dissolved oxygen, which could subsequently temporarily displace aquatic species from the affected area.

Per the CCTPL Procedures, in-stream work would be completed within 24 hours for minor perennial waterbodies and within 48 hours for minor intermittent/ephemeral waterbodies and all intermediate waterbodies. Turbidity and dissolved oxygen would return to background levels soon after construction is completed. Decreases in dissolved oxygen concentrations or other impacts on water quality would be restricted to the construction period at the waterbody crossing. Effects on water quality (i.e., temperature, pH, and dissolved oxygen, etc.), benthic invertebrate communities, or fish populations resulting from construction would be temporary and similar to those that occur naturally during storm conditions. Once disturbed areas are restored, no long-term effects are expected as a result of operation of the CCTPL Expansion Project pipelines. CCTPL would implement the FERC Plan and the CCTPL Procedures to minimize construction-related impacts on fisheries. Further, CCTPL would use the HDD method to cross major waterbodies and/or sensitive environmental features, which would minimize impacts on the waterbodies and the surrounding vegetation.

CCTPL would cross some waterbodies by HDD (see sections 1.6.1 and 2.2.1.2 and appendix 5, table 5-1). In these locations there would be no impact on fisheries along the paths of the HDD, and if an inadvertent release of drilling mud were to occur, CCTPL would follow its HDD Contingency Plan (see appendix 2).

As described in section 2.2.1.3, the CCTPL pipelines would be hydrostatically tested to ensure that the pipeline can be safely operated at design pressure. Hydrostatic test water would be withdrawn from surface water sources in accordance with the FERC Plan and CCTPL's Procedures. After each section of pipe is tested, hydrostatic test water would be moved to the next pipe section to be tested or discharged in accordance with LDEQ permit conditions and CCTPL's Procedures. Erosion-control measures may include discharge to energy dissipation structures constructed of straw bales, filter bags, and splash blocks to minimize erosion and sedimentation. With the implementation of BMPs, impacts from hydrostatic testing are expected to be negligible and temporary.

Based on the characteristics of the identified fisheries, our review of CCTPL's proposed waterbody crossings methods, hydrostatic test water withdrawal and discharge methods, and CCTPL's commitment to its implementation of impact minimization methods, we have determined that constructing and operating of the CCTPL Expansion Project would not significantly affect fisheries.

2.2.2.2 Essential Fish Habitat

Essential fish habitat (EFH) is designated by the Magnuson-Stevens Fishery Conservation and Management Act. It is defined as "waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." Specific EFH includes all estuarine water and substrate (mud, sand, shell and rock), sub-tidal vegetation (seagrasses and algae), and the adjacent inter-tidal vegetation (marshes and mangroves).

SPLNG Terminal

EFH is found in areas around the SPLNG Terminal. All work proposed for Sabine Pass Channel (e.g., maintenance dredging) would be done whether or not the SPLE Project is constructed and operated. Therefore, we do not anticipate any new impacts on EFH associated with the SPLE Project.

CCTPL Pipelines and Aboveground Facilities

Loop 1 is the only portion of the CCTPL Expansion Project that crosses EFH. EFH within the vicinity of Loop 1 is found between MPs 1.8 and 6.2. EFH in this area consists of tidally influenced marsh (estuarine emergent wetlands), submerged aquatic vegetation, tidally influenced waters (estuarine water column), and tidally influenced water bottoms (estuarine mud bottoms). These habitats have been designated by NOAA, National Marine Fisheries Service, Office of Sustainable Fisheries (NOAA Fisheries), as EFH for larval, juvenile, and sub-adult life stages of brown shrimp, white shrimp, and red drum. Seasonal relative abundance for each of these species is provided in table 2.2-5.

From April through July, juvenile brown shrimp (*Penaeus aztecus*) are abundant in the region. Postlarvae and juveniles are found in highest density within marsh edge habitat and submerged aquatic vegetation. They are also found in tidal creeks, inner marsh, shallow open water, and oyster reefs. Juvenile and sub-adult brown shrimp are found from secondary estuarine channels out to the continental shelf, but are more commonly found in shallow estuarine areas, such as soft, muddy areas associated with the plant-water interface (Gulf of Mexico Fishery Management Council [GMFMC], 1998).

Juvenile white shrimp (*Litopenaeus setiferus*) are the most abundant lifestage in the region and are most abundant between April and July. After the larval stage, white shrimp move into estuaries where they are found in shallow areas with sand-mud bottoms with organic detritus. As they develop, juvenile white shrimp move into estuarine mud habitats or peat bottoms with decaying organic matter or vegetation cover. As adults, white shrimp move from estuaries to coastal areas (GMFMC, 1998).

TABLE 2.2-5

Relative Abundance of EFH-Designated Species within the Cameron Parish Project Areas

Species	Life Stage b/	Relative Abundance a/			
		Low Salinity (March-May)	Increasing Salinity (June-July)	High Salinity (August-October)	Decreasing Salinity (November-February)
Brown Shrimp	Adult	C	C	C	C
	Juvenile	A	A	A	C
White Shrimp	Adult	C	A	HA	HA
	Juvenile	HA	HA	HA	HA
Red Drum	Adult	R	R	R	R
	Juvenile	R	R	R	NP

a Relative abundance provided for salinity seasons as provided by Gulf of Mexico Fishery Management Council (2003)EFH maps and as determined as the highest monthly relative abundance value in the Estuarine Living Marine Resources database (http://www8.nos.noaa.gov/biogeo_public/elmr.aspx) for that salinity season.

b Life stages for which EFH is mapped include only adults and juveniles.

R=Rare, C=Common, A=Abundant, HA=Highly Abundant, NP=Not Present

Red drum (*Sciaenops ocellatus*) are found in a wide range of coastal and open water habitats, from shallow estuarine areas to estuarine or marine areas 40 meters deep. Juvenile red drum are more common in shallower, estuarine areas and are common near the projects. Juveniles use a range of estuarine habitats, including those with mud and sand bottoms. Spawning typically occurs in deeper areas near the mouths of bays and inlets (Pearson, 1929). Larval red drum enter emergent wetlands that serve as nursery areas until red drum mature and move back to more open waters in the Gulf of Mexico.

Federal agencies are required to consult with NOAA Fisheries regarding EFH for all activities that they permit, fund, or undertake that may have an adverse effect on designated EFH. The EFH rules define an adverse effect as “any impact which reduces quality and/or quantity of EFH . . . [and] may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species’ fecundity), site-specific, or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.”

Potential effects on EFH would be localized, temporary, and would affect a very small area of the Sabine Lake marsh complex. Impacts on EFH would be the same as those described for fisheries and surface water in sections 2.2.2.1 and 2.2.1.2. Sabine Pass and CCTPL would implement BMPs during construction and restoration to minimize impacts on estuarine and freshwater wetlands (see section 2.2.3). BMPs include the following:

- restoring crossing areas;
- restricting the number of tracked equipment passes over wetlands;
- backfilling the pipeline trench to marsh elevations; and
- monitoring the success of wetland revegetation annually for the first three years after construction or until wetland revegetation is successful, and replanting marsh vegetation in areas where wetland vegetation does not reestablish.

In an email to the Applicants on May 2, 2013, NOAA Fisheries indicated that it would agree with a "no effect determination" if the aforementioned measures are implemented. We concur.

2.2.3 Wetlands

Wetlands are areas that are inundated or saturated for a sufficient duration or frequency to provide hydrologic and soil conditions conducive to a specialized assemblage of plant species. Wetlands provide valuable natural services, including flood control, water filtration, wildlife habitat, and outdoor recreational opportunities.

After reviewing USFWS National Wetlands Inventory maps, Sabine Pass and CCTPL conducted field surveys using methods set forth within the 1987 USACE Wetland Delineation Manual and the Regional Supplement (November 2010) to locate and delineate wetlands within the project areas. These wetlands were described using the Cowardin classification system (Cowardin et al., 1979).

SPLNG Terminal

Wetlands within the SPLNG Terminal site were delineated for other FERC-approved projects previously and are under an active USACE jurisdictional verification. Within the SPLNG Terminal site, the SPLE Project would permanently affect 153.5 acres of emergent wetlands. This includes 110.58 acres in Mitigation Area C, which were previously set aside as mitigation for wetlands affected by the existing SPLNG Terminal facilities. The remaining 42.95 acres of permanently affected wetland are part of applicant-designated Wetland 17.

Sabine Pass is proposing mitigation for all permanent wetland impacts on the SPLNG Terminal site. Because there would be no space available for on-site mitigation and there are currently no credits available from wetland banks within the watershed, Sabine Pass would develop appropriate mitigation areas on other properties in coordination with the USACE. To ensure these impacts on wetlands associated with the SPLE Project are taken into consideration, **we recommend that:**

- **<u>prior to beginning construction at the SPLE Terminal</u>, Sabine Pass file with the Secretary the USACE-approved wetland mitigation plan and associated correspondence.**

CCTPL Pipelines and Aboveground Facilities

The CCTPL Expansion Project would cross 290 wetlands, including 5 estuarine intertidal emergent wetlands, 154 palustrine emergent wetlands, 71 palustrine scrub-shrub wetlands, and 60 palustrine forested wetlands. Table 2.2-6 provides a summary of the wetlands affected.

Construction of the CCTPL facilities would result in temporary and permanent impacts on about 276.64 acres of wetlands. Of these 276.64 acres, about 17.27 acres represent permanent conversion of forested wetlands to emergent wetlands, with the remaining acres being temporary impacts on emergent and scrub-shrub wetlands. Impacts on some of these wetland areas would be avoided by using HDD. Temporary impacts during construction would result in temporary loss of wetland vegetation, associated habitat, and function. The disturbance of wetland soils and the increased erosion and sedimentation potentials could affect the natural restoration of wetland vegetation and hydrologic conditions.

TABLE 2.2-6						
Wetlands Affected by the CCTPL Expansion Project Pipelines						
		Acres Affected				
Wetland Type	**Total Length Crossed by Pipeline (miles)**	**Construction Right-of-Way**	**Permanent Right-of-Way**	**ATWS**	**Total Area Impacted by Construction**	**Total Palustrine Forested Conversion**
Estuarine Intertidal Emergent	5.97	50.45	36.26	2.75	89.46	0
Palustrine Emergent	7.84	61.12	42.93	2.52	106.57	0
Palustrine Scrub-shrub	3.55	27.08	19.45	1.88	48.41	0
Palustrine Forested a/	4.43	13.34	17.27	1.59	32.20	17.27
Total	**21.79**	**151.99**	**115.91**	**8.74**	**276.64**	**17.27**

a Forested wetlands include some cypress-tupelo within stands of hardwoods. All of the cypress-tupelo wetlands would be crossed via HDD.

Construction impacts are considered temporary due to the natural restoration of wetland habitat over time. Emergent and scrub-shrub wetlands would return to pre-construction conditions over several growing seasons. Permanent conversion of forested wetlands to emergent wetlands would cause the loss of forested vegetation and the associated habitat and function. However, the restoration of emergent wetland conditions in these areas following construction would retain some of the original function and habitat.

CCTPL would minimize impacts on wetlands from construction and operation of the CCTPL Expansion Project by implementing its Procedures, which include the following measures:

- segregating the top foot of topsoil where hydrologic conditions permit;
- limiting fuel storage to at least 100 feet away from all wetlands;
- preventing mixing wetland topsoil and subsoil by using low ground pressure equipment or temporary equipment mats where necessary;
- preserving vegetated buffer zone between wetlands and upland construction areas, where possible;
- properly using and maintaining erosion control measures such as silt fences, interceptor dikes, and straw bale structures;
- installing trench plugs where needed to prevent unintentionally draining wetlands; and
- using a push/pull wetland construction technique in large, highly inundated wetlands, which would significantly limit wetland impacts by reducing equipment impacts and required clearing.

In addition, the USACE may require that additional impact minimization measures be implemented and that unavoidable wetland impacts be mitigated. Following construction and restoration of disturbed areas, CCTPL would monitor revegetation progress according to the CCTPL Procedures or as required by permitting agencies. Unless otherwise required, wetland revegetation would be considered complete when 80 percent coverage of native vegetation matches conditions in adjacent undisturbed wetlands.

Two wetland mitigation banks would be crossed by the Extension between MPs 99.0 and 100.42: Clear Creek Mitigation Bank and Calcasieu Mitigation Bank. The Extension would parallel an existing Texas Eastern Transmission, LP pipeline right-of-way while crossing these mitigation banks. The area crossed includes 1.0 mile of open land and 0.42 mile of forested land. The total length of the Clear Creek Mitigation Bank crossing would be about 0.95 mile and the Calcasieu Mitigation Bank Crossing would be about 0.47 mile. Because CCTPL has not completed its permitting process with the USACE, **we recommend that:**

- **<u>prior to beginning construction of the Extension between MPs 99 and 100</u>, CCTPL file with the Secretary documentation of approval from the mitigation bank owners and the USACE authorizing crossing of the Clear Creek Mitigation Bank and Calcasieu Mitigation Bank.**

Thirteen mitigation banks with credits are available for purchase in the watersheds that would be crossed by the CCTPL Expansion Project, and two additional banks are expected to have credits available in 2014. Credits from these sites may be purchased along with other mitigation options for any USACE-required mitigation. Wetland mitigation details would be established through coordination with the USACE and the development of the wetland mitigation plan. To ensure impacts on wetlands are mitigated properly for the CCTPL Expansion Project, **we recommend that:**

- **<u>prior to beginning construction of the pipelines</u>, CCTPL file with the Secretary a USACE-approved wetland mitigation plan and associated correspondence.**

2.3 Vegetation and Wildlife

The expansion of the SPLNG Terminal would result in disturbing about 401.15 acres, of which about 156.3 acres would be in previously undisturbed areas of the site and would be permanently converted to industrial use. The CCTPL pipelines would temporarily disturb 1,696.46 acres of land, with about 629.57 acres maintained for operation of the pipeline. The degree of impact on vegetation would depend on the type of vegetation affected, the rate at which vegetation would regenerate after construction, and the area and frequency of vegetation maintenance needed during operation. The Projects would temporarily affect a total of 2,097.61 acres during construction, with 785.87 acres affected during operation.

2.3.1 Vegetation

The Projects would be constructed and operated in areas with upland forests and open lands; forested, scrub-shrub, and emergent wetlands; and agricultural lands. The Louisiana Department of Wildlife and Fisheries (LDWF) has identified seven unique community types that could be in the project area (see table 2.3-1) (LDWF 2013a, 2013b).

Because of the potential for these unique community types to be in the project area, Sabine Pass and CCTPL conducted field surveys from April 2013 to August 2013. These surveys indicated that the Projects would not cross any of these unique community types. In addition to these community types, several agricultural communities could be in the vicinity of the SPLNG Terminal and/or the CCTPL pipelines. These include pine plantations, pasture lands, and agricultural fields. Pine plantations are dominated by loblolly pine (*Pinus taeda*) and are exclusively used for timber production. They typically exhibit a varied understory and ground cover, depending on the native habitat that was in the area before conversion to agricultural uses and on the frequency of maintenance activities. Pasture lands are open fields that have maintained their natural herbaceous vegetation cover or have been seeded for grazing animals or hay production. Agricultural fields are used for crop production such as cotton, rice, soybeans, and corn, and also for crawfish harvesting.

TABLE 2.3-1

Natural Communities Potentially Crossed by Project Facilities

Community	Parish	Description	Representative Vegetation
Coastal Dune Grassland	Cameron	• Occurs on beach dunes and elevated backshore areas • Elevated above highest flood mark • Xeric	Wire grass, sea oats, beach panic, purple sandgrass, jointgrass, seacoast bluestem, salt grass, broomsedges, salt wort, beach morning glory, sand wild bean, seaside goldenrod, large leaf pennywort, sea purselane, lazy daisy, butterfly pea
Coastal Live Oak-Hackberry Forest	Cameron	• Abandoned beach ridges via deltaic sedimentation • Composed of sand and shell • Typically 4 to 5 feet above sea level	Live oak and hackberry dominate canopy, swamp red maple, sweetgum, water oak, green ash, American elm, dwarf palmetto, prickly pear cactus
Coastal Prairie	Allen, Calcasieu, and Cameron	• Underlain by impervious clay that prevents downward flow of water • Demarcation between forest and grassland is sharp	Brownseed paspalum, little bluestem, big bluestem, broomsedges, wire grass, switchgrass, Indian grass, sedges, umbrella sedges, beaked sedges, nut-rushes, Indian plantain, milkweeds, blue star, brown-eyed Susans, false foxgloves
Flatwoods Pond	Allen, Beauregard, and Calcasieu	• Small, natural depressional wetlands within flatwoods/ savannahs • Generally treeless	Bushy beardgrass, tickseed, spikerush, pipewort, beakrushes, St. John's wort, swtichgrass, bluestar, warty sedge, rosemallow, soft rush, arrowhead
Western Acidic Longleaf Pine Savannah	Allen, Beauregard, and Calcasieu	• Herb-dominated wetlands • Sparse longleaf pine	Longleaf pine, slash pine, sweet bay magnolia, live oak, St. John's worts, broomsedges, little bluestem, jointgrasses, beakrushes, pipeworts, pitcher plants, bog thistle, milkworts, club mosses, sphagnum moss
Western Upland Longleaf Pine Forest	Allen and Beauregard	• Dominated by longleaf pine • Hilly uplands with acidic soils	Longleaf pine, southern red oak, black hickory, sassafras, shortleaf pine, black gum, dogwood, blackberry, winter honeysuckle, huckleberry, greenbriers, broomsedges, bluestems, crab grasses, goldenrods, mildweeds, wild petunias, sunflowers, bracken fern
Western Xeric Sandhill Woodland	Allen	• Nutrient-poor soils that quickly dry • Tree stunting	Shortleaf pine, upland laurel oak, loblolly pine, dwarf paw-paw, winter huckleberry, yaupon, witch-hazel, prickly-pear cactus, milkweeds, broomsedges, bull-nettles, wild buckwheats

Non-agricultural lands that may be crossed include upland forest, upland open land, wetlands (PEM, PSS, and PFO), and open water (see Section 2.2.1, Water Resources, and Section 2.4, Land Use, Recreation, and Visual Resources). Upland forest habitats grow on unsaturated soils and can include selectively cut forest communities, mostly comprising loblolly pine (*Pinus taeda*) interspersed with longleaf pine (*P. palustris*). Upland open land consists of herbaceous communities such as native grasslands, unimproved pastures, and maintained rights-of-way that support a dominance of grass species.

SPLNG Terminal

Construction of Trains 5 and 6 on the SPLNG Terminal site would affect about 401.15 acres of land. This land consists of previously disturbed industrial land (233.38 acres), existing site roads (11.47 acres), and 156.3 acres of open land previously used as a DMPA. In the DMPA, 153.53 acres have been classified as emergent wetland and would be permanently converted to industrial use for the construction and operation of the Train 4 and 5 liquefaction facilities. Sabine Pass would compensate for the 153.53 acres of DMPA wetland impacts for the SPLE Project through off-site, permittee-responsible mitigation within Cameron Parish, Louisiana, under the terms of the USACE Section 404 permit and LDNR Coastal Use Permit.

CCTPL Pipelines and Aboveground Facilities

CCTPL's construction of the pipelines and associated aboveground facilities would affect a total of 1,696.5 acres, 629.6 acres of which would be maintained for operation of the CCTPL Expansion Project. Possible long-term impacts include the permanent alteration of the vegetation cover at the aboveground facilities and along forested areas of the permanent right-of-way. Possible temporary impacts would include alteration of vegetation along the temporary construction right-of-way and any ATWS.

About 455.3 acres of forested land (including forested uplands, forested wetlands, and pine plantations) would be affected during construction, and about 275.82 acres would be allowed to revert back to forest. Clearing forested areas would result in limited habitat alteration and fragmentation. To minimize potential impacts, CCTPL would construct the pipeline parallel to existing pipeline rights-of-way or other linear infrastructure (i.e., publically maintained roads) where possible. Additionally, a variable construction right-of-way would be used (from 85-feet-wide in wetlands to 180-feet-wide in upland areas) depending on land use/land cover and site-specific conditions. Justification of these construction right-of-way widths is provided in the CCTPL Procedures (see appendix 2, table 2). Section 2.2.1, Water Resources, addresses impacts on wetlands and the mitigation measures that would be used.

About 776.7 acres of open and scrub-shrub lands would be affected during construction of the pipeline and aboveground facilities. About 48.4 acres would be palustrine scrub-shrub wetlands and 196.0 acres would be estuarine intertidal emergent and palustrine emergent wetlands (see table 2.2-6 above). Following installation of the pipeline, open lands would be allowed to revegetate, and scrub-shrub lands in the permanent right-of-way would be maintained as herbaceous cover. About 2.14 acres of open land and 0.05 acre of scrub-shrub land would be permanently converted to industrial use for the operation of the PPEC M&R Station and mainline valves (MLVs); following construction there would be minor changes to vegetation in scrub-shrub lands as a result of constructing the pipelines and the remaining open lands would be allowed to revert back to their pre-construction state (see table 2.3-1 above). An additional 349.57 acres of agricultural land would be affected during construction of the CCTPL pipelines, and all agricultural land would be returned to cultivation following construction of the CCTPL Expansion Project except for the 40 acres that would be permanently converted to industrial use for the Mamou Compressor Station and two MLVs. A total of 119.1 acres of agricultural land would be in the permanent right-of-way but would continue to be used for agriculture during operation.

Following construction, CCTPL would maintain a 50-foot-wide permanent right-of-way, except on Loop 2, where the existing 50-foot-wide easement would be expanded by 35 feet. Revegetation of the construction right-of-way and ATWS would be in accordance with FERC's Plan and recommendations from regional offices of the NRCS, other agencies, or landowners. Generally, the non-agricultural areas would be seeded with mixes favorable to wildlife and then allowed to revegetate through natural succession. During pipeline operation, routine clearing of the right-of-way would occur no more than once every 3 years. By paralleling existing rights-of-way and infrastructure, allowing for revegetation where possible, and adhering to construction protocols, we conclude that construction and operation of the CCTPL Expansion Project would not have significant impacts on vegetation.

Noxious Weeds and Other Invasive Plant Species

Invasive species are unwanted species that display rapid growth and spread, becoming established over large areas. Invasive plant species can change natural vegetation communities, reducing the quality of habitat for wildlife and native plant species. The Chinese tallow tree (*Triadica sebifera*) is the most pervasive species found along the proposed rights-of-way in wetlands.

During restoration, CCTPL would implement appropriate removal/control techniques for nuisance species that are found to occur in greater densities than in adjacent undisturbed areas. Additionally, CCTPL would implement additional measures to minimize the spread of the Chinese tallow tree. These measures would include installing sediment/erosion control devices at the base of slopes leading to wetlands, expediting construction in and around wetlands and limiting equipment and construction activities, using equipment (e.g., balloon-tires, timber mats) that would minimize soil surface disturbance, segregating topsoil from the subsoil, and monitoring the right-of-way for 3 to 5 years following restoration.

Based on this information and the proposed actions, we conclude that the spread of noxious and invasive weeds would be minimized to the extent practicable.

2.3.2 Wildlife

As noted above, the project areas consist of forested, open, and agricultural lands; emergent, scrub-shrub, and forested wetlands; and open water aquatic habitats. Common wildlife species inhabiting these areas include, but are not limited to, white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), Virginia opossum (*Didelphis virginiana*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), common muskrat (*Ondatra zibethicus*), brown thrasher (*Toxostoma rufum*), hairy woodpecker (*Picoides villosus*), Cooper's hawk (*Accipiter cooperii*), sparrows (*Passeridae* spp.), red-winged blackbirds (*Agelaius phoeniceus*), cattle and great egrets (*Bubulcus ibis* and *Ardea alba*), cricket frogs (*Acris* spp.), spring peepers (*Pseudacris crucifer*), cottonmouth water moccasin (*Agkistrodon piscivorus*), and Eastern diamondback snakes (*Crotalus adamanteus*). Through consultation with the LDWF and the USFWS, it was determined that no sensitive wildlife habitats, including state wildlife management areas, federal wildlife refuges, and bird nesting colonies, would be impacted by construction of the Project, although two wildlife management areas in Louisiana are located within a 10-mile radius of the Projects (LDWF, 2013b; USFWS, 2013a).

SPLNG Terminal

Impacts from construction of the SPLE Project on wildlife species would be temporary and considered not significant because construction would occur within the existing disturbed SPLNG Terminal site, an industrial site. Mobile wildlife species would be temporarily displaced from the construction workspace to surrounding habitats nearby, and some would return to the newly disturbed area after construction. Due to the abundance of suitable habitat adjacent to the construction and operational areas, impacts on wildlife species would not be significant during construction. Because the SPLE Project would be constructed and operated adjacent to facilities that already exist at the SPLNG Terminal, we conclude that their operation would not significantly affect wildlife.

CCTPL Pipelines and Aboveground Facilities

Temporary impacts on wildlife from construction of the CCTPL pipelines and associated aboveground facilities would include displacement of wildlife as a result of noise, the presence of workers and machinery, and clearing of vegetation. Clearing construction right-of-way vegetation would reduce cover, nesting, and foraging habitat for some wildlife, although mobile species would be able to migrate to surrounding similar habitats. Some of these species may return to the right-of-way following construction. Long-term impacts would be limited to forested areas of the right-of-way that would be converted to a different habitat type (scrub-shrub or grassland), which may permanently displace some wildlife and create habitat fragmentation and edge effects. However, because the pipeline would be installed next to existing rights-of-way for about 78 percent of the total pipeline route, and CCTPL would restore vegetation communities to pre-existing conditions where possible, impacts on forest habitat would be minimized to the extent possible. Therefore, we conclude that impacts on wildlife from construction and operation of the CCTPL pipelines and aboveground facilities would be temporary and minor.

2.3.2.1 Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act of 1918 ([MBTA] -16 U.S. C. 703-711) and Bald and Golden Eagles are additionally protected under the Bald and Golden Eagle Protection Act ([BGEPA], 16 U.S.C. 668-668d). EO 13186 (66 Federal Register 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the USFWS. EO 13186 states that emphasis should be placed on special species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts.

On March 30, 2011, the USFWS and the Commission entered into a Memorandum of Understanding that focuses on avoiding or minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the Commission and the USFWS by identifying areas of cooperation. This voluntary Memorandum does not waive legal requirements under the MBTA, BGEPA, the Endangered Species Act of 1973 (ESA), the Federal Power Act, the NGA, or any other statutes and does not authorize the take of migratory birds.

Migratory birds follow broad routes called “flyways” between breeding grounds in Canada and the U.S. and wintering grounds in Central and South America. The SPLNG Terminal is at the western edge of the Mississippi flyway and the eastern edge of the Central flyway.

Bald Eagle

The bald eagle was officially delisted from the federal endangered and threatened species list on August 8, 2007. However, the bald eagle is still protected under the MBTA and BGEPA. The bald eagle is typically associated with large waterbodies with surrounding forested areas and is commonly found wintering along lakes and major waterways (USDA, 2007). The decline of bald eagles was linked to the use of pesticides, hunting, and loss of habitat due to development (USFWS, 1989). Current bald eagle populations are rebounding and new nests are being constructed every year. The bald eagles usually nest in mature trees near fresh to intermediate marshes or open water in the southeastern Parishes of Louisiana from October through mid-May. Bald eagles also nest in mature pine trees within several miles of large lakes throughout Louisiana. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods may lead to nest abandonment. Human activity near a nest late in the nesting cycle may harm young birds and reduce their chance of survival. CCTPL’s field reconnaissance surveys from April 2013 to August 2013 identified little suitable habitat along the project pipeline routes, and no bald eagles or their nests were observed. Based on the distance of the project components from large waterbodies, and the lack of suitable nesting habitat, no impact on bald eagles is expected from construction and operation of the Projects. However, because the Projects are within floodplains of the Calcasieu and Mermentau Rivers, the USFWS (letter dated November 14, 2013, to the Applicants) recommended that all field personnel be trained to be aware of the potential presence of nesting bald eagles.

Colonial Birds

A bird colony is a group of birds nesting together at the same place and same time. Several species in the project area are considered colonial birds, including but not limited to the large blue heron (*Egretta caerulea*) and the reddish egret (*Egretta rufescens*). Additionally, during construction of the Projects, on-site contract personnel would be trained to recognize colonial nesting birds and their nesting behavior. The USFWS restricts activity within 1,000 feet of a rookery to the non-nesting period (USFWS, 2013) depending on the species present.

SPLNG Terminal

Disturbance from construction of the SPLE Project may result in some migratory birds avoiding construction areas. Impacts on migratory birds from construction and operation of the SPLE Project are expected to be minimal because the site is already largely industrialized. The existing SPLNG Terminal does not currently provide preferred habitat for migratory or non-migratory birds, although the DMPA may provide some marginal habitat.

We evaluated the potential impacts of project lighting on migratory birds. The SPLNG Terminal includes new facilities and structures that would require proper lighting for operations and safety purposes, which would include column-mounted lights, stanchion-mounted lights, and pendant lights. Sabine Pass has indicated that each light would consist of instant re-strike high-pressure sodium lights, with down shields installed to reduce upward illumination, light spill, and glare to minimize visual disturbances of the surrounding wildlife and environment (including ships navigating the Sabine Pass River Channel). In addition all proposed construction activities would occur within the existing SPLNG Terminal foot print.

The SPLNG Terminal would also include occasional flaring events as part of the wet/dry flare system used during commissioning and start-up activities, major overhauls, maintenance activities, or during upset, or emergency, conditions.

The design of the lights would reduce impacts on the surrounding area. In addition, Sabine Pass has committed to minimizing flaring events and their duration, and all new facilities would be constructed within existing SPLNG facility footprints. The Applicants provided project details to the USFWS in a letter dated April 19, 2013; the USFWS has not expressed any concern about the lighting and its impacts on migratory birds. Therefore, we conclude that project lighting would not adversely affect migratory birds.

2.3.2.2 CCTPL Pipelines and Aboveground Facilities

Indirect impacts on migratory birds from the construction of the CCTPL pipelines are expected to be minimal. Conversion of forested lands to grasslands would reduce tree cover, but the surrounding areas provide similar, suitable habitat, so displacement would be limited. Direct impacts from the construction of the CCTPL pipelines and facilities would occur, but would be limited to the period of active construction. Specifically, construction is proposed to begin in the second quarter of 2015, which overlaps with the nesting season (generally March 1 to July 31). Impacts during active nesting could include nest abandonment, overheating or chilling, nestling mortality, premature fledging, and ejection of eggs or young from the nest. Mitigation measures CCTPL would use to minimize these impacts include but would not be limited to, the following:

- installing pipelines next to existing right-of-ways, where possible;
- installing pipelines within agricultural, open, or scrub-shrub lands for approximately 70 percent of their length;
- using HDD to cross certain waterbodies to reduce impacts on riparian habitat;
- reducing right-of-way width to 85 feet in forested wetlands; and
- mitigating forested wetland impacts via compensatory wetland mitigation per the requirements of a USACE permit.

As a result, impacts on migratory birds would be short-term and would not result in population-level impacts, although construction could impact individual birds and/or nests. Because construction is proposed to begin within the nesting season and USFWS has not provided specific comments regarding migratory bird impacts, **we recommend that:**

- **prior to beginning construction, CCTPL file with the Secretary documentation of its consultation with the USFWS regarding the project impacts on migratory birds for review and written approval by the Director of the Office of Energy Projects (OEP).**

2.3.3 Special Status Species

Federal agencies are required by Section 7 of the ESA to consult with the USFWS to ensure that any action they authorize, fund, or carry out would not jeopardize the continued existence of a federally listed threatened or endangered species or species proposed for listing. As the lead federal agency, the FERC is responsible for the Section 7 consultation with the USFWS. In accordance with Section 380.13(b) of FERC's Order 603, however, the project sponsor is designated as FERC's non-federal representative for purposes of initial coordination and informal consultation with the USFWS. In compliance with ESA, Sabine Pass and CCTPL have been assisting the FERC in meeting its Section 7 obligations by conducting informal consultations with the USFWS and NOAA, National Marine Fisheries Service (NMFS) about species under their jurisdictions that would be potentially affected by the Projects. In addition, Sabine Pass also consulted with the LDWF.

Federally Listed Threatened and Endangered Species

We identified four federally listed species as potentially occurring in the project area through consultation with the USFWS, Lafayette Office, and the LDWF. They determined the possible presence of two federally listed endangered species, red-cockaded woodpecker (RCW) and American chaffseed; a one federal candidate species, Sprague's pipit. Candidate species do not receive protection under the ESA; however, the USFWS (2013) encourages avoidance of activities that would negatively impact Sprague's pipit. As such, we are evaluating potential impacts on this species in this EA. Table 2.3-2 lists the special status wildlife species that may occur in the project area.

Through consultation with the NMFS, the Applicants determined that the Projects would have no effect on endangered or threatened species under its jurisdiction. The NMFS (via a May 2, 2013 email to FERC) concurred with the Applicants' determination of no adverse impacts.

TABLE 2.3-2 **Federal and State-Listed Plant and Wildlife Species that may Occur in the Project Area**		
Species	**Federal / State Status**	**Parish**
American chaffseed (*Schwalbea americana)*	Endangered/ S1 (critically imperiled)	Allen and Beauregard
Red-cockaded Woodpecker (*Picoides borealis)*	Endangered / Endangered	Allen, Beauregard, Calcasieu, and Evangeline
Sprague's Pipit (*Anthus spragueii)*	Candidate / None	Allen, Calcasieu, and Cameron
Source: USFWS, 2013a.		

Federally Listed Species

Red-cockaded Woodpecker

The RCW has the potential to occur along the proposed pipeline route in Allen, Calcasieu, and Evangeline Parishes. The RCW inhabits open, park-like stands of mature pine trees containing little or no hardwood mid-story and few or no over-story hardwoods. RCWs are small birds that use open pine woodlands and savannahs with large old pines, preferring longleaf pine, abundant foraging habitat with mature pines, and an open canopy and abundant groundcover. They roost and forage year-around and nest seasonally from April through July. The species excavates its nesting cavities in live pine trees, typically in trees where the heartwood has been weakened by red heart fungus. Trees selected for cavity excavation are generally at least 60 years old, although the average stand can be as young as 30 years. Fire suppression and lack of cavity trees limit suitable nesting habitat. Forest fragmentation is another primary factor in the species decline (USFWS, 2003).

Prior to conducting field surveys, CCTPL reviewed aerial photography of the entire CCTPL Expansion Project area to identify areas of RCW potential foraging and/or nesting habitat. Two RCW survey reports that were previously conducted within portions of the CCTPL Expansion Project area in 2006 to identify potential foraging and nesting habitat were also reviewed. Areas lacking forest canopy, possessing a hardwood-dominated color signature, or comprising less than 100 contiguous acres were dismissed from further evaluation. Three areas in Allen and Calcasieu Parishes along the proposed pipeline totaling about 0.7 mile were identified as having potential habitat for RCWs. Each survey site was evaluated for the following characteristics: large, contiguous area of semi-mature to mature pine forest more than 100 acres in size; predominantly open mid-story; thick and diverse herbaceous layer; pine trees that were about 30 years old or greater for foraging habitat; and mature pine trees 60 years old or greater for nesting habitat. Areas that had potential foraging or nesting habitat were revisited and surveyed according to the *Recovery Plan for the Red-cockaded Woodpecker* (USFWS, 2003). During CCTPL's field surveys of these areas from April to August 2013, no RCWs were heard or observed, no nesting or roosting cavities were observed, and the potential nesting habitat did not possess cavity trees. Based on the results of the field surveys and the distance of documented potential habitat, the survey report determined that the RCW may occur in the project area, but it is not likely to be adversely affected by the CCTPL Expansion Project. In a letter dated November 14, 2013, to the Applicants, the USFWS concurred with the determination that the CCTPL Expansion Project is not likely to adversely affect the RCW. We agree.

<u>American chaffseed</u>

Through consultations with federal and state agencies, one federally listed threatened plant species, American chaffseed, could potentially occur within the project area. The USFWS did not express concern about this species in its July 2, 2013 letter to FERC. This species occurs in sandy, acidic, seasonally moist to dry soils; in particular, the Caddo-Messer soils along longleaf pine flatwoods savannah. It grows on "pimple mounds" (USFWS, 2013) in the longleaf pine flatwoods of Allen and Beauregard Parishes in southwestern Louisiana. The American chaffseed is a tall perennial herb and is a partial parasite on the roots of other plants. Flowering occurs from April to June in south and from June to mid-July in the north. No American chaffseed or any pimple mounds were observed during the field surveys in 2013, in the project area. Therefore, the CCTPL determined that the CCTPL Expansion Project is not likely to adversely affect American chaffseed. We concur.

As of October 2014, access to portions of the CCTPL Expansion Project had not yet been granted, preventing threatened and endangered species surveys along about 6.4 miles of pipeline routes. Threatened and endangered species surveys in these areas would only be necessary from MP 96.07 to MP 96.77 on the Extension pipeline where Caddo-Messer soil complex was identified by the Applicants. Caddo-Messer soil represents the preferred soil type for American chaffseed. Therefore, **we recommend that:**

- **<u>prior to beginning construction on the Extension</u>, CCTPL consult with the USFWS to determine if surveys for the American chaffseed are necessary for the segment between MPs 96.07 and 96.77, and file the results of that consultation with the Secretary.**

<u>Federal candidate species</u>

Sprague's pipit

The Sprague's pipit is a candidate species for listing under the ESA in Allen, Calcasieu, and Cameron Parishes. Sprague's pipit is a small, grassland specialist bird that winters in Louisiana from September through April. Sprague's pipit prefers open grassland habitat with native grasses of intermediate height and thickness, and tend to avoid areas with shrub encroachment (USFWS, 2013a). This species is a ground feeder and forages mainly on insects but will occasionally eat seeds. During the 2013 field surveys, no native prairie habitat or Sprague's pipit was observed. Because the Project would be in the easternmost edge of their wintering range, and no habitat or individuals were found during the surveys, we determined that the Project would not impact Sprague's pipit.

2.4 Land Use, Recreation, and Visual Resources

2.4.1 Land Use

Construction of the Projects would affect a total of approximately 2,097.61 acres of land, of which 785.87 acres would be maintained for operation. Table 2.4-1 summarizes the acreage of land uses affected by the construction and operation of the Projects. Land uses within the project area are classified as follows:

- Agricultural Land: active cropland, rice/bean fields, crawfish farming;
- Open Land: pasture, non-forested lands, maintained utility rights-of-way, emergent wetlands;
- Scrub-Shrub: mix of shrubs and open land, scrub-shrub wetlands;
- Forest/Woodland: upland and wetland forest or woodland not actively managed for pine plantations;
- Pine Plantation: planted/harvested pine tree;

- Industrial/Commercial: existing and approved facilities at the SPLNG Terminal, paved roads, and access roads; and
- Open Water: water crossings more than 100 feet wide.

SPLNG Terminal

About 401.2 acres of the existing SPLNG Terminal would be affected by project construction, including 156.3 acres of open land previously used as a DMPA and 244.8 acres of existing industrial/commercial land currently being used for construction of the approved facilities. Within the 156.3 acres of open land, 153.5 acres are emergent wetlands. The 153.5 acres of emergent wetlands include 110.6 acres of mitigated wetlands affected by the existing SPLNG Terminal facilities (Mitigation Area C) and 42.9 acres of non-mitigated wetlands (Wetland 17). The entire 156.3 acres of the former DMPA area would be permanently converted to industrial land, of which 67.6 acres would be maintained for operations of Train 5 and 6.

Sabine Pass is proposing mitigation for 191.3 acres of wetlands, which would include the 153.5 acres of DMPA emergent wetlands and 37.7 acres of previously permanently impacted wetlands[11]. Project construction would require using the entire SPLNG Terminal site; therefore, no wetlands areas would be available for on-site mitigation. Additionally, no mitigation credits are available from wetland mitigation banks in the Sabine Lake watershed of Louisiana. Sabine Pass, in consultation with the USACE, is proposing off-site permittee-responsible mitigation for impacts on jurisdictional wetlands. Under permittee-responsible mitigation, Sabine Pass would be responsible for the implementation and long-term success of the mitigation site. Sabine Pass is consulting with the USACE to develop a wetlands mitigation plan and is consulting with landowners to identify property for potential wetland mitigation.

Construction traffic would use Louisiana SH 82 to access the terminal and other existing roadways (Duck Blind Road, Center Levee Road, Liquefaction Road, or Lighthouse Road) to access the terminal and construction work areas that may delay or temporarily affect vehicular traffic during peak hours.

The residences closest to the proposed Stage 3 liquefaction facilities are across the Sabine Pass Channel. No known planned residential or commercial areas are proposed within 0.25 mile of the SPLNG Terminal site.

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11 A total of 37.74 acres of DMPA wetlands was originally impacted during the development of the SPLNG Terminal site. In 2005, the USACE authorized 110.58 acres in compensatory mitigation (Mitigation Area C) for impacted wetlands at the terminal site. Sabine Pass is proposing mitigation to compensate for the 153.53 acres of DMPA wetlands impacted by the construction and operation of Stage 3 liquefaction facilities and the 37.74 acres of originally impacted wetlands.

TABLE 2.4-1

SPLNG Terminal, CCTPL Pipelines, and Associated Facilities: Acres of Land Use Affected by Construction and Operation

Facility	Agriculture		Open Land		Scrub-Shrub		Forest / Woodland		Pine Plantation		Indust./Comm.		Open Water		Total	
	Const.	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**
SPLNG Terminal:																
Trains 5 & 6	0	0	156.30	156.30	0	0	0	0	0	0	233.38	0	0	0	389.68	156.30
Existing Access Roads	0	0	0	0	0	0	0	0	0	0	11.47	0	0	0	0	0
Sub-Total	***0***	***0***	***156.30***	***156.30***	***0***	***0***	***0***	***0***	***0***	***0***	***244.85***	***0***	***0***	***0***	***401.15***	***156.30***
Pipeline: a/																
Loop 1	5.55	2.21	187.12	76.82	13.64	4.70	0	0	0	0	0.53	0.22	0.11	0.04	206.95	83.99
Loop 2	45.95	13.4	197.17	79.14	1.54	0	36.17	11.44	34.17	0.18	1.26	0.47	0.26	0.21	316.52	104.84
Extension (including the ANR and TGT Laterals)	119.65	49.58	197.74	78.06	55.92	25.63	188.93	82.13	153.99	64.48	0	0	0.34	0.34	716.57	300.22
CGT Lateral	112.79	44.54	32.42	11.51	9.6	4.59	20.84	8.85	0.04	0.04	0.02	0	0	0	175.71	69.53
PPEC Lateral	24.91	9.33	4.93	1.22	7.19	2.7	18.38	9.58	0	0	2.18	0.84	0	0	57.59	23.67
Sub-Total	***308.85***	***119.06***	***619.38***	***246.75***	***87.89***	***37.62***	***264.32***	***112.00***	***188.20***	***64.70***	***3.99***	***1.53***	***0.71***	***0.59***	***1473.34***	***582.25***
Aboveground Facilities: b/																
Mamou Compressor Station ANR and TGT M&R Stations (MP142.4)	39.64	39.64	0	0	0	0	0	0	0	0	0	0	0	0	39.64	39.64
CGT M&R Station (CGT MP 11.5)	0	0	0.88	0.88	0	0	0	0	0	0	0	0	0	0	0.88	0.88
PPEC M&R Station (PPEC MP 3.2)	0	0	0.76	0.76	0	0	2.63	2.63	0	0	0	0	0	0	3.39	3.39
Loop 2 - MLV/Receiver (MP 69.4)	0	0	0.25	0.25	0	0	0	0	0	0	0	0	0	0	0.25	0.25
Loop 2 - MLV (MP 86.2)	0.06	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0.06

TABLE 2.4-1

SPLNG Terminal, CCTPL Pipelines, and Associated Facilities: Acres of Land Use Affected by Construction and Operation

Facility	Agriculture		Open Land		Scrub-Shrub		Forest / Woodland		Pine Plantation		Indust./Comm.		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Extension - MLV (MP 103.7)	0	0	0.06	0.06	0	0	0	0	0	0	0	0	0	0	0.06	0.06
Extension - MLV (MP 119.7)	0	0	0.01	0.01	0.05	0.05	0	0	0	0	0	0	0	0	0.06	0.06
Extension - MLV (MP 135.6)	0	0	0	0	0	0	0.06	0.06	0	0	0	0	0	0	0.06	0.06
ANR Lateral - MLV (ANR MP 1.7)	0	0	0.18	0.18	0	0	0.08	0.08	0	0	0	0	0	0	0.26	0.26
TGT Lateral - MLV (TGT MP 0.2)	0.29	0.29	0	0	0	0	0	0	0	0	0	0	0	0	0.29	0.29
Sub-Total	***39.99***	***39.99***	***2.14***	***2.14***	***0.05***	***0.05***	***2.77***	***2.77***	***0***	***0***	***0***	***0***	***0***	***0***	***44.95***	***44.95***
Contractor/Pipe Yards:																
Johnson Bayou Yard **d/**	0	0	30.67	0	0	0	0	0	0	0	4.34	0	0	0	35.01	0
Kim Street Yard	0	0	0	0	0	0	0	0	0	0	7.99	0	0	0	7.99	0
Klump Yard	0	0	0	0	0	0	0	0	0	0	19.65	0	0	0	19.65	0
Cabot Yard **c/**	0.73	0	36.62	0	0	0	0	0	0	0	0.19	0	0	0	37.54	0
Sub-Total	***0.73***	***0***	***67.29***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***32.17***	***0***	***0***	***0***	***100.19***	***0***
Access Roads:																
Loop 1	0	0	0	0	0	0	0	0	0	0	5.39	0.52	0	0	5.39	0.52
Loop 2	0	0	0	0	0	0	0	0	0	0	31.6	0.57	0	0	31.6	0.57
Extension	0	0	0	0	0	0	0	0	0	0	29.74	1.08	0	0	29.74	1.08
CGT Lateral	0	0	0	0	0	0	0	0	0	0	9.10	0.18	0	0	9.10	0.18

TABLE 2.4-1

SPLNG Terminal, CCTPL Pipelines, and Associated Facilities: Acres of Land Use Affected by Construction and Operation

Facility	Agriculture		Open Land		Scrub-Shrub		Forest / Woodland		Pine Plantation		Indust./Comm.		Open Water		Total	
	Const.	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**
ANR Lateral	0	0	0	0	0	0	0	0	0	0	2.15	0.02	0	0	2.15	0.02
Sub-Total	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***77.98***	***2.37***	***0***	***0***	***77.98***	***2.37***
Total	**349.57**	**159.05**	**845.11**	**405.19**	**87.94**	**37.67**	**267.09**	**114.77**	**188.20**	**64.70**	**358.99**	**3.90**	**0.71**	**0.59**	**2,097.61**	**785.87**

a Impacts are estimated on the actual footprint of the construction work area (i.e., construction and operational right-of-way and ATWS) for construction, and the operational right-of-way (i.e., permanent right-of-way) for operations.

b MLVs and launchers/receivers that would be installed within the Mamou Compressor Station and M&R stations are included the acreage calculations for the compressor or M&R stations.

c The Johnson Bayou Yard encompasses the construction work areas for Loop 1, and the Cabot Yard encompasses the construction work area for the CGT Lateral and the CGT M&R Station. These pipeline and station areas have been deducted from the total yard acreage.

Note: Land use classification described in section 2.4.1.

CCTPL Pipelines and Aboveground Facilities

A total of 1,696.5 acres of land would be affected during construction of the CCTPL pipelines and aboveground facilities. About 582.3 acres would be maintained as permanent right-of-way for pipeline segments. The permanent right-of-way would generally be maintained in herbaceous cover or allowed to return to previous uses in accordance with easement agreements. An additional 44.9 acres of land would be permanently converted to industrial use for the operation of the Mamou Compressor Station and four M&R station sites and MLV sites. Table 2.4-1 summarizes the acreage of land uses affected by the construction and operation of the pipelines and aboveground facilities.

The temporary right-of-way and ATWS would be allowed to re-vegetate. Upland forest within the permanent right-of-way would be permanently converted to cleared, open land, except along stream banks and in forested wetlands. However, trees along stream banks and forested wetlands that are within 15 feet of the pipeline may be removed to avoid potential root damage to pipeline coating. Portions of pine plantations within the operational right-of-way would also be permanently converted to cleared, open land. Temporary construction work areas and ATWS would be allowed to be revegetated and restored and allowed to return to previous uses.

ATWS outside of the construction right-of-way would be required for pipe installations at road and waterbody crossings and at the HDD entry/exit sites. ATWS areas would affect a total of 93.8 acres of land during construction.

A total of 112 access roads would be used for the construction of the pipeline, totaling about 55.6 miles and affecting about 78 acres (see section 1.8 and tables 1.8-1 and 1.8-3. Ten roads would be maintained as permanent roads for access to aboveground facilities, three of which would be new roads. Access roads may be modified or improved to support construction equipment and traffic. CCTPL would restore temporary access roads to pre-construction condition and pursuant to landowner request.

Four construction staging and pipe storage yards, totaling 100.2 acres, would be required for construction of the CCTPL pipelines. The existing land uses at the contractor/pipe storage yards are open land and/or industrial/commercial land. Storage of equipment, materials, and pipe during construction would have temporary impacts on land use.

Residential, Commercial, and Industrial Properties

A total of 19 structures (including 3 residences and other buildings such as sheds, barns, etc.) would be within 50 feet of the edge of the CCTPL pipeline construction workspaces (defined in this section as the construction right-of-way and ATWS). No residences would be within 25 feet of the construction workspaces. Noise during construction activities could temporarily affect residents living near the compressor station or the HDD entry/exit sites. (Additional information on noise impacts is provided in section 2.7.2, Noise). CCTPL would coordinate with property owners to minimize impact on and ensure access to residences during construction activities for privately owned and emergency vehicles, as needed. Where residences are within 50 feet of the construction workspaces, CCTPL would:

- avoid removal of mature trees and landscaping within the construction workspace unless necessary for safe operation of construction equipment or as specified in landowner agreements;
- install a safety fence along the edge of the construction workspace for a distance of 100 feet on either side of the residence; and
- restore all lawn areas and landscaping immediately following cleanup operations or as specified in landowner agreements.

No new planned developments were identified within 0.25 mile of the pipelines. Storm-damaged facilities at Johnson Bayou High School, which is about 0.12 mile south of the CCTPL Loop 1 pipeline (near MP 12.5) along SH 82, are being reconstructed. Reconstruction activities are anticipated to occur within the high school's property boundary and, therefore, would not be affected by the construction or operation of the pipelines.

Agricultural Lands

A total of 349.57 acres of agricultural land, including active cropland, rice/bean fields, and crawfish farming in Allen and Evangeline Parishes, would be affected during construction of the CCTPL Expansion Project pipelines and aboveground facilities. About 159 acres of agricultural land would be required for operation of the CCTPL Expansion Project, including about 119.1 acres within the permanent right-of-way and 36.9 acres within the Mamou Compressor Station. Crawfish and rice are typically farmed in rotation, and the land is terraced and routinely flooded. Rice is harvested one season and the fields are flooded, and then crawfish are cultivated in the flooded areas the following season. CCTPL would coordinate with farmers to minimize impacts on agricultural water wells and irrigation canals and to restore agricultural lands. Irrigation canals and water wells would be rerouted or temporarily blocked to prevent flow of spoil or sediment into any waterbodies. Following construction, CCTPL would compensate landowners for the loss of agricultural production and for restoring terracing.

About 70 percent of the pipeline construction footprint would be on prime farmland, and almost 100 percent of the construction area for the aboveground facilities would be on prime farmland. The area within the footprint of the aboveground facilities would be permanently converted from agricultural land use to industrial land use. Additional information on prime farmland is provided in section 2.1.

Pipeline construction would have short-term impacts on agricultural lands. Topsoil would be segregated from the ditch and spoil side during grading activities in cultivated or rotated agricultural lands. Once the pipeline is installed, CCTPL would use subsoil for backfilling and the segregated topsoil would be spread across the graded right-of-way. Soil compaction would be completed in accordance with FERC's Plan. The restored construction areas could then be used for agricultural production. Agriculture use would be permitted within the permanent easement in accordance with applicable easement agreements. CCTPL would conduct post-construction monitoring to evaluate restoration within affected agricultural areas. Therefore, construction and operation of the CCTPL Expansion Project would not permanently affect agricultural land uses except in the areas where aboveground facilities are constructed.

Coastal Zone Management

Section 307(c)(3) of the Coastal Zone Management Act requires that all federally licensed and permitted activities be consistent with approved state Coastal Zone Management Programs. The LDNR, Office of Coastal Management, administers the state's Coastal Zone Management Program and is the lead state agency that performs federal consistency reviews. The SPLNG Terminal site is located entirely within the coastal zone management area. All of Loop 1 would be within the coastal zone management area.

On June 27, 2014, the LDNR, Office of Coastal Management, Permits/Mitigation Division, issued a Coastal Use Permit/Consistency Determination for the Projects. By accepting the permit, Sabine Pass and CCTPL would agree to comply with permit conditions in accordance with the rules and regulations of the Louisiana Coastal Resources Program and Louisiana R. S. 49 Sections 214.21 and 214.41, the State and Local Coastal Resources Management Act of 1978, as amended. The permit authorizes the initiation of the permitted coastal use within two years from the date of its issuance.

2.4.2 Recreation and Public Interest Areas

SPLNG Terminal

The SPLE Project is within the footprint of the existing SPLNG Terminal site and does not cross public or conservation lands. The Creole Nature Trail, which is a designated an All American Road and a

Louisiana State Scenic Byway, runs north of the SPLNG Terminal property boundary along SH 82. SH 82 would be the primary road access for workers and material transport, and construction activities may delay or temporarily affect vehicular traffic during peak hours.

Designated natural and recreational areas in the vicinity of the SPLNG Terminal include the Sabine Pass Lighthouse (2.7 miles southeast of the terminal site) and the Sabine Pass Battleground State Historic Park (1.2 miles southwest of the terminal site). Public boat ramps are along the Sabine Pass Channel at the SH 82 bridge, north of the SPLNG Terminal and at the Sabine Pass Battleground State Historic Park (Long, 2010, Louisiana Office of Cultural Development, 2014). We conclude that construction and operation of the SPLE Project would not affect these recreational resources.

CCTPL Pipelines and Aboveground Facilities

The CTTPL Expansion Project pipelines would cross both designated scenic highways and trails. Loop 1 would cross the Creole Nature Trail National Scenic Byway/Louisiana Gulf Coast American Wetland Birding Trail (MP 2.4 and parallel the north side of the byway from MP 2.4 to 15.7), and the CGT Lateral would cross the Zydeco Cajun Prairie Scenic Byway (MP 0.05). CCTPL would use bores to cross them to avoid road closures and traffic disruptions.

The CCTPL Extension Project would also cross three designated scenic rivers: Whiskey Chitto Creek (MP 109.0), Barnes Creek (MP 97.1), and the Calcasieu River (MP 112.4). These rivers are all within the Louisiana Natural and Scenic Rivers System; Whiskey Chitto Creek is also listed on the Nationwide Rivers Inventory. CCTPL would use HDD to avoid in-stream impacts and vegetation removal along both banks. Prior to construction, CCTPL would file a State Scenic River Crossing permit application with the LDWF to cross these three waterbodies.

The Extension pipeline would cross five tracts of land in Allen Parish that have been established as mitigation banks under the USACE mitigation program (Table 2.4-2). Covenant agreements would not restrict construction of pipelines. CCTPL would consult with the New Orleans District USACE to determine if special construction or restoration techniques are required when crossing mitigation banks. Because CCTPL has not completed its permitting process with the USACE, we have recommended in section 2.2.3, Wetlands, that CCTPL file with the Secretary documentation of approval from the mitigation bank owners and the USACE authorizing crossing of the Clear Creek and Calcasieu Mitigation Banks.

TABLE 2.4-2

Mitigation Banks Crossed by the CCTPL Pipelines

Facility / Enter MP	Exit MP	Total Crossing Length (mi)	Mitigation Bank	Status
Extension				
99.0	99.31	0.31	Clear Creek	Sold out
99.31	99.33	0.02	Calcasieu	Credits available
99.33	99.43	0.10	Clear Creek	Sold out
99.43	99.97	0.54	Clear Creek	Sold out
99.97	100.42	0.45	Calcasieu (right-of-way only)	Credits available
	Total	**1.42**		

2.4.3 Visual Resources

Construction of all facilities associated with the SPLE Project and CCTPL Expansion Project would result in temporary visual impacts on the immediate area. Impacts would include removing soil, vegetation, and woody cover and the presence of project personnel and associated project equipment, vehicles, and materials in previously undisturbed areas.

The aboveground facilities associated with construction of SPLNG Terminal Trains 5 and 6 would result in a permanent change in visual resources. These impacts would be relatively minimal because construction would occur in an industrial area within the existing fence line of the SPLNG Terminal and construction is already under way at the site for Trains 1 through 4.

The underground facilities associated with the CCTPL Expansion Project would not result in significant changes to the existing viewshed, although the rights-of-way would be cleared of woody cover during project construction and operation. Vegetated and forested areas cleared for construction that are not within the permanent rights-of-way would be allowed to regenerate naturally. In total, 70 percent of the areas affected by construction of the CCTPL pipelines would be allowed to return to their previous vegetation state once construction is over. The remaining 30 percent of the CCTPL pipeline routes (30.9 miles) would be in forested or pine plantation areas and would permanently remain free of vegetation, creating a noticeable visual impact. The magnitude of these impacts would vary based on the viewpoints and remoteness of the locations as well as the existing landscape and topography of the area.

Aboveground facilities associated with the CCTPL Expansion Project pipelines would result in permanent changes in visual resources in the existing viewshed. Vegetated and forested areas cleared for construction that are not in the operational right-of-way would be allowed to revegetate naturally.

SPLNG Terminal

The construction of Trains 5 and 6 at the SPLNG Terminal on approximately 401.15 acres would be within the existing facility that are already part of the visual environment. Trains 5 and 6 would be installed next to Trains 1 through 4, which are already under construction at the facility, and would be constructed and lit in the same manner. About 156.3 acres of the new facilities would be constructed in previously undisturbed areas of the terminal. Of this area, 67.65 acres would be used as a footprint for Trains 5 and 6, creating a long-term visual impact on the facility consistent with the ongoing industrial operations of the area. The remaining 88.65 acres would need soil improvement and would also be permanently converted from emergent wetlands to industrial use. Intermittent views of the facility would be available to boaters in the Sabine Pass Channel, users of the SH 82 Sabine Pass bridge boat ramps, motorists using SH 82, visitors to the Sabine Pass Battleground State Historic Park, and the community of Sabine Pass. No residences or schools are in the viewshed of the SPLNG Terminal. The visual impact of the construction and operation of these facilities would be relatively minor because the area on both the Texas and Louisiana sides of Sabine Pass is already developed with industrial facilities, and construction of the SPLNG Terminal Trains 5 and 6 would be consistent with the existing viewshed. Therefore, we anticipate no significant impacts on visual resources resulting from the SPLE Project.

CCTPL Pipelines and Aboveground Facilities

About 78 percent of the expansion and extension of the existing CCTPL pipeline system would be next to existing road/pipeline rights-of-way. Therefore, any permanent visual impacts resulting from cleared woody lands would be minimized in these regions because construction would be consistent with existing land use in the area.

Loop 1, Loop 2, and the ANR and TGT Laterals would be installed next to existing road/pipeline rights-of-way for 100 percent of their lengths. Most of this area is remote and not accessible via public access points and would be obscured from public roadways in the area by vegetation or woody cover. During the construction period, temporary visual impacts would occur at areas associated with public road crossings. Post-construction, areas of the CCTPL Expansion Project pipelines not located in the operational right-of-way (about 1,473 acres [60.5 percent] of the construction area) would be allowed to revegetate to previous conditions. Operational areas of the pipelines in pine plantation or forested areas (about 176.7 acres) would be maintained as herbaceous shrub-scrub vegetation post-construction, except in forested wetlands, where areas would be allowed to revegetate in order to maintain a maintenance corridor up to 10 feet wide centered on the pipeline. Permanent visual impacts on wooded lands would occur along these areas as wooded lands are removed as needed along the existing rights-of-way.

About 18.6 miles of the Extension, 1.3 miles of the CGT Lateral, and 2.8 miles of the PPEC Lateral would not be co-located along existing rights-of-way. In these areas passing motorists would see both temporary and permanent impacts on visual resources along the Extension right-of-way from MP 120.1 to MP 132.6, which would be co-located along portions of Powell Road and Cottongin Castor Road. Public viewpoints of construction and operation of the PPEC Lateral from MP 3.0 to MP 3.5 would also create both temporary and permanent visual impacts for motorists on Ambrose Road. About 5.59 miles of the Extension route along Powell Road and Cottongin Castor Road would be constructed within previously undisturbed forest and pine plantation areas. About 0.34 mile of the PPEC Lateral that would be constructed within previously undisturbed forested area would be visible from Ambrose Road. Temporary and permanent impacts on visual resources in the area would be minimal because these areas are relatively remote locations and construction and operation would be consistent with ongoing activities in the area. Construction would occur during daylight hours and nighttime lighting would not be needed. Areas not associated with the operational section of the pipeline would be allowed to revegetate and reestablish over the long-term. About 165.08 acres of pine plantation and forest land would be permanently altered for operation of the Extension, the CGT Lateral, and the PPEC Lateral.

Mitigation to minimize visual impacts from the three residences within 50 feet of pipeline construction workspaces during construction would be in accordance with Section III. H of the FERC Plan and as specified in any landowner agreements.

Staging Areas and Storage Yards

Constructing the pipelines would require temporary use of about 100.19 acres of open, industrial, and agricultural land for four contractor staging areas and pipe storage yards. Following construction, these four yards would be restored to pre-construction or similar condition. During construction, nighttime lighting may be required at any of these facilities for safety, operations, and security purposes. Residences near the Kim Street Yard at MP 69.4 of Loop 2 would be visually screened from the yard by forest cover. Similarly, residences south of the Klump Yard (which is associated with the Extension, 3.5 miles south of MP 112.0) would be screened visually from the yard by trees. Residences near the Cabot Yard at the end of the CGT lateral at MP 11.5 would likely experience temporary visual impacts by the use of the area during construction. Post-construction, the area would be restored to pre-construction conditions or as specified in any landowner agreements.

Mamou Compressor Station

The Mamou Compressor Station would be on 39.64 acres of currently undeveloped agricultural land. The TGT and ANR M&R Stations would be co-located with the new Mamou Compressor Station site. Construction and operation of the Mamou Compressor Station would create a permanent visual impact on the agricultural landscape and the nearby residences located within 0.3 to 0.6 mile from the site; however, the visual impact would decrease with distance from the site and would be consistent with ongoing gas infrastructure and operations in the area. Areas of the compressor station not occupied by aboveground facilities would be maintained in herbaceous cover. Outdoor lighting would be necessary during operations for security purposes and during inclement weather if work is required at night. The effect of nighttime lighting would be minimized to the extent possible so as not to affect nearby residences.

CGT and PPEC M&R Stations

The CGT and PPEC M&R Stations would be at or near the end of the CGT and PPEC Laterals. The CGT M&R Station would be constructed on 0.88 acre of land next to an existing natural gas facility; no new significant changes in visual resources would be associated with operation of the station because construction and operation would be consistent with nearby structures in the area. Temporary visual impacts on nearby residences located less than 0.25 mile from the site would occur during the construction period, as vehicles and additional staff would be located in the construction area.

The PPEC M&R Station would be constructed on 3.39 acres of land in the existing footprint of PPEC's storage facility. No residences are within 50 feet of the existing PPEC facility. No long-term impacts on visual resources are expected because construction of this facility is consistent with ongoing industrial use of the property.

Scenic Rivers and Byways

Scenic roads and rivers crossed by the CCTPL Extension Project would not be permanently impacted. Loop 1 and the CGT Lateral would cross the Creole Nature Trail/Louisiana Greater Gulf Coast Birding Trail (SH 82) and the Zydeco Cajun Prairie Scenic Byway (SH 13) via borings underneath each roadway. Neither crossing would affect visual resources of the byways or surrounding topography post-construction because both road crossings would be in open lands; however, temporary visual impacts would occur during construction due to the presence of construction staff, vehicles, and equipment in the area and the location of temporary workspace adjacent to each road crossing. No forested areas would be cleared for construction or operation at either of the roadway crossings. Temporary workspace associated with the crossing at the Zydeco Cajun Prairie Scenic Byway would create impacts on agricultural lands during construction. This area would be restored to agricultural use post-construction.

The Extension would cross three scenic rivers: Barnes Creek, Whiskey Chitto Creek, and the Calcasieu River. These rivers would be crossed using HDD with a minimum 50-foot buffer from the river bank. No vegetation would be cleared, no trees would be removed, nor would any modifications to the topography occur between the HDD entry and exit ATWS for each of the three crossings, either during construction or operation of the Extension. Therefore, no long-term visual impacts on scenic rivers in the area are expected to occur as a result of construction or operation of the CCTPL Extension Project.

2.5 Socioeconomics

Socioeconomics is an evaluation of the basic conditions (attributes and resources) associated with the human environment, particularly the population and economic activity within a region. Economic activity generally encompasses regional employment, personal income, and revenues and expenditures. Impacts on these fundamental socioeconomic components can influence other issues such as regional housing availability and provision of community services.

This section addresses several different factors that could affect the quality of life and economy in the area surrounding the project areas where employees might live, shop, and use public resources. These factors include public services such as fire, police, and medical facilities; educational facilities; and environmental justice.

For the purpose of this analysis the region of influence (ROI) includes all geographic areas within reasonable commuting distance for local hires (15 to 16 miles from the SPLE Project or the CCTPL Expansion Project locations). This area includes Cameron, Calcasieu (including the City of Sulphur), Beauregard, Allen, and Evangeline Parishes, Louisiana, where the construction would take place, and the surrounding areas of St. Landry, Acadia, Jefferson Davis, Avoyelles, and Rapides Parishes, Louisiana, and Jefferson County, Texas (including the City of Port Arthur).

2.5.1 Population and Demographics

Table 2.5-1 provides a summary of selected population and demographic statistics and illustrates the population profile of the potentially affected parishes/counties and municipalities in and around the project areas.

TABLE 2.5-1

Population and Demographics

	Total Population (2012 estimate)	Population Density (2010 persons per square mile)	Population Change (percentage change from April 1, 2010 to July 1, 2012)	Median Age	Persons Per Household (2007-2011)
United States	313,914,040	87.4	1.7	37.2	2.6
State of Louisiana	4,601,893	104.9	1.5	35.8	2.6
Cameron Parish, LA	6,702	5.3	-2.0	39.9	2.85
Calcasieu Parish, LA	194,493	181.2	0.9	35.9	2.59
City of Sulphur, LA	20,157	2,042.8	-1.2	36.2	2.51
Beauregard Parish, LA	36,281	30.8	1.8	36.6	2.63
Allen Parish, LA	25,539	33.8	-0.9	37.4	2.62
Evangeline Parish, LA	33,710	51.3	-0.8	35.9	2.65
St. Landry Parish, LA	83,662	90.3	0.3	36.8	2.72
Acadia Parish, LA	61,912	94.3	0.2	35.7	2.74
Jefferson Davis Parish, LA	31,432	48.5	-0.5	37.7	2.62
Avoyelles Parish, LA	41,632	50.5	-1.0	38.1	2.44
Rapides Parish, LA	132,373	99.9	0.6	36.9	2.67
Jefferson County, TX	251,813	287.9	-0.2	36.0	2.56
City of Port Arthur, TX	54,010	699.8	0.3	35.3	2.65

Sources: U.S. Census Bureau, 2010, 2013a, 2013b

Population numbers within the ROI have remained steady since April 2010, with a majority of the locations having a population change of less than 1 percent since that time. Population density is an indication of the extent of development. Cities and other urban areas contain higher populations of people per land area than rural areas. The population density numbers within the ROI illustrate that these parishes are mostly rural. Calcasieu Parish and the City of Sulphur are the only locations where the population density is greater than the average for the State of Louisiana.

Population and demographics information is based on permanent residence. After construction of the SPLE Project, about 120 full-time positions would be needed to maintain and operate the Stage 3 Trains 5 and 6. In addition, t three full-time positions would be required to maintain and operate the expanded pipeline system created by the CCTPL Expansion Project. Most of these positions are expected to be filled by workers already living in the ROI. Any workers migrating from outside the ROI would represent a low percentage of the anticipated workforce and would not cause significant changes to the population or demographics numbers.

2.5.2 Employment and Income

Table 2.5-2 provides a summary of selected employment and income statistics for the potentially affected parishes/counties and municipalities in and around the project area.

Per capita income ranges from a low of $25,101 (Allen Parish) to a high of $39,222 (Rapides Parish) with the entire ROI being below the national and Louisiana averages (Bureau of Economic Analysis, 2013). The lowest reported unemployment rate was in Cameron Parish (5.0 percent) and the highest in Jefferson County (10.1 percent) and the City of Port Arthur (15.3 percent) (Bureau of Labor Statistics, 2013). Employment growth rate, which tracks the percentage of jobs gained or lost in the economy, ranged from 2.6 percent (Cameron and Calcasieu Parishes) to -0.6 percent (Evangeline Parish) (Federal Deposit Insurance Corporation, 2013). A majority of the ROI also has individual and family poverty rates at or above the National and Louisiana rates.

Available budget information shows the primary sources of revenues for parishes and municipalities within the ROI are sales tax (26.8 percent) and intergovernmental transfers (21.4 percent) in Calcasieu Parish; property taxes (67.9 percent) (Calcasieu Parish Police Jury, 2012) and sales taxes (16.7 percent) in Jefferson County (Jefferson County, 2012); sales tax transfers for the City of Sulphur (59.0 percent) (City of Sulphur 2012); and taxes for the City of Port Arthur (71.4 percent) (City of Port Arthur, 2012). Sales and property taxes are vital sources of revenue for the parishes/counties and municipalities in and around the project area.

The SPLE Project and the CCTPL Expansion Project would bring an influx of jobs and tax money to the ROI. The SPLE Project would create about 2,450 direct jobs at peak construction with an average of 941 maintained through the design, engineering, and construction period. This translates into about $495 million in wages over the approximate four-year construction period. The CCTPL Expansion Project's estimated peak construction workforce would be about 1,500 workers, with an average workforce of 500 workers through the construction period (see table 2.5-3).

TABLE 2.5-2

Employment and Income

	Per Capita Income ($) - 2012	Poverty Levels a/		Civilian Labor Force – Sept. 2013	Unemployment Rate (percent) – Sept. 2013	Employment Growth Rate (percent) - 2012
		Individuals Below the Poverty Line b/ (percent) – 2008-2012	Families Below the Poverty Line c/ (percent) - 2008-2012			
United States	43,735	14.9	10.9	155,559,000	7.2	1.9
State of Louisiana	40,057	18.7	14.3	2,104,306	6.5	1.4
Cameron Parish, LA	37,274	8.9	6.8	3,183	5.0	2.6
Calcasieu Parish, LA	37,224	16.8	12.8	95,694	5.9	2.6
City of Sulphur, LA	37,226 **d/**	18.4	14.8	--	6.3 **d/**	2.0 **d/**
Beauregard Parish, LA	30,955	14.8	11.2	14,738	7.4	1.8
Allen Parish, LA	25,101	16.6	13.4	8,709	8.1	0.0
Evangeline Parish, LA	30,425	22.7	19.3	12,711	6.5	-0.6
St. Landry Parish, LA	37,179	26.4	21.5	38,572	6.5	0.9
Acadia Parish, LA	36,180	19.1	15.5	25,831	5.9	0.8
Jefferson Davis Parish, LA	33,518	18.1	14.4	14,864	5.4	1.7
Avoyelles Parish, LA	33,286	23.1	17.8	16,529	7.4	-0.2
Rapides Parish, LA	39,222	19.9	15.3	58,902	6.6	-0.5
Jefferson County, TX	38,357	19.3	16.4	119,486	10.1	-0.1
City of Port Arthur, TX	38,374 **e/**	25.9	23.4	23,376	15.3	0.3 **e/**

a Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level." The poverty thresholds are revised annually to reflect changes in the consumer price index.

b The national poverty line for an individual in 2012 was $11,720.

c The national poverty line for a family of four in 2012 was $23,492.

d The City of Sulphur is calculated as part of the larger Lake Charles Metropolitan Statistical Area.

e The City of Port Arthur is calculated as part of the larger Beaumont-Port Arthur Metropolitan Statistical Area.

Sources: Bureau of Economic Analysis 2013; Bureau of Labor Statistics 2013; Federal Deposit Insurance Corporation 2013; U.S. Census Bureau 2010, 2013a, 2013b

TABLE 2.5-3

Employment and Income

	SPLE Project	CCTPL Expansion Project	Total
Construction			
Average Construction Workforce	941	500	1,441
Peak Construction Workforce (craft workers)	2,250	1,500	3,750
Peak Construction Workforce (supervisory staff)	200	40	240
Peak Workforce Hired Locally	980 (40 percent)	246 (16 percent)	1,226
Peak Construction Workforce (non-local)	1,470	1,294	2,764
Estimated Construction Payroll	$495 million	$258 million	$753 million
Duration of Construction	49 months	6 to 8 months	Maximum of 49 months
Operation			
Additional Operation Workforce	120	3	123

When available, local workers would be employed for construction. Local hires[12] would include surveyors, welders, equipment operators, and general laborers. Additional construction personnel hired from outside the project area would typically include pipeline construction specialists, supervisory personnel, and inspectors who would temporarily relocate to the ROI. An estimated 40 percent of the construction workforce for the SPLE Project would be local hires, or 980 workers, during peak construction. An estimated 16 percent of the construction workforce for the CCTPL Expansion Project would be local hires, or 246 workers, during peak construction. In September 2013 the labor force in the ROI totaled about 383,388 persons. Hiring within the ROI would have a positive effect on unemployment rates.

Socioeconomic impacts associated with construction of the SPLE Project would be limited to the approximate 49-month construction period for the Stage 3 liquefaction Trains 5 and 6. During the SPLE Project construction period, the CCTPL Expansion Project would also be constructed and would take about 6 to 8 months to construct.

Most socioeconomic impacts are expected to be beneficial because the Projects would create jobs and provide a stimulus to the regional economy as a result of local and non-local construction workers spending and through project-related purchases of construction materials. During construction, some portion of the construction payroll, estimated at $753 million ($495 million for the SPLE Project and $258 million for the CCTPL Expansion Project), would be spent locally by both local and non-local workers for the purchase of housing, food, gasoline, entertainment, and luxury items. The dollar amount would depend on the number of construction workers employed at any given time and the duration of the non-local worker’s stay in the ROI. It is also likely that some portion of construction materials would be purchased locally. These direct payroll and materials expenditures would have a positive impact on local economies and would likely stimulate indirect expenditures within the region as inventories are restocked

12 Local hires are defined as those currently living within the ROI.

or new workers are hired to meet construction demands. Sales tax would also be paid on all goods and services purchased with payroll monies or for construction materials.

As described in section 2.5.1, about 120 full-time positions would be needed to maintain and operate Trains 5 and 6 following completion of the SPLE Project. In addition, three full-time positions would be required to maintain and operate the expanded pipeline system following completion of the CCTPL Expansion Project. Similar to the construction jobs, these full-time jobs would provide socioeconomic benefit by stimulating the regional economy.

There would be relatively minor negative long-term socioeconomic impacts during construction operation of the Projects due to increased use of public services such as fire, police, and emergency care. The construction and operation jobs created for the Projects would bring in non-local workers that would be utilizing the public services. The jobs created as part of the Projects are not expected to lead to upgrades to public services, and therefore additional residents would draw from the current level of public services. In the event public services are degraded to the point of needing upgrades, any costs to the parish would be more than offset by the economic and fiscal benefits created by the Projects, including increased tax revenue, increased employment, and increased employee income.

Following construction, the SPLE Project, as part of the expanded SPLNG Terminal, would be subject to property taxes. Property taxes in Louisiana are assessed and collected at the parish or municipal level. The SPLNG Terminal property is subject to the state's ad valorem property tax, which is levied on oil and gas properties. Property subject to ad valorem taxation is listed on the assessment rolls at its assessed value, which is a percentage of its fair market value. The percentage of fair market value for ad valorem taxation is 25 percent for public service properties such as oil and gas properties. It is estimated that the SPLE Project would provide $200 million in tax revenue to Cameron Parish over the life of the project. CCTPL estimates that the CCTPL Pipeline Expansion would contribute about $23 million in tax revenues in year one distributed to the following parishes:

- Cameron Parish, $2.7 million;
- Calcasieu Parish, $5.9 million;
- Beauregard Parish, $2.8 million;
- Allen Parish, $7.3 million; and
- Evangeline Parish, $4.3 million.

These taxes would have a positive impact on parishes and municipalities in which project facilities are located. We conclude that the primary socioeconomic impacts on the ROI would be increases in employment and local tax revenue, which is expected to more than offset any minor adverse impacts on public services.

2.5.3 Housing

With an increase in non-local workers during both construction and operation, housing within the ROI becomes an important socioeconomic factor. The housing vacancy rate ranges from 11.1 percent in Jefferson Davis Parish to 33.1 percent in Cameron Parish. The number of vacant houses ranges from 1,226 in Cameron Parish to 11,896 in Jefferson County (U.S. Census Bureau, 2013a).

In addition to vacant housing, there are hotels/motels within the ROI. Jefferson County has 96 hotels/motels, more than the other counties. St. Landry and Avoyelles Parishes, which are part of the ROI described in section 2.5, do not have any hotels/motels, but all other potentially affected parishes/counties and municipalities in and around the project area have at least four. Further, all of the potentially affected parishes/counties and municipalities in and around the project area have at least two campgrounds/recreational vehicle (RV) parks. Jefferson County also has the most campgrounds/RV parks within the ROI with 27 (Allen Parish Tourist Commission, 2013; Beauregard Parish Tourist Commission, 2013; Cameron Parish Tourist Commission, 2013; Hotelmotels.info, 2013; YellowPages, 2013).

Within the ROI, the vacant rental housing (6,835 units), motels/hotels (288 with an estimated 30 rooms per motel/hotel or 8,640 rooms), and RV parks (106 with an estimated 30 spaces per park, or 3,180 spaces) are sufficient to accommodate the estimated peak non-local workforce. Since many workers are expected to room with each other to lower costs, and peak construction months would be limited, the available housing is expected to be considerably more than needed.

It should also be noted that during construction of the existing SPLNG Terminal and CCTPL pipelines in Cameron Parish, landowners in Johnson Bayou used their private property to operate at least two RV parks for non-local construction workers. These same landowners, or others, may elect to establish RV parks for the SPLE Project and the CCTPL Expansion Projects. If these two parks are in operation, they might accommodate a minimum of 60 RVs.

Competition for hotels/motels and campsites could occur during the peak tourist seasons or if other large-scale projects are being constructed at the same time within the ROI. The peak construction workforce for the SPLE Project is expected to occur in the 48th month of construction. If construction proceeds on schedule, the peak construction workforce would be in June 2019. CCTPL anticipates pipeline construction beginning in June 2017 and being in service by December 2018. However, peak employment depends on when pipeline construction is initiated. Travel advisors recommend the best time to visit Louisiana is in early spring or late fall when the weather is mild. As proposed, the peak construction workforce would not be present during those months and, therefore, construction is unlikely to have significant effects on the tourism industry in the ROI.

Due to the relatively small non-local workforce and the availability of temporary housing in the ROI, we conclude that no negative impacts on housing resources are anticipated during construction of the Projects.

Displacement of Residences and Businesses

All construction for the SPLE Project would take place within the existing SPLNG Terminal site, so no residences or businesses would be displaced. No residential or other structures are within 50 feet of proposed construction workspaces.

Construction of the CCTPL Expansion Project also would not displace residences or businesses. About 78 percent of the pipelines would be constructed next to existing rights-of-way. Where residences are close to the edge of the construction right-of-way, CCTPL would reduce construction workspace areas as practicable to minimize inconvenience for property owners. If construction requires the removal of private property features such as gates or fences, the landowner or tenant would be notified beforehand. Following completion of construction, the property would be restored in accordance with any agreements between CCTPL and the landowner. CCTPL would develop site-specific residential construction plans for any residence within 25 feet of the construction work areas (However, at this time no residence would be within 25 feet of construction workspaces).

Before construction begins, CCTPL would work with the owners of agricultural land to identify any irrigation canals and related facilities within the construction workspaces. If any of these features are damaged during construction, they would be repaired to landowner specifications or to pre-construction condition.

We conclude that construction and operation of the Projects would not displace residences or businesses.

Property Values

Currently available information does not support any firm conclusion with respect to the effects of natural gas or LNG facilities on property values. No new land would be acquired for construction or operation of the SPLE Project and all construction activities would occur within land currently leased by Sabine Pass; therefore, no impact on property values is anticipated as a result of the addition of Trains 5 and 6.

The impact a pipeline may have on the value of a tract of land depends on many factors, including size, the values of adjacent properties, presence of other pipelines, the current value of the land, and the extent of development and other aspects of current land use. As part of the easement acquisition process, CCTPL would compensate landowners as appropriate for unrestored construction damage to their property, including damage to crops, pasture, and timber. In the event that a landowner observes damage after restoration is complete, CCTPL has stated that it would work with the landowner to correct the deficiency. Thus, we conclude that no impact on property values from construction or operation of the CCTPL Expansion Project is expected.

2.5.4 Public Services

This section describes the community and public services available within the ROI, including schools, emergency response protocol and medical facilities, and fire and police protection. Table 2.5-4 provides the total number of these public facilities within the ROI.

Education and School System

Table 2.5-4 lists the number of public schools within the ROI. In 2012, there were about 154,280 students enrolled in the 327 schools in the project area (Institute of Education Sciences, 2013, Public School Review, 2013).

Most non-local construction personnel are not expected to relocate their entire families to the construction areas; therefore, no impacts on local schools are expected. However, even if the non-local construction workers (2,764 workers during peak construction) brought an estimated 1,724 school age children with them (24 percent of the estimated in-migration of 7,186 persons), these children would represent 1.1 percent of the current school enrollment (154,280) in the ROI.

Ultimately, we conclude that impacts on the local school system are expected to be negligible. The addition of about 120 full-time workers at the SPLNG Terminal and 3 full-time workers along the extended CCTPL pipeline would have a negligible effect on the local school system because these workers would mostly be hired from the local/regional labor pool.

Hospitals

As shown in table 2.5-4, 50 hospitals with a total of 4,529 beds are within or adjacent to the project area (American Hospital Directory, 2013; Louisiana Hospital Inform, 2013; U Compare Healthcare, 2013).

Health care demands during the construction phase are expected to include emergency medical services to treat injuries resulting from construction accidents such as slips, trips, and falls. Medical facilities within the ROI are sufficient to absorb any increase in demand by the temporary construction workforce, with minimal cost to the local governments. Ultimately, we conclude that impacts on the local hospitals are expected to be negligible. The addition of about 120 full-time workers at the SPLNG Terminal and 3 full-time workers along the extended CCTPL pipeline would have a negligible effect on hospitals since these workers would mostly be hired from the local/regional labor pool.

TABLE 2.5-4 **Public Services**					
	Number of Public Schools	**Number of Police Departments**	**Number of Fire Departments (by type)**	**Number of Hospitals a/**	**Number of Hospital Beds**
Cameron Parish, LA	4	1	3 (Volunteer)	1	49
Calcasieu Parish, LA	60	7	5 (Career) / 8 (Volunteer)	8	740
Sulphur, LA	13	1	2 (Career) / 1 (Volunteer)	2	150
Beauregard Parish, LA	13	3	1 (Career) / 2 (Volunteer)	1	60
Allen Parish, LA	12	4	1 (Career) / 5 (Volunteer)	2	85
Evangeline Parish, LA	12	5	1 (Career) / 4 (Volunteer)	2	227
St. Landry Parish, LA	37	11	4 (Career) / 4 (Volunteer)	6	326
Acadia Parish, LA	24	5	3 (Career) / 9 (Volunteer)	6	243
Jefferson Davis Parish, LA	14	6	4 (Career)	3	89
Avoyelles Parish, LA	13	8	3 (Career) / 10 (Volunteer)	2	76
Rapides Parish, LA	56	8	17 (Career) / 12 (Volunteer)	11	1,061
Jefferson County, TX	82	7	5 (Career) / 3 (Volunteer)	5	1,179
Port Arthur, TX	23	1	1 (Career)	1	244

a Hospitals do not include rehabilitation, long-term care, or psychiatric facilities.

Sources: American Hospital Directory, 2013; Fire Department Directory, 2013; Institute of Education Sciences, 2013; Louisiana Hospital Inform, 2013; Public School Review, 2013; U Compare Healthcare 2013, U.S.A. Cops, 2013

Police and Fire

As shown in table 2.5-4, 67 police departments and 108 fire departments serve the project area and/or the surrounding areas (Fire Department Directory, 2013; U.S.A. Cops, 2013). The fire departments that serve each of the communities within the project area are composed of both career and volunteer divisions.

Construction-related demands on local agencies could include increased enforcement activities associated with issuing permits for vehicle load and width limits, local police assistance during construction at road crossings to facilitate traffic flow, and emergency medical services to treat injuries resulting from construction accidents. Police and fire departments within the ROI can absorb any increase in demand by the temporary construction workforce with minimal cost to the local governments. Further, the SPLNG Terminal has 24-hour on-site security, which would minimize reliance on local law enforcement. The SPLNG Terminal also has an on-site firewater pond and pumps with sufficient capacity to respond to fires. We conclude that construction of the Projects would have only minor and temporary negative impacts on the local police and fire services. The addition of about 120 full-time workers at the SPLNG Terminal and three full-time workers along the extended CCTPL pipeline would have a negligible effect on police and fire services since these workers would mostly be hired from the local/regional labor pool.

2.5.5 Transportation

Existing public highways (primarily Louisiana SH 82) would be used to transport construction equipment, materials, and workers to the SPLNG Terminal site. Once at the site, construction traffic would use Duck Blind Road (which parallels the western boundary of the SPLNG Terminal property), Center Levee Road, or Lighthouse Road (which is the SPLNG Terminal main entrance road that parallels the eastern boundary of the property).

Material deliveries to the site would generate, on average, 10 to 12 deliveries via truck per day during construction, with a peak of 15 to 20 trips per day during peak construction. A similar number of small, two-axle truck trips would also be expected. Material delivery vehicles would not exceed the load capacity of either the public roads or the SH 82 bridge. Heavy material delivery would be via barge to the on-site construction dock or via SH 27 to SH 82 from Holly Beach, Louisiana.

It is anticipated that most construction materials and workforce access to the site would be from the west, from the Port Arthur, Texas, area via SH 82, crossing the Sabine Pass Channel at the bridge on SH 82. The remainder of the construction materials and workforce would access the site from the east (from the Sulphur, Louisiana area) via SH 27 and SH 82. From the SPLNG Terminal site, the primary route to connect to the interstate highway system is U.S. Route 69/96 in Port Arthur to Interstate 10 in Beaumont, about 30 miles from the SPLNG Terminal. Alternately, the interstate can be accessed via SH 82 to SH 27 in Holly Beach to I-10 in Lake Charles, Louisiana.

Traffic impacts associated with the construction of the Stage 3 liquefaction Trains 5 and 6 would be similar to those analyzed for the phased construction of the Stage 1 and 2 liquefaction trains. In the EA prepared for the Stage 1 and 2 trains, FERC concluded that temporary impacts on traffic could occur during the construction period but conditions would return to normal during operation. Since Stages 1 and 2 will be operational when Stage 3 construction begins there will be no overlap in construction that would cause an increase in potential impacts.

Temporary impacts on the transportation network during construction of the pipeline facilities would result from construction across roads and from the movement of construction personnel, equipment, and materials to the pipeline rights-of-way. The pipeline route would cross six U.S. Highways (171, 190, 185, 126, 13, and 167) and eight state highways (SH 82, 27, 376 [three times], 10, and 3042 [twice]), all of which would be used by construction-related traffic to reach the smaller local roads that would provide access to the pipeline right-of-way.

CCTPL would use boring or HDD methods to install the pipeline beneath certain roads, generally including federal and state highways, which would avoid or minimize disrupting traffic flows on these roads. Other roads would be crossed using the open-cut method, which would temporarily disrupt road traffic. To avoid or minimize delays associated with open-cut road crossings, CCTPL would establish detours if necessary. If no reasonable detours are feasible, no more than one traffic lane would be used during construction except for the brief periods when road closure is essential to lay the pipeline in the trench. CCTPL would also avoid road closings during peak traffic hours and would coordinate construction activities with appropriate local and state officials in order to avoid or minimize any potential traffic delays/impacts. Road crossings would comply with applicable state and local regulations and permits and, in the case of private roads, landowner agreements.

Heavy truck traffic associated with transporting construction equipment and pipe to the project area (including the pipeline rights-of-way or the contractor yard) could potentially cause delays in traffic flow, but such impacts would be temporary. Construction work is typically scheduled to take advantage of daylight hours, usually starting at 7:00 a.m. and ending at 6:00 p.m. (six days a week). Therefore, most workers would commute to and from the CCTPL pipeline right-of-way during off-peak travel hours. Once construction equipment and materials reach the construction rights-of-way, construction-related traffic would remain on the right-of-way except to cross roads. It is unlikely that workers commuting to the construction areas would significantly affect traffic patterns in the project area. Workers would be expected to leave many of their personal vehicles at a contractor yard and share rides to the rights-of-way. Because pipeline construction is linear and progressive, workers would be dispersed along the right-of-way, and disruptions of traffic on local roads would be limited to a short period at any given location as the construction progresses along the pipeline route.

Workers commuting to CCTPL construction sites would likely be commuting from areas near the work location because temporary housing options are readily available throughout the entire ROI. Workers would make one round trip to the site per day. No significant impacts on SH 82 or other major roadways are expected as a result of the movement of workers or materials to and from the proposed project sites.

In an effort to help minimize vehicle traffic on the area road network, the SPLNG Terminal construction dock would be used to transport equipment and materials to the SPLNG Terminal site. Barges would use the Intracoastal Waterway and the Sabine Pass and Port Arthur ship channels to reach and unload materials at the construction dock. The SPLNG Terminal construction dock is along the Sabine Pass Channel, southeast of the proposed liquefaction trains.

No additional marine facilities would be required for the SPLE Project. Trains 5 and 6 would use the existing marine berths at the SPLNG Terminal and would load or unload at the same rate (12,000 cubic meters per hour). During the permitting and review process for the SPLNG Terminal, Sabine Pass coordinated with the U.S. Coast Guard (USCG) in preparing shipping studies. These studies considered the maximum number of ships that the 4.0-Bcf/d SPLNG Terminal could accommodate in a year.

The number of ships using the SPLNG Terminal would not increase from the maximum of 400 ships, which was and would remain the basis of the total ship visits. This number was derived by estimating the maximum number of ships that could call on the terminal and included channel transit time, positioning in the marine berth and unloading, and exiting the channel while either receiving and re-gasifying, or producing and exporting, about 4.0 Bcf/d of natural gas during the year. Since the loading rates proposed for Trains 5 and 6 are the same as the original unloading rates, no increase in ship traffic is proposed.

2.5.6 Environmental Justice

In 1994, EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income communities (The White House, 1994). In 1997, EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, expanded the focus to include children populations. The EOs require that impacts on minority or low-income populations and children be taken into account when preparing environmental and socioeconomic analysis of projects or programs that are proposed, funded, or licensed by federal agencies. EOs 12898 and 13045 are described in more detail below.

- *EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 1994)* requires federal agencies to identify and take necessary measures to address disproportionately high and adverse human health or environmental effects of its actions on these populations to the greatest extent practicable permitted by law and also involve representatives of these populations in the community participation and public involvement process (The White House, 1994).

- *EO 13045, Protection of Children from Environmental Health Risks and Safety Risks (April 1997)* requires a similar analysis for children, where federal agencies are required to identify and address the potential environmental health risks and safety risks of its actions that may disproportionately affect children (The White House, 1997).

Table 2.5-5 provides a summary of the ethnic profile of the potentially affected parishes/counties and municipalities in and around the project area. The percentage of minority populations in the vicinity of the SPLE Project and the CCTPL Expansion Project are generally lower than the state as a whole. In some cases the minority population is as much as 30 percent lower than the state average. St. Landry Parish and Jefferson County both have minority populations higher than Louisiana's state average; however, the Projects are expected to have beneficial socioeconomic impacts. During construction, the Projects would positively affect minority and economically disadvantaged populations, as well as the general population, by generating jobs, boosting economic activity within the ROI, and providing continuing tax payments during operation.

TABLE 2.5-5

Ethnic Profile

	White (percent)	Black or African American (percent)	American Indian or Alaskan Native (percent)	Asian (percent)	Native Hawaiian and Other Pacific Islander (percent)	Two or More Races (percent)	Hispanic or Latino (of any race) a/ (percent)
United States	77.9	13.1	1.2	5.1	0.2	2.4	16.9
State of Louisiana	63.7	32.4	0.7	1.7	0.1	1.4	4.5
Cameron Parish, LA	96.5	1.9	0.6	0.2	0.0	0.9	3.0
Calcasieu Parish, LA	71.5	25.1	0.5	1.2	0.1	1.7	2.8
Sulphur, LA	89.8	6.2	0.4	0.8	0.1	1.8	3.4
Beauregard Parish, LA	82.2	13.5	1.1	0.7	0.1	2.5	3.2
Allen Parish, LA	71.9	23.4	2.5	0.7	< 0.1	1.5	1.5
Evangeline Parish, LA	69.8	28.4	0.3	0.4	< 0.1	1.0	2.3
St. Landry Parish, LA	56.6	41.5	0.4	0.4	< 0.1	1.1	1.7
Acadia Parish, LA	79.9	18.3	0.3	0.3	< 0.1	1.2	1.9
Jefferson Davis Parish, LA	80.2	17.2	0.6	0.3	< 0.1	1.7	1.8
Avoyelles Parish, LA	67.2	29.4	1.3	0.5	< 0.1	1.6	1.6
Rapides Parish, LA	64.1	32.1	0.9	1.3	< 0.1	1.6	2.7
Jefferson County, TX	59.6	34.2	1.0	3.7	0.1	1.4	18.2
Port Arthur, TX	36.1	40.7	0.7	5.9	< 0.1	2.4	29.6

a Because multiple races can claim to be Hispanic or Latino, some duplication may be present in this census information.

Sources: U.S. Census Bureau, 2010, 2013a, 2013b

There is a potential for minor temporary adverse impacts on children. Because construction sites can be appealing to children, construction activity could be an increased safety risk; however, mitigation measures such as fencing, signs, and communication with affected landowners about the timing of construction activities on their properties would be used to reduce this to a non-significant impact. The Projects would be constructed and operated in a manner consistent with appropriate federal and state regulations.

During operation, the Projects would have positive socioeconomic effects on minority and economically disadvantaged populations as well as the general population in the ROI through job creation, economic activity, and continuing tax payments. Construction and operation of the Projects would not generate significant levels of air quality emissions (either nuisance or human health hazards) off-site. Additionally, no significant impacts on water quality or noise are expected to affect the health or welfare of the population living in the ROI. The minor impacts that would occur would be temporary, with water quality returning to existing conditions when construction is completed, or would be about the same as existing noise conditions in the area (see sections 2.7.2 and 2.7.3).

We conclude that construction and operation of the Projects would not disproportionately affect any population group, and no environmental justice or protection of children issues are anticipated as a result of construction or operation of the Projects.

2.6 Cultural Resources

Section 106 of the National Historic Preservation Act, as amended, requires the FERC to take into account the effects of its undertakings on properties on or eligible for listing on the National Register of Historic Places and to afford the Advisory Council on Historic Preservation an opportunity to comment. Sabine Pass, as a non-federal party, is assisting us in meeting our obligations under Section 106 and the implementing regulations at 36 CFR 800.

Consultation

We sent copies of our NOI for this project to a wide range of stakeholders, including the U.S. Department of the Interior Bureau of Indian Affairs, the Louisiana Department of Culture, Recreation, and Tourism, and Indian tribes that may have an interest in the project area. The NOI stated that we use the notice to initiate consultations with the State Historic Preservation Officer (SHPO)[13], regarding Section 106 of the National Historic Preservation Act, and to solicit their views and those of other government agencies, interested Indian tribes, and the public on the project's potential effects on historic properties.

In addition to the NOI, on June 13, 2013, FERC staff sent letters inviting consultation to the five federally recognized Native American tribes listed below:

- Alabama-Coushatta Tribe of Texas;
- Caddo Nation;
- Chitimacha Tribe of Louisiana;
- Coushatta Tribe of Louisiana; and
- Tunica-Biloxi Indians of Louisiana.

To date, no tribes have responded to our request for comment.

13 In Louisiana, the SHPO is part of the Louisiana Department of Culture, Recreation, and Tourism.

Sabine Pass sent project information to the same five tribes and to the Jena Band of Choctaw Indians in letters dated April 19, 2013. The Jena Band of Choctaw Indians indicated that it has no concerns at this time. However, if any culturally significant artifacts are discovered, the tribe requested that Sabine Pass contact the Tribal Historic Preservation Office immediately. To date, none of the other five tribes responded to Sabine Pass.

Sabine Pass and CCTPL consulted with the Louisiana SHPO regarding the cultural investigation for the SPLE Project and the CCTPL Expansion Project. Because the SPLE Project would be within the existing 853-acre leased boundary of the SPLNG Terminal, which has been preciously evaluated for cultural resources, Sabine Pass requested cultural resources clearance for the SPLE Project.[14] In a response dated August 13, 2013, the Louisiana SHPO indicated that no known historic properties would be affected by the SPLE Project (Breaux, 2013a). Additionally, CCTPL consulted with the Louisiana SHPO regarding survey methodology and site avoidance strategies for the CCTPL Expansion Project.[15]

Cultural Resource Surveys

CCTPL conducted archaeological and architectural surveys within previously unsurveyed portions of the area of potential effects (APE) for the CCTPL Expansion Project, including unsurveyed areas within the pipeline rights-of-way for the looping, expansion, and lateral pipelines, and unsurveyed areas at aboveground facilities, expanded work areas, contractor yards, and access roads.

The archaeological and architectural survey of the construction workspace generally encompassed a 300-foot-wide corridor along the proposed pipeline rights-of-way and the entire workspace for aboveground facilities and contractor yards. In some locations along the pipeline rights-of-way, expanded workspaces were surveyed beyond the 300-foot-wide corridor to accommodate necessary construction activities. The survey coverage for the access roads was a 50-foot-wide corridor.

For previous projects, CCTPL conducted architectural surveys along the pipeline routes. CCTPL is consulting with the Louisiana SHPO to determine if additional architectural surveys are necessary to update the previously surveyed portions of the APE. CCTPL has not updated this consultation at this time.

Five areas have not been surveyed because access was denied: three areas along the Extension (MP 96.07 to 96.77, MP 118.48 to 118.74, and MP 134.24 to 134.84), one area along the PPEC Lateral (MP 2.43 to 2.76), and one area along the CGT Lateral (MP 9.3 to 9.53). CCTPL will survey these areas once permission to enter has been obtained. Three additional areas along the Extension were not surveyed because surficial ground disturbance would be avoided by using HDD.

Four archaeological resources were identified within the surveyed APE: one previously recorded historic archaeological site (16CU28), two newly recorded prehistoric archaeological sites (16AL48 and

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14 The terminal property had been evaluated before by both federal and state agencies for multiple projects, including the Sabine Pass LNG Import Terminal (FERC Docket Nos. CP04-38-000 and CP04-47-000), the Sabine Pass Phase II Project (FERC Docket No. SP05-396-000), and the Sabine Pass Liquefaction Project (FERC Docket No. CP11-72-000). For these projects, the Louisiana SHPO indicated that no known historic properties would be affected by any of these previous projects within the terminal property.

15 Portions of the CCTPL Expansion Project had been evaluated before by both federal and state agencies for multiple projects, including the Creole Trail LNG Terminal and Pipeline Project (FERC Docket Nos. PF05-08-000, CP05-357-000, CP05-358-000, CP05-359-000 and CP05-357-000) and the Sabine Pass LNG and Pipeline Project (FERC Docket CP04-38-000, et al.). For these projects, the Louisiana SHPO indicated that no known historic properties would be affected by these previous projects, related to the area currently proposed as part of the CCTPL Expansion Project area.

16AL49), and one newly recorded prehistoric isolated find (IF-WWD-01). The time periods represented by these archaeological resources consists of unknown prehistoric occupation (16AL48), Late Woodland period occupation (IF-WWD-01), Woodland and/or Mississippian period occupation (16AL49), and a late 19th/early 20th century-era sulfur mine and associated living quarters (16CU28). No previously or newly recorded historic buildings or structures were identified within the surveyed APE.

The portion of a previously recorded historic archaeological site (16CU28) that would be crossed by the CCTPL Extension Project has been recommended not eligible for listing in the National Register of Historic Places. Additionally, site 16AL48 and the isolated find were recommended as not eligible for listing on the National Register. Therefore, no avoidance or mitigation measures for these sites are necessary. The National Register eligibility of site 16AL49 is unknown; however, the pipeline route has been designed to completely avoid this site by using HDD construction techniques to install the pipeline under the site.

The Phase I cultural resources report presenting results of the archeological and architectural surveys was provided to FERC and the Louisiana SHPO. In a letter dated October 3, 2013, the Louisiana SHPO agreed with the findings of the draft Phase I cultural resources investigation, and agreed with the measures to avoid site 16AL49. We agree as well.

Sabine Pass developed an unanticipated discovery plan for the SPLNG Terminal facilities that would also be used during construction of the CCTPL Expansion Project. The UDP was approved by the Louisiana SHPO in August 2004 and July 2005, and was updated and approved for Docket No. CP11-72-000 in 2012. This unanticipated discovery plan has been updated to include appropriate contact information for the CCTPL Expansion Project and was filed with the FERC in the current application. We find this plan acceptable.

As noted above, CCTPL has not been granted access to survey five areas of the project (three areas along the Extension; one area along the PPEC lateral, and one area along the CGT Lateral). Additionally, CCTPL is consulting with the Louisiana SHPO to determine if additional architectural surveys are necessary for those portions of the CCTPL Expansion Project that were surveyed for other projects. Therefore, to ensure compliance with Section 106 requirements, **we recommend that:**

- **CCTPL <u>not begin</u> construction of facilities and/or use staging, storage, or temporary work areas and new or to-be-improved access roads until:**

  a. CCTPL files supplemental survey reports for areas where access was not previously granted, any realignments or reroutes, extra work spaces, access roads, contractor yards, or other areas requiring survey, and the Louisiana SHPO's comments on the reports;

  b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

  c. the Director of OEP reviews and approves all reports and plans and notifies CCTPL in writing that it may proceed with any treatment or construction.

  All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: <u>"CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."</u>

2.7 Air Quality and Noise

2.7.1 Air Quality

Air quality would be affected by construction and operation of the SPLE and CCTPL Expansion Projects. The Mamou Compressor Station would be about 105 miles northeast of the SPLNG Terminal. Although air emissions would be generated by equipment operations during construction of the aboveground facilities and pipeline proposed by Sabine Pass and CCTPL, most air emissions associated with the SPLE Project and CCTPL Expansion Project would result from the long-term operation of the SPLE and CCTPL Expansion Projects.

2.7.1.1 Existing Environment

The project area is characterized by a modified marine climate that is influenced by the predominant onshore flow of tropical maritime air from the Gulf of Mexico during parts of the year. When onshore flow occurs, the region exhibits a more subtropical humid climate. During summer, sea breezes help moderate maximum temperatures.

According to the National Climate Data Center's (NCDC) 2013 Local Climatological Data Annual Summary with Comparative Data (NCDC, 2013), which summarizes data for the years 1984 through the end of 2013, temperatures at the SPLE and CCTPL Expansion Project areas are generally highest in July and August and lowest in January. Monthly average daily maximum temperatures range from the low 60 °F in January to the low 90°F in August. Monthly average daily minimum temperatures range from the low 40°F in January to the mid 70°F in July. Maximum temperatures of 90°F or higher occur over 70 days per year on average, while minimum temperatures of 32°F or lower occur about 10 days per year on average.

The mean annual precipitation at the project areas is about 60 inches, with monthly average precipitation ranging from a low of about 3 inches in April to a maximum of about 7 inches in June. Precipitation of 0.01 inch or greater occurs on about 100 days per year on average. Precipitation of 1.0 inch or greater occurs on average about 18 to 19 days per year. The annual average wind speed is about 8 mph. Wind direction shows significant seasonal variations. In the spring, winds from the south are most frequent. In the summer, winds from the south and west-southwest predominate. In the fall, winds from the north clockwise through northeast are common. In the winter, winds from the north predominate.

2.7.1.2 Ambient Air Quality

Ambient air quality is protected by federal and state regulations. The Clean Air Act (CAA) and its amendments designate six pollutants as criteria pollutants for which the National Ambient Air Quality Standards (NAAQS) are promulgated. The NAAQS for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM), including PM less than 10 microns in aerodynamic diameter (PM_{10}) and PM less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), carbon monoxide (CO), ozone , and lead were set by the EPA to protect human health (primary standards) and public welfare (secondary standards). The current NAAQS for these criteria pollutants are summarized in table 2.7-1.

Individual state air quality standards cannot be less stringent than the NAAQS. The LDEQ has adopted ambient air quality standards that are the same as the NAAQS, with the exceptions that the LDEQ has not yet adopted SO_2 or NO_2 1-hour standards or the 2008 ozone 8-hour standard. The Louisiana standards use a calendar quarter averaging period for lead, with a primary and secondary standard equal to 1.5 micrograms per cubic meter ($\mu g/m^3$).

TABLE 2.7-1

National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS Primary	NAAQS Secondary
SO_2	3-hour **a/**	--	0.5 ppm 1300 µg/m^3
	1-hour **b/**, **c/**	75 ppb	-
PM_{10}	24-hour **d/**	150 µg/m^3	150 µg/m^3
$PM_{2.5}$	Annual **e/**	12.0 µg/m^3	15.0 µg/m^3
	24-hour **f/**	35 µg/m^3	35 µg/m^3
NO_2	Annual **g/**	0.053ppm (53 ppb) 100 µg/m^3	0.053 ppm (53 ppb) 100 µg/m^3
	1-hour **h/**	100 ppb	53 ppb
CO	8-hour **a/**	9 ppm 10,000 µg/m^3	-
	1-hour **a/**	35 ppm 40,000 µg/m^3	-
O_3 (2008 Standard)	8-hour **i/**	0.075 ppm	0.075 ppm
O_3 (1997 Standard)	8-hour **i/**, **j/**	0.08 ppm	0.08 ppm
Lead	Rolling 3-month **g/**	0.15 µg/m^3	0.15 µg/m^3
	3-month **g/**	1.5 µg/m^3	1.5 µg/m^3

a Not to be exceeded more than once per year.

b Compliance based on 3-year average of 99th percentile of daily maximum 1-hour average at each monitor within an area.

c The 1-hour SO_2 standard is effective August 23, 2010.

d Not to be exceeded more than once per year on average over 3 years.

e Compliance based on 3-year average of weighted annual mean $PM_{2.5}$ concentrations at community-oriented monitors.

f Compliance based on 3-year average of 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.

g Not to be exceeded.

h Compliance based on 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area.

i Compliance based on 3-year average of fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area.

j The 1997 8-hour ozone standard and associated implementation rules remain in place as the transition to the 2008 standard occurs.

Note: ppm = parts per million
ppb = parts per billion
µg/m^3 = micrograms per cubic meter

The EPA and state and local agencies have established a network of ambient air quality monitoring stations to measure and track the background concentrations of criteria pollutants across the United States. To characterize the background air quality in the region surrounding the project areas, data were obtained from representative air quality monitoring stations near the SPLNG Terminal and the

Mamou Compressor Station. For some criteria pollutants, ambient air quality monitoring data in the project area were not available. Therefore, the best available data were used to represent the air quality at those stations. A summary of the regional ambient air quality monitoring data from the 3-year period (2010 to 2012) for the project areas are presented in table 2.7-2.

On December 7, 2009, the EPA defined air pollution to include six well-mixed greenhouse gases (GHGs), finding that the presence of these GHGs in at the atmosphere endangers public health and public welfare through climate change: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

As with any fossil-fuel fired project or activity, the SPLE and CCTPL Expansion Projects would contribute GHG emissions. The principal GHGs that would be produced are CH_4, CO_2, and N_2O. No fluorinated gases would be emitted. Emissions of GHGs are typically quantified and regulated in unites of carbon dioxide equivalents (CO_2-eq).

The CO_2-eq takes into account the global warming potential (GWP) of each GHG. The GWP is a ratio relative to CO_2 that is based on the properties of a GHG's ability to absorb solar radiation as well as its residence time in the atmosphere. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298. [16] In compliance with EPA's definition of air pollution to include GHGs, we have provided estimates of GHG emissions for construction and operation, as discussed throughout this section. Impacts from GHG emissions (climate change) are described in more detail in section 2.7.1.4.

Air Quality Control Regions (AQCRs) were established in accordance with Section 107 of the CAA as a way to implement the CAA and to comply with the NAAQS through state implementation plans. The AQCRs are intra- and interstate regions such as large metropolitan areas where the improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or portion thereof, is designated as attainment, unclassifiable, maintenance, or nonattainment. Areas where an ambient air pollutant concentration is determined to be below the applicable ambient air quality standard are designated attainment. Areas where no data are available are designated unclassifiable. Unclassifiable areas are treated as attainment areas for the purpose of permitting a stationary source of pollution. Areas where the ambient air concentration is greater than the applicable ambient air quality standard are designated nonattainment. Areas that have been designated nonattainment but have since demonstrated compliance with the ambient air quality standard(s) are designated maintenance for that pollutant. Cameron, Calcasieu, Beauregard, Allen, and Evangeline Parishes, Louisiana, are designated as in attainment for all regulated pollutants.

While Cameron Parish is in attainment for all criteria pollutants, three neighboring counties in Texas (Hardin, Jefferson, and Orange), comprising the Beaumont-Port Arthur Area, are classified as 8-hour ozone maintenance areas. These counties are within 50 miles of the SPLE Project location. Cameron Parish is also near parishes in the Baton Rouge, Louisiana, area that are designated nonattainment for 8-hour ozone and the Houston/Galveston/Brazoria 8-hour ozone severe nonattainment area.

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16 These GWPs are based on a 100-year time period. We have selected their use over other published GWPs for other time periods because these are the GWPs that EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

TABLE 2.7-2

Ambient Air Quality Concentrations

Pollutant	Averaging Period	Rank	Units	SPLNG Terminal			Mamou Compressor Station		
				2012	2011	2010	2012	2011	2010
CO	1-hour	2^{nd} high	ppm	0.7 a/	0.6 a/	1.0 a/	2.2 g/	1.7 g/	2.5 g/
	8-hour	2^{nd} high	ppm	0.5 a/	0.4 a/	0.5 a/	1.7 g/	1.4 g/	2.0 g/
NO_2	annual	mean	ppb	11.9 a/	10.8 a/	13.8 a/	12.3 h/	15.4 h/	15.6 h/
	1-hour	98th percentile	ppb	28 a/	25 a/	34 a/	27 h/	32 h/	37 h/
O_3	1-hour	2^{nd} high	ppm	0.104 b/	0.13 b/	0.102 b/	0.082 j/	0.087 j/	0.086 j/
	8-hour	4^{th} high	ppm	0.076 b/	0.084 b/	0.081 b/	0.07 j/	0.073 j/	0.074 j/
$PM_{2.5}$	24-hour	98^{th} percentile	µg/m^3	18 c/	22 c/	18 c/	18 j/	21 j/	23 j/
	annual	mean	µg/m^3	8 c/	9 c/	9 c/	8.6 j/	9 j/	9.7 j/
PM_{10}	24-hour	2^{nd} high	µg/m^3	54 d/	47 d/	39 d/	73 j/	51 j/	72 j/
SO_2	1-hour	99th percentile	ppb	46 e/	62 e/	70 e/	42 j/	37 j/	34 j/
	3-hour	2^{nd} high	ppm	0.032 e/	0.051 e/	0.065 e/	0.037 j/	0.055 j/	0.03 j/
	24-hour	2^{nd} high	ppm	0.008 e/	0.017 e/	0.018 e/	0.019 j/	0.019 j/	0.014 j/
	annual	mean	ppm	1.0 e/	2.0 e/	1.9 e/	0.004 j/	0.005 j/	0.003 j/
Pb	3-month rolling	annual average	µg/m^3	0.0026 f/	-	-	0.002 i/	0.005 i/	0.004 i/

Monitor Key

a Seattle Street, Nederland, Jefferson Co., TX (monitor no. 482451035).
b 5200 Mechanic, Port Arthur, Jefferson Co., TX (monitor no. 482450101).
c 2284 Paul Bellow Road, Vinton, Calcasieu Parish, LA (monitor no. 220190009).
d 2516 Texas Avenue, Texas City, Galveston Co., TX (monitor no. 481670004).
e 623 Ellias Street, Port Arthur, Jefferson Co., TX (monitor no. 482450011).
f 4514 ½ Durant St., Deer Park TX (monitor no. 482011039).
g 1061-A Leesville Ave., Baton Rouge, LA (monitor no. 22-033-0009).
h 2646 John Stine Road, Westlake, LA (monitor no. 22-019-0008).
i 1400 West Irene Road, Zachary, LA (monitor no. 22-033-00014.
j 646 Cajundome, Lafayette, LA (monitor no. 22-055-0007).

2.7.1.3 Regulatory Requirements

The CAA, as amended in 1977 and 1990, is the basic federal statute governing air pollution. The provisions of the CAA that are potentially relevant to the Projects include the following:

- Prevention of Significant Deterioration (PSD)/Nonattainment New Source Review (NNSR);
- Title V Operating Permits;
- New Source Performance Standards (NSPS);
- National Emission Standard for Hazardous Air Pollutants for Source Categories (NESHAP);
- Chemical Accident Prevention Provisions;
- General Conformity; and
- GHG Reporting Rule.

Prevention of Significant Deterioration/Nonattainment New Source Review

Separate procedures have been established for federal pre-construction air permit review of certain large proposed projects in attainment areas versus nonattainment areas. Federal pre-construction review for affected sources located in attainment areas is called PSD. This process is intended to keep new or modified major air emission sources from causing existing air quality to deteriorate beyond acceptable levels. Federal pre-construction review for affected sources located in nonattainment areas is commonly referred to as an NNSR, which contains stricter thresholds and requirements. The SPLNG Terminal and the proposed site for the new Mamou Compressor Station are located in attainment areas and are, therefore, potentially subject to PSD regulations.

The PSD regulations define a major source as any source type belonging to a list of named source categories that emit or have the potential to emit 100 tons per year (tpy) or more of any regulated pollutant. A major source under PSD also can be defined as any source not on the list of named source categories with the potential to emit any regulated pollutant equal to or greater than 250 tpy. Modifications of existing facilities have lower pollutant thresholds, called significant emission rates (100 tpy for CO; 40 tpy for nitrogen oxides (NO_X), volatile organic compounds (VOCs), and SO_2 [for each]; 15 tpy for PM_{10}; and 10 tpy for $PM_{2.5}$), above which PSD review is triggered.

On May 13, 2010, the EPA issued the PSD GHG Tailoring Rule. After July 1, 2011, the PSD major source threshold of 100,000 tpy of CO_2-eq became effective for new sources. For existing PSD major sources, the threshold for a modification is 75,000 tpy CO_2-eq.

The SPLNG Terminal is an existing PSD major source, and the SPLE Project would be a major modification. As shown in table 2.7-3, the net emissions increase requires a PSD review for PM_{10}, $PM_{2.5}$, NO_2, CO, and VOCs. Sabine Pass filed its revised air permit application with the LDEQ in September 2013 and filed an addendum to the air permit application in September 2014.

The September 2013 permit application and September 2014 addendum address emissions associated with the additional liquefaction trains and updated emissions for liquefaction Trains 1 through 4. Sabine Pass refined the refrigeration compressor gas turbine emissions based on revised gas turbine manufacturer's data and slight changes in the emission rate based on the type of refrigerant gas being compressed.

The sum of the changes from the revised application and application addendum are reflected in the emission totals shown in this section.

TABLE 2.7-3

Potential to Emit Criteria and Hazardous Air Pollutants (in tons per year)

Emission Unit	NO_X	VOCs	CO	PM_{10}	$PM_{2.5}$	SO_2	Total HAP	Individual HAP a/
SPLE Project Trains 5 and 6								
Acid gas vent thermal oxidizers (2)	19	1	75	2	2	6	20	13
Flares – Wet gas (1), Dry gas (1)	19	40	164	<0.1	<0.1	0.14		
Refrigeration compressor turbines (12)	1,687	36	1,312	38	38	-		
Natural gas-fired generator turbines (2)	251	5	153	6	6	-		
Standby diesel-fired engines (2)	12	1	6.4	0.4	0.4	0.02		
Fugitive emissions	-	4	-	-	-	-		
SPLE Project Trains 5 and 6 Total	1,988	87	1,710	47	47	6	20	13
Total Facility b/	6,638	318	6,043	186	186	24	67	44
Vaporization and Liquefaction Emissions Cap c/	5,906	136	4,572	149	149	4.76	-	44
Wet and Dry Gas Flare Emissions Cap c/	57	121	493	0.05	0.05	0.43	-	0.52

a Highest individual HAP emission is formaldehyde for SPLE Trains 5 and 6, total facility, and the vaporization/liquefaction emission cap. Highest individual HAP for the wet and dry gas flare emission cap is benzene.

b Total facility emissions are based on data presented in the Title V and PSD permit applications and include the existing vaporization facility and liquefaction Trains 1 to 6. Includes modifications to existing liquefaction Trains 1 through 4, including increasing the NOx emission rate from 20 ppm to 25 ppm, changing standby engines from natural gas to diesel fuel, adding thermal oxidizers to acid gas vents, updating refrigeration compressor gas turbine emission profiles based on the type of refrigerant, and incorporating updated emission rates from equipment manufacturers and stack testing.

c Sabine Pass's Title V permit application contains emissions caps (limits) for total emissions from the vaporization and liquefaction equipment, and for the wet and dry gas flares. The vaporization/liquefaction emission cap limits annual emissions to less than total vaporization/liquefaction facility emissions; similarly for wet and dry gas flares, the cap limits emissions to less than total wet and dry gas flare emissions.

Facilities can trigger additional review by the EPA if emissions exceed the PSD major source thresholds and if project-associated emissions exceed the PSD significant emission rate for existing facilities defined as a PSD major source. The revised air permit application and addendum is still under LDEQ's review. Sabine Pass would be subject to the emissions limitations, monitoring requirements, and other conditions set forth in the permit.

The SPLNG Terminal also has projected CO_2-eq emissions attributed to the modification above 75,000 tpy (see table 2.7-4). Therefore, the SPLE Project is subject to the PSD GHG Tailoring Rule, and Sabine Pass included a GHG Best Available Control Technology Analysis as part of its PSD permit modification and addendum.

TABLE 2.7-4

Potential to Emit Greenhouse Gases (in tons per year)

Emission Unit	CO_2	N_2O	CH_4	GHG (CO_2-eq)
SPLE Project Trains 5 and 6				
Acid gas vent thermal oxidizers (2)	3.96E05	4.00E-02	5.10E-01	3.96E05
Flares – Wet gas (1), Dry gas (1)	4.08E04	6.60E-02	9.90E01	4.24E04
Refrigeration compressor turbines (12)	2.00E06	1.88E00	3.76E01	2.00E06
Natural gas-fired generator turbines (2)	2.94E05	5.50E-01	5.50E00	2.94E05
Standby diesel-fired engines (2)	1.3E03	1.00E-02	5.00E-02	1.3E03
Fugitive emissions	2.10E02	-	1.55E03	3.28E04
SPLE Project Trains 5 and 6 Total	2.73E06	6.52E00	1.69E03	2.77E06
Total Facility a/	9.81E06	1.64E01	5.10E03	9.92E06
Vaporization and Liquefaction Emissions Cap b/	7.21E06	1.36E01	1.36E02	7.22E06
Wet and Dry Gas Flare Emissions Cap b/	1.21E05	1.98E-01	2.96E02	1.27E05

a Total facility emissions are based on data presented in the Title V and PSD permit applications and include the existing vaporization facility and liquefaction trains 1 to 6. Includes modifications to existing liquefaction trains 1 through 4 including increasing the NO_X emission rate from 20 ppm to 25 ppm, changing standby engines from natural gas to diesel fuel, adding thermal oxidizers to acid gas vents, updating refrigeration compressor gas turbine emission profiles based on the type of refrigerant, and incorporating updated emission rates from equipment manufacturers and stack testing.

b Sabine Pass's Title V permit application contains emissions caps (limits) for total emissions from the vaporization and liquefaction equipment and for the wet and dry gas flares. The vaporization/liquefaction emission cap limits annual emissions to less than total vaporization/liquefaction facility emissions; similarly for wet and dry gas flares, the cap limits emissions to less than total wet and dry gas flare emissions.

Based on total facility-wide net emissions presented in table 2.7-5, the New Mamou Compressor Station would exceed the PSD *de minimis* levels for NO_X and CO. Projected CO_2-eq emissions for the Mamou Compressor Station are also above the 100,000 tpy CO_2-eq threshold (see table 2.7-5); thus, it is subject to the PSD GHG Tailoring Rule. CCTPL filed an air permit application with the LDEQ in September 2013 and updated the air permit application with additional data and a dispersion modeling study in January 2014. A draft permit was issued for public review with the comment period ending May 15, 2014. The final permit was issued June 2, 2014. CCTPL is subject to the emissions limitations, monitoring requirements, and other conditions set forth in the permit.

TABLE 2.7-5

Potential to Emit for Criteria and Hazardous Air Pollutants and GHG– CCTPL Mamou Compressor Station (in tons per year)

Emission Unit	NO_X	VOCs	CO	PM_{10}	$PM_{2.5}$	SO_2	Total HAP	Individual HAP a/	GHG (CO_2-eq)
Turbine 1 to 3	103	7.2	126	6.7	6.7	14.6	3.3	3.0	120,687
Turbine 4	63.5	4.4	76.9	4.1	4.1	9.00	2.0	1.8	74,345
Standby natural gas-fired engines (2)	0.24	0.04	0.16	0.02	0.02	0.02	0.02	0.02	44
Condensate Tank	-	0.26	-	-	-	-	-	-	-
Fugitive (valves, pumps, flanges)	-	0.25	-	-	-	-	0.06	0.06	-
Maintenance, Startup and Shutdown	0.52	0.51	44.2	-	-	-	-	-	286
Unit and Station Blowdown Emissions	-	13.8	-	-	-	-	2.8	2.8	11,969
Truck Loading	-	0.09	-	-	-	-	-	-	-
Total Facility	**167**	**27**	**247**	**11**	**11**	**24**	**8**	**8**	**207,331**

a Individual HAP emitted in largest quantity is formaldehyde (4.82 tpy).

One additional factor considered in the PSD review process is the potential impact on protected Class I areas. Areas of the country are categorized as Class I, Class II, or Class III. Class I areas are designated specifically as pristine natural areas or areas of natural significance and receive special protections under the CAA because of their good air quality. If a new source or major modification is subject to the PSD program requirements and is within 100 kilometers (62 miles) of a Class I area, the facility is required to notify the appropriate federal officials and assess the impacts of the project on the Class I area The closest designated Class I area (Breton National Wildlife Refuge) is about 450 kilometers (279 miles) away from the SPLNG Terminal and 330 kilometers (204 miles) away from the proposed site of the Mamou Compressor Station. Because of these distances, additional PSD Class I analysis was not required.

Title V Operating Permit

The Title V Operating Permit program requires major stationary sources of air emissions to obtain an operating permit within one year of initial facility startup. The major source threshold levels for determining the need for a Title V Operating Permit are a potential to emit 100 tpy or more of any criteria pollutant, 10 tpy of any individual HAP, or 25 tpy of any combination of HAPs. On May 13, 2010, the EPA issued the Title V Tailoring Rule. After July 1, 2011, facilities that emit at least 100,000 tpy CO_2-eq are subject to Title V permitting requirements.

The SPLNG Terminal is considered an existing Title V major source and currently operates under Title V permit number 0560-00214-V4 issued by the LDEQ on March 22, 2013. The permit includes provisions allowing operation as both an export and import facility, with no restrictions on simultaneous operation of export and import equipment (i.e., bi-directional operation). Sabine Pass applied to the LDEQ to modify its existing Title V permit to include the facilities associated with the SPLE Project and submitted an addendum to the application in September 2014. In the application and addendum, Sabine Pass included a vaporization and liquefaction emissions unit cap to limit annual emissions from combined operation. The emissions cap is less than the sum of the potential emissions from the vaporization facility and the liquefaction facility, and thus it provides a limit on simultaneous vaporization/liquefaction operation on an annual basis. Similarly, an emissions cap was included for the wet and dry gas flares to limit annual emissions. The permit application and addendum are currently under review at the LDEQ. The SPLNG Terminal would also exceed the Title V Tailoring Rule Thresholds and Sabine Pass was required to modify their Title V permit to meet GHG permitting requirements.

The new Mamou Compressor Station would exceed major source thresholds for NOx, CO, and CO_2-eq, and therefore, would be a new Title V major source. CCTPL applied to the LDEQ in September 2013 for a Title V permit and updated the application on January 31, 2014, with additional data and a dispersion modeling study. The final permit was issued June 2, 2014.

New Source Performance Standards

The NSPS include emission limits, monitoring, reporting, and record keeping for new or significantly modified sources. The following NSPS requirements were identified as potentially applicable to the Projects.

NSPS Subpart Kb, "Standards of Performance for Volatile Organic Liquid Storage Vessels, (Including Petroleum Liquid Storage Vessels)" applies to storage vessels that are constructed, reconstructed, or modified after July 23, 1984, with a capacity more than 75 cubic meters (19,800 gallons) that store volatile organic liquids. The Projects do not include construction of storage tanks with a capacity more than 75 cubic meters, so Subpart Kb does not apply.

NSPS Subpart IIII, "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines", applies to certain stationary compression ignition internal combustion engines (ICE). The SPLE Project includes two standby generator diesel engines, which would be subject to

Subpart IIII. The engines must meet the applicable emission standards in effect for the model year and type of engine installed. Sabine Pass states it would comply with the emission and monitoring limitations of Subpart IIII by installing manufacturer-certified engines and maintaining those engines according to the manufacturer's specifications. Additionally, Subpart IIII limits operation of emergency stationary ICE for the purpose of maintenance checks and readiness testing to 100 hours per year unless operation beyond 100 hours per year is required by other federal, state, or local standards. NSPS Subpart IIII does not apply to the Mamou Compressor Station because no compression ignition ICE would be installed there.

NSPS Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines," applies to manufacturers and owner/operators of spark-ignition ICEs manufactured after the applicability date stated in the rule for the particular type and size engine. The proposed natural gas-fired standby generators at the Mamou Compressor Station would be subject to NSPS Subpart JJJJ. The natural gas-fired engines must meet the applicable emission limits and operational requirements, as well as record-keeping and reporting requirements of this subpart. NSPS Subpart JJJJ does not apply to the SPLE Project because no spark ignition engines would be installed.

NSPS Subpart KKKK, "Standards of Performance for Stationary Combustion Turbines," applies to manufacturers and owner/operators of gas turbines manufactured after the applicability date stated in the rule for the particular type and size gas turbine. Subpart KKKK regulates emissions of NO_X and SO_2. The SPLE Project's proposed gas turbines to drive refrigeration compressors and electrical generators and the proposed gas turbines at the CCTPL Expansion Project's Mamou Compressor Station would be subject to NSPS Subpart KKKK. The turbines at both locations must meet the applicable emission limits and operational requirements, as well as the record-keeping and reporting requirements of this subpart.

All NSPS requirements would be defined in the air permits issued by LDEQ to Sabine Pass for the SPLNG Terminal and to CCTPL for the Mamou Compressor Station.

National Emission Standards for Hazardous Air Pollutants

NESHAPS, codified in 40 CFR Parts 61 and 63, regulates the emissions of HAPs from existing and new sources. Part 61 was promulgated prior to the 1990 CAA Amendments and regulates eight types of hazardous substances: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. The SPLE Project and CCTPL Expansion Project are not expected to operate any processes that are regulated by Part 61.

The 1990 CAA Amendments established a list of 189 HAPs, resulting in the promulgation of Part 63. Part 63, also known as the Maximum Achievable Control Technology standards, regulates HAP emissions from major sources of HAP emissions and specific source categories that emit HAPs. Some NESHAPS standards may apply to non-major sources (area sources) of HAPs. The major source thresholds for the purpose of NESHAP applicability are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate. The existing SPLNG Terminal (export facilities and liquefaction Trains 1 through 4) are major HAP emitters. The SPLNG Terminal would continue to be a major source of HAP emissions after completion of the SPLE Project. The Mamou Compressor Station would be a minor (area) source of HAPs. Certain engines at the Mamou Compressor Station would be required to comply with area source NESHAPs for spark ignition engines.

NESHAPS standards for marine tank vessel-loading operations were promulgated under Subpart Y and apply to marine vessel loading operations at facilities that are considered major sources of HAPs. Although the SPLE Project would be considered a major source of HAPs, this subpart does not apply to emissions resulting from marine tank vessel-loading operations of commodities with vapor pressures less than 10.3 kilopascals at standard conditions. Therefore, this subpart does not apply to the Project.

NESHAPS standards for stationary combustion turbines were promulgated under Subpart YYYY. Under Subpart YYYY, there are no requirements applicable to existing turbines greater than or equal to 1 megawatt (about 1,340 hp). Furthermore, on August 18, 2004, the D.C. Circuit Court issued a Stay of Implementation on 40 CFR 63, Subpart YYYY. The EPA is evaluating the possibility of delisting gas-fired turbines from the Rule. Currently, natural gas-fired turbines are only subject to the general permitting and notification requirements under 40 CFR 63, Subpart A. Thus, there are no pollutants regulated under the current Subpart YYYY. The natural gas-fired refrigeration compressor and generator turbines proposed for the SPLE Project and the natural gas-fired compressors at the CCTPL Mamou Compressor Station qualify as new stationary combustion turbines under Subpart YYYY and would be subject to the initial notification requirements.

NESHAPS for reciprocating internal combustion engines were promulgated under Subpart ZZZZ. Under Subpart ZZZZ, new engines located at an area source of HAPs that are subject to NSPS Subpart JJJJ have no additional requirements under Subpart ZZZZ. For the SPLE Project, the two proposed diesel engine standby generators qualify as emergency reciprocating internal combustion engines under this subpart and are subject only to the initial notification requirements. For the Mamou Compressor Station, the two proposed natural gas-fired emergency generator engines would be subject to NSPS Subpart JJJJ and would have no additional requirements under Subpart ZZZZ.

Chemical Accident Prevention Provisions

The chemical accident prevention provisions, codified in 40 CFR 68, are federal regulations designed to prevent the release of hazardous materials in the event of an accident and minimize potential impacts if a release does occur. The regulations contain a list of substances and threshold quantities for determining applicability to stationary sources, including methane, propane, and ethylene in amounts greater than 10,000 pounds. If a stationary source stores, handles, or processes one or more substances on this list in a quantity equal to or greater than that specified in the regulation, the facility must prepare and submit a risk management plan. A risk management plan is not required to be submitted to the EPA until the chemicals are stored on-site at the facility.

If a facility does not have a listed substance onsite, or the quantity of a listed substance is below the applicability threshold, the facility does not have to prepare a risk management plan. In the latter case, the facility still must comply with the requirements of the general duty provisions in Section 112(r)(1) of the 1990 CAA Amendments if there is any regulated substance or other extremely hazardous substance on-site. The general duty provision is as follows:

"The owners and operators of stationary sources producing, processing, handling and storing such substances have a general duty to identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility, taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur."

Stationary sources are defined in 40 CFR 68 as any buildings, structures, equipment, installations, or substance-emitting stationary activities that belong to the same industrial group, that are located on one or more contiguous properties, are under control of the same person (or persons under common control), and are from which an accidental release may occur. The SPLE Project would use methane, propane, and ethylene as refrigerants in the overall process for liquefying the natural gas at the SPLNG Terminal. Propane and ethylene would be stored onsite in quantities exceeding 1 million pounds each, and methane would be used in the liquefaction process in quantities greater than 10,000 pounds.

However, the definition of a stationary source does not apply to transportation of any regulated substance or any other extremely hazardous substance. When the EPA issued the final rule for chemical accident prevention provisions (*Federal Register*, January 6, 1998 [Vol. 63, pp 639-645]), it clarified that the transportation exemption applies to LNG facilities and natural gas transmission facilities subject to oversight or regulation under 49 CFR Part 193. These exempt facilities include natural gas pipeline and compressor stations, those used to liquefy natural gas or those used to transfer, store, or vaporize LNG in conjunction with pipeline transportation. We have included a compliance analysis of the design of the SPLE Project with Part 193, including overpressure modeling, in section 2.8 of this EA.

General Conformity

The EPA promulgated the General Conformity Rule on November 30, 1993, to implement the conformity provision of Title I, Section 176(c)(1) of the CAA. On March 24, 2010, the EPA amended the General Conformity Rule. Section 176(c)(1) requires that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to, an approved CAA implementation plan.

The General Conformity Rule is codified in Title 40 CFR Part 51, Subpart W and Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." A conformity determination must be conducted by the lead federal agency if a federal action's construction and operational activities is likely to result in generating direct and indirect emissions that would exceed the conformity threshold levels (*de minimis*) of the pollutant(s) for which an air basin is in nonattainment or maintenance. According to the conformity regulations, emissions from sources that are major for any criteria pollutant with respect to the NNSR or PSD permitting/licensing are exempt and are deemed to have conformed.

Section 176(c)(1) of the CAA (40 CFR 51.853), states that a federal agency cannot approve or support any activity that does not conform to an approved state implementation plan. Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or,
- delay timely attainment of any NAAQS or interim emission reductions.

As noted earlier, the SPLE Project and CCTPL Expansion Project's operating sites would be located in attainment areas; however, the three neighboring counties in Texas (Hardin, Jefferson, and Orange) near the SPLNG Terminal are in the Beaumont-Port Arthur Area 8-hour ozone maintenance area. Also, some barge transport would originate at the Port of Houston, which is in the Houston-Galveston-Brazoria, Texas, 8-hour ozone severe non-attainment area. Operating emissions from the SPLNG Terminal and the Mamou Compressor Station would be entirely within attainment areas and would be subject to PSD permitting and, therefore, are not subject to General Conformity Regulations. Construction emissions, including barge transport, would be subject to General Conformity Regulations for any emissions that occur in the Beaumont-Port Arthur ozone maintenance area or the Houston-Galveston-Brazoria non-attainment area. For construction of the SPLE Project, Sabine Pass indicated some barges would most likely originate at the Port of Houston and travel 97 nautical miles (84 miles) along the Intracoastal Waterway to Port Arthur, Texas, and the SPLNG Terminal construction dock. Construction emissions for the Mamou Compressor Station would occur within attainment areas and are not subject to General Conformity.

Sabine Pass provided a description of the operation of the barge/tug vessels that would be used to transport construction materials through the Gulf Intracoastal Waterway. These vessels would operate in and near the Port of Houston, which would impact the Houston-Galveston-Brazoria ozone nonattainment area and Jefferson and Orange Counties, Texas in the Beaumont-Port Arthur ozone maintenance area. Vessels would impact the Beaumont-Port Arthur area when they travel through Jefferson and Orange Counties on the way to and from the Port of Houston and, to a much lesser extent, when they enter Texas waters between ports in Louisiana to the SPLNG Terminal construction dock. Vessels traveling along the Gulf Intracoastal Waterway in Louisiana would remain outside the Baton Rouge nonattainment area (i.e., the parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge) and impact only unclassifiable or attainment areas in Louisiana.

Sabine Pass estimated emissions from the tug vessels that push the barges using the methods described in *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* (ICF International, April 2009). Sabine Pass also estimated travel distances between ports using NOAA's *Distances Between United States Ports, 12th ed.* (2012c). The emissions were apportioned among the severe nonattainment, maintenance, and unclassifiable or attainment areas according to the emission rate (pounds per hour) calculated to occur during the time spent traveling through each of these areas.

Sabine Pass did not estimate projected percentages of on-road material deliveries or workers commuting from the Beaumont-Port Arthur 8-hour ozone maintenance area from their total worker commuting on-road emission estimates. Therefore, to conservatively determine General Conformity Applicability, we have assumed all on-road material delivery and worker commuting emissions would occur within the maintenance area. The total emissions within the nonattainment and maintenance areas were compared to those emissions with the General Conformity Applicability thresholds for ozone as shown in table 2.7-6.

TABLE 2.7-6

Summary Of General Conformity Applicable Emissions (in tons per year)

Year	Construction Emission Source	Beaumont-Port Arthur Area			Houston-Galveston-Brazoria Area		
		(NO_X)	(VOCs)	(SO_2)	(NO_X)	(VOCs)	(SO_2)
2015	On-road and Barge Transport	1.90	0.17	<0.1	0.2	0.01	0.02
2016	On-road and Barge Transport	6.1	0.65	<0.1	1.13	0.02	0.11
2017	On-road and Barge Transport	6.8	0.67	<0.1	1.13	0.02	0.11
2018	On-road and Barge Transport	4.9	0.73	<0.1	--	--	--
2019	On-road and Barge Transport	1.2	0.29	<0.1	--	--	--
General Conformity Threshold		**100**	**100**	**100**	**25**	**25**	**N/A**

Notes:
On-road emissions = Worker commuting vehicle emissions and on-road material delivery.
Barge emissions cease after 2017.

The maximum annual emission rates due to construction in the Houston-Galveston-Brazoria Area are below the *de minimis* emission rates for NO_X and VOCs of 25 tpy for severe ozone nonattainment areas. Similarly, the maximum annual emission rates due to construction in the Beaumont-Port Arthur Area are also below the *de minimis* emission rate for NO_X and VOCs of 100 tpy for moderate ozone maintenance areas. Therefore, the SPLE Project's construction emissions would be below the General Conformity Applicability threshold, and a General Conformity Determination is not required for the SPLE Project.

Greenhouse Gas Reporting Rule

On September 22, 2009, the EPA issued the final Mandatory Reporting of Greenhouse Gases Rule. This rule requires reporting GHG emissions from suppliers of fossil fuels and facilities that emit greater than or equal to 25,000 metric tpy of GHG (reported as CO_2-eq). On November 8, 2010, the EPA signed a rule that finalizes GHG reporting requirements for the petroleum and natural gas industry under Subpart W of 40 CFR 98. The rule does not apply to construction emissions.

Potential GHG emissions from the existing SPLNG Terminal and the SPLE Project are shown in table 2.7-4. Estimated SPLNG Terminal emissions after completion of the SPLE Project would continue to be above the 25,000 tpy CO_2-eq threshold and potentially subject to the GHG Mandatory Reporting Rule. Table 2.7-5 presents GHG emissions from the Mamou Compressor Station. The Mamou Compressor Station would also be potentially subject to the GHG Mandatory Reporting Rule. Each facility would report as a separate entity under the rule. The rule does not require emission control devices and is strictly a reporting requirement based on actual emissions. Sabine Pass and CCTPL would monitor emissions at their respective facilities in accordance with the reporting rule and, if actual emissions exceed the 25,000 tpy CO_2-eq reporting threshold, Sabine Pass and CCTPL would be required to report their GHG emissions to the EPA.

Applicable State Air Quality Requirements

The LDEQ is the lead air permitting authority for the SPLNG Terminal and for the Mamou Compressor Station. Both sites would be required to obtain an air quality permit prior to initiating construction. Facilities also trigger review by other states if the project location is within 50 miles of an adjacent state's border. The SPLNG Terminal is within 1 mile of the Texas state line; therefore, the TCEQ will have the opportunity to review and comment on the application and subsequent permits. The Mamou Compressor Station is not within 50 miles of an adjacent state's border.

In addition to the federal regulations identified above, the LDEQ has its own air quality regulations, codified in LAC 33:III. The state requirements potentially applicable to the Projects are listed below.

SPLE Project

- Chapter 9 – General Regulations on Control of Emissions and Emission Standards. This Chapter contains requirements to submit an air emissions inventory and report unauthorized discharges.

- Chapter 11 - Control of Air Pollution from Smoke establishes opacity limits for combustion units, prohibits open burning and impairment of visibility on public roads.

- Chapter 13 - Emission Standards for Particulate Matter apply to any operation, process, or activity from which PM is emitted and requires that all reasonable precautions be taken to minimize PM emissions from fugitive sources. Fuel burning equipment is limited to 0.6 pounds per 1 million British thermal units of PM emissions.

- Chapter 21 - Control of Emission of Organic Compounds, subchapter A, section 2111 requires that pumps and compressors handling VOCs with a true vapor pressure greater than 1.5 psia at handling conditions to be equipped with mechanical seals or other equivalent equipment approved by the administrative authority. Section 2113 requires best practical housekeeping and maintenance practices must be maintained at highest possible standards to minimize the quantity of organic compound emissions.

- Chapter 29 - Odor Regulations require that a facility be operated such that off-site odors do not cause a nuisance.

- Chapter 51 – The Comprehensive Toxic Air Pollutant Emission Control Program applies to major sources of toxic air pollutants. Operations at major sources subject to a Federal Maximum Achievable Control Technology standard are exempt; however, all other operations are included.

- Chapter 56 - Prevention of Air Pollution Emergency Episodes requires any person responsible for operation of a listed source to prepare a standby plan for the reduction of emissions, and activate the plan when LDEQ declares an Air Pollution Alert, Air Pollution Warning and Air Pollution Emergency.

CCTPL Pipeline Expansion

State requirements in LAC 33:III identified for the SPLE Project that are also applicable to the CCTPL Expansion Project are Chapter 9 and Chapter 21 (section 2113 – housekeeping to minimize organic compound emissions).

CCTPL Mamou Compressor Station

State requirements in LAC 33:III identified for the SPLE Project at the SPLNG Terminal that are also applicable to the Mamou Compressor Station are Chapter 9, Chapter 11 (provision for impairment of visibility on public roads), Chapter 13, Chapter 21 (section 2111 and 2113) and Chapter 29. Additional state regulations that apply to the Mamou Compressor Station include:

- Chapter 15 - Emission Standards for Sulfur Dioxide requires new or existing single point sources that emit or have potential SO_2 emissions equal to or greater than 5 tpy to meet to meet an SO_2 emissions limitation of 2,000 ppm, or any applicable NESHAP or NSPS that is more stringent.

2.7.1.4 Impacts and Mitigation

The SPLE Project and CCTPL Expansion Project would produce air pollutant emissions during construction and operation. Although many construction activities for the projects would be considered temporary, construction at the SPLNG Terminal would occur over a 5-year period (2015 to 2019) in one location. Therefore, the impacts are considered to be short-term. In addition, following construction, air quality near the SPLNG Terminal would not revert to previous conditions but would transition to operational-phase emissions after commissioning and initial startup of Trains 5 and 6. Similarly, following construction, air quality near the Mamou Compressor Station would not revert to previous conditions but would transition to operational-phase emissions after startup of the compressor station. Air quality along the pipeline routes would return to previous conditions after completion of construction because no permanent emission sources would exist along the pipeline rights-of-way.

Construction Emissions – SPLE Project

Construction of Trains 5 and 6 would result in short-term increases in emissions of some pollutants from equipment powered by diesel fuel or gasoline engines and from the generation of fugitive dust when the ground surface is disturbed and from other dust-generating actions. There also may be some temporary indirect emissions attributable to construction workers commuting to and from work sites during construction and from barges transporting construction materials.

The quantity of fugitive dust generated by construction-related activities depends on several factors, including the size of area disturbed, the nature and intensity of construction activity, surface properties (such as the silt and moisture content of the soil), wind speed, and the speed, weight, and volume of vehicular traffic. Fugitive dust emissions would be limited or mitigated, if necessary, by spraying water to dampen the surfaces of dry work areas and/or by the application of calcium chloride or other dust suppressants as needed. Table 2.7-7 provides estimates of fugitive dust emissions associated with construction activities for all five years of the SPLE Project and assumes a dust suppressant control efficiency of 50 percent.

TABLE 2.7-7

Fugitive Dust Emissions From Construction SPLE Project

Activity	Land Affected (acres)	Duration (months)	PM_{10} (tons)	$PM_{2.5}$ (tons)
Laydown Areas	103.9	60	343	34
Trains 5 and 6 Areas	54.0	60	178	18
		Total	**521**	**52**

Note: Emission factors used are most applicable to a semi-arid climate. The SPLE Project site is in a wetter marine climate; therefore, calculated emissions should exceed those for the actual site.

Fugitive dust emissions for PM_{10} would be above 100 tpy and $PM_{2.5}$ would be below 100 tpy both with a dust suppression control factor of 50 percent applied. Although Sabine Pass identified a generic mitigation measure to reduce fugitive dust formation (spraying water on work areas and/or the application of calcium chloride or other dust suppressants), we do not believe these measures are sufficient to ensure adequate mitigation of fugitive dust emissions that would occur in the same area over a multi-year period. In addition, Sabine Pass has not provided any information about accountability or individuals with authority regarding fugitive dust mitigation. However, Sabine Pass currently implements a Fugitive Dust Control Plan for construction of the Stage 1 and 2 Liquefaction Project (FERC Docket No. CP11-72) which we do find acceptable. Therefore, **we recommend that:**

- **<u>Prior to beginning construction</u>, Sabine Pass file with the Secretary a statement verifying it will adopt its approved (in Docket CP11-72) Fugitive Dust Control Plan for use on the SPLE Project and identify any modification or additional measures needed for the SPLE Project. Any revised measures or modification to the approved plan should also be filed with the Secretary, for review and written approval by the Director of OEP.**

Emissions of NO_X, CO, PM_{10}/$PM_{2.5}$, SO_2, VOCs, and GHGs from construction vehicle engines were estimated for the SPLE Project construction activities. The estimates are based on the construction equipment expected to be used (number, type, capacity, and level of activity). Emissions attributable to vehicles driven by construction workers commuting to and from the SPLE Project work site during construction also were estimated. Sabine Pass also estimated that three tug boats/barges would be used to deliver piles and other construction equipment/material. These tug boats/barges would originate from the Ports of New Orleans; Houston, Texas; and Lake Charles, Louisiana. Pile deliveries would originate in New Orleans and total about 46 and 106 deliveries in 2015 and 2016, respectively. Concurrent with pile delivery and extending into 2017, about one tug boat/barge per 2-month period would be required to provide other material and equipment from the Port of Houston, Texas, and about one tug boat/barge every two to three months would be required for deliveries from the Port of Lake Charles, Louisiana. Therefore, emissions from barge activity are included in the construction emissions estimate.

Construction criteria pollutant and GHG emissions from all sources by year are shown in table 2.7-8. Construction equipment would be operated primarily on an as-needed basis during daylight hours. The emissions from gasoline and diesel engines would be minimized because the engines must be built to meet the standards for mobile sources established by the EPA mobile source emission regulations. Most of the construction equipment would be powered by diesel engines and would be equipped with typical control equipment (e.g., catalytic converters). Construction of the SPLE Project would occur over a 60-month period, resulting in short-term impacts on air quality. Once construction activities are completed, fugitive dust and construction equipment emissions would subside. Conditions after construction would transition to operational-phase emissions after commissioning and initial startup of Trains 5 and 6.

TABLE 2.7-8

Construction Emissions of Criteria Pollutants and CO_2-eq
SPLE Project Trains 5 and 6
(in tons per year [tpy])

Year	Construction Emission Source	Nitrogen Oxide (NO_X)	Volatile Organic Compounds (VOCs)	Carbon Monoxide (CO)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10}/ $PM_{2.5}$)	Carbon Dioxide Equivalent (CO_2-eq)
2015	Non-road	43	4	19	0.1	3	11,159
	On-road	2	0.2	4	<0.1	<0.1	803
	Tug/Barges	43	1	8	4	1	2,335
	Sub-total	**88**	**5**	**31**	**4**	**4**	**14,297**
2016	Non-road	68	10	163	0.2	5	16,005
	On-road	7	1	14	<0.1	0.2	3,282
	Tug/Barges	100	2	19	10	2	5,452
	Sub-total	**175**	**13**	**196**	**10**	**7**	**24,739**
2017	Non-road	94	15	302	0.2	7	20,666
	On-road	9	0.8	14	<0.1	0.3	3,954
	Tug/Barges	3	<0.1	0.5	0.3	<0.1	143
	Sub-total	**106**	**16**	**316**	**<1**	**7**	**24,763**
2018	Non-road	84	4	296	0.2	6	20,038
	On-road	7	1	21	<0.1	0.2	4,326
	Tug/Barges	-	-	-	-	-	-
	Sub-total	**91**	**5**	**317**	**<1**	**6**	**24,364**
2019	Non-road	19	4	75	<0.1	1	5,423
	On-road	2	0.4	12	<0.1	<0.1	1,887
	Tug/Barges	-	-	-	-	-	-
	Sub-total	**21**	**4**	**87**	**<1**	**1**	**7,310**

Notes:
Non-road emissions = Construction equipment and vehicle emissions related to site activity.
On-road emissions = Worker commuting vehicle emissions.

Construction Emissions – Mamou Compressor Station

Construction of the Mamou Compressor Station would result in short-term increases in emissions of some pollutants from using equipment powered by engines using diesel fuel or gasoline and the generation of fugitive dust due to disturbance of the surface and other dust-generating actions. There also may be some temporary indirect emissions attributable to construction workers commuting to and from the work site and construction material delivery to the site.

Over the 6 to 8 month construction period for the Mamou Compressor station, fugitive dust emissions would be about 11 tons of PM_{10} and 1 ton of $PM_{2.5}$. Emissions of NO_X, CO, PM_{10}/$PM_{2.5}$, SO_2, VOCs, and GHGs from construction vehicle engines are shown in Table 2.7-9. The estimates are based on the number, type, capacity, and level of activity of equipment to be used. Emissions attributable to vehicles driven by construction workers commuting to and from the construction site and emissions from on-road vehicles used to deliver construction materials were also estimated.

TABLE 2.7-9

Construction Emissions of Criteria Pollutants
CCTPL Mamou Compressor Station
(in tons per year)

Year	Construction Emission Source	NO_X	VOCs	CO	SO_2	PM_{10}/ $PM_{2.5}$	CO_2-eq
2015	Non-road	2	<1	1	<0.1	<1	442
	On-road	1	<0.1	1	<0.1	<0.1	190
	Sub-total	**3**	**<1**	**2**	**<0.1**	**<1**	632
2016	Non-road	4	1	10	<0.1	<1	782
	On-road	<1	<0.1	1	<0.1	<0.1	188
	Sub-total	**4**	**1**	**11**	**<1**	**<1**	**970**

Notes:
Non-road emissions = Construction equipment and vehicle emissions related to site activity.
On-road emissions = Worker commuting vehicle emissions.

Emissions of criteria pollutants from construction of the Mamou Compressor Station and fugitive dust emissions would be well below 100 tpy. Construction equipment would be operated primarily on an as-needed basis during daylight hours. Following construction of the Mamou Compressor Station, fugitive dust and construction equipment emissions would subside and conditions would transition to operational-phase emissions.

Construction of the pipelines for the CCTPL Expansion Project would also result in short-term increases in emissions of some pollutants from using equipment powered by engines using diesel fuel or gasoline, the generation of fugitive dust due to disturbance of the surface and other dust-generating actions, and from open burning of vegetation cleared from the pipeline right-of-way and other work areas. Indirect emissions would also be generated by construction workers commuting to and from the work site and construction material delivery to the site.

This would result in 62 tons of PM_{10} in 2015 and 186 tons of PM_{10} in 2016 as fugitive dust. Similarly, fugitive dust $PM_{2.5}$ emissions would be 7 tons in 2015 and 21 tons in 2016. These fugitive dust emissions would be spread out over multiple parishes and over 104 miles of pipeline construction. Emissions of NO_X, CO, $PM_{10}/PM_{2.5}$, SO_2, VOCs, and GHGs from construction vehicle engines and open burning are shown in table 2.7-10. The estimates are based on the number, type, capacity, and level of activity of equipment to be used. Emissions attributable to vehicles driven by construction workers commuting to and from the construction site and emissions from on-road vehicles used to deliver construction materials also were estimated.

TABLE 2.7-10

Construction Emissions of Criteria Pollutants
CCTPL Expansion Project Pipelines
(in tons per year)

Year	Construction Emission Source	NO_X	VOCs	CO	SO_2	PM_{10}/ $PM_{2.5}$	CO_2-eq
2015	Non-road	10	1	5	<0.1	1	4,001
	On-road	2	<1	3	<0.1	<1	811
	Open Burning	2	12	71	<0.1	9	1,611
	Sub-total	**14**	**13**	**79**	**<0.1**	**10**	**6,423**
2016	Non-road	32	3	14	<0.1	2	11,265
	On-road	10	1	15	<0.1	<1	3,868
	Open Burning	6	37	213	<0.1	26	4,833
	Sub-total	**48**	**41**	**242**	**<0.1**	**28**	**19,966**

Notes:
Non-road emissions = Construction equipment and vehicle emissions related to site activity.
On-road emissions = Worker commuting vehicle emissions, pipeline material deliveries and pipeline on-site vehicles.
Open Burning emissions = based on 560 acres of upland forest with a fuel loading of 9 tons per acre.

Emissions of criteria pollutants from construction of the CCTPL Expansion Project pipelines would exceed 100 tpy for CO in 2016 due to open burning of vegetation cleared from the construction area. Construction equipment would be operated primarily on an as-needed basis during daylight hours. The emissions from gasoline and diesel engines would be minimized because the engines must be built to meet the standards for mobile sources established by the EPA mobile source emission regulations. Most of the construction equipment would be powered by diesel engines and would be equipped with typical control equipment (e.g., catalytic converters). This construction would result in temporary impacts limited to the immediate vicinity of the construction area. Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside and project-related impacts on air quality would terminate.

Operational Emissions – SPLE Project

The SPLE Project includes the following stationary point sources of air pollutants for liquefaction Trains 5 and 6:

- two acid gas vent thermal oxidizers;
- one wet gas flare;
- one dry gas flare;
- twelve gas-fired refrigeration compressor turbines;
- two gas-fired power generation turbines;
- two diesel-fired standby generators; and
- fugitive emission sources (valves, flanges, connectors, and pump seals).

The SPLE Project and existing SPLNG Terminal (total facility) potential annual emissions for criteria pollutants and HAPs are shown in table 2.7-3, and potential annual GHG emissions are shown in table 2.7-4. The existing SPLNG terminal consists of the original import terminal and liquefaction Trains 1 through 4. The emission data are based on EPA emission factors obtained from AP-42, applicable federal and/or state regulatory emission limitations, and manufacturer-supplied emission factors, where available. Potential to emit is based on continuous operation (8,760 hours per year) except for standby engines, for which the potential to emit is based on 500 hours per year of operation.

As part of the air permit application process for the SPLE Project, Sabine Pass prepared a BACT for the refrigeration compressor turbines, power generation turbines, and internal combustion engines (standby generators). Methods for reducing emissions of NO_X, CO, and VOCs for each of these emission sources were evaluated based on technical feasibility. Through this process and review by the LDEQ, Sabine Pass would reduce emissions of NO_X for the refrigeration compressor turbines by using water-injection and would reduce NO_X emissions for the power generation turbines by using dry-low NO_X combustion. CO and VOC emission rates would be maintained by using good combustion practices.

Due to the operational flexibility of the SPLNG Terminal after construction of the SPLE Project, Sabine Pass could operate under multiple scenarios. Although Sabine Pass would have the capability to operate liquefaction and regasification simultaneously (the annual emission scenario identified above), market forces would likely determine the use of either liquefaction or regasification facilities. Higher worldwide prices (compared with the United States) would likely cause Sabine Pass customers to liquefy U.S.-sourced natural gas and export it abroad. Alternatively, higher prices in the United States (compared with worldwide markets) would likely cause Sabine Pass customers to deliver LNG to the SPLNG Terminal and use its regasification capability. If U.S. and worldwide prices are similar, Sabine Pass customers likely would opt to not use either regasification or liquefaction. The regasification facilities and liquefaction Trains 1 through 4 were previously evaluated, including NEPA review, and authorized through FERC and LDEQ permitting. Short-term emission rates for the SPLE Project are being added to the separate operating scenario established for liquefaction for the SPLNG Terminal. Maximum short-term controlled emission rates are listed in table 2.7-11. The short-term emission rates shown for the liquefaction scenario (Trains 1 through 6) are not anticipated to occur simultaneously with the existing import terminal. However, in a scenario in which simultaneous operation would occur, the SPLNG Terminal would operate under emission caps for the vaporization and liquefaction facility equipment and a cap for the wet and dry gas flares that limit annual emissions and effectively control simultaneous operation while allowing the facility the flexibility to operate as market conditions warrant.

TABLE 2.7-11

Maximum Short-Term Controlled Emissions for Criteria Pollutants
(in pounds per hour)

Emission Unit	NO_X	VOCs	CO	PM_{10}	$PM_{2.5}$	SO_2
SPLE Project Trains 5 and 6						
Acid gas vent thermal oxidizers (2)	4.72	0.28	18.8	0.38	0.38	1.48
Flares – Wet gas (1), Dry gas (1)	184.9	837	1,585	0.004	0.004	1.4
Refrigeration compressor turbines (12) **a/**	414.6	9.56	639	10.3	10.3	-
Natural gas-fired generator turbines (2)	57.36	1.32	34.92	1.58	1.58	-
Standby diesel-fired engines (2)	51.38	3.14	28.1	1.6	1.6	0.06
Fugitive emissions	-	1.26	-	-	-	-
SPLE Project Trains 5 and 6 Total	713	853	2,306	13.9	13.9	2.94
Total Facility b/	**2,449**	**2,593**	**7,390**	**62.4**	**62.4**	**12.6**

a Maximum hourly rate show is total for Trains 5 and 6. Individual rates vary depending on the type of refrigerant being compressed.

b Total facility maximum short-term emission rates are based on data presented in the Title V and PSD permit applications and include the existing vaporization facility and liquefaction Trains 1 to 6. Includes modifications to existing liquefaction Trains 1 through 4, including increasing the NOx emission rate from 20 ppm to 25 ppm, changing standby engines from natural gas to diesel fuel, adding thermal oxidizers to acid gas vents, updating refrigeration compressor gas turbine emission profiles based on the type of refrigerant, and incorporating updated emission rates from equipment manufacturers and stack testing.

Once constructed, Trains 5 and 6 would undergo an initial startup process before they could be fully operational. Initial startup would consist of a series of steps primarily aimed at conditioning, drying out, and cooling the various components of the liquefaction process equipment. Facility startup would begin with the activation of electrical generators, flares, and other support equipment. Various components would then be cleaned, followed by drying out and cooling the liquefaction system. Natural gas (feed gas) and boil-off gas (natural gas resulting from evaporation of liquefied natural gas) used in the conditioning and cooling process would be sent to the wet gas flare and marine flare, respectively. These steps would result in larger emissions than under normal operating conditions and would last about 1 to 1.5 months. After initial startup, Sabine Pass plans to operate Trains 5 and 6 continuously in conjunction with Trains 1 through 4 at the liquefaction facility, thus limiting startup/shutdown events to those associated with individual components as part of maintenance or the need to shut down due to equipment malfunction. Table 2.7-12 summarizes the criteria pollutant, HAP, and GHG emissions for initial startup activities.

TABLE 2.7-12

SPLE Project Startup Emissions (in tons)

Pollutant	LNG Tank and Pipe Cooling Emissions	LNG Trains Start-up Emissions	Total
PM_{10}	-	-	-
$PM_{2.5}$	-	-	-
SO_2	0.3	3.8	4.1
NO_X	29	338	367
CO	251	2,900	3,151
H_2S	0.003	0.04	0.04
VOCs	4.6	48.2	52.8
HAPs	-	-	-
CO_2-eq	5,056	33,310	38,366

Venting or flaring would occur during regularly scheduled overhauls of the LNG trains. A major overhaul would occur about every 5 years, based on the running time of the refrigerant compressors. During this overhaul, which lasts 3 to 6 weeks, several units in the LNG train would be inspected, preventive maintenance would be performed, and consumables such as molecular sieves, lubrication oils, and mercury-removal beds may be replaced. After overhaul, the LNG train must be purged and restarted in a process similar to the initial startup, and emissions would be comparable.

Complete shutdown of the refrigerant compressors is not anticipated, based on ambient temperatures and recommended system operating specifications. In the event the refrigerant compressors are shut down, there would be no need to vent or flare the stored refrigerants. The methane refrigerant would be returned to the LNG tank vapor space. The propane refrigerant could be held in the refrigerant loop indefinitely. The ethylene could be stored for as long as a week in the LNG train. Within this timeframe, one LNG train would be started up so that the ethylene in the common ethylene vapor system could be cooled down as part of the process. As no purging of the refrigeration compressor turbines would occur as a result of intermittent shutdowns, no additional emissions are anticipated.

Air Modeling

In order to provide a more thorough evaluation of the potential impacts on air quality in the vicinity of the SPLE Project, Sabine Pass conducted a quantitative assessment of air quality impacts using two different models. The assessment included air dispersion modeling to predict off-site (i.e., ambient) concentrations in the vicinity of the SPLE Project resulting from the proposed emissions associated with its operation. Due to the proximity of the SPLNG Terminal to areas in Texas and Louisiana designated as nonattainment or maintenance for the 8-hour ozone NAAQS, and the projected level of NO_X emissions (an ozone precursor), the LDEQ requested an analysis of the effect of the facility's ozone precursor emissions on 8-hour ozone levels using photochemical grid modeling.

Because an air quality modeling analysis that quantifies the impacts of the SPLE Project is required as part of the air quality permit application process and has been submitted, we have used that modeling analysis for our evaluation of stationary source impacts. To better understand the full ambient air quality impact, we asked Sabine Pass to also conduct dispersion modeling that included marine vessel sources (the LNG carrier and its supporting tug and security boats) in the modeling emission inventory along with the stationary emission sources used for permit evaluation. The modeling was conducted according to the "Air Quality Dispersion Modeling Protocol Including Marine Sources" describing the methodology and input data to be used, which was submitted to FERC in July 2013. The dispersion modeling results described here include the combined contribution of stationary sources and the marine vessel emission sources.

Dispersion modeling of operational emissions followed the EPA PSD modeling requirements to evaluate potential air quality impacts in an area extending out to 50 kilometers from the SPLNG Terminal. Although the EPA has not issued formal guidance for conducting ozone modeling or interpretation of the results, Sabine Pass used methodology provided by EPA Region VI. The dispersion modeling with marine sources and ozone modeling was performed using emissions from liquefaction Trains 1 through 6. We have reviewed Sabine Pass' methodology and modeling inputs and find them acceptable. However, EPA and LDEQ are continuing to review the air permit application and modeling for stationary sources only and may request additional information or changes throughout the permitting process. Our analysis conservatively considers not only marine emissions but also the increased NOx emissions associated with Trains 1 to 4. Sabine Pass would also be required to operate the SPLNG Terminal in accordance with its air permit requirements.

<u>Dispersion Modeling</u>

Each pollutant proposed to be emitted above a significant emission rate prescribed in the PSD regulation was modeled to determine whether its maximum ambient impact is above PSD significant impact levels (SILs) and monitoring *de minimis* levels. For any modeled results below the respective SIL, no additional modeling was required. For modeled results above the respective SIL, a full impact analysis, consisting of a comparison of modeled results with NAAQS and a PSD increment analysis, including other nearby sources, was performed.

The full impact NAAQS analysis models the impact of the proposed project with other existing on-site sources, as well as existing off-site emission sources and a monitor-derived background concentration value. In this way, most emission source contributions of a pollutant at a particular site are considered in the analysis.

The PSD increment analysis is used to determine whether a proposed project would cause or contribute to an exceedance of the allowable decrease in air quality. Federal PSD guidelines specify allowable changes in air pollutant concentrations due to industrial expansion in an area; three allowable concentrations are specified based on each PSD Class designation. The SPLNG Terminal is located in a controlled industrial growth area; therefore, the Class II increment value applies.

For the analysis to determine whether pre-construction monitoring is required, modeled results are compared with monitoring *de minimis* levels specified in the PSD regulation. If the modeled result is above a monitoring *de minimis* level, then one year of preconstruction ambient air pollutant monitoring may be required for the applicable pollutant; if below, no project/site monitoring is required.

The PSD modeling study was conducted using the EPA's approved American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) with a 5-year meteorological data set. Data sets input to this model include emission source parameter values (stack height and diameter, stack exhaust temperature and gas flow, and emission rate), building/structure dimensions for determining the effects of the buildings/structure on dispersion of emissions, receptor locations, terrain elevation data, and meteorological data. An hourly meteorological data set spanning five calendar years (2008 to 2012) was used. No receptors were placed within the facility fence line because, in accordance with modeling guidance, these are not considered "ambient-air" locations.

We used the SIL and monitoring *de minimis* values and modeling performed for pollutants emitted at rates above PSD significant emission rates (i.e. the pollutants modeled were PM_{10}, $PM_{2.5}$, NO_2, and CO) to assess the need for additional modeling. Table 2.7-13 summarizes the SIL modeling results. The SIL modeling results show that 1-hour and annual average periods for NO_2 exceed their respective SILs, requiring further analysis via a full impact analysis. No monitoring *de minimis* level was exceeded for any modeled pollutant/averaging period combination; therefore, no pre-construction ambient air quality monitoring was required.

TABLE 2.7-13

Significant Impact Level (SIL) Modeling Results (µg/m^3)

Criteria Pollutant	Averaging Period	Maximum	SIL	Monitoring *de minimis* Level
NO_2	1-hour **b/**	109	7.5	-
	Annual **a/**	7.33	1	14
CO	1-hour **a/**	739	2,000	-
	8-hour **a/**	322	500	575
PM_{10}	24-hour **b/**	1.1	5	10
$PM_{2.5}$	24-hour **b/**	1.1	1.2	4
	Annual **b/**	0.2	0.3	-

a Maximum from modeled years 2008, 2009, 2010, 2011, and 2012. Based on maximum hourly emission rates. Includes annual Tier 2 NO_2/NO_X adjustment.

b Average over modeled years 2008, 2009, 2010, 2011, and 2012. Includes 1-hour Tier 2 NO_2/NO_X adjustment.

Note: Emission sources modeled include SPLE Project stationary sources, Trains 1 through 4, and marine vessel sources.

The full impact analysis for 1-hour and annual average NO_2 requires the determination of the Project's area of influence (AOI). The AOI is an area defined by the farthest radial distance from a project site where ambient air quality impacts drop below the respective SIL. The AOI for annual-period

NO_2 is 5.1 kilometers. The annual NO_2 AOI is added to a 50-kilometer distance to define the area within which other emission sources must be included for the annual-period full impact analysis.

The AOI for the 1-hour analysis is 48.4 kilometers. In this situation, EPA guidance on how far from the NAAQS exceedance location emission sources must be included in full impact modeling was implemented, resulting in the AOI extending an additional 10 kilometers to 58.4 kilometers from the SPLNG Terminal. The emission inventory of other (i.e., non-SPLNG Terminal) sources included in the full impact analysis were developed by Sabine Pass from LDEQ and TCEQ air permit databases.

For the full impact NAAQS analysis, the SPLE Project (including marine vessels), the existing SPLNG Terminal liquefaction Trains 1 through 4, and other off-property sources up to 58.4 kilometers from the SPLNG Terminal were modeled. To account for additional sources not explicitly modeled but that contribute to background NO_2 in the project area, monitoring data from a representative monitoring site also was added to the full impact modeled results prior to comparison with the NAAQS. A monitor site located on-site at the SPLNG Terminal was used as the background NO_2 site. The time period of background data used was December 2011 to November 2012. Table 2.7-14 shows the results of the full impact NAAQS analysis for annual NO_2 and the highest impact for the 1-hour time period. The combined concentration results for the annual average period, including background, are shown to be below the NAAQS.

TABLE 2.7-14

Full Impact National Ambient Air Quality Standards (NAAQS) Analysis for Nitrogen Dioxide (µg/m³)

Averaging Period and Year of Highest Concentration	Adjusted Modeled Concentration a/	Background Concentration	Combined Concentration	NAAQS
Annual (2011)	18.2	35.7	53.9	100
1-Hour (Highest Impact - 5 year Average)	223	35.7	259	188

a Annual maximum and 1-Hour results shown includes adjustment by the NO_2:NO_X ambient ratio of 0.75 (annual) and 0.80 (1-hour), in accordance with the EPA Tier 2 screening method. Sabine Pass conservatively used the 1-hour 98th percentile background value for the annual background value.

The full impact modeling for 1-hour NO_2 showed exceedances of the NAAQS at multiple locations spread throughout the 50 kilometer region around the SPLNG Terminal. The locations of significant contribution to a NAAQS exceedance were found to be within 20 kilometers of the SPLNG Terminal. Additional modeling was then performed for only the receptors within the 20 kilometer region where there was a NAAQS exceedance at the same time and location as a contribution from the SPLNG Terminal (including Trains 1 through 4, the SPLE Project and marine sources) above the SIL. This analysis was performed by adjusting the off-site source emission inventory in accordance with EPA and LDEQ 1-hour NO_2 modeling guidance. The guidance recommends limiting off-site emission sources included in the analysis to sources within the AOI and an additional 10 kilometers beyond the AOI of the source when evaluating receptor locations predicted to exceed the NAAQS. EPA guidance suggests that including only off-site sources within this area results in less likelihood of an overestimation of ambient impacts.

The contributions of each source in the emission inventory (including the SPLNG Terminal Trains 1 through 4, the SPLE Project, and its marine sources) to the receptor location of a modeled NAAQS exceedance were determined using a processing procedure in the AERMOD model applied to model results for 1-hour NO_2 compliance demonstrations. If a NAAQS exceedance was modeled but the impact from the SPLNG Terminal was less than the SIL at that receptor, the receptor location was eliminated from further analysis. The results from this second step evaluation eliminated some receptor locations from further analysis and reduced the area where there was overlapping NAAQS exceedances and SPLNG Terminal contribution above the SIL. A third step in the modeling analysis evaluated the contribution of the SPLNG Terminal to the remaining NAAQS exceedances locations by considering all emission sources within 10 kilometers of the remaining receptors. The source emission inventory was adjusted to remove sources beyond 10 kilometers of the remaining receptor locations showing a NAAQS exceedance. This process of elimination resulted in demonstrating that the SPLNG Terminal did not contribute to a 1-hour NAAQS exceedance.

The NO_2 PSD Class II increment analysis considered SPLNG Terminal-wide sources, as well as off-site emission sources in Louisiana and Texas. These sources were selected based on the AOI determined for the full impact analysis. A PSD Class II increment for annual NO_2 is used in the analysis; however, the EPA has not yet established a PSD Class II increment for 1-hour NO_2. The results of the PSD increment analysis are shown in table 2.7-15. The maximum modeled concentration for the annual average period is below (i.e., better than) the allowable value.

TABLE 2.7-15

Nitrogen Dioxide (NO_2) Prevention of Significant Deterioration (PSD) Class II Increment Analysis Results (μg/m^3)

Period and Year of Maximum	Adjusted Modeled Concentration a/	PSD NO_2 Class II Increment
Annual (2011)	18	25

a Annual concentration shown includes adjustment of model results by the NO_2:NO_X ambient ratio of 0.75, in accordance with the EPA Tier 2 screening method.

Sabine Pass conducted an additional impact analysis as required by the PSD regulations. The growth analysis indicated that no significant commercial, residential, or industrial growth is expected as a result of construction of the facility due to a combination of factors, such as only modest permanent job growth, the rural location of the facility, and either water or marshland surrounding the facility that would preclude additional development.

Secondary air quality standards are set under the CAA for the protection of soils, water, vegetation, animals, and other public welfare impacts. Sabine Pass's air quality analysis demonstrated that no secondary air quality standards would be violated; therefore, any impacts on soils, vegetation, animals, and other public welfare concerns would not be significant.

Visibility impacts were evaluated using the Visibility Screening (VISCREEN) model for the analysis. The closest open/active park, Sea Rim State Park, was selected for the visibility impact analysis. Visibility impacts at Sea Rim State Park were assessed using a conservative Level I (screening) analysis, followed by a refined analysis. The refined analysis was necessary because the visibility impacts determined via the Level I screening analysis were found to be above critical screening criteria. The refined analysis is more rigorous because it includes the use of regional meteorological data, annual PM and NO_X emission rates, a background ozone concentration value, and distances/angles that specify the relationship of the facility to Sea Rim State Park and a hypothetical observer. The results of the refined analysis are presented in table 2.7-16 and show that projected visibility impacts are below (i.e., better than) critical screening levels, and the SPLE Project would not result in adverse visibility impacts at Sea Rim State Park.

TABLE 2.7-16

Visibility Screening Analysis for Sea Rim State Park

Perceptibility of Plume Based on Color Difference, Maximum Modeled Value	Critical Screening Value, Color Difference	Maximum Modeled Contrast	Critical Screening Value, Contrast
1.56	2.0	0.008	0.05

Photochemical Modeling

Photochemical grid modeling using emissions from Trains 1 through 6 was used to determine the impact on ozone concentrations for the 8-hour time period. Although the EPA has not issued formal guidance for conducting ozone modeling or interpretation of the results, Sabine Pass used methodology provided by EPA Region VI. The Comprehensive Air Quality Model with Extensions (CAMx) was used for the analysis. The modeling concept to evaluate the SPLNG Terminal including the SPLE Project was to re-model a previous attainment demonstration based on a known ozone episode (May 26 to July 1, 2006) with the SPLNG Terminal NO_2 and VOC emissions from Trains 1 through 6 added to the projected emission inventory. The analysis addresses impacts at known monitor locations.

Two initial runs of CAMx were performed to check that the model reproduced previous LDEQ CAMx results. CAMx was run using a “base case” scenario of emissions as well as an emissions scenario that included the SPLE Project (added to the base case), thus allowing for a comparison of ozone levels before and after permitting.

The emissions scenario included emissions from all 6 liquefaction trains consisting of 7 flares, 36 natural gas turbine-driven refrigeration compressors, 4 natural gas-fired gas turbine electrical generators, fugitive emissions, 2 internal floating roof tanks, and 6 thermal oxidizers. This is an unlikely operating condition because it reflects operation of the facility at a level that would produce more LNG than allowed in the export license. It also includes operation of redundant capacity and spare equipment, which would not normally occur. The results from modeling likely overestimate the impact on ozone from the proposed facility but were modeled because this represents the facility as permitted.

A total of 65 monitor locations in 3 ozone nonattainment areas were analyzed. The monitors are located in the Baton Rouge metropolitan area, Beaumont-Port Arthur, Texas, and Houston-Galveston-Brazoria, Texas. The EPA has not defined a significance threshold for ozone impacts, especially when evaluating a single facility’s contribution to ozone impacts. In Louisiana, the CAMx results showed that 8-hour ozone concentrations would not increase at any monitoring stations. Further, in Texas the results analysis does not show any new violations of the 8-hour ozone NAAQS and/or does not show an increase in the severity and/or frequency of existing violations. Therefore, we find that impacts on ozone levels from the SPLE Project would not be significant.

Ozone modeling did not include emissions from marine mobile sources associated with the SPLE Project. The contribution of these emission sources to the total facility NO_X emissions (127 tpy compared with 6,638 tpy from the entire facility) is approximately 1.9 percent. Modeled ozone impacts vary in relation to the total NO_X emissions. Because the much larger total facility NO_X emissions were demonstrated to not significantly impact ozone levels, we find that the small increment from the marine sources would not significantly affect the modeling results.

Operational Emissions – Mamou Compressor Station and CCTPL Expansion Project Pipelines

Operation of the pipelines and four associated M & R stations would not introduce new stationary source air emissions to the region. There may be minor emissions of VOCs and GHGs from fugitive sources such as valves, gaskets/flanges, and other pipe fittings.

The CCTPL Mamou Compressor Station would introduce new stationary emission sources consisting of the following:

- three natural gas –fired gas turbines of 10,455 hp each driving gas compressors;
- one natural gas-fired gas turbine of 19,879 hp driving a gas compressor;
- two natural gas-fired engines driving emergency generators; and
- miscellaneous emission sources including a storage tank, fugitive emissions from equipment leaks, maintenance/start-up/shut-down activities, gas blowdown discharges, and truck loading operations.

The CCTPL Mamou Compressor Station's potential annual emissions for criteria pollutants, GHG and HAPs, are shown in table 2.7-5. The emission data are based on EPA emission factors obtained from AP-42, applicable federal and/or state regulatory emission limitations, and manufacturer-supplied emission factors, where available. Potential to emit is based on continuous operation (8,760 hours per year) except for the following:

- emergency generator engines, for which the potential to emit is based on 100 hours per year of operation;
- maintenance, startup/shutdown emissions, which are based on 100 events per year of 10 minutes duration for each event;
- truck loading, which is based on approximately 52,000 gallon/year of condensate; and
- blowdown emissions, which are based on a varying number of events per year (depending on the blowdown emission source) and that vary in duration from 5 to 15 minutes.

As part of the air permit application process, CCTPL prepared a BACT analysis for emission sources emitting NO_X, CO, CO_2e, and $PM_{2.5}$. The sources include gas turbines, internal combustion engines, fugitive emissions and blowdown sources. Methods for reducing emissions were evaluated based on technical feasibility. Through this process and review by LDEQ, CCTPL would control emissions as follows.

- NO_X and CO for the compressor turbines would be controlled through use of dry-low NO_X combustion, natural gas fuel, and good combustion practices. Control of the internal combustion emergency generator engines would be by using turbochargers with intercooler/aftercooler, limiting operating hours, and good combustion practices.
- $PM_{2.5}$ emissions for the gas turbines and internal combustion engines would be controlled by use of natural gas fuel and good combustion practices.

- GHG emissions for the gas turbines would be controlled by using high thermal efficiency turbines, natural gas fuel and good combustion/operating practices. CCTPL did not find any technology available to control GHG emissions from blowdown discharges, so no controls were proposed. For fugitive emissions, CCTPL proposed leak detection and repair using infrared monitoring and repair-as-quickly-as-practical as BACT for GHG (methane) control.

In support of the air permit application, CCTPL performed a dispersion modeling study for submittal to and review by the LDEQ. The modeling approach, procedures, and model used were similar to those described earlier that were used to evaluate the SPLE Project and included consideration of secondary $PM_{2.5}$ formation. Because emission rates of NO_X, CO, and $PM_{2.5}$ are above PSD significant emission rates, the modeling followed EPA PSD modeling requirements to evaluate potential air quality impacts in an area extending out to 50 kilometers from the facility. We have used CCTPL's PSD modeling study for our evaluation of potential ambient air quality impacts. The LDEQ did not require a separate photochemical ozone modeling study for the Mamou Compressor Station due to the limited amount of potential emissions of NO_X.

SIL and monitoring *de minimis* modeling was performed for $PM_{2.5}$, NO_2, and CO. Table 2.7-17 summarizes the SIL modeling results. The SIL modeling results for 1-hour and annual average periods for NO_2 and the 24-hour $PM_{2.5}$ period exceeded their respective SILs, requiring further analysis via a full impact analysis. No monitoring *de minimis* level was exceeded for any modeled pollutant/averaging period combination; therefore, no preconstruction ambient air quality monitoring or waiver was necessary.

TABLE 2.7-17

Significant Impact Level (SIL) Modeling Results – Mamou Compressor Station (µg/m³)

Criteria Pollutant	Averaging Period	Maximum	SIL	Monitoring de minimis Level
NO_2	1-hour **b/**	70.08	7.5	-
	Annual **a/**	2.47	1	14
CO	1-hour **a/**	107.6	2,000	-
	8-hour **a/**	99.4	500	575
PM_{10}	24-hour **b/**	3.51	5	10
$PM_{2.5}$	24-hour **b/**	3.51	1.2	4
	Annual **b/**	0.19	0.3	-

a Maximum from modeled years 2008, 2009, 2010, 2011, and 2012.

b Average over modeled years 2008, 2009, 2010, 2011, and 2012.

The full impact analysis requires the determination of the Mamou Compressor Station's AOI for each pollutant/averaging time combination exceeding its SIL. The AOI for annual-period NO_2 is 0.532 kilometers; for 1-hour NO_2 the AOI is 2.75 kilometers; and for 24-hour $PM_{2.5}$ the AOI is 0.478 kilometers. For annual NO_2 and 24-hour $PM_{2.5}$ the AOI is added to a 50-kilometer distance to define the area within which other emission sources must be included for the annual-period full impact analysis. Per EPA guidance for 1-hour NO_2, the AOI is added to a 10-kilometer distance to define the area for collection of other emission source data.

For the full impact NAAQS analysis, the Mamou Compressor Station and other off-property emission sources contained within each AOI for the pollutant/averaging period were modeled. To account for additional sources not explicitly modeled but that contribute to background NO_2 and $PM_{2.5}$ in the project area, monitoring data from representative monitoring sites were added to the full impact modeled results before comparison with the NAAQS. A monitor site located at the SPLNG Terminal was used as the background NO_2 site. Background data from December 2011 to November 2012 were used. Monitoring data from the SPLNG terminal site were used by Sabine Pass as representative of the Mamou Compressor Station site. Data from the LDEQ monitoring site in Alexandria, Louisiana, was used for $PM_{2.5}$ background. Table 2.7-18 shows the results of the full impact NAAQS analysis. The results for the annual average and 1-hour NO_2 period, when including background, are shown to be below the NAAQS.

TABLE 2.7-18

Full Impact National Ambient Air Quality Standards (NAAQS) Analysis including the Mamou Compressor Station and Other Off-Site Emission Sources ($\mu g/m^3$)

Averaging Period and Year of Highest Concentration	Modeled Concentration a/	Background Concentration	Combined Concentration	NAAQS
Annual NO_2 (2012)	24.11	35.7	59.81	100
1-hour NO_2 (5-year average)	93.07	35.7	128.77	188
24-hour $PM_{2.5}$	20.09	20.0	40.09	35

a Annual and 1-hour NO_2 shown include adjustment of results by the NO_2:NO_X annual ambient ratio of 0.75 and the NO_2:NO_X 1-hour ambient ratio of 0.80, in accordance with the Tier 2 screening method. Sabine Pass conservatively used the 1-hour 98th percentile background value for the annual background value.

The 24-hour $PM_{2.5}$ NAAQS was exceeded at 101 receptor locations. These exceedances were further investigated to determine if the Mamou Compressor Station was a significant contributor to any location with a modeled exceedance by comparing the contribution of the compressor station with the total modeled concentration. If the contribution from the compressor station was less than the SIL at that receptor, then it does not contribute significantly to the modeled exceedance. For all of the locations where the 24-hour $PM_{2.5}$ NAAQS was exceeded, the Mamou Compressor Station was not a significant contributor (i.e., was below the SIL). Therefore, the modeling has shown that impacts associated with the operation of the Mamou Compressor Station would be below (better than) the NAAQS.

For the PSD Class II increment analysis, the analysis considered the Mamou Compressor Station, as well as off-site emission sources. The off-site sources were selected based on the AOI determined for the full impact analysis. The PSD Class II increment for annual NO_2 and 24-hour $PM_{2.5}$ was used in the analysis; however, the EPA has not yet established a PSD Class II increment for 1-hour NO_2. The results of the PSD increment analysis are shown in table 2.7-19. The maximum modeled concentration for the annual average period for NO_2 is below (i.e., better than) the allowable value. For 24-hour $PM_{2.5}$, modeling indicated the PSD increment would be exceeded at multiple locations; thus, similar to the analysis conducted for the full impact NAAQS analysis, the contribution of the Mamou Compressor Station to the locations where the PSD increment was exceeded was examined. For all five years of meteorological data processed in the modeling, the Mamou Compressor Station did not contribute above the SIL to any location where the PSD increment was exceeded. Therefore, the Mamou Compressor Station was shown to not significantly increase the PSD increment at these locations.

TABLE 2.7-19 **Prevention of Significant Deterioration (PSD) Class II Increment Analysis Results (μg/m^3)**		
Period and Year of Maximum	**Modeled Concentration a/**	**PSD NO_2 Class II Increment**
NO_2 - Annual (2012)	24.11	25
24-hour $PM_{2.5}$	exceeded at multiple sites **b/**	9

a Annual concentration shown for NO_2 includes adjustment of model results by the NO_2:NO_X ambient ratio of 0.75, in accordance with the EPA Tier 2 screening method.
b Additional analyses were conducted to determine the Mamou Compressor Station contribution to the PSD increment exceedances.

CCTPL conducted an additional impact analysis as required by the PSD regulations. The growth analysis indicated that no significant commercial, residential, or industrial growth is expected as a result of construction of the facility because CCTPL anticipates hiring only two new employees who would reside in the area, the facility is in a rural location, and there are no requirements for additional development to support the Mamou Compressor Station.

Secondary air quality standards are set under the CAA for the protection of soils, water, vegetation, animals, and other public welfare impacts. CCTPL's air quality analysis demonstrated that no secondary air quality standards would be violated; therefore, any impacts on soils, vegetation, animals, and other public welfare concerns would not be significant.

Visibility impacts were evaluated using the VISCREEN model for the analysis. The closest open/active park, Chicot State Park, was selected for the visibility impact analysis. Visibility impacts were assessed using a conservative Level I (screening) analysis. The results of the analysis are presented in table 2.7-20 and show that projected visibility impacts are below (i.e., better than) critical screening levels and the Mamou Compressor Station would not result in adverse visibility impacts at Chicot State Park.

TABLE 2.7-20 **Visibility Screening Analysis for Chicot State Park**			
Perceptibility of Plume Based on Color Difference, Maximum Modeled Value	**Critical Screening Value, Color Difference**	**Maximum Modeled Contrast**	**Critical Screening Value, Contrast**
0.94	2.0	0.004	0.05

2.7.2 Noise

Construction and operation of the Projects would affect the local noise environment. The ambient sound level of a region is defined by the total noise generated within the specific environment and comprises sounds from both natural and artificial sources. At any location, both the magnitude and frequency of environmental noise may vary considerably throughout the day and week, in part due to changing weather conditions and the impacts of seasonal vegetative cover.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is a sound level containing the same sound energy as the instantaneous sound levels measured over a specific time period. Noise levels are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Specifically, in the calculation of the L_{dn}, late night to early morning (10:00 p.m. to 7:00 a.m.) noise exposures are penalized +10 decibels (dB), to account for people's greater sensitivity to sound during the nighttime hours. The A-weighted scale (dBA) is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. For an essentially steady sound source that operates continuously over a 24-hour period, the L_{dn} is approximately 6.4 dB above the measured L_{eq}.

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impacts from the Project at noise-sensitive areas (NSAs) such as residences, schools, or hospitals. Because of the 10 dBA nighttime penalty added before calculating the L_{dn}, for a facility to meet the L_{dn} 55 dBA limit, it must be designed such that actual constant noise levels on a 24-hour basis do not exceed 48.6 dBA L_{eq} at any NSA. Also, in general, a person's threshold of perception for a perceivable change in loudness on the A-weighted sound level is about 3 dBA, whereas a 5 dBA change is clearly noticeable, and a 10 dBA change is perceived as either twice or half as loud.

There are no noise regulations or ordinances at the state level applicable to the Projects. Calcasieu Parish noise regulations are contained in the Calcasieu Parish Police Jury Code of Ordinances, Chapter 18, Article VIII. This noise ordinance allows noises made by persons having obtained a permit; however, construction within 165 feet of any residence or NSA is prohibited between sunset and sunrise on weekdays and Saturday, and 9:00 p.m. and 8:00 a.m. on Sundays and holidays. This noise ordinance also prohibits the creation or operation of any machine, instrument, or device within 300 feet of a church, synagogue, or regular place of worship, if operation interferes with the conduct of worship.

2.7.2.1 Existing Noise Conditions

SPLNG Terminal

The SPLE Project would be located next to the existing SPLNG Terminal. The area is bounded by the Sabine River on the west and south and by wetlands to the north and east. No residences are within a 1-mile radius of the SPLE Project. Two NSAs were identified during authorization of the existing SPLNG Terminal. These locations include a marina (NSA T1), located about 8,180 feet south-southwest of the project area, and the Sabine Pass Battleground state historic site (NSA T2), located about 8,710 feet south of the project area. The Sabine Pass Battleground state historic site was extensively damaged by Hurricane Ike (2008) and no longer provides camping or overnight facilities. The Sabine Pass Battleground site was transferred to the Texas Historical Commission from the Texas Parks and Wildlife Department, is no longer considered a Texas State Park, and has been removed from state park status. However, the site is still open to the public and we continue to evaluate it as an NSA in the project area.

Sabine Pass measured ambient noise at NSA T1 on June 17-18, 2013, during construction of Trains 1 through 4. The measured sound level at NSA T1 was 47.1 dBA (L_{eq}), with a corresponding calculated L_{dn} of 53.5 dBA. The sound level measured at NSA T1 was used to characterize conditions at NSA T2.

CCTPL Pipelines and Aboveground Facilities

The land uses surrounding the Mamou Compressor Station include agricultural land. The nearest NSAs (all residences) are located 2,000 feet north (NSA M1), 1,700 feet southeast (NSA M2), and 3,300 feet west (NSA M3). CCTPL measured sound levels at these NSAs on June 12-13, 2013. Measured ambient sound levels ranged from 58.5 to 61.9 dBA L_{dn}. Nighttime levels were louder because of insect noise. Analyzed noise levels estimates the ambient sound levels at these NSAs without insect noise at 43.0 to 57.1 dBA L_{dn}.

CCTPL proposes to use the HDD method 14 times where NSAs are within one- half mile of the HDD entry or exit site. These locations range from quiet suburban residential areas to very quiet, sparse suburban or rural areas. CCTPL estimated ambient noise levels using an American National Standards Institute standard based on land use categories. Ambient noise levels range from 43 to 48 dBA L_{eq}.

2.7.2.2 Construction Noise Impacts and Mitigation

Construction noise is highly variable because the types of equipment in use at a construction site changes with the construction phase and the type of activities. Generally, construction would take place during daylight hours (7:00 a.m. to 7:00 p.m.) and would include the following major phases: site preparation, excavation, installation of pipeline and/or aboveground facilities, and site cleanup and restoration. The construction equipment would differ from phase to phase but would include dozers, cranes, cement mixers, dump trucks, and loaders. Noise generated during construction is primarily from the diesel engines that power the equipment. Exhaust noise is usually the predominant source of diesel engine noise. Equipment used is not generally operated continuously, nor is the equipment always operated simultaneously. Typically, the highest site average sound levels (89 dBA at 50 feet) are associated with excavation and finishing activities.

Measures to mitigate construction noise include complying with federal regulations limiting noise from trucks and ensuring that equipment and sound-muffling devices provided by the manufacturer are kept in good working condition. In addition, construction activity would generally not occur during the nighttime hours when people are sleeping.

SPLNG Terminal

Construction noise from Trains 1 through 4 is currently inaudible at the two NSAs near the SPLNG Terminal, and Phase 3 would be farther from these NSAs. Construction of the SPLE facilities would take about 49 months and would primarily occur during daytime hours (7:00 a.m. to 7:00 p.m.). Sabine Pass used the Federal Highway Administration's Roadway Construction Noise Model, version 1.0, to predict the sound level during typical construction activities. The predicted short-term sound level at the nearest NSA during daytime construction is 45 dBA L_{eq}.

The SPLE Project would also require pile-driving when constructing the foundations for the liquefaction equipment. The pre-cast piles would be installed using a combination of boring and impact pile-driving. Sabine Pass used a computer noise model to calculate the estimated noise impacts of pile-driving activities at the nearest NSAs. A typical pre-cast pile driver installing piles at 50 blows per minute results in noise levels 123 dBA per pile driver operation. Sabine Pass assumed two simultaneous pile-driving operations at the closest edge of the construction area, resulting in a sound level of 38 dBA L_{eq} at the nearest NSA.

Construction noise would be below the ambient noise level at the nearest NSAs. Therefore, the 49-month SPLE Project construction, including pile driving, would not result in a significant noise impact.

Mamou Compressor Station

Noise generated by construction of the Mamou Compressor Station would be from the use of heavy construction equipment during site preparation, excavation, foundation placement, installation of gas-handling equipment and piping, building construction, and finishing and site cleanup. Construction of the compressor station would last six to eight months and would typically occur between the hours of 7:00 a.m. and 7:00 p.m. NSA M2 is the closest to the proposed compressor station. CCTPL estimated construction noise levels at a distance of 50 feet for each phase of construction activity. We have calculated the noise impacts at NSA M2 based on additional noise attenuation for distance for each construction activity (see table 2.7-21). Noise impacts at the other two NSAs would be lower due to further noise attenuation. The sound levels in the table indicate that site clearing, excavation, and building construction noise at the NSA closest to the Mamou Compressor Station would be above existing daytime noise levels. However, construction noise would not be louder than other typical construction activity or affect nighttime sound levels.

TABLE 2.7-21

Typical Site Average Noise Levels at Nearest NSA by Construction Activity

Location	Existing Daytime L_{eq}	Distance (feet)	Site Clearing L_{eq}	Excavation L_{eq}	Foundations L_{eq}	Building Construction L_{eq}	Finishing L_{eq}
NSA M2	38.8	1,700	53.3	58.3	46.3	53.3	58.3

CCTPL Pipelines and Aboveground Facilities

Pipeline

Noise could affect the local environment along the pipeline routes and at aboveground facilities and contractor/pipe yards during the construction period. Construction activities use standard heavy equipment such as track-excavators, backhoes, bulldozers, dump trucks, loaders, cranes, and boring equipment; however, not all of the equipment would be used in each phase of construction. Pipeline construction generally would proceed at rates ranging from several hundred feet to 1 mile per day. However, with the assembly-line method of construction, construction activities in any one area would last from several weeks to several months on an intermittent basis.

Construction is currently planned to occur during normal daytime working hours. Although residents near the construction workspace would likely experience annoyance, the impact on the noise environment at any specific location along the pipeline routes would be short-term. CCTPL would also construct during the daytime, allowing nighttime noise to be unaffected.

Horizontal Directional Drilling

CCTPL identified the nearest NSA within 0.5 mile of each of the 14 HDD entry and exit sites along the pipeline route. HDD activities are currently planned only during daytime hours. Our analysis, therefore, presents the daytime L_{eq} sound levels.

HDD uses a number of pieces of equipment that include power generation, drill pile storage, control rooms, an excavator, and storage trailers. Of these sources, the diesel engine power generation units create the most noise. CCTPL identified noise-level data measured at a typical HDD site, where the HDD entry generates a sound level of approximately 85 dBA L_{eq} at 50 feet, and the HDD exit side noise levels are about 79 dBA L_{eq} at 50 feet. We calculated the projected L_{eq} HDD noise levels at each NSA. We also calculated the simultaneous impact of entry and exit noise for those NSAs that are within 0.5 mile of both the entry and exit site. The results of the analysis are provided in table 2.7-22.

TABLE 2.7-22

Horizontal Directional Drilling Site Noise Analysis – No Noise Mitigation

Facility / HDD Site	NSA	Distance (feet)/ Direction to NSA	Existing Daytime L_{eq} (dBA) a/	Calculated HDD L_{eq} Noise Level (dBA)	Combined Ambient Plus HDD (dBA)	Increase Above Ambient Noise Level (dBA)
Houston River Canal Entry	H1	1,800 / NE	48	53.9	54.9	6.9
Houston River Canal Exit	H1	550 / E	48	58.2	58.6	10.6
Houston River Canal Entry and Exit	H1	NA	48	59.6	59.9	11.9
Houston River Entry	H2 H3	400 / SE 600 / NW	48 48	66.9 63.4	67.0 63.5	19.0 15.5
Houston River Exit	H3	2,300 / SW	48	45.7	50.0	2.0
Houston River Entry and Exit	H3	NA	48	63.5	63.6	15.6
U.S. 27/Bankens Road/Railroad Entry	H4 H5	250 / NW 1,100 / SE	48 48	71.0 58.2	71.0 58.6	23.0 10.6
U.S. 27/Bankens Road/Railroad Exit	H4 H5	2,400 / W 1,450 / SW	48 48	43.4 49.8	49.9 52.0	1.9 4.0
U.S. 27/Bankens Road/Railroad Entry and Exit	H4 H5	NA	48 48	71.0 58.8	71.0 59.1	23.0 11.1
Little River Entry	H6	1,400 / S	48	56.1	56.7	8.7
Little River Exit	H6 H7	2,300 / SW 1,600 / E	48 48	45.7 48.9	50.0 51.5	2.0 3.5
Little River Entry and Exit	H6	NA	48	56.5	57.1	9.1
West Fork Calcasieu River Entry	H8 H9	450 / S 1,200 / N	43 43	65.9 57.4	65.9 57.6	22.9 14.6
West Fork Calcasieu River Exit	H9	2,600 / SW	43	44.7	46.9	3.9
West Fork Calcasieu River Entry and Exit	H9	NA	43	57.6	57.8	14.8
Indian Bayou/Camp Edgewood Road Entry	H10 H11	1,500 / E 1,600 / ENE	48 48	55.5 54.9	56.2 55.7	8.2 7.7
Indian Bayou/Camp Edgewood Road Exit	H10 H11	600 / S 400 / SE	48 48	57.4 60.9	57.9 61.2	9.9 13.2
Indian Bayou/Camp	H10	NA	48	59.6	59.9	11.9

TABLE 2.7-22

Horizontal Directional Drilling Site Noise Analysis – No Noise Mitigation

Facility / HDD Site	NSA	Distance (feet)/ Direction to NSA	Existing Daytime L_{eq} (dBA) a/	Calculated HDD L_{eq} Noise Level (dBA)	Combined Ambient Plus HDD (dBA)	Increase Above Ambient Noise Level (dBA)
Edgewood Road Entry and Exit	H11		48	61.9	62.0	14.0
Marsh Bayou Entry	H12 H13	350 / W 1,800 / NNW	43 43	68.1 53.9	68.1 54.2	25.1 11.2
Marsh Bayou Exit	H12 H13	1,900 / W 1,700 / W	43 43	47.4 48.4	48.7 49.5	5.7 6.5
Marsh Bayou Entry and Exit	H12 H13	NA	43	68.1 55.0	68.2 55.2	25.2 7.2
Barnes Creek Entry	H14	850 / NE	43	60.4	60.5	17.5
Barnes Creek Exit	None	NA	NA	NA	NA	NA
Whiskey Chitto Creek Entry	H15	750 / SE	43	61.5	61.5	18.5
Whiskey Chitto Creek Exit	None	NA	NA	NA	NA	NA
Calcasieu River Entry	None	NA	NA	NA	NA	NA
Calcasieu River Exit	H16	1,950	43	47.2	50.6	7.6
Highway 165 Entry	H17 H18	800 / ESE 2,100 / E	48 48	60.9 52.5	61.1 53.8	13.1 5.8
Highway 165 Exit	H17 H18	1,400 / W 300 / N	48 48	50.1 63.4	52.2 63.6	4.2 15.6
Highway 165 Entry and Exit	H17 H18	NA	48 48	61.2 63.7	61.4 63.9	13.4 15.9
Highway 10 Entry	H19	2,200 / NW	48	52.1	53.5	5.5
Highway 10 Exit	None	NA	NA	NA	NA	NA
WCGTLTA016 Wetland Entry	H20	1,000 / S	43	59.0	59.1	16.1
WCGTLTA016 Wetland Exit	H20	1,550 / SW	43	49.2	50.1	7.1
WCGTLTA016 Wetland Entry and Exit	H20	NA	43	59.4	59.5	16.5
East Fork Bayou Nezpique Entry	None	NA	NA	NA	NA	NA
East Fork Bayou Nezpique Exit	H21	2,300 / SE	43	45.7	47.6	4.6

a Estimated L_{eq} based on land use as set forth in American National Standards Institute 12.9-1993/Part 3.

NA = Not applicable.
None = No NSA within 0.5 mile of the HDD site.

At this time, CCTPL plans to operate HDD only during the day; therefore, nighttime sound levels would be unaffected. As shown in table 2.7-22, HDD noise levels would be similar to that of other construction noise.

CCTPL states that if residents indicate that HDD activities are or may be disruptive, CCTPL would implement mitigative noise measures at the site or provide compensation to the residents for temporary housing elsewhere in the local area during HDD-related construction activities. CCTPL states that typical mitigation measures could provide up to a 15 dBA reduction in noise levels. If additional noise mitigation is required, an onsite evaluation of equipment noise would be completed to identify the predominant noise sources based on site-specific characteristics and NSA proximity. Based on this evaluation, additional noise mitigation measures may include any of the following:

- reconfiguring equipment locations to take advantage of natural and artificial noise barriers;
- installation of a partial noise barrier around the hydraulic power unit, including the engine and associated engine jacket-water cooler (for example, cover two sides of the power unit with a plywood barrier system, such as a 14-foot high or other type of effective noise barrier system;
- use of residential grade silencers or mufflers on engines;
- use of gear box noise blanket and other mechanical noise dampening blankets, acoustical tents, acoustical barriers; and
- employment of low noise generators.

However, because there may be instances where 24-hour drilling is required where noise levels may exceed 55 dBA Ldn at some NSAs, and because site-specific mitigation measures at such HDD sites have not been developed, **we recommend that**:

- **CCTPL perform all HDD activities, with the exception of the pull-back, during daytime hours. If 24-hour operations are required at any location, CCTPL should file with the Secretary for review and written approval by the Director of OEP an HDD noise analysis and mitigation plan prior to beginning the 24-hour HDD construction. The plan should include:**

    a. the distance and direction to each NSA within 0.5 mile of the 24-hour HDD entry and exit site and the proposed length of time HDD activities would occur;

    b. the background noise levels and the estimated drilling noise contributions at the NSAs using a day-night equivalent sound level (L_{dn});

    c. the noise mitigation measures CCTPL would commit to implement at each entry or exit site where estimated drilling noise contribution would exceed 55 dBA L_{dn} at a nearby NSA, and the resulting noise levels with the mitigations measures; and

    d. site-specific plans identifying any noise walls or barriers, equipment locations, equipment barriers, or any other noise mitigation measures.

2.7.2.3 Operation Noise Impacts and Mitigation

SPLNG Terminal

Sabine Pass used a three-dimensional acoustic noise modeling software to analyze the noise contributions expected from the addition of the proposed equipment at the SPLNG Terminal. The model accounts for attenuation, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. Table 2.7-23 presents the results of the acoustical analysis for the SPLE Project, including the following modeled sound sources and mitigation measures:

- twelve LM2500+G4 gas turbine-driven compressors (6 per train);
- two LM2500+ gas turbine generators;
- recycle boil-off gas compressors;
- induced draft air cooler noise;
- noise radiated by liquefaction facility piping;
- acoustically treated boil-off gas compressor buildings;
- exhaust stack silencers for the liquefaction train combustion turbines and power generator combustion turbine;
- acoustical lagging material around aboveground pipes; and
- low noise gas coolers and lube-oil coolers.

TABLE 2.7-23

Sabine Pass Liquefied Natural Gas Terminal Sound-Level Predictions

NSA	Distance from Trains 5 and 6 (feet)	Direction	Measured Existing L_{dn} (dBA)	Predicted L_{dn} Contribution of Existing a/ and New Equipment (dBA)	Combined Equipment L_{dn} and Existing L_{dn} (dBA)	Predicted Increase Above Existing L_{dn} (dBA)
T1	8,180	SSW	53.5	54.7	57.2	3.7
T2	8,710	S	53.5	54.2	56.9	3.4

a Includes existing vaporization equipment and new liquefaction equipment (Trains 1-4) under construction.

The results of the acoustical analysis for the entire SPLNG Terminal (existing LNG facility, Trains 1 through 4, and the proposed SPLE Project facilities) indicate that sound levels at the nearest NSAs would be below the FERC criterion of 55 dBA L_{dn}. Also, the increase in noise levels at the NSAs would just reach the threshold of a perceptible change. Although noise impacts from operation of the SPLE Project are not projected to be significant, **we recommend that:**

- **Sabine Pass file a full load noise survey of the SPLNG Terminal with the Secretary <u>no later than 60 days</u> after placing each liquefaction train (5 and 6) in service. If a full load condition noise survey is not possible, Sabine Pass should provide an interim survey at the maximum possible operation <u>within 60 days</u> of placing each liquefaction train in service and file the full load operational survey <u>within 6 months</u>. If the noise attributable to operation of all of the equipment at the SPLNG Terminal, including the liquefaction facilities, under interim or full load conditions, exceeds an L_{dn} of 55 dBA at any nearby NSA, Sabine Pass should file a report on the changes that are needed and should install the additional noise controls to meet the level <u>within one year</u> of the in-**

service date. Sabine Pass should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs additional noise controls.

Mamou Compressor Station

CCTPL also estimated the operational noise levels for the Mamou Compressor Station using acoustic computer modeling software. The following sound sources and mitigation measures related to the proposed Mamou Compressor Station were included in the acoustic modeling:

- three Dresser Rand C40-5M compressors;
- one Dresser Rand C51-4 compressor;
- three Solar Taurus 70 combustion turbines;
- one Solar Titan 130 combustion turbine;
- eight lube oil cooler fans;
- eight gas cooler fan bays (21 fans in total);
- acoustically treated compressor building;
- exhaust stack silencers;
- engine combustion air intake silencers;
- pipe lagging around aboveground pipes; and
- low-noise gas coolers and outdoor lube oil coolers.

The results of the noise modeling analysis are provided in table 2.7-24. The modeling results indicate that the calculated levels at the NSAs resulting from the station operation would all be below the FERC-criterion of 55 dBA L_{dn}. As indicated in the table, operation of the Mamou Compressor Station would be just perceptible at two of the NSAs and would result in a 1 dBA increase in noise over the existing sound level at NSA 2, which currently exceeds a L_{dn} of 55 dBA. This increase is below the 3 dBA threshold of noticeable difference for humans. However, to ensure that the actual noise levels resulting from operation of the Mamou Compressor Station are not significant, **we recommend that:**

- **CCTPL file noise surveys with the Secretary no later than 60 days after placing the Mamou Compressor Station in service. If a full load condition noise survey is not possible, CCTPL should provide an interim survey at the maximum possible horsepower load and provide the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at the compressor station, under interim or full horsepower load conditions, exceeds an L_{dn} of 55 dBA at any nearby NSAs, CCTPL should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. CCTPL should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

TABLE 2.7-24 **Mamou Compressor Station Operational Noise Impact Summary**						
NSA	**Distance from Station (feet)**	**Direction**	**Station Contribution L_{dn} (dBA)**	**Existing L_{dn} without Station a/ (dBA)**	**Combined L_{dn} (Station plus Existing) (dBA)**	**Predicted Increase Above Existing L_{dn} (dBA)**
M1	2,000	North	51.6	49.3	53.6	4.3
M2	1,700	Southeast	51.4	57.1	58.1	1.0
M3	3,300	West	44.7	43.0	46.9	3.9
a Insect noise removed from ambient for comparison during any season or when insects are not present.						

2.8 Reliability and Safety

2.8.1 LNG Facility Regulatory Oversight

Three federal agencies share regulatory authority over the siting, design, construction and operation of LNG import terminals: the USCG, the DOT, and FERC. The USCG has authority over the safety of an LNG facility's marine transfer area and LNG marine traffic as well as over security plans for the entire LNG terminal facility and LNG marine traffic. Those standards are codified in 33 CFR Parts 105 and 127. The DOT establishes federal safety standards for siting, construction, operation, and maintenance of onshore LNG facilities, as well as for the siting of marine cargo transfer systems at waterfront LNG plants. Those standards are codified in 49 CFR 193. Under the NGA and delegated authority from the DOE, FERC authorizes the siting and construction of LNG import and export facilities.

In 1985, FERC and the DOT entered into a Memorandum of Understanding regarding the execution of each agency's respective statutory responsibilities to ensure the safe siting and operation of LNG facilities. In addition to FERC's existing ability to impose requirements to ensure or enhance the operational reliability of LNG facilities, the Memorandum specified that FERC may, with appropriate consultation with the DOT, impose more stringent safety requirements than those in Part 193.

In February 2004, the USCG, DOT, and FERC entered into an Interagency Agreement to ensure greater coordination among these three agencies in addressing the full range of safety and security issues at LNG terminals, including terminal facilities and tanker operations, and maximizing the exchange of information related to the safety and security aspects of the LNG facilities and related marine operations. Under the Interagency Agreement, the FERC is the lead federal agency responsible for the preparation of the analysis required under NEPA for impacts associated with terminal construction and operation. The DOT and USCG participate as cooperating agencies. All three agencies have some oversight and responsibility for inspection and compliance during the facility's operation.

As part of the review required for a FERC authorization, we must ensure that all proposed LNG facilities would operate safely and securely. The design information that must be filed in the application to the Commission is specified by 18 CFR 380.12 (m) and (o). The level of detail necessary for this submittal requires the project sponsor to perform substantial front-end engineering of the complete facility. The design information is required to be site-specific and developed to the extent that further detailed design would not result in changes to the siting considerations, basis of design, operating conditions, major equipment selections, equipment design conditions, or safety system designs which we considered during our review process.

The FERC's filing regulations also require an applicant to identify how its proposed design would comply with DOT's siting requirements of 49 CFR 193, Subpart B. As part of our NEPA review, we use the applicant's information, developed to comply with DOT's regulations, to assess whether or not the facility would have a public safety impact. As a cooperating agency, DOT assists the FERC in evaluating whether an applicant's proposed siting meets the DOT requirements. If a facility is constructed and becomes operational, the facility would be subject to DOT's inspection program. Final determination of whether a facility is in compliance with the requirements of 49 CFR 193 would be made by DOT staff.

In a letter to the USCG dated February 6, 2013, Sabine Pass described the SPLE Project modifications and that authorization of the SPLE facilities would bring the total number of prospective LNG liquefaction trains at the terminal to six. Additionally, in the February 6, 2013 letter, Sabine Pass further stated that the potential maximum vessel traffic for all six LNG liquefaction trains would be 312 per year, which would not go beyond the anticipated maximum of 400 ship transits per year already assumed in the February 2006 Waterway Suitability Assessment . In accordance with 33 CFR 127, the USCG has reviewed the SPLE Project and stated that a Letter of Intent or revision to the existing Waterway Suitability Assessment is not required for the SPLE Project because the proposed modifications lie outside the Marine Transfer Area. A copy of the correspondence between Sabine Pass and the USCG is included in Attachment 2 of the Request to Initiate the Pre-filing Review Process under PF13-8.[17]

2.8.2 LNG Facility Hazards

With the exception of the October 20, 1944 failure at an LNG facility in Cleveland, Ohio, the operating history of the U.S. LNG industry has been free of safety-related incidents resulting in adverse effects on the public or the environment. The 1944 incident in Cleveland led to a fire that killed 128 people and injured 200 to 400 more people.[18] The failure of the LNG storage tank was due to the use of materials inadequately suited for cryogenic temperatures. LNG migrating through streets and into underground sewers due to the lack of adequate spill impoundments at the site was also a contributing factor. Current regulatory requirements ensure that proper materials suited for cryogenic temperatures are used and that spill impoundments are designed and constructed properly to contain a spill at the site.

Another operational accident occurred in 1979 at the Cove Point LNG facility in Lusby, Maryland. A pump seal failure resulted in gas vapors entering an electrical conduit and settling in a confined space. When a worker switched off a circuit breaker, the gas ignited, causing heavy damage to the building and a worker fatality. With the participation of the FERC, lessons learned from the 1979 Cove Point accident resulted in changing the national fire codes to ensure that the situation would not occur again.

On January 19, 2004, a blast occurred at Sonatrach's Skikda, Algeria, LNG liquefaction facility, which killed 27 and injured 56 workers. No members of the public were injured. Findings of the accident investigation suggested that a cold hydrocarbon leak occurred at Liquefaction Train 40 and was introduced to the high-pressure steam boiler by the combustion air fan. An explosion developed inside the boiler firebox, which subsequently triggered a larger explosion of the hydrocarbon vapors in the

17 Accession number 20130227-5190.

18 For a description of the incident and the findings of the investigation, see "U.S. Bureau of Mines, Report on the Investigation of the Fire at the Liquefaction, Storage, and Regasification Plant of the East Ohio Gas Co., Cleveland, Ohio, October 20, 1944," dated February 1946.

immediate vicinity. The resulting fire damaged the adjacent liquefaction process and liquid petroleum gas separation equipment of Train 40, and spread to Trains 20 and 30. Although Trains 10, 20, and 30 had been modernized in 1998 and 1999, Train 40 had been operating with its original equipment since start-up in 1981.

On March 31, 2014, an explosion and fire occurred at Northwest Pipeline Corporation's LNG peak-shaving facility in Plymouth, Washington. The facility was immediately shut down, and emergency procedures were activated, which included notifying local authorities and evacuating all plant personnel. No members of the public were injured. The accident investigation is still in progress. Once developed, measures to address any causal factors which led to this incident will be applied to all facilities under the Commission's jurisdiction.

2.8.2.1 Hazards Associated with the Proposed Equipment

Before liquefaction, Sabine Pass would pre-treat the feed gas for the removal of mercury, H_2S, benzene, and carbon dioxide. The hazards associated with the removal of these substances from the feed gas stream result from the physical and chemical properties, flammability, and toxicity of mercury, benzene, H_2S, and amine. Sabine Pass proposes a design capacity to remove up to 20 micrograms per standard cubic meter mercury, 15 ppm by volume benzene, 4 ppm by volume H_2S, and 2 percent by volume CO_2. However, lower quantities and concentrations of these substances would be expected in the natural gas feed stream and would not pose a hazard to the public.

Mercury, which may exist in the feed gas but is not expected to be present, would be removed by absorption in the mercury-removal units. The spent material in the mercury removal units would be disposed of off-site at a licensed facility and would not pose a significant safety hazard to the public. Maintenance and safety procedures would cover the proper replacement and disposal of the spent material.

H_2S would be removed from the feed gas by the amine system to prevent downstream corrosion and fouling in the liquefaction process. During this process, H_2S may accumulate to concentrations up to approximately 0.016 percent by volume during regeneration of the amine. After regeneration, the H_2S would be sent through scavenger beds to be removed. In the case of a release of H_2S prior to reaching the scavenger beds, Sabine Pass has provided hazard modeling (see section 2.8.5.3). The spent scavenger would be disposed of off-site at a licensed facility and would not pose a significant safety hazard to the public.

The amine solution would be contained (see section 2.8.5.1, Impoundment Sizing) and handled at temperatures below the point at which it could produce enough vapors to form a flammable mixture. Therefore, the amine solution would not pose a significant hazard to the public, which would have no access to the on-site areas.

Sabine Pass would install a heavy hydrocarbon removal system to remove hydrocarbons that may be present in the natural gas stream and that could freeze and foul the liquefaction process. The hydrocarbons heavier than methane would be separated out through a series of distillation columns. The lighter hydrocarbons that exist as liquids under elevated pressures, are often referred to as natural gas liquids (NGLs). The NGLs would not freeze during the liquefaction process and would be recycled back into the natural gas stream before liquefaction. The NGLs would be handled on-site at temperature and pressure conditions under which a loss of containment would result primarily in a vapor release. The NGLs are not toxic but are flammable and have the ability to produce damaging overpressures if ignited. The heavier hydrocarbons that exist as liquids near atmospheric pressure, such as pentane, hexane, benzene, toluene, ethylbenzene, and xylene, are referred to as condensates. These components would freeze during the liquefaction process and could damage or foul equipment. Therefore, these components would be removed from the natural gas stream as liquids and sent to floating roof storage tanks where they would be either pumped into an existing condensate pipeline or transferred to tanker trucks for removal in the event that the stabilized condensate does not meet the applicable quality specifications of the pipeline. Most of the stabilized condensate components are flammable and some are toxic. Any liquid spill would be contained in impoundments (see section 2.8.5.1, Impoundment Sizing). Sabine Pass has provided modeling in the case of an accidental release of stabilized condensate (see section 2.8.5).

After pre-treatment, the treated natural gas would then be liquefied into LNG through a series of heat exchangers using ethylene, propane, and methane as refrigerants. The LNG would then be stored on-site in the existing LNG storage tanks before being transferred to LNG ships for export. The refrigerants would also be stored on-site and periodically re-filled as needed. The LNG and refrigerants are not toxic, but they are flammable and some can present overpressure hazards if ignited. Any liquid spill would be contained in impoundments, as discussed under "Impoundment Sizing" in section 2.8.5.1. Sabine Pass has addressed modeling of an accidental release of LNG and refrigerants, also described in section 2.8.5.

The principal hazards associated with the substances involved in the liquefaction, storage and vaporization of LNG result from loss of containment, vapor dispersion characteristics, flammability, and the ability to produce damaging overpressures. The dispersion of toxic components would also be a hazard associated with substances at the proposed SPLE facilities. These hazards are described in more detail below.

2.8.2.2 Loss of Containment

A loss of the containment from the storage vessels or process piping would result in the formation of flammable vapor near the release location and a potential for pooled liquid nearby. Releases occurring in the presence of an ignition source would most likely result in a fire located at the vapor source. A spill without ignition would form a vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. The fluid released may present low or high temperature hazards and may result in the formation of toxic and flammable vapors. The extent of the hazard would depend on the material released, the storage and process conditions, and the volumes released.

The SPLE Project would handle LNG at a cryogenic temperature of -260°F. Liquid ethylene and liquid propane would be handled within the process stream at elevated pressures of approximately 305 pounds per square inch gauge (psig) and 125 psig, respectively, and at temperatures as low as -25°F. The NGLs would be handled from approximately -88°F to 316°F and approximately 40 psig to 620 psig. Condensate storage would be at near atmospheric pressure and temperature.

Because of the temperature and pressure conditions under which these liquids would be handled on-site, loss of containment of these liquids could lead to the release of both liquid and vapor into the immediate area. Contact with either cold liquid or vapor could cause freeze burns or frostbite for personnel in the immediate area or more serious injury or death, depending on the length of exposure. However, spills would be contained to on-site areas and the cold state of these releases would be greatly limited due to the continuous mixing with the warmer air. The cold temperatures from the release would not present a safety hazard to the public, which would not have access to on-site areas.

These releases may also quickly cool any materials contacted by the liquid on release, causing extreme thermal stress in materials not specifically designed for such conditions. These thermal stresses could subsequently subject the material to brittleness, fracture, or other loss of tensile strength. These temperatures, however, are accounted for in the design of equipment and structural supports and would not be substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296ºF) or several other cryogenic liquids that have been routinely produced and transported in the United States.

2.8.2.3 Vapor Dispersion

In the event of a loss of containment, LNG, ethylene, propane, and NGL would vaporize on release from any storage or process facilities. Depending on the size of the release, these may also form a liquid pool and vaporize. Additional vaporization would result from exposure to ambient heat sources, such as water or soil. When released from a containment vessel or transfer system, LNG will generally produce 620 to 630 standard cubic feet (ft^3) of natural gas for each cubic foot of liquid. Ethylene will produce approximately 375 ft^3 of gas for each cubic foot of liquid. Propane will produce approximately 250 ft^3 of gas for each cubic foot of liquid. The composition of NGL would vary throughout the heavy hydrocarbon removal process and may produce up to 380 ft^3 of gas for each cubic foot of liquid. In the event of a loss of containment of stabilized condensate, the stabilized condensate would spill primarily as a liquid and form a pool, but would vaporize much more slowly than NGL.

The vapor may form a toxic or flammable cloud depending on the material released. The dispersion of the vapor cloud will depend on the physical properties of the cloud, the ambient conditions, and the surrounding terrain and structures. Generally, a denser-than-air vapor cloud would sink to the ground and would travel with the prevailing wind, while a lighter-than-air vapor cloud would rise and travel with the prevailing wind. The density will depend on the material releases and the temperature of the material. For example, a LNG release would initially form a denser-than-air vapor cloud and transition to lighter-than-air vapor cloud as the vapor disperses downwind and mixes with the warm surrounding air; a liquid ethylene release would form a denser-than-air vapor cloud and transition to a neutrally buoyant vapor cloud as it mixes with the warm surrounding air; and a propane, NGL, or condensate release would form a denser-than-air vapor cloud and would remain denser than the surrounding air, even after warming to ambient temperatures. However, experimental observations and vapor dispersion modeling indicate a LNG vapor cloud would not typically be warm, or buoyant, enough to lift off from the ground before the LNG vapor cloud disperses below its lower flammable limit (LFL).

The vapor cloud would continue to be hazardous until it dispersed below toxic levels and/or flammable limits. Toxicity is primarily dependent on the concentration of the vapor cloud in the air and the exposure duration, while flammability of the vapor cloud is primarily dependent just on the concentration of the vapor when mixed with the surrounding air. In general, higher concentrations within the vapor cloud would exist near the spill, and lower concentrations would exist near the edge of the cloud as it disperses downwind.

Toxicity is defined by a number of different agencies for different purposes. Acute Exposure Guideline Levels (AEGLs) and Emergency Response Planning Guidelines (ERPGs) can be used for emergency planning, prevention, and response activities related to the accidental release of hazardous substances.[19] Other federal agencies, such as the Department of Energy, EPA, and NOAA, use AEGLs and ERPGs as the primary measure of toxicity.[20,21,22]

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19 U.S. Environmental Protection Agency, *Dose-Response Assessment for Assessing Health Risks Associated with Exposure to Hazardous Air Pollutants,* http://www2.epa.gov/fera/dose-response-assessment-assessing-health-risks-associated-exposure-hazardous-air-pollutants, July 3, 2014.

20 U.S. Department of Energy, *Temporary Emergency Exposure Limits for Chemicals: Methods and Practice*, DOE Handbook, DOE-HDBK-1046-2008, August 2008.

21 U.S. Environmental Protection Agency, *40 CFR 68 Final Rule: Accidental Release Prevention Requirements: Risk Management Programs Under Clean Air Act Section 112(r)(7)*, 61 Federal Register 31667-31732, Vol. 61, No. 120, Thursday, June 20, 1996.

There are three AEGLs and ERPGs which are distinguished by varying degrees of severity of toxic effects, with AEGL-1 and ERPG-1 (level 1) being the least severe to AEGL-3 and ERPG-3 (level 3) being the most severe. AEGL-1 is the airborne concentration of a substance that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, these effects are not disabling and are transient and reversible upon cessation of the exposure. AEGL-2 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. AEGL-3 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. ERPG levels have similar definitions, but are based on the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing similar effects defined in each of the AEGLs. The EPA provides ERPGs (1 hour) and AEGLs at varying exposure times (10 minutes, 30 minutes, 1 hour, 4 hours, and 8 hours) for a list of chemicals. AEGLs are used preferentially as they are more inclusive and provide toxicity levels at various exposure times. The preferential use of AEGLs is also done by DOE and NOAA. The toxic properties for the various material components stored and processed on-site are tabulated in table 2.8-1.

In addition, methane and heavier hydrocarbons are classified as simple asphyxiants and may pose extreme health hazards, including death, if inhaled in significant quantities within a limited time. Very cold methane and heavier hydrocarbons vapors may also cause freeze burns. However, the locations of concentrations where cold temperatures and oxygen-deprivation effects could occur are greatly limited due to the continuous mixing with the warmer air surrounding the spill site. For that reason, exposure injuries from contact with releases of methane and heavier hydrocarbons normally represent negligible risks to the public.

Flammable vapors can develop when a flammable material is above its flash point and concentrations are between the LFL and the upper flammable limit (UFL). Concentrations between the LFL and UFL can be ignited, but concentrations above the UFL or below the LFL do not ignite. The flammable properties for the various material components processed on-site are tabulated in table 2.8-2.

The extent of the affected area and the severity of the impacts on objects within a vapor cloud would primarily be dependent on the material, quantity, and duration of the initial release, the surrounding terrain, and the environmental conditions present during the dispersion of the cloud. Sabine Pass has modeled the extent of the potential vapor dispersion hazards for the SPLE Project, which is discussed in section 2.8.5.3.

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22 U.S. National Oceanic and Atmospheric Administration, *Public Exposure Guidelines*, http://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/resources/public-exposure-guidelines.html, December 3, 2013.

TABLE 2.8-1

Toxicity Levels (in ppm) a/,b/

		10 min	30 min	60 min	4 hr	8 hr
Hydrogen Sulfide	AEGL 1	0.75	0.60	0.51	0.36	0.33
	AEGL 2	41	32	27	20	17
	AEGL 3	76	59	50	37	31
Benzene	AEGL 1	130	73	52	18	9
	AEGL 2	2,000*	1,100	800	400	200
	AEGL 3	9,700**	5,600*	4,000*	2,000*	990
Toluene	AEGL 1	200	200	200	200	200
	AEGL 2	3,100*	1,600	1,200	790	650
	AEGL 3	13,000**	6,100*	4,500*	3,000*	2,500*
EthylBenzene	AEGL 1	33	33	33	33	33
	AEGL 2	2,900	1,600	1,100	660	580
	AEGL 3	4,700	2,600	1,800	1,000	910
Xylenes	AEGL 1	130	130	130	130	130
	AEGL 2	2,500*	1,300*	920*	500	400
	AEGL 3	7,200**	3,600*	2,500*	1,300*	1,000*

a/ EPA, Acute Exposure Guideline Levels, http://www.epa.gov/oppt/aegl/pubs/chemlist.htm, December 3, 2013.

b/ American Industrial Hygiene Association, 2013 ERPG/WEEL Handbook, http://www.aiha.org/get-involved/AIHAGuidelineFoundation/EmergencyResponsePlanningGuidelines, 2013.

*=≥10% LFL; **=≥50% LFL; ***=≥100%LFL.

TABLE 2.8-2

Flammable Properties a/

Material Component	Flash Point	LFL (% vol)	UFL (% vol)
Methane	-283°F	5.0	15.0
Ethylene	-250°F	2.7	36
Ethane	-211°F	3.0	12.5
Propane	-155°F	2.1	9.5
n-Butane	-76°F	1.8	8.5
i-Butane	-105°F	1.8	8.4
n-Pentane	-56°F	1.4	7.8
i-Pentane	-60°F	1.4	7.6
n-Hexane	-7.6°F	1.2	7.5
Benzene	11°F	1.4	7.1
Toluene	45°F	1.2	7.1
EthylBenzene	75°F	1.0	6.7
m-Xylene	77°F	1.1	7.0
o-Xylene	75°F	1.1	6.0
p-Xylene	77°F	1.1	7.0
Hydrogen sulfide	-116°F	4.0	44

a/ Society of Fire Protection Engineers (2008)

2.8.2.4 Flammable Vapor Ignition

If the flammable portion of a vapor cloud encounters an ignition source, a flame would propagate through the flammable portions of the cloud. In most circumstances, the flame would be driven by the heat it generates. This process is known as a deflagration, or a flash fire because of its relatively short duration. However, exposure to this methane vapor cloud fire can cause severe burns and death and can ignite combustible materials within the cloud. Sabine Pass has modeled the extent of the potential flammable vapor dispersion hazards for the SPLE Project (see section 2.8.5).

If the deflagration in a flammable vapor cloud accelerates to a sufficiently high rate of speed, pressure waves that can cause damage would be generated. As a deflagration accelerates to super-sonic speeds, the large shock waves produced, rather than the heat, would begin to drive the flame, resulting in a detonation. The flame speeds are primarily dependent on the reactivity of the fuel, the ignition strength and location, the degree of congestion and confinement of the area occupied by the vapor cloud, and the flame travel distance. Sabine Pass has modeled the extent of the potential overpressure hazards for the SPLE Project, which is discussed in section 2.8.5.

Once a vapor cloud is ignited, the flame front may propagate back to the spill site if the vapor concentration along this path is sufficiently high to support the combustion process. When the flame reaches vapor concentrations above the UFL, the deflagration could transition to a fireball and result in a pool or jet fire back at the source. A fireball would occur near the source of the release and would be of a relatively short duration compared to an ensuing jet or pool fire. The extent of the affected area and the severity of the impacts on objects in the vicinity of a fire would primarily be dependent on the material, quantity, and duration of the fire, the surrounding terrain, and the environmental conditions present during the fire. Sabine Pass has modeled the extent of the potential radiant heat hazards for the SPLE Project, which is discussed in section 2.8.5.

2.8.2.5 Overpressures

If the deflagration in a flammable vapor cloud accelerates to a sufficiently high rate of speed, pressure waves that can cause damage would be generated. As a deflagration accelerates to super-sonic speeds, the large shock wave produced, rather than the heat, would begin to drive the flame, resulting in a detonation. Deflagrations or detonations are generally characterized more generally as "explosions" when the rapid movement of the flame and pressure waves associated with them cause additional damage beyond that from the heat. The amount of damage an explosion causes depends on the amount the produced pressure wave is above atmospheric pressure (i.e., an overpressure) and its duration (i.e., pulse). For example, a 1 psi overpressure is often cited as a safety limit in regulations and is associated with glass shattering and traveling with velocities high enough to lacerate skin.

Flame speeds and overpressures primarily depend on the reactivity of the fuel, the ignition strength and location, the degree of congestion and confinement of the area occupied by the vapor cloud, and the flame travel distance.

The potential for unconfined LNG vapor cloud detonations was investigated by the USCG in the late 1970s at the Naval Weapons Center in China Lake, California. Using methane, the primary component of natural gas, several experiments were conducted to determine whether unconfined LNG vapor clouds would detonate. Unconfined methane vapor clouds ignited with low-energy ignition sources (13.5 joules) produced flame speeds ranging from 12 to 20 mph. These flame speeds are much lower than the flame speeds associated with a deflagration with damaging overpressures or with a detonation.

To examine the potential for detonation of an unconfined natural gas cloud containing heavier hydrocarbons that are more reactive, such as ethane and propane, the USCG conducted further tests on ambient-temperature fuel mixtures of methane-ethane and methane-propane. The tests indicated that the addition of heavier hydrocarbons influenced the tendency of an unconfined natural gas vapor cloud to detonate. Natural gas with greater amounts of heavier hydrocarbons would be more sensitive to detonation.

Although it has been possible to produce damaging overpressures and detonations of unconfined LNG vapor clouds, the feed gas stream proposed for the SPLE Project would have lower ethane and propane concentrations than those that resulted in damaging overpressures and detonations. The substantial amount of initiating explosives needed to create the shock initiation during the limited range of vapor-air concentrations also renders the possibility of detonation of these vapors at an LNG plant as unrealistic. Ignition of a confined LNG vapor cloud could result in higher overpressures. In order to prevent such an occurrence, Sabine Pass would take measures to mitigate the vapor dispersion and ignition into confined areas, such as buildings. Sabine Pass has proposed installing hazard detection devices at all combustion and ventilation air intake equipment to enable isolation and deactivation of any combustion equipment whose continued operation could add to, or sustain, an emergency. In general, the primary hazards to the public from an LNG spill that disperses to an unconfined area, either on land or water, would be from dispersion of the flammable vapors or from radiant heat generated by a pool fire.

In comparison with LNG vapor clouds, unconfined propane clouds have a higher potential for producing damaging overpressures, and an even higher potential for unconfined ethylene vapor clouds to produce damaging overpressures. Unconfined ethylene vapor clouds also have the potential to transition to a detonation much more readily than propane. This has been shown by multiple experiments conducted by the Explosion Research Cooperative to develop predictive blast wave models for low-, medium-, and high-reactivity fuels and varying degrees of congestion and confinement[23]. The experiments used methane, propane, and ethylene, as the respective low-, medium-, and high-reactivity fuels. In addition, the tests showed that if methane, propane, or ethylene is ignited within a confined space, such as in a building, they all have the potential to produce damaging overpressures. The mixed refrigerant liquefaction and NGL process streams would contain a mixture of components such as the ones discussed above (i.e., ethylene and propane). Therefore, a potential exists for these process streams to produce unconfined vapor clouds that could produce damaging overpressures in the event of a release.

Discussion of these hazards and potential mitigation for the SPLE facilities are in section 2.8.5.

2.8.3 Technical Review of the Facility Preliminary Engineering Design

Operation of the proposed facility poses a potential hazard that could affect the public safety if strict design and operational measures to control potential accidents are not applied. The primary concerns are those events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard as discussed in section 2.8.2. However, it is important to recognize the stringent requirements in place for the design, construction, operation, and maintenance of the facility, as well as the extensive safety systems proposed to detect and control potential hazards.

In general, we consider an acceptable design to include various layers of protection or safeguards in the facility design to reduce the risk of a potentially hazardous scenario from developing into a larger event. These layers of protection are independent of one another so that anyone would perform its function regardless of the action or failure of any other protection layer or initiating event. Such design features and safeguards typically include:

- a facility design that prevents hazardous events through the use of suitable materials of construction; operating and design limits for process piping, process vessels, and storage tanks; adequate design for wind, flood, seismic, and other outside hazards;
- control systems, including monitoring systems and process alarms, remotely-operated control and isolation valves, and operating procedures to ensure the facility stays within the established operating and design limits;
- safety-instrumented prevention systems, such as safety control valves and emergency shutdown systems, to prevent a release if operating and design limits are exceeded;
- physical protection systems, such as appropriate electrical area classification, proper equipment and building spacing, pressure relief valves, spill containment, and structural fire protection, to prevent escalation to a more severe event;
- site security measures for controlling access to the facility, including security inspections and patrols; response procedures to any breach of security and liaison with local law enforcement officials; and

23 Pierorazio, A.J., Thomas, K., Baker, Q.A., Ketchum, D.E., *An Update to the Baker–Strehlow–Tang Vapor Cloud Explosion Prediction Methodology Flame Speed Table*, Process Safety Progress (Vol.24, No.1), March 2005.

- on-site and off-site emergency response, including hazard detection and control equipment, firewater systems, and coordination with local first responders to mitigate the consequences of a release and prevent it from escalating to an event that could impact the public.

The inclusion of such protection systems or safeguards in a facility design can minimize the potential for an initiating event to develop into an incident that could impact the safety of the off-site public. In addition, DOT's regulations in 49 CFR 193, Subpart B require a siting analysis be performed by Sabine Pass as discussed in section 2.8.5.

As part of the application, Sabine Pass provided a FEED for the SPLE Project. As part of the project's preliminary safety review, Sabine Pass used the hazard identification study for the previously approved Sabine Pass Liquefaction Project under FERC Docket CP11-72-000 to identify potential risk scenarios. Sabine Pass indicated that this approach was used because the Trains 5 and 6 process design duplicates Trains 1 through 4.

We have analyzed the information filed by Sabine Pass to determine the extent that layers of protection or safeguards that enhance the safety, operability, and reliability of the facility are included in the FEED.

The objectives of our FEED review focused on the engineering design and safety concepts of the various protection layers as well as the projected operational reliability of the proposed facilities. The design would use materials of construction suited to the pressure and temperature conditions of the process design. Piping would be designed in accordance with American Society of Mechanical Engineers (ASME) B31.3. Pressure vessels would be designed in accordance with ASME Section VIII. Valves and other equipment would be designed to generally accepted good engineering practices. Sabine Pass indicated the SPLE Project facilities would be designed to fully meet the requirements of 49 CFR 193.2067, specifically that the facility would be designed to withstand an assumed sustained wind velocity of 150 mph (which would be equivalent to a 183 mph 3-second gust) without the loss of structural or functional integrity. As discussed in section 2.1.3, Sabine Pass proposes to design the facility for a 100-year storm surge for the Port Arthur/southern Sabine Lake of 14 feet (USACE, 1968). This proposed facility design elevation would be equivalent to potential storm surge elevations defined by NOAA for a Category 3 hurricane. Equipment and structures would be at a minimum point of support of 18.5 feet NAVD 88 to minimize the risk of flooding. The minimum elevation for building finished floors would be 19.0 feet NAVD 88. The crown of roads would be designed to a minimum 17.5 feet NAVD 88. As discussed in section 2.1.3, we also examined the seismic and structural design of the facility and determined that earthquakes and liquefaction are not likely to affect construction or operation of the Projects.

Sabine Pass would install process control valves and instrumentation to safely operate and monitor the facility. Alarms would have visual and audible notification in the control room to warn operators that process conditions may be approaching design limits. Operators would be able to take action from the control room to mitigate an upset.

Sabine Pass would expand the existing facility operation procedures to include the SPLE Project after completion of the final design; this timing is fully consistent with accepted industry practice. We have made recommendations for Sabine Pass to provide more information on the operating and maintenance procedures as they are developed, including safety procedures, hot work procedures and permits, abnormal operating conditions procedures, and personnel training. In addition, we have recommended measures such as labeling instrumentation and valves (i.e., car-seals/locks), piping, and equipment to address human factor considerations and improve facility safety. An alarm management program would also be in place to ensure effectiveness of the alarms.

Safety valves and instrumentation would be installed to monitor, alarm, shutdown, and isolate equipment and piping during process upsets or emergency conditions. Safety instrumented systems would comply with International Society for Automation Standard 84.01 and other recommended and generally accepted good engineering practices. We also made recommendations on the design, installation, and commissioning of instrumentation and emergency shutdown equipment to ensure appropriate cause and effect alarm or shutdown logic and enhanced representation of the emergency shutdown valves in the facility control system.

Safety relief valves and flares would be installed to protect the process equipment and piping. The safety relief valves would be designed to handle process upsets and thermal expansion within piping, per NFPA 59A and ASME Section VIII, and would be designed based on American Petroleum Institute 520, 521, 527, and other recommended and generally accepted good engineering practices.

In order to minimize the risk of an intentional event, Sabine Pass would provide security fencing, access control, lighting, camera systems, and intrusion detection to deter, monitor, and detect intruders into the facility. The security requirements for the SPLE Project are governed by 49 CFR 193, Subpart J - Security. This subpart includes requirements for conducting security inspections and patrols, liaison with local law enforcement officials, design and construction of protective enclosures, lighting, monitoring, alternative power sources, and warning signs. In accordance with 33 CFR 105, the facility must also have a Facility Security Plan approved by the USCG. The existing SPLNG Terminal commenced service in April 2008 and has an existing Facility Security Plan. However, the USCG has notified Sabine Pass that applicable amendments to the Operations Manual, Emergency Manual, and Facility Security Plan must be made that capture changes to the operations associated with the SPLE Project. As required by 33 CFR 105 and 127, Sabine Pass would amend these documents and submit them to the USCG prior to operation of the expansion facility as an export terminal.

In the event of a release, drainage systems from liquefaction process facilities would direct a spill away from equipment in order to minimize flammable vapors from dispersing to confined, occupied, or public areas and to minimize heat from impacting adjacent equipment and public areas if ignition occurs. Spacing of vessels and equipment between each other, from ignition sources, and to the property line would comply with NFPA 59A and NFPA 30. Impoundment systems are further discussed in section 2.8.5.1.

Sabine Pass performed a preliminary fire protection evaluation to ensure that adequate hazard detection, hazard control, and firewater coverage would be installed to detect and address any upset conditions. Structural fire protection, proposed to prevent failure of structural supports of equipment and pipe racks, would comply with NFPA 59A and other recommended and generally accepted good engineering practices. Sabine Pass would also install hazard detection systems to detect, alarm, and alert personnel in the area and control room to initiate an emergency shutdown and/or initiate appropriate procedures and would meet NFPA 72, International Society for Automation 12.13, and other recommended and generally accepted good engineering practices. Hazard control devices would be installed to extinguish or control incipient fires and releases and would meet NFPA 59A and NFPA 10, 12, 15, and 17 and other recommended and generally accepted good engineering practices. Sabine Pass would provide automatic firewater systems and monitors for use during an emergency to cool the surface of storage vessels, piping, and equipment exposed to heat from a fire and would meet NFPA 59A, 20, 22, and 24 requirements. We have made recommendations for Sabine Pass to provide more information on the design, installation, and commissioning of hazard detection, hazard control, and firewater systems as Sabine Pass would further develop this information during the final design phase.

Sabine Pass would also update the existing emergency procedures to include the SPLE Project facilities in accordance with 49 CFR 193 and 33 CFR 127. The emergency procedures would provide protection for personnel and the public as well as the prevention of property damage that may occur as a result of incidents at the facility.

The use of these protection layers would minimize the potential for an initiating event to develop into an incident that could impact the safety of the off-site public. As a result of our technical review of the information provided by Sabine Pass in the submittal documents, we identified a number of concerns in an information data request issued on January 24, 2014, relating to the reliability, operability, and safety of the proposed design. Sabine Pass provided written responses on February 12, 2014, to staff's questions. Some of these responses indicated that Sabine Pass would correct or modify its design in order to address the identified issues. As a result, **we recommend that:**

- **<u>prior to construction of the final design</u>, Sabine Pass file information/revisions with the Secretary, for review and written approval by the Director of the OEP, pertaining to Sabine Pass' response numbers 6, 9, 10, 12 of its February 12, 2014 filing, which indicated features to be included or considered in the final design and documentation.**

The FEED and specifications submitted for the proposed facilities to date are preliminary, but would serve as the basis for any detailed design to follow. If authorization is granted by the Commission, the next phase of the Project would include development of the final design, including final selection of equipment manufacturers, process conditions, and resolution of some safety-related issues. We do not expect that the detailed design information to be developed would result in changes to the basis of design, operating conditions, major equipment selections, equipment design conditions, or safety system designs which were presented as part of the FEED.

A more detailed and thorough hazard and operability (HAZOP) review analysis would be performed by Sabine Pass during the final design phase to identify the major hazards that may be encountered during the operation of facilities. The HAZOP study would be intended to address hazards of the process and engineering and administrative controls and would provide a qualitative evaluation of a range of possible safety, health, and environmental effects that could result from the design or operation of the facility. Recommendations to prevent or minimize these hazards would be generated from the results of the HAZOP review.

Once the design has been subjected to a HAZOP review, the design development team tracks changes in the facility design, operations, documentation, and personnel. Sabine Pass would evaluate these changes to ensure that the safety, health, and environmental risks arising from these changes are addressed and controlled. Resolutions of the recommendations generated by the HAZOP review would be monitored by FERC staff. We have included a recommendation that Sabine Pass should file a HAZOP study on the completed final design.

We note that Sabine Pass indicated Trains 5 and 6 process designs duplicate Trains 1 through 4, and therefore, would be subject to the same conditions of the Orders for the April 16, 2012 Sabine Pass LNG Liquefaction Project (Docket Number CP11-72-000) and the August 2, 2013 Sabine Pass Liquefaction Project Modification (Docket Number CP13-2-000). Therefore, **we recommend that:**

- **<u>prior to construction of the final design</u>, Sabine Pass file with the Secretary for review and written approval by the Director of OEP, certification that the process design for Trains 5 and 6 would duplicate Trains 1 through 4, and the conditions from the April 16, 2012 and August 2, 2013 Orders (Docket Numbers CP11-72-000 and CP13-2-000, respectively) will be incorporated in the design for trains 5 and 6.**

Information regarding the development of the final design, as detailed below, would need to be filed with the Secretary for review and written approval by the Director of OEP before equipment construction at the site would be authorized. To ensure that the concerns we've identified relating to the reliability, operability, and safety of the proposed design are addressed by Sabine Pass, and to ensure that the facility is subject to the Commission's construction and operational inspection program, **we recommend the following measures should apply to the SPLE Project. Information pertaining to**

these specific recommendations should be filed with the Secretary for review and written approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; prior to introduction of hazardous fluids; or prior to commencement of service, as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, should be submitted as critical energy infrastructure information pursuant to 18 CFR 388.112 (see Critical Energy Infrastructure Information, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006), FERC Stats. & Regs. ¶31,228 [2006]). Information pertaining to items such as off-site emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements will be subject to public disclosure. All information should be filed a minimum of 30 days before approval to proceed is requested.

- **Prior to initial site preparation, Sabine Pass should provide quality assurance and quality control procedures for construction activities.**
- **Prior to initial site preparation, Sabine Pass should file an overall project schedule that includes the proposed stages of the commissioning plan.**
- **Prior to initial site preparation, Sabine Pass should provide procedures for controlling access during construction.**
- **Prior to initial site preparation, Sabine Pass should provide a plot plan of the final design showing all major equipment, structures, buildings, and impoundment systems.**
- **The final design should include change logs that list and explain any changes made from the FEED provided in the SPLE Project application and filings. A list of all changes with an explanation for the design alteration should be provided and all changes should be clearly indicated on all diagrams and drawings.**
- **The final design should provide an up-to-date complete equipment list, process and mechanical data sheets, and specifications.**
- **The final design should provide up-to-date process flow diagrams with heat and material balances and piping and instrumentation diagrams (P&IDs), which include the following information:**

    a. equipment tag number, name, size, duty, capacity, and design conditions;
    b. equipment insulation type and thickness;
    c. storage tank pipe penetration size or nozzle schedule;
    d. piping with line number, piping class specification, size, and insulation type and thickness;
    e. piping specification breaks and insulation limits;
    f. all control and manual valves numbered;
    g. valve high pressure sides and cryogenic ball valve external and internal vent locations;
    h. relief valves with set points; and
    i. drawing revision number and date.

- **The final design should include a list of all car-sealed and locked valves consistent with the P&IDs.**
- **The final design should provide P&IDs, specifications, and procedures that clearly show and specify the tie-in details required to safely connect the SPLE Project facilities to the existing facility.**

- **The final design should include a HAZOP review of the completed design prior to issuing the P&IDs for construction. A copy of the review, a list of the recommendations, and actions taken on the recommendations should be filed.**
- **The final design should include spill containment system drawings with dimensions and slopes of curbing, trenches, and impoundments.**
- **The final design should include electrical area classification drawings for the condensate storage and send-out area.**
- **The final design should specify that for hazardous fluids, stainless steel and carbon steel branch piping and piping nipples are consistent with the existing facility's specifications.**
- **The final design should include a plan for clean-out, dry-out, purging, and tightness testing. This plan should address the requirements of the American Gas Association's Purging Principles and Practice required by 49 CFR 193 and should provide justification if not using an inert or non-flammable gas for cleanout, dry-out, purging, and tightness testing.**
- **The final design should include the cause-and-effect matrices for the process instrumentation, fire and gas detection system, and emergency shutdown system. The cause-and-effect matrices should include alarms and shutdown functions, details of the voting and shutdown logic, and setpoints.**
- **The final design should include a drawing showing the location of the emergency shutdown (ESD) buttons. ESD buttons should be easily accessible, conspicuously labeled and located in an area which would be accessible during an emergency.**
- **The final design should include an updated fire protection evaluation of the proposed facilities carried out in accordance with the requirements of NFPA 59A 2001, chapter 9.1.2 as required by 49 CFR 193. A copy of the evaluation, a list of recommendations, supporting justifications, and actions taken on the recommendations should be filed.**
- **The final design of the hazard detectors should account for the calibration gas when determining the LFL set points for methane, propane, and ethylene, and condensate.**
- **The final design should include complete drawings and a list of the hazard detection equipment. The drawings should clearly show the location and elevation of all detection equipment. The list should include the instrument tag number, type and location, alarm indication locations, and shutdown functions of the proposed hazard detection equipment.**
- **The final design should provide a technical review of its proposed facility design that:**
  - **a. identifies all combustion/ventilation air intake equipment and the distances to any possible hazardous fluid release (LNG, flammable refrigerants, flammable liquids and flammable gases); and**
  - **b. demonstrates that these areas are adequately covered by hazard detection devices and indicates how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.**
- **The final design should provide complete plan drawings and a list of the fixed and wheeled dry-chemical, hand-held fire extinguishers, and other hazard control equipment. Drawings should clearly show the location by tag number of all fixed, wheeled, and hand-held extinguishers. The list should include the equipment tag number, type, capacity, equipment covered, discharge rate, and automatic and manual remote signals initiating discharge of the units.**

- **The <u>final design</u> should include facility plans and drawings showing the proposed location of the firewater and any foam systems. Drawings should clearly show firewater and any foam piping; post indicator valves; and the location of, and area covered by, each monitor, hydrant, water curtain, deluge system, foam system, water mist system, and sprinkler. The drawings should also include piping and instrumentation diagrams of the firewater and foam systems.**
- **<u>Prior to commissioning</u>, Sabine Pass should file plans and detailed procedures for testing the integrity of on-site mechanical installation; functional tests; introduction of hazardous fluids; operational tests; and placing the equipment into service.**
- **<u>Prior to commissioning</u>, Sabine Pass should provide a detailed schedule for commissioning through equipment startup. The schedule shall include milestones for all procedures and tests to be completed prior to introduction of hazardous fluids and during commissioning and startup. Sabine Pass should file documentation certifying that each of these milestones has been completed before authorization to begin the next phase of commissioning and startup would be issued.**
- **<u>Prior to commissioning</u>, Sabine Pass should tag all equipment, instrumentation, and valves in the field, including drain valves, vent valves, main valves, and car-sealed or locked valves.**
- **<u>Prior to commissioning</u>, Sabine Pass should file Operation and Maintenance procedures and manuals which include safety procedures, hot work procedure and permits, abnormal operating conditions reporting procedures, and management of change procedures and forms.**
- **<u>Prior to commissioning</u>, Sabine Pass should maintain a detailed training log to demonstrate that operating staff has completed the required training.**
- **<u>Prior to commissioning</u>, Sabine Pass should file a tabulated list and drawings of the proposed hand-held fire extinguishers. The list should include the equipment tag number, extinguishing agent type, capacity, number, and location. The drawings should show the extinguishing agent type, capacity, and tag number of all hand-held fire extinguishers.**
- **<u>Prior to introduction of hazardous fluids</u>, Sabine Pass should complete all pertinent tests (Factory Acceptance Tests, Site Acceptance Tests, Site Integration Tests) associated with the Distributed Control System (DCS) and Safety Instrumented System (SIS) that demonstrates full functionality and operability of the system.**
- **<u>Prior to introduction of hazardous fluids</u>, Sabine Pass should complete a firewater monitor and hydrant coverage test. The actual coverage area from each monitor and hydrant should be shown on facility plot plan(s).**
- **<u>Prior to commencement of service</u>, Sabine Pass should label piping with fluid service and direction of flow in the field in addition to the pipe labeling requirements of NFPA 59A.**
- **<u>Prior to commencement of service</u>, progress on the construction of the proposed systems in should be reported in <u>monthly</u> reports filed with the Secretary. Details should include a summary of activities, problems encountered, contractor non-conformance/deficiency logs, remedial actions taken, and current project schedule. Problems of significant magnitude should be reported to the FERC <u>within 24 hours</u>.**

In addition, we recommend that the following measures should apply throughout the life of the facility:

- **The facility should be subject to regular FERC staff technical reviews and site inspections on at least an annual basis or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, Sabine Pass should respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted annual report, should be submitted.**

- **Semi-annual operational reports should be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals/departures, quantity and composition of imported and exported LNG, liquefied and vaporized quantities, boil-off/flash gas, etc.), and plant modifications including future plans and progress thereof. Abnormalities should include but are not limited to unloading/loading shipping problems, potential hazardous conditions caused by off-site vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, nonscheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, hazardous fluid releases, fires involving hazardous fluid, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility should also be reported. Reports should be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section entitled "Significant Plant Modifications Proposed for the Next 12 Months (dates)" should also be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.**

- **Significant non-scheduled events, including safety-related incidents (e.g., hazardous fluid releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security-related incidents (i.e., attempts to enter site, suspicious activities) should be reported to FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification should be made immediately, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification should be made to FERC staff within 24 hours. This notification practice should be incorporated into the LNG facility's emergency plan. Examples of reportable hazardous fluids related incidents include:**

  a. fire;
  b. explosion;
  c. estimated property damage of $50,000 or more;
  d. death or personal injury necessitating in-patient hospitalization;
  e. release of hazardous fluid for five minutes or more;
  f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes hazardous fluids;
  g. any crack or other material defect that impairs the structural integrity or reliability of an facility that contains, controls, or processes a hazardous fluid;

h. **any malfunction or operating error that causes the pressure of a pipeline or facility that contains or processes a hazardous fluid to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;**
i. **a leak in a facility that contains or processes a hazardous fluid that constitutes an emergency;**
j. **inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;**
k. **any safety-related condition that could lead to an imminent hazard and cause (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent reduction in operation of a pipeline or a facility that contains or processes a hazardous fluid;**
l. **safety-related incidents with hazardous material transportation occurring at or en route to and from the LNG facility; or**
m. **an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.**

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, FERC staff would determine the need for a separate follow-up report or follow-up in the upcoming semi-annual operational report. All company follow-up reports should include investigations results and recommendations to minimize a reoccurrence of the incident.

In addition to the final design review, we would conduct inspections during construction and would review additional materials, including quality assurance and quality control plans, non-conformance reports, and commissioning plans, to ensure that the installed design is consistent with the safety and operability characteristics of the FEED. We would also conduct inspections during operation to ensure that the facility is operated and maintained in accordance with the filed design throughout the life of the facility. Based on our analysis and recommendations presented above, the FEED presented by Sabine Pass would include acceptable layers of protection or safeguards that would reduce the risk of a potentially hazardous scenario from developing into an event that could impact the off-site public.

2.8.4 LNG Facility Siting Requirements

The principal hazards associated with the substances involved in the liquefaction, storage and vaporization of LNG result from cryogenic and flashing liquid releases; flammable and toxic vapor dispersion; vapor cloud ignition; pool fires; boiling liquid expanding vapor explosions; and overpressures. As discussed in section 2.8.3, our FEED review indicates that sufficient layers of protection would be incorporated into the facility design to mitigate the potential for an initiating event to develop into an incident that could impact the safety of the off-site public. Siting the facility with regard to potential off-site consequences is also required by DOT's regulations in 49 CFR 193, Subpart B to ensure that impact on the public would be minimized. The Commission's regulations under 18 CFR 380.12(o)(14) require Sabine Pass to identify how the proposed design complies with the siting requirements of DOT's regulations in 49 CFR 193, Subpart B. As part of our review, we used Sabine Pass' information, developed to comply with DOT's regulations, to assess whether or not the facility would have a public safety impact. The Part 193 requirements state that an operator or government agency must exercise control over the activities that can occur within an "exclusion zone," defined as the area around an LNG facility that could be exposed to specified levels of thermal radiation or flammable vapor in the event of a release. Approved mathematical models must be used to calculate the dimensions of these exclusion zones. The 2001 edition of NFPA 59A, an industry consensus safety standard for the siting, design, construction, operation, maintenance, and security of LNG facilities, is incorporated into Part 193 by reference, with regulatory preemption in the event of conflict. The following sections of Part 193 specifically address the siting requirements applicable to each LNG container and LNG transfer system:

- Part 193.2001, Scope of part, excludes any matter other than siting provisions pertaining to marine cargo transfer systems between the marine vessel and the last manifold or valve immediately before a storage tank;
- Part 193.2051, Scope, states that each LNG facility designed, replaced, relocated or significantly altered after March 31, 2000, must be provided with siting requirements in accordance with Subpart B and NFPA 59A (2001). In the event of a conflict with NFPA 59A (2001), the regulatory requirements in Part 193 prevail;
- Part 193.2057, Thermal radiation protection, requires that each LNG container and LNG transfer system have thermal exclusion zones in accordance with Section 2.2.3.2 of NFPA 59A (2001); and
- Part 193.2059, Flammable vapor-gas dispersion protection, requires that each LNG container and LNG transfer system have a dispersion exclusion zone in accordance with Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A (2001).

For the LNG facilities proposed for the SPLE Project, these Part 193 siting requirements would be applicable to the following equipment:

- Four 6,569-gpm LNG transfer pumps (two per liquefaction train; one operating and one spare) and associated piping and appurtenances - Parts 193.2057 and 2059 require thermal and flammable vapor exclusion zones. NFPA 59A (2001) Section 2.2.3.2 specifies the thermal exclusion zone and Sections 2.2.3.3 and 2.2.3.4 specify the flammable vapor exclusion zone based on the design spills for containers and process areas; and
- Two liquefaction heat exchangers (one per liquefaction train) and associated piping and appurtenances, including a 24-inch-diameter LNG rundown line - Parts 193.2057 and 2059 require thermal and flammable vapor exclusion zones. NFPA 59A (2001) Section 2.2.3.2 specifies the thermal exclusion zone, and Sections 2.2.3.3 and 2.2.3.4 specify the flammable vapor exclusion zone based on the design spills for containers and process areas.
- Previous FERC environmental assessments/impact statements for past projects have identified inconsistencies and areas of potential conflict between the requirements in Part 193 and NFPA 59A (2001). Sections 193.2057 and 193.2059 require exclusion zones for each LNG container and LNG transfer system, and an LNG transfer system is defined in Section 193.2007 to include cargo transfer system and transfer piping, and does not distinguish between permanent or temporary. However, NFPA 59A (2001) requires exclusion zones only for "transfer areas," which is defined as the part of the plant where the facility introduces or removes the liquids, such as truck loading or ship-unloading areas. The NFPA 59A (2001) definition does not include permanent plant piping, such as cargo transfer lines. Section 2.2.3.1 of NFPA 59A (2001) also states that transfer areas at the water edge of marine terminals are not subject to the siting requirements in that standard.

- The DOT has addressed some of these issues in a March 2010 letter of interpretation[24]. In that letter, DOT stated that: (1) the requirements in the NFPA 59A (2001) for transfer areas for LNG apply to the marine cargo transfer system at a proposed waterfront LNG facility, except where preempted by the regulations in Part 193; (2) the regulations in Part 193 for LNG transfer systems conflict with NFPA 59A (2001) on whether an exclusion zone analysis is required for transfer piping or permanent plant piping; and (3) the regulations in Part 193 prevailed as a result of that conflict. The DOT has determined that an exclusion zone analysis of the marine cargo transfer system is required.

In the FERC environmental assessments/impact statements for past projects, we have also noted that when the DOT incorporated NFPA 59A into its regulations, it removed the regulation that required impounding systems around transfer piping. As a result of that change, it is unclear whether Part 193 or the adopted sections of NFPA 59A (2001) require impoundments for LNG transfer systems. We note that Part 193 requires exclusion zones for LNG transfer systems and that those zones were historically calculated based on impoundment systems. We also note that the omission of containment for transfer piping is not a sound engineering practice. For these reasons, we generally recommend containment for all LNG transfer piping within a plant's property lines.

Federal regulations issued by Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.119 (Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents [PSM]), and the EPA under 40 CFR 68 (Risk Management Plans) cover hazardous substances such as methane, propane, and ethylene at many facilities in the United States. However, OSHA and EPA regulations are not applicable to facilities regulated under 49 CFR 193. On October 30, 1992, shortly after the promulgation of the OSHA PSM regulations, OSHA issued a letter of interpretation that precluded the enforcement of PSM regulations over gas transmission and distribution facilities. In a subsequent letter on December 9, 1998, OSHA further clarified that this letter of interpretation applies to LNG distribution and transmission facilities.

In addition, EPA's preamble to its final rule in Federal Register, Volume 63, Number 3, 639 645, clarified that exemption from the requirements in 40 CFR 68 for regulated substances in transportation, including storage incident to transportation, is not limited to pipelines. The preamble further clarified that the transportation exemption applies to LNG facilities subject to oversight or regulation under 49 CFR 193, including facilities used to liquefy natural gas or used to transfer, store, or vaporize LNG in conjunction with pipeline transportation. Therefore, the above OSHA and EPA regulations are not applicable to facilities regulated under 49 CFR 193. As stated in Section 193.2051, LNG facilities must be provided with the siting requirements of NFPA 59A (2001 edition). The siting requirements for flammable liquids within an LNG facility are contained in NFPA 59A, Chapter 2:

- NFPA 59A (2001 Edition), Section 2.1.1 requires consideration of clearances between flammable refrigerant storage tanks, flammable liquid storage tanks, structures and plant equipment, both with respect to plant property lines and each other. This section also requires that other factors applicable to the specific site that have a bearing on the safety of plant personnel and surrounding public be considered, including an evaluation of potential incidents and safety measures incorporated in the design or operation of the facility.

- NFPA 59A (2001 Edition), Section 2.2.2.2 requires impoundments serving flammable refrigerants or flammable liquids to contain a 10-minute spill of a single accidental leakage source or during a shorter time period based upon demonstrable surveillance and shutdown

24 PHMSA Interpretation #PI-10-0020 "Re: Application of the Siting Requirements in Subpart B of 49 CFR Part 193 to the Mount Hope Bay Liquefied Natural Gas Transfer System" (March 25, 2010).

provisions acceptable to the DOT. In addition, NFPA Section 2.2.2.5 requires impoundments and drainage channels for flammable liquid containment to conform to NFPA 30, Flammable and Combustible Liquids Code.

- NFPA 59A (2001 Edition), Section 2.2.3.2 requires provisions to minimize the damaging effects of fire from reaching beyond a property line, and requires provisions to prevent a radiant heat flux level of 1,600 BTU/ft2-hr from reaching beyond a property line that can be built upon. The distance to this flux level is to be calculated with LNGFIRE or using models that have been validated by experimental test data appropriate for the hazard to be evaluated and that are acceptable to DOT.
- NFPA 59A (2001 Edition), Section 2.2.3.4 requires provisions to minimize the possibility of any flammable mixture of vapors from a design spill from reaching a property line that can be built upon and that would result in a distinct hazard. Determination of the distance that the flammable vapors extend is to be determined with DEGADIS or alternative models that take into account physical factors influencing LNG vapor dispersion. Alternative models must have been validated by experimental test data appropriate for the hazard to be evaluated and must be acceptable to DOT. Section 2.2.3.5 requires the design spill for impounding areas serving vaporization and process areas to be based on the flow from any single accidental leakage source.

For the following liquefaction facilities proposed for the SPLE Project, the Part 193 and NFPA 59A (2001 edition) siting requirements would be applicable to the following equipment:

- two liquefaction heat exchangers (one per liquefaction unit), associated piping, and appurtenances;
- one 240,493-gallon stabilized condensate storage tank, associated piping, and appurtenances;
- two 65 gpm ethylene pump (one per liquefaction train), associated piping, and appurtenances;
- two 200 gpm propane pump (one per liquefaction train), associated piping, and appurtenances;
- one 100 gpm condensate send-out pump, associated piping, and appurtenances;
- six 358 gpm heavies removal column reflux pumps (three per liquefaction train), associated piping, and appurtenances;
- four 166 gpm heavies removal column reflux pumps (two per liquefaction train), associated piping, and appurtenances;
- three 2,340 gpm hot oil pumps and associated piping and appurtenances; and
- one 53 gpm pentane charge pump and associated piping and appurtenances.

2.8.5 LNG Facility Siting Analysis

Suitable sizing of impoundment systems and selection of design spills on which to base hazard analyses are critical for establishing an appropriate siting analysis. Although impoundment capacity and design spill scenarios for storage tank impoundments are well described in Part 193, a clear definition for other impoundments is not provided either directly by the regulations or by the adopted sections of NFPA 59A (2001). Under NFPA 59A (2001) Section 2.2.2.2, the capacity of impounding areas for vaporization, process, or LNG transfer areas must equal the greatest volume that can be discharged from any single accidental leakage source during a 10-minute period or during a shorter time period based upon demonstrable surveillance and shutdown provisions acceptable to the DOT. However, no definition of single accidental leakage source is provided in the regulations.

We recommend that impoundments be sized based on the greatest flow capacity from a single transfer pipe for 10 minutes, recognizing that different spill scenarios are used for the single accidental leakage sources for the hazard calculations required by Part 193. A similar approach is used with impoundments for process vessels. We recommend that these impoundments also be able to contain the contents of the largest process vessel served, while recognizing that smaller design spills may be appropriate for Part 193 calculations.

2.8.5.1 Impoundment Systems

Sabine Pass proposes to construct an LNG impoundment basin (Trains 5 and 6) that would be 75 feet in diameter by 10.5 feet deep, of which 4 feet would be below the bottom of the trench. The LNG impoundment basin (Trains 5 and 6) would serve the entire liquefaction process area and the area south of the boil-off gas recycle compressors (Trains 5 and 6) located outside the existing LNG storage tank S-104 dike area. This sump would be constructed of and lined with regular concrete. Any spills occurring from the elevated transfer piping in the liquefaction facilities and immediately east of the existing LNG storage tanks would be drained from underneath the elevated pipe racks into concrete troughs and directed towards this sump. Curbing and sloped floors that direct potential spills into concrete troughs would be provided around areas where hazardous liquid spills may occur. The concrete troughs would have either rectangular or trapezoidal cross-sectional areas with a minimum slope of 0.1 percent and we confirmed the concrete troughs would accommodate the maximum volumetric flow from any single line.

The LNG impoundment basin (Trains 5 and 6) would have a volumetric capacity of 363,600 gallons, with a net volumetric capacity of 134,600 gallons before backflowing into the troughs. Sabine Pass designed the LNG impoundment basin (Trains 5 and 6) to completely contain a 10-minute spill from the largest potential spill event, which would be from a full rupture from the 24-inch-diameter LNG transfer common header for the two trains – 132,100 gallons. This 10-minute spill volume from the LNG transfer common header assumed two pumps running (one operational per train) at the rated pump flow rate. However, the maximum possible flow rate for a pump would occur at pump run-out, resulting in a flow rate of 8,068 gpm. We calculated a 10-minute spill volume from the guillotine rupture of the 24-inch-diameter LNG transfer common header considering pump run-out would be 161,400 gallons. This spill would be contained in the proposed LNG impoundment sump (Train 5 and 6) but would backflow into the troughs.

Once the 24-inch-diameter LNG transfer common header piping from Trains 5 and 6 enters the LNG storage tank diked areas, the piping would be routed in parallel with other LNG piping in existing pipe racks. In this area, potential spills occurring from the LNG transfer common header from Trains 5 and 6 would drain to the existing LNG storage tank's containment area as the pipe racks are located inside of the tank dike. The containment area for each tank is sized to contain the total LNG tank volume of 52,307,511 gallons. Therefore, as shown in table 2.8-3 the existing LNG storage tank containment areas would adequately contain the worst case LNG spill.

Sabine Pass proposes to install a stabilized condensate storage tank adjacent to the condensate storage tanks for Trains 1 through 4 previously authorized under Docket CP13-2-000. The maximum design volumetric capacity for the proposed condensate storage tank would be 240,493 gallons. Containment for the stabilized condensate storage tank would be provided by an earthen containment dike that would be 114-feet-long by 114-feet-wide by 3.5-feet-high, with a useable volume of 280,669 gallons. Sabine Pass proposes to utilize the same condensate storage tank and spill containment system design for the SPLE Project as the design previously authorized under Docket Number CP13-2-000 for the condensate storage tanks for Trains 1 through 4. Additionally, Sabine Pass indicated in question 6 response of their February 12, 2014 filing that the design of the SPLE Project condensate storage system would comply with Environmental Conditions 14, 23, 24, 25, 26, 28, 35, and 36 of the Sabine Pass Liquefaction Modification Project August 2, 2013 Order (Docket CP13-2-000). Therefore, we have included a recommendation to ensure the design of the SPLE Project condensate storage system would comply with the applicable conditions of the above-mentioned August 2, 2013 Order (Docket CP13-2-000) as discussed in section 2.8.3.

Sabine Pass proposes to install a 37,600-gallon amine storage tank within a 49-foot-long by 49-foot-wide by 4-foot-high diked area. The diked area would have a useable volumetric capacity of 71,840 gallons and would hold the entire contents of the amine storage tank. The Triazine - Scavenger Tank, Triazine - Spent Scavenger Tank, and Hot Oil Surge Drum would also have separate containment, as shown in table 2.8-3.

TABLE 2.8-3

Impoundment Area Sizing

Source	Spill Size (gallons)	Impoundment System	Impoundment Size (gallons)
LNG Transfer Common Header	132,100	LNG Impoundment Basin (Train 5 & 6)	134,600
LNG Transfer Common Header	132,100	Existing LNG Tank Earthen Dike	52,307,511
Condensate Storage Tank	240,493	Condensate Containment	280,669
Amine Storage Tank	37,600	Amine Impoundment Area	71,840
Triazine-Scavenger Tank	28,210	Scavenger Tanks and Wastewater Tank Dike	81,700
Triazine-Spent Scavenger Tank	35,660	Scavenger Tanks and Wastewater Tank Dike	81,700
Hot Oil Surge Drum	115,500	Hot Oil Spill Pad	175,842

2.8.5.2 Design Spills

Design spills are used in the determination of the hazard calculations required by Part 193. Prior to the incorporation of NFPA 59A in 2000, the design spill in Part 193 assumed the full rupture of "a single transfer pipe which has the greatest overall flow capacity" for not less than 10 minutes (old Part 193.2059(d)). With the adoption of NFPA 59A, the basis for the design spill for impounding areas serving only vaporization, process, or LNG transfer areas became the flow from any single accidental leakage source. Neither Part 193 nor NFPA 59A (2001) defines "single accidental leakage source."

In a letter to the FERC staff, dated August 6, 2013, DOT requested that LNG facility applicants contact the Office of Pipeline Safety's Engineering and Research Division regarding the Part 193 siting requirements.[25] Specifically, the letter stated that DOT required a technical review of the applicant's design spill criteria for single accidental leakage sources on a case-by-case basis to determine compliance with Part 193.

Sabine Pass provided DOT with its design spill criteria and identified leakage scenarios for the proposed equipment. The highest rate of LNG flow (i.e., liquid scenario) selected by Sabine Pass was a hole equivalent to 8-inch-diameter (⅓-diameter) in the 24-inch transfer line from the liquefaction trains to the existing LNG Storage Tanks. The following leakage source design spills for the SPLE facilities were selected by Sabine Pass to address the highest rate of LNG vapor flow (i.e., flashing and jetting scenario):

- full guillotine rupture of a 4-inch-diameter attachment to a LNG line in Train 6;
- full guillotine rupture of a 4-inch-diameter ethylene line within Train 6;
- full guillotine rupture of a 3-inch diameter propane line within Train 6;
- full guillotine rupture of a 4-inch-diameter attachment to a propane line in Train 6; and
- full guillotine rupture of a 4-inch-diameter heavies reflux line in Train 6.

Sabine Pass determined that Train 6 was of most interest because it would be closer to the property boundary than Train 5. The conditions for the selected design spills are listed in the following table 2.8-4.

TABLE 2.8-4

SPLE Project Design Spills

Hole Diameter	Location	Pressure (psig)	Temp. (^{o}F)	Scenario Flow Rate (kg/sec)	Duration (sec)
8-inch	LNG rundown line outside trains 5 and 6	50	-245.28	348.4	600
4-inch	Train 6 Low Stage Flash Drum LNG line	72.5	-246	104.8	600
4-inch	Train 6 ethylene line	280.3	-24.8	235.9	600
4-inch	Train 6 ethylene line	338	-27	229.3	600
3-inch	Train 6 propane line	233.5	68.5	121.7	600
4-inch	Train 6 propane line	191	108	178.8	600
1-inch	Train 6 heavies line	643	-23	7.0	600

Sabine Pass estimated the release height at 15 feet for the LNG line vapor scenario, 26 feet for the ethylene release, 75 feet for the propane line, and 7 feet for the heavies line.

25 August 6, 2013 Letter from Kenneth Lee, Director of Engineering and Research Division, Office of Pipeline Safety to Terry Turpin, LNG Engineering and Compliance Branch, Office of Energy Projects. Filed in Docket Number CP13-552 on August 13, 2013. Accession Number 20130813-4021.

In general, higher flow rates would result in larger spills and longer dispersion distances; higher temperatures would result in higher rates of flashing; and higher pressures would result in higher rates of jetting and aerosol formation. Therefore, Sabine Pass considered two scenarios for the design spills:

- the pressure in the line is assumed to be maintained by pumps and/or hydrostatic head to produce the highest rate of flashing and jetting (i.e., flashing and jetting scenario); and
- the pressure in the line is assumed to be depressurized by the breach and/or emergency shutdowns to produce the highest rate of liquid flow within a curbed, trenched, or impounded area (i.e., liquid scenario).

In addition, the location and orientation of the leakage source must be considered. The closer a leakage source is to the property line, the higher the likelihood that the vapor cloud would extend off-site. As most flashing and jetting scenarios would not have appreciable liquid rainout and accumulation, the siting of impoundment systems would be driven by liquid scenarios, while siting of piping and other remaining portions of the plant would be driven by flashing and jetting scenarios.

NFPA 59A Table 2.2.3.5, as adopted by 49 CFR 193, requires the design spill duration to be 10 minutes or less based on demonstrable surveillance and shutdown provisions that are acceptable to the DOT. The design spill scenarios identified by Sabine Pass assume constant release rates for 10 minutes.

DOT reviewed the data and methodology Sabine Pass used to determine the single accidental leakage sources for the design spills based on the flow from various leakage sources including piping, containers, and equipment containing LNG, refrigerants, and flammable fluids. On April 11, 2014, DOT provided a letter to the FERC staff stating that DOT had no objection to Sabine Pass's methodology for determining the single accidental leakage source for the candidate design spills to be used in establishing the Part 193 siting requirements for the proposed SPLE facilities.[26,27] The design spills produced by this methodology were identified in the documents reviewed by DOT and are the same design spills listed in this section.

DOT's conclusions on the candidate design spills used in the siting calculations required by Part 193 was based on preliminary design information which may be revised as the engineering design progresses. If Sabine Pass' design or operation of the proposed facility differs from the details provided in the documents on which DOT based its review, then the facility may not comply with the siting requirements of Part 193. As a result, **we recommend that:**

- **<u>prior to the construction of the final design</u>, Sabine Pass file with the Secretary for review and written approval by the Director of OEP, certification that the final design is consistent with the information provided to DOT as described in the design spill determination letter dated April 11, 2014 (Accession Number 20140415-4004). In the event that any modifications to the design alters the candidate design spills on which the 49 CFR 193 siting analysis was based, Sabine Pass should consult with DOT on any actions necessary to comply with Part 193.**

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26 April 11, 2014 Letter "Re: Sabine Pass Liquefaction, LLC, Sabine Pass Liquefaction Expansion, LLC and Sabine Pass LNG, L.P. FERC Docket CP13-552-000, Design Spill Determination" from Kenneth Lee to Lauren H. O'Donnell. Filed in Docket CP13-552 on April 15, 2014. Accession Number 20140415-4004.

27 Pipeline and Hazardous Materials Safety Administration based this decision on the following documents: (1) Sabine Pass Liquefaction Expansion, LLC, et al. Supplement to Appendix Q.13, FERC Docket Accession Number 20130920-5146; and (2) Sabine Pass response to FERC/PHMSA Data Request, FERC Docket Accession Number 20140411-5267; and (3) Sabine Pass response to FERC/PHMSA Data Request, FERC Docket Accession Number 20140411-5268.

As design spills vary depending on the hazard (vapor dispersion, overpressure or radiant heat), the specific design spills used for the SPLE Project siting analysis are discussed in Section 2.8.5.3, Vapor Dispersion Analysis, and in section 2.8.5.5, Thermal Radiation Analysis.

2.8.5.3 Vapor Dispersion Analysis

As discussed in section 2.8.2, a release may form a toxic or flammable cloud depending on the material released. A large quantity of LNG spilled without ignition would form a flammable vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limit or encountered an ignition source. In order to address these hazards, 49 CFR 193.2051 and 193.2059 require vapor dispersion evaluation of potential incidents and exclusion zones in accordance with applicable sections of NFPA 59A (2001). NFPA 59A, Section 2.1.1 requires consideration of clearances between flammable refrigerant storage tanks, flammable liquid storage tanks, structures and plant equipment, both with respect to plant property lines and each other. This section also requires that other factors applicable to the specific site that have a bearing on the safety of plant personnel and surrounding public be considered, including an evaluation of potential incidents and safety measures incorporated in the design or operation of the facility. NFPA 59A Section 2.2.3.4 also requires provisions to minimize the possibility of any flammable mixture of vapors from a design spill from reaching a property line that can be built upon and that would result in a distinct hazard. Taken together, Part 193 and NFPA 59A (2001) require that flammable vapors either from an LNG tank impoundment or a single accidental leakage source do not extend beyond areas in which the operator or a government agency legally controls all activities. Other potential incidents (e.g., toxic releases) must also be considered.

49 CFR 193.2059 requires that dispersion distances be calculated for a 2.5 percent average gas concentration (one-half the LFL of LNG vapor) under meteorological conditions which result in the longest downwind distances at least 90 percent of the time. Alternatively, maximum downwind distances may be estimated for stability Class F, a wind speed of 4.5 mph, 50 percent relative humidity, and the average regional temperature.

The regulations in Part 193 specifically approve the use of two models for performing these dispersion calculations, DEGADIS and FEM3A. The use of alternative models is also allowed, but must be specifically approved by the DOT. Although Part 193 does not require the use of a particular source term model, modeling of the spill and resulting vapor production is necessary prior to the use of vapor dispersion models. In August 2010, the DOT issued Advisory Bulletin ADB-10-07 to provide guidance on obtaining approval of alternative vapor-gas dispersion models under Subpart B of 49 CFR 193. In October 2011, two dispersion models were approved by DOT for use in vapor dispersion exclusion zone calculations: PHAST-UDM Version 6.6 and Version 6.7 (submitted by Det Norske Veritas) and FLACS Version 9.1 Release 2 (submitted by GexCon). PHAST 6.7 and FLACS 9.1, with their built-in source term models, were used by Sabine Pass to calculate dispersion distances.

Sabine Pass used the following conditions, corresponding to 49 CFR §193.2059, for the vapor dispersion calculations: ambient temperature of 68°F, relative humidity of 50 percent, wind speeds of 4.5 mph, atmospheric stability Class F and a ground surface roughness of 0.03 meter. In addition, a sensitivity analysis to the wind speed and direction was provided to demonstrate the longest predicted downwind dispersion distance in accordance with the PHAST and FLACS Final Decisions.

Sabine Pass accounted for the facility geometry, including the impoundment and trench geometry details as established by available plant layout drawings. The plant geometry accounts for any on-site wind channeling that could occur. The releases were initiated after sufficient time had passed in the model simulations to allow the wind profile to stabilize from effects due to the presence of buildings and other on-site obstructions.

The liquefaction units would include numerous air coolers, consisting of arrays of axial fans mounted to pull air from near ground level to flow through the pipe racks and then discharge it upwards. The air coolers for a liquefaction train would be operating continuously while that train is active and would continue running until they are stopped by operator intervention, even during automatic shutdowns. This is to ensure that the refrigerant in the pipes remains cool following a shutdown in order to prevent pressure buildup in the refrigerant lines. For conservative vapor dispersion simulation purposes, the air coolers were considered to be operating only for the train in which a release occurs.

In order to address the highest rate of LNG flow (i.e., liquid scenario) into the LNG Impoundment Basin (Train 5 and 6), Sabine Pass specified the design spill as a hole equivalent to ⅓ diameter of the 24-inch-diameter LNG rundown header located south of the liquefaction trains 5 and 6, resulting in a 13,093 gpm spill rate. The FLACS results indicate that the ½-LFL vapor cloud would remain within the Sabine Pass property boundary at all times.

As discussed in section 2.8.5.2, DOT has no objections to Sabine Pass using the design spill selection methodology that resulted in the following set of design spills for determining compliance with 49 CFR Part 193 for the SPLE Project:

- full guillotine rupture of a 4-inch-diameter attachment to a LNG line in Train 6;
- full guillotine rupture of a 4-inch-diameter ethylene line within Train 6;
- full guillotine rupture of a 3-inch-diameter attachment to a propane line in Train 6
- full guillotine rupture of a 4-inch-diameter attachment to a propane line in Train 6; and
- full guillotine rupture of a 4-inch-diameter heavies reflux line in Train 6.

Various wind directions were modeled for each case. Sabine Pass found that the cases with the most significant vapor dispersion toward the northern and eastern property lines were from the 4-inch-diameter ethylene and 4-inch-diameter propane releases in train 6. These cases that resulted in the most significant vapor dispersion were evaluated with release directions to the east and wind directions to the north and east.

In the revised vapor dispersion modeling provided on April 11, 2014, the FLACS simulations from the 4-inch-diameter ethylene and propane releases showed the ½-LFL vapor cloud would extend beyond the eastern property boundary onto land not under legal control by Sabine Pass as shown in figures 3 and 4, which would be prohibited by 49 CFR 193. In order to address this, Sabine Pass established an Exclusion Zone Agreement and Declaration of Restrictive Covenants, dated May 9, 2014, between Sabine Pass and the affected landowners. This agreement restricts the land use within these exclusion zones for the life of the SPLE facility. Staff of DOT has reviewed this document and have indicated that the language in the agreement is satisfactory; however, DOT staff noted that not all owners of the subject property have signed the agreement. Therefore, staff of DOT would be unable to make a determination that the agreement would provide an acceptable solution to the ½-LFL vapor clouds extending beyond the eastern plant property boundary for the purposes of complying with Part 193. As a result, **we recommend that:**

- **<u>prior to initial site preparation</u>, Sabine Pass file with the Secretary for review and written approval by the Director of OEP, certification that DOT has found the Exclusion Zone Agreement and Declaration of Restrictive Covenants satisfactory for compliance with 49 CFR 193.2059. Sabine Pass should consult with DOT on any actions necessary to demonstrate compliance with Part 193.**

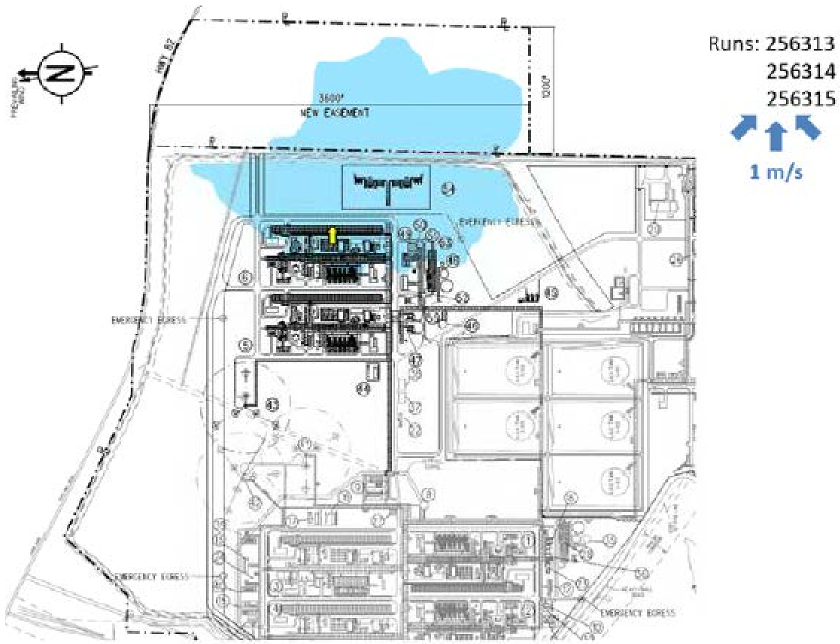

Figure 3 Ethylene Vapor Dispersion Zone – Flashing and Jetting

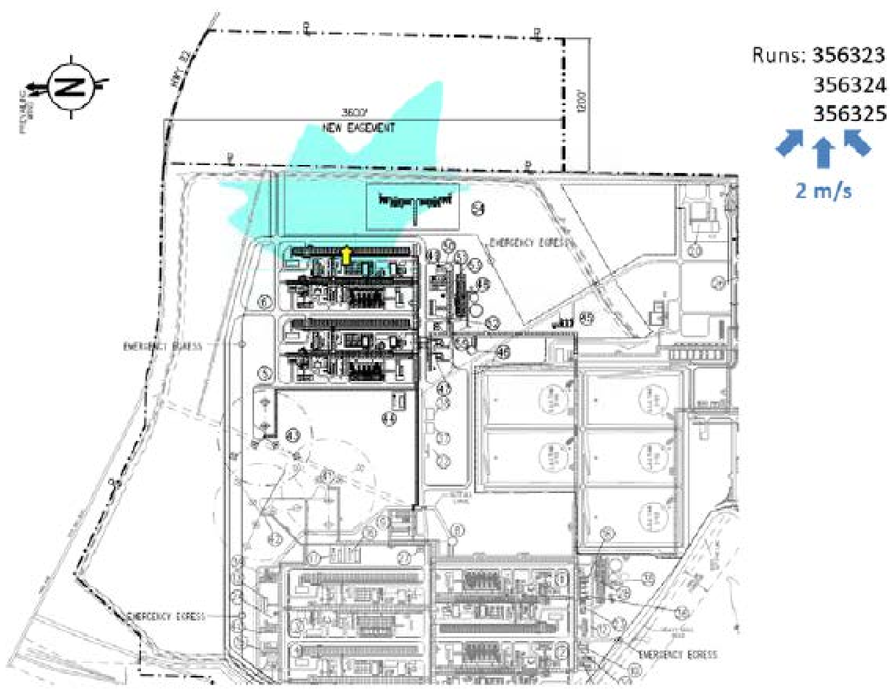

Figure 4 Propane Vapor Dispersion Zone – Flashing and Jetting

Sabine Pass did not perform a flammable vapor dispersion analysis for a release from the stabilized condensate storage area. However, under the previously authorized Sabine Pass Liquefaction Project Modification (Docket Number CP13-2-000), FERC staff performed a flammable vapor dispersion analysis from a release in the stabilized condensate storage area. The analysis assumed the entire contents of the condensate storage tank would be instantaneously released into the impoundment area. Based on the condensate properties, the longest ½-LFL vapor cloud distance from the stabilized condensate storage area evaluated under the Sabine Pass Liquefaction Project Modification (Docket Number CP13-2-000) produced a distance of approximately 1,038 feet. The condensate storage tank for the SPLE Project would be located adjacent to the two condensate storage tanks previously authorized under Docket Number CP13-2-000 and would utilize the same storage tank design. Therefore, a release from the proposed condensate storage tank would also result in a ½-LFL vapor cloud distance of 1,038 feet. The release would remain onsite, and therefore, would not present an offsite hazard to the public.

The distances to the ½-LFL vapor cloud for the LNG liquid, LNG flashing and jetting, and stabilized condensate flashing and jetting release scenarios discussed above would remain within the Sabine Pass property. The ethylene and propane flashing and jetting release scenarios would result in the ½-LFL vapor cloud extending beyond the eastern property line. Sabine Pass has secured an easement agreement with the landowner affected by the exclusion zones which would need to be reviewed by DOT to ensure it would satisfy the Part 193 requirements. Provided this agreement meets the exclusion zone requirements, we conclude that the siting of the SPLE Project with respect to hazards from vapor dispersion would not have a significant impact on public safety. If the facility is constructed and operated, compliance with the requirements of 49 CFR 193, would be addressed as part of DOT's inspection and enforcement program.

Since the acid gas would contain the toxic component H_2S and the stabilized condensate would contain toxic components of benzene, toluene, ethylbenzene, and xylene, Sabine Pass also calculated the dispersion distances for these substances to toxic threshold exposure limits based on the Acute Exposure Guideline Level (AEGL) maintained by the EPA.

Sabine Pass's toxicity analysis for H_2S considered a 1-inch-diameter hole in the 24-inch-diameter acid gas line from the Acid Gas Removal Unit to the three H_2S Removal Skids. A 1-1/2-inch diameter hole in the Condensate Discharge Pump line to the Condensate Metering Station was evaluated for benzene. Sabine Pass used PHAST Version 6.7 to model the releases. Similar to flammability concentrations, a factor of 2 (i.e., ½ AEGL) was also applied to reflect uncertainties associated with the model.

The maximum dispersion distance to the ½ AEGL-1 at 10 minutes for H_2S would extend 105 feet from the release point, which would remain onsite. For the benzene release, PHAST calculated the maximum dispersion distance to the ½ AEGL-1 at 4 hours would be 1,319 feet from the release point, which would extend beyond the area under legal control by Cheniere. This adjacent area to the facility is comprised primarily of wetlands and does not include any land uses where the public would be expected to be located for an extended amount of time. Additionally, the toxicity effects associated with AEGL-1 are non-disabling and reversible. We conclude the stabilized condensate would not present a significant impact to the public

2.8.5.4 Overpressure Analysis

As discussed in section 2.8.2, the propensity of a vapor cloud to detonate or produce damaging overpressures is influenced by the reactivity of the material, the level of confinement and congestion surrounding and within the vapor cloud, and the flame travel distance. It is possible that the prevailing wind direction may cause the vapor cloud to travel into a partially confined or congested area.

LNG Vapor Clouds

As adopted by Part 193, Section 2.1.1 of NFPA 59A (2001) requires an evaluation of potential incidents and safety measures incorporated in the design or operation of the facility be considered. As discussed in Section 2.8.2.4, Flammable Vapor Ignition, unconfined LNG vapor clouds would not be expected to produce damaging overpressures.

The potential for unconfined LNG vapor cloud detonations was investigated by the Coast Guard in the late 1970s at the Naval Weapons Center in China Lake, California. Using methane, the primary component of natural gas, several experiments were conducted to determine whether unconfined LNG vapor clouds would detonate. Unconfined methane vapor clouds ignited with low-energy ignition sources (13.5 joules), produced flame speeds ranging from 12 to 20 mph. These flame speeds are much lower than the flame speeds associated with a deflagration with damaging overpressures or a detonation.

To examine the potential for detonation of an unconfined natural gas cloud containing heavier hydrocarbons that are more reactive, such as ethane and propane, the Coast Guard conducted further tests on ambient-temperature fuel mixtures of methane-ethane and methane-propane. The tests indicated that the addition of heavier hydrocarbons influenced the tendency of an unconfined natural gas vapor cloud to detonate. Less processed natural gas with greater amounts of heavier hydrocarbons would be more sensitive to detonation.

The USCG indicated overpressures of 4 bar and flame speeds of 78 mph were produced from vapor clouds of 86 percent to 96 percent methane in near stoichiometric proportions using exploding charges as the ignition source. The 4 bar overpressure was the same overpressure produced during the calibration test involving exploding the charge ignition source alone, so it remains unclear that the overpressure was attributable to the vapor deflagration.

Additional tests were conducted to study the influence of confinement and congestion on the propensity of a vapor cloud to detonate or produce damaging overpressures. The tests used obstacles to create a partially confined and turbulent scenario, but found that flame speeds developed for methane were not significantly higher than the unconfined case and were not in the range associated with detonations.

Although it has been possible to produce damaging overpressures and detonations of unconfined LNG vapor clouds, the SPLE Project would be designed to receive feed gas with methane concentrations as low as 90 percent, which are not in the range shown to exhibit overpressures and flame speeds associated with high-order explosions and detonations.

Ignition of a confined LNG vapor cloud could result in higher overpressures. In order to prevent such an occurrence, Sabine Pass would take measures to mitigate the vapor dispersion and ignition into confined areas, such as buildings. The liquefaction trains would be located away from proposed and existing buildings in the SPLNG Terminal. In addition, Sabine Pass LNG proposes to install flammable gas detectors in occupied building heating, ventilation, and air conditioning inlets that enable isolation of the air dampers. Hazard detection with shutdown capability would also be installed at air intakes of combustion equipment whose continued operation could add to, or sustain, an emergency.

Vapor Clouds from Other Hazardous Fluids

In comparison with LNG vapor clouds, there is a higher potential for unconfined propane clouds to produce damaging overpressures, and an even higher potential for unconfined ethylene vapor clouds to produce damaging overpressures. Unconfined ethylene vapor clouds also have the potential to transition to a detonation much more readily than propane. This has been shown by multiple experiments conducted by the Explosion Research Cooperative to develop predictive blast wave models for low, medium, and high reactivity fuels and varying degrees of congestion and confinement[28]. The experiments used methane, propane, and ethylene, as the respective low, medium, and high reactivity fuels. In addition, the tests showed that if methane, propane, or ethylene is ignited within a confined space, such as in a building, they all have the potential to produce damaging overpressures. The refrigerant streams would contain all three of these components (i.e., methane, propane, and ethylene). Therefore, a potential exists for unconfined vapor clouds that could produce damaging overpressures in the event of a release of propane or ethylene.

In order to evaluate this hazard, Sabine Pass used FLACS Version 9.1 software to perform an overpressure analysis. Sabine Pass used the vapor dispersion results previously discussed in Section 2.8.5.3, Vapor Dispersion Analysis, to determine the combination of release direction, wind speed, and wind direction that would create the greatest equivalent stoichiometric cloud within the congested region of the liquefaction trains. Due to the highest reactivity, releases of ethylene from the liquefaction train dispersing to the most confined and congested regions of the facility resulted in the largest equivalent stoichiometric cloud that was evaluated in the overpressure analyses. Various ignition locations and times were evaluated to predict the worst case overpressure distances. Releases of methane and propane and subsequent ignition would be less severe due to their lower reactivity. As shown in figure 5, the results demonstrated that an overpressure of 1 psi, which was actually modeled to the ½ psi to account for any uncertainty in the model, would extend beyond the eastern property boundary of the facility. However, as discussed in section 2.8.5.3, Vapor Dispersion Analysis, Sabine Pass would obtain legal control over the land adjacent to the eastern property boundary through an easement agreement. Therefore, we conclude that the siting of the SPLE Project would not have a significant impact on public safety. If the facility is constructed and operated, compliance with the requirements of 49 CFR 193 would be addressed as part of DOT's inspection and enforcement program.

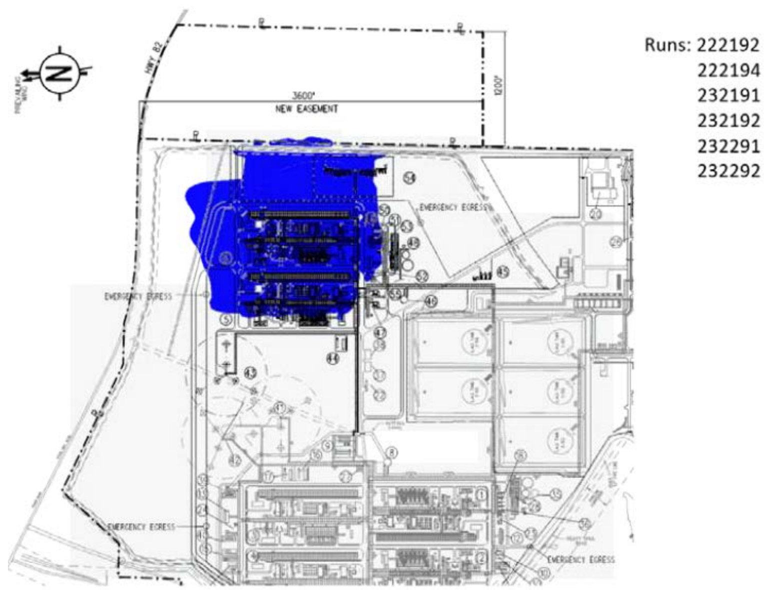

Figure 5 Extent of 1 Psi Overpressures due to Ethylene Design Spill in Train 6 – Shown as Shaded Areas

28 Pierorazio, A.J., Thomas, J.K., Baker, Q.A., Kethcum, D.E, "An Update to the Baker-Strehlow-Tang Vapor Cloud Explosion Prediction Methodology Flame Speed Table", American Institute of Chemical Engineers, Process Safety Progress, Vol. 24., No. 1, March 2005.

2.8.5.5 Thermal Radiation Analysis

As discussed in section 2.8.2, if flammable vapors are ignited, the deflagration could propagate back to the spill source and result in a pool fire causing high levels of thermal radiation (i.e., heat from a fire). In order to address this, 49 CFR § 193.2057 specifies hazard endpoints in terms of flux levels for spills into LNG storage tank containment and spills into impoundments for process or transfer areas. For any distance from a pool fire, a flux level which expresses how much thermal radiation would be received at that point can be calculated. Each LNG container and LNG transfer system is required to have a thermal exclusion zone in accordance with Section 2.2.3.2 of NFPA 59A (2001). Together, Part 193 and NFPA 59A (2001) specify different hazard endpoints for spills into LNG storage tank containment and spills into impoundments for process or transfer areas. For LNG storage tank spills, there are three radiant heat flux levels which must be considered:

- 1,600 British thermal units per square foot-hour (Btu/ft^2-hr) - This level can extend beyond the facility's property line that can be built upon but cannot include areas that, at the time of facility siting, are used for outdoor assembly by groups of 50 or more persons;
- 3,000 Btu/ft^2-hr - This level can extend beyond the facility's property line that can be built upon but cannot include areas that, at the time of facility siting, contain assembly, educational, health care, detention or residential buildings or structures; and
- 10,000 Btu/ft^2-hr - This level cannot extend beyond the facility's property line that can be built upon.

The requirements for spills from process or transfer areas are more stringent. For these impoundments, the 1,600 Btu/ft^2-hr flux level cannot extend beyond the facility's property line that can be built upon.

Part 193 requires the use of the LNGFIRE3 computer program model developed by the Gas Research Institute to determine the extent of the thermal radiation distances. Part 193 stipulates that the wind speed, ambient temperature, and relative humidity that produce the maximum exclusion distances must be used, except for conditions that occur less than 5 percent of the time based on recorded data for the area. Sabine Pass selected the following ambient conditions to produce the maximum exclusion distances: wind speed of 28 mph, ambient temperature of 34°F, and 80 percent relative humidity. These conditions yield longer distances than the 0 mph wind speed, 70°F ambient temperature, and 50 percent relative humidity specified in NFPA 59A. However, different meteorological data that produced longer thermal exclusion zone distances were selected for the SPLE Project impoundments as discussed below.

We used a wind speed of 17.4 mph, ambient temperature of 48.8°F, and 53 percent relative humidity using LNGFIRE3 to calculate the 1,600 Btu/ft^2-hr zone centered on the LNG Impoundment Basin (Trains 5 and 6). The 1,600 Btu/ft^2-hr thermal radiation distance would extend 347 feet from the LNG Impoundment Basin (Trains 5 and 6) and would stay within the facility boundary.

For the condensate storage tank analysis, Sabine Pass indicated that the thermal radiation distances calculated for the Sabine Pass Liquefaction Project Modification (Modification Project) EA under Docket No. CP13-2-000 would yield the same distances for a condensate release into the proposed condensate storage tank area for the SPLE Project. Sabine Pass determined for the Modification Project that the thermal radiation distances for a condensate release into the condensate storage tank impoundment area would be based on Acceptable Separation Distances of the U.S. Department of Housing and Urban Development (HUD) 24 CFR Part 51C. Sabine Pass selected this approach since HUD regulation 24 CFR Part 51C is a federally recognized standard for determining thermal radiation flux levels from a fire. The thermal radiation flux levels from a condensate storage tank fire established by HUD for the siting of buildings and people in unprotected outdoor areas of congregation or recreation are 10,000 Btu/ft2-hr and 450 Btu/ft^2-hr, respectively. Based on the standards developed by HUD, Sabine Pass determined the Acceptable Separation Distances for buildings and exposure to people from a potential condensate tank fire would be 100 feet and 1,000 feet, respectively. However, 24 CFR Part 51C applies to siting of HUD-assisted projects near hazardous facilities and are specifically used to determine the ASD for a HUD-assisted project from a specific hazard source. Therefore, as concluded previously in the Modification Project EA, we do not believe the approach presented by Sabine Pass demonstrates the facility would not meet the requirements of Part 193.

Using the atmospheric conditions discussed above, we calculated the 1,600 Btu/ft^2-hr flux level using LNGFIRE3 for a pool fire within the condensate storage tank impoundment. Although LNGFIRE3 is specifically designed to calculate thermal radiation flux levels for LNG pool fires, LNGFIRE3 could also be used to conservatively calculate the thermal radiation flux levels for flammable hydrocarbons such as ethylene, propane, and condensate. Two of the parameters used by LNGFIRE3 to calculate the thermal radiation flux is the mass burning rate of the fuel and the surface emissive power (SEP) of the flame, which is an average value of the thermal radiation flux emitted by the fire. The mass burning rate and SEP of an ethylene, propane, NGL, or condensate fire would be less than an equally sized LNG fire. Because the thermal radiation from a pool fire is dependent on the mass burning rate and SEP, the thermal radiation distances required for ethylene, propane, and condensate fires would not extend as far as the exclusion zone distance previously calculated for an LNG fire in the same sump. For a condensate spill into the condensate impoundment, we determined that the 1,600 Btu/ft^2-hr thermal radiation distance would extend 598 feet from the center of the condensate impoundment. The 1,600 Btu/ft^2-hr exclusion zones from the LNG Impoundment Basin (Trains 5 and 6) and condensate storage tank impoundment would not extend beyond the property line as shown in figure 6. As a result, we conclude that the siting of the SPLE Project would not have a significant impact on public safety. If the facility is constructed and operated, compliance with the requirements of 49 CFR 193 would be addressed as part of DOT's inspection and enforcement program.

2.8.6 LNG Facility Emergency Response

Both the DOT's regulations in 49 CFR 193 and the USCG's regulations in 33 CFR 127 establish requirements for the development and content of emergency response plans for LNG facilities. These plans, which are required to be developed prior to facility operation or LNG transfer from a ship, are to address the facility staff's response to onsite emergencies. For emergencies that may impact the public, the regulations contain requirements for notification, coordination and cooperation with local officials, hospitals, fire departments, police departments and other emergency response organizations. In addition, the NGA in Title 15, U.S.C., Section 717b-1(e) stipulated that in any order authorizing an LNG terminal, the Commission shall require the LNG terminal operator to develop an emergency response plan (ERP) and Cost Sharing Plan in consultation with the USCG and state and local agencies. The NGA requires that this plan, intended to address security and safety needs at the LNG terminal and in proximity to vessels that serve the facility, be approved prior to the beginning of facility construction.

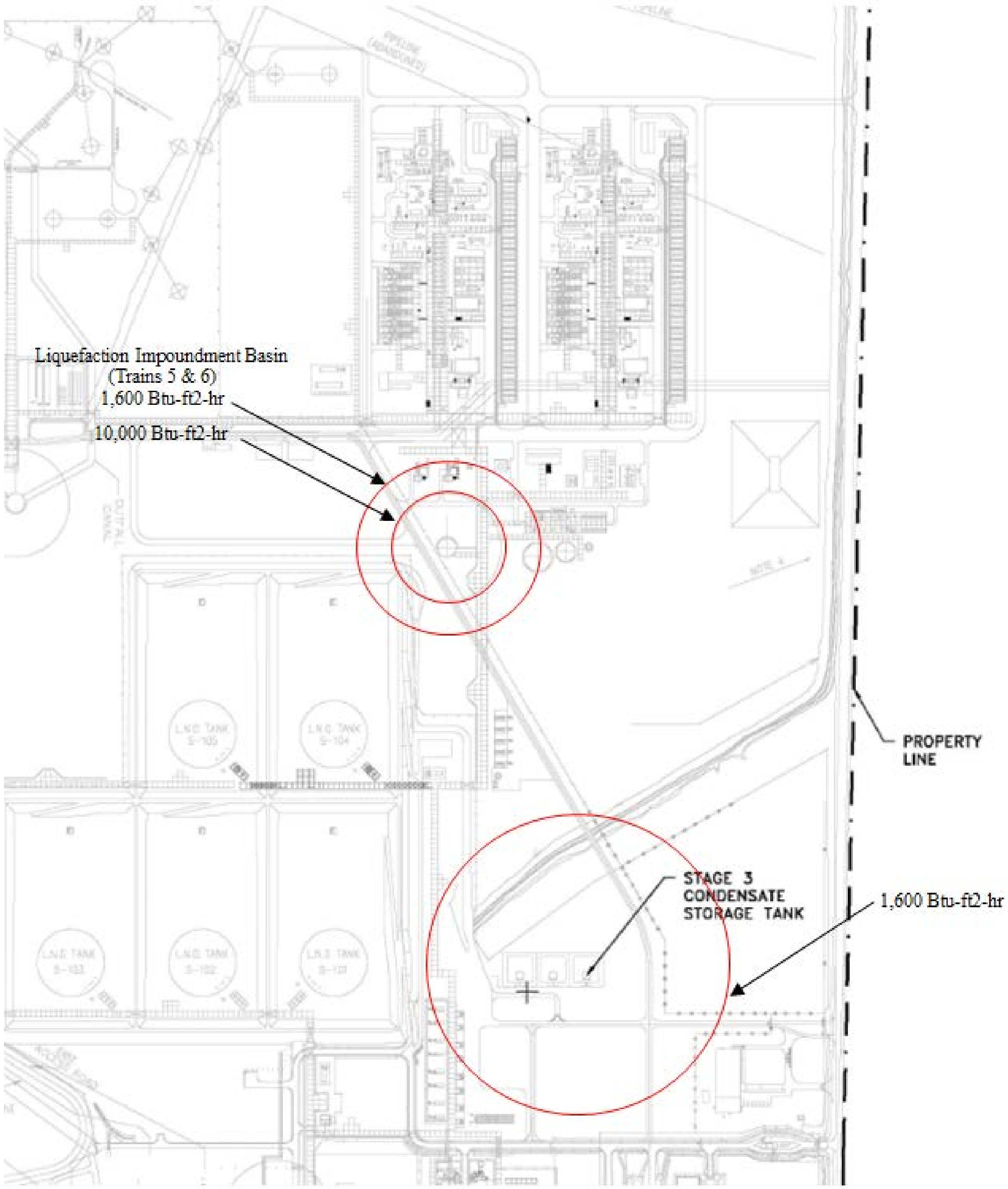

Figure 6 Thermal Radiation Distances (1,600 Btu/ft2-hr) for the LNG Impoundment Basin (Trains 5 & 6) and Condensate Storage Tank Area

Sabine Pass's existing ERP has been in place since 2008. The existing ERP would need to be updated to include the proposed liquefaction facilities and emergencies related to refrigerant handling and condensates. Therefore, **we recommend that:**

- **Sabine Pass file an updated ERP which addresses on-site and off-site emergency response for the SPLE Project facilities. The ERP should include evidence of consultation and coordination with all incident response organizations or personnel responsible for emergency response. Information pertaining to items such as off-site emergency response and procedures for public notification and evacuation would be subject to public disclosure. The ERP should be filed with the Secretary for review and written approval by the Director of OEP <u>prior to initial site preparation and a minimum of 30 days before approval to proceed would be requested</u>.**
- **The ERP include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan should include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. Sabine Pass should file the Cost-Sharing Plan for review and written approval by the Director of OEP <u>prior to initial site preparation</u>.**

2.8.7 Conclusions on Facility Reliability and Safety

As part of the NEPA review, Commission staff must assess whether the proposed facilities would be able to operate safely and securely to minimize potential public safety impacts. As a result of our technical review of the preliminary engineering design, we have made a number of recommendations to be implemented prior to initial site preparation, prior to construction of final design, prior to commissioning, prior to introduction of hazardous fluids, prior to commencement of service, and throughout the life of the facility to enhance the reliability and safety of the facility and to mitigate the risk of impact to the public. Based on our analysis and recommended mitigation, we believe that the facility design proposed by Sabine Pass includes acceptable layers of protection or safeguards which would reduce the risk of a potentially hazardous scenario from developing into an event that could impact the off-site public.

As a cooperating agency, DOT assisted us in evaluating whether Sabine Pass's proposed design would meet the DOT siting requirements. DOT reviewed the data and methodology Sabine Pass used to determine the design spills from various leakage sources, including piping, containers, and equipment containing hazardous liquids. Sabine Pass used those design spills to model hazardous releases. On April 11, 2014, DOT provided a letter to the FERC staff stating that DOT had no objection to Sabine Pass's methodology for determining the single accidental leakage sources for candidate design spills to be used in establishing the Part 193 siting requirements for the proposed LNG liquefaction facilities. Based on the hazardous area calculations we reviewed, we conclude that potential hazards from the siting of the facility at this location would not have a significant impact on public safety. The areas impacted by these design spills also appear to meet the DOT's exclusion zone requirements by being within the facility property boundary, with the exception of the ½-LFL vapor cloud extending beyond the eastern property boundary of the facility from the 4-inch-diameter ethylene and propane releases. However, Sabine Pass would obtain legal control over the land adjacent to the eastern property boundary thru an easement agreement. If the facility is constructed and becomes operational, the facility would be subject to DOT's inspection and enforcement program. Final determination of whether a facility is in compliance with the requirements of 49 CFR 193 would be made by DOT staff.

2.8.8 Pipeline Reliability and Safety

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an auto-ignition temperature of 1,000°F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of methane and air is not explosive; however, it may ignite and burn if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

2.8.8.1 Safety Standards

The DOT is mandated to provide pipeline safety under Title 49, U.S.C. Chapter 601. The DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level.

The DOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions. Office of Pipeline Safety federal inspectors perform inspections on interstate natural gas pipeline facilities in Louisiana.

The DOT pipeline standards are published in Parts 190-199 of Title 49 of the CFR. Part 192 specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities dated January 15, 1993, between the DOT and FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with federal safety standards and plans for maintenance and inspection. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline facilities associated with the Projects must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The DOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

Class 1 Location with 10 or fewer buildings intended for human occupancy;

Class 2 Location with more than 10 but fewer than 46 buildings intended for human occupancy;

Class 3 Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period; and

Class 4 Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For instance, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; maximum allowable operating pressure (MAOP); inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Preliminary class locations for the CCTPL Expansion Project pipelines have been developed based on the relationship of the pipeline centerline to other nearby structures and manmade features. Table 2.8-5 identifies the design class for the proposed pipelines.

If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, CCTPL would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the DOT requirements for the new class location.

The DOT Pipeline Safety Regulations require operators to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and that addresses the risks on each transmission pipeline segment. The rule establishes an integrity management program that applies to all high consequence areas (HCA).

The DOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the congressional mandate for the DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

TABLE 2.8-5

CCTPL Expansion Project Pipeline – Class Locations

Facility	Class	From MP	To MP	Length (mi)
Loop 1	1	1.80	14.41	12.61
	3	14.41	14.77	0.36
	1	14.77	14.79	0.02
	3	14.79	15.08	0.29
	1	15.08	15.70	0.62
Loop 2	1	69.40	71.95	2.55
	2	71.95	73.98	2.03
	1	73.98	89.18	15.20
	2	89.18	91.01	1.83
	1	91.01	93.90	2.89
Extension	1	93.90	107.07	13.17
	2	107.07	108.79	1.72
	1	108.79	142.40	33.61
CGT Lateral	1	0.00	7.29	7.29
	2	7.29	8.90	1.61
	1	8.90	11.50	2.60
PPEC Lateral	1	0.00	4.01	4.01
ANR Lateral	1	0.00	1.70	1.70
TGT Lateral	1	0.00	0.20	0.20

HCAs may be defined in one of two ways. In the first method an HCA includes:

- current class 3 and 4 locations,
- any area in Class 1 or 2 where the potential impact radius[29] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[30], or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

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29 The potential impact radius is calculated as the product of 0.69 and the square root of: the MAOP of the pipeline in psig multiplied by the square of the pipeline diameter in inches.

30 The potential impact circle is a circle of radius equal to the potential impact radius.

In the second method, an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy, or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to the segments of the pipeline that are within HCAs. The DOT regulations specify the requirements for the integrity management plan at 49 CFR 192.911. The HCAs have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites. MP 14.41 to 14.77 and MP14.79 to 15.08 of Loop 1 would be classified as an HCA. The pipeline integrity management rule for HCAs requires pipeline HCAs to be inspected every seven years.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards of a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property and making them safe from actual or potential hazards.

The DOT requires that each operator establish and maintain liaisons with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. CCTPL would provide the appropriate training for local emergency service personnel before the pipeline is placed in service.

2.8.8.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the DOT of any significant incident and to submit a report within 20 days. Significant incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000 (1984 dollars)[31].

31 $50,000 in 1984 dollars is about $115,000 as of March 2014 (Consumer Price Index, Bureau of Labor Statistics ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt February 2014)

During the 20-year period from 1994 through 2013, a total of 1,237 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 2.8-6 provides a distribution of the causal factors as well as the number of each incident by cause.

TABLE 2.8-6

Natural Gas Transmission Pipeline Significant Incidents by Cause
1994-2013 a/

Cause	No. of Incidents	Percentage
Corrosion	292	23.6
Excavation **b/**	211	17.0
Pipeline material, weld, or equipment failure	304	24.6
Natural force damage	142	11.5
Outside force **c/**	74	6.0
Incorrect operation	33	2.7
All other causes **d/**	181	14.6
Total	**1,237**	**-**

a All data gathered from PHMSA Significant incident files, March 25, 2014. http://primis.phmsa.dot.gov/comm/reports/safety/

b Includes third-party damage

c Fire, explosion, vehicle damage, previous damage, intentional damage

d Miscellaneous causes or unknown causes

The dominant causes of pipeline incidents are corrosion and pipeline material, with weld or equipment failure constituting 48.2 percent of all significant incidents. The pipelines included in the data set in table 2.8-6 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

Because corrosion and pipeline stress/strain increases with time, older pipelines have a higher frequency of corrosion incidents and material failure.

The use of both an external protective coating and a cathodic protection system[32], required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared with unprotected or partially protected pipe.

32 Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline through the use of an induced current or a sacrificial anode (like zinc) that corrodes at faster rate to reduce corrosion.

Outside forces (e.g., fire, vehicle damage intentional damage) and natural forces (e.g., earth movements due to soil settlement, washouts, or geologic hazards; winds, storms, and thermal strains) are the cause of 34.5 percent of significant pipeline incidents. Table 2.8-7 classifies outside force incidents by cause.

TABLE 2.8-7

Outside Forces Incidents by Cause a/
(1994-2013)

Cause	No. of Incidents	Percent of all Incidents
Third-party excavation damage	176	14.2
Operator excavation damage	25	2.0
Unspecified excavation damage/previous damage	10	0.8
Heavy rain/floods	72	5.8
Earth movement	35	2.8
Lightning/temperature/high winds	21	1.7
Natural force (other)	14	1.1
Vehicle (not engaged with excavation)	45	3.6
Fire/explosion	8	0.6
Previous mechanical damage	5	0.4
Fishing or maritime activity	7	0.6
Electrical arcing from other equipment/facility	1	0.1
Intentional damage	1	0.1
Unspecified/other outside force	7	0.6
TOTAL	**427**	**-**

a Excavation, Outside Force, and Natural Force from Table 2-1

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller-diameter pipelines, which have a greater rate of outside forces incidents. Small-diameter pipelines are more easily crushed or broken by mechanical equipment or earth movement.

Since 1982, operators have been required to participate in “One Call” public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The “One Call” program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

2.8.8.3 Impact on Public Safety

The service incidents data summarized in table 55 include pipeline failures of all magnitudes with widely varying consequences.

Table 2.8-8 presents the average annual injuries and fatalities that occurred on natural gas transmission lines for the five-year period between 2009 and 2013. The majority of fatalities from pipelines are due to local distribution pipelines not regulated by FERC. These pipelines distribute natural gas to homes and businesses after transportation through interstate natural gas transmission pipelines. In general, these distribution lines are smaller diameter pipes and/or plastic pipes, which are more susceptible to damage. Local distribution systems do not have large rights-of-way and pipeline markers common to the FERC-regulated natural gas transmission pipelines.

TABLE 2.8-8

Injuries and Fatalities - Natural Gas Transmission Pipelines

Year	Injuries	Fatalities
2009	11	0
2010 **a/**	61	10
2011	1	0
2012	7	0
2013	2	0

a All of the public injuries and fatalities in 2010 were due to the Pacific Gas and Electric pipeline rupture and fire in San Bruno, California, on September 9, 2010.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 2.8-9 to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared with the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1994 to 2013, there were an average of 62 significant incidents, 10 injuries, and 2 fatalities per year. The number of significant incidents over the more than 300,000 miles of natural gas transmission lines indicates the risk is low for an incident at any given location. The operation of the CCTPL Expansion Project would represent a slight increase in risk to the nearby public.

TABLE 2.8-9

Nationwide Accidental Deaths a/

Type of Accident	Annual No. of Deaths
All accidents	117,809
Motor Vehicle	45,343
Poisoning	23,618
Falls	19,656
Injury at work	5,113
Drowning	3,582
Fire, smoke inhalation, burns	3,197
Floods **b/**	89
Lightning **b/**	54
Tornado **b/**	74
Farming, fishing, and forestry occupations **c/**	279
Natural gas distribution lines **d/**	14
Natural gas transmission pipelines **d/**	2

a All data, unless otherwise noted, reflects 2005 statistics from U.S. Census Bureau, Statistical Abstract of the United States: 2010 (129th Edition) Washington, DC, 2009; http://www.census.gov/statab.

b NOAA National Weather Service, Office of Climate, Water and Weather Services, 30 year average (1983-2012) http://www.weather.gov/om/hazstats.shtml

c Bureau of Labor Statistics, Census of Fatal Occupational Injuries, May 2, 2014, 10-year average (2003-2012). http://www.bls.gov/iif/oshwc/cfoi/all_worker.pdf

d PHMSA significant incident files, March 25, 2014. http://primis.phmsa.dot.gov/comm/reports/safety/ 20-year average.

2.9 Cumulative Impacts

In accordance with NEPA and FERC policy, we considered the cumulative impacts of the SPLE Project and CCTPL Expansion Project and other projects in the general area. Cumulative impacts represent the incremental effects of the proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a given period. The direct and indirect impacts of the Projects are addressed in other sections of this EA.

This cumulative impact analysis generally follows the methodology set forth in relevant guidance (CEQ, 1997). Under these guidelines, we based our selection of other projects in the analysis by identifying commonalities of impacts. The actions considered in the cumulative impact analysis may vary from the Projects in nature, magnitude, and duration; however, an action must meet the following three criteria to be included in the cumulative impacts analysis:

- impacts a resource area potentially affected by the Projects;

- causes this impact within all, or part of, the project areas; and
- causes this impact within all, or part of, the time span for the potential impact from the Projects.

For the purposes of this cumulative impact analysis, we considered the project areas to be Cameron Parish, Louisiana (terminal location), and the parishes traversed by the CCTPL Expansion Project, including Cameron, Calcasieu, Beauregard, Allen, and Evangeline Parishes, Louisiana.

Project impacts would be primarily additive to the existing SPLNG Terminal and CCTPL's existing natural gas pipeline facilities. The SPLE Project would be within the existing terminal boundary and the CCTPL Expansion Project would be co-located with the existing pipeline or utility corridors to the greatest extent practicable, thereby minimizing additional temporary, permanent, and cumulative impacts. Potential cumulative impacts associated with current, proposed, or reasonably foreseeable future projects or activities in the ROI (e.g., same parishes) were identified and are listed in table 2.9-1. Some of these projects do not fit all three criteria that determine the potential for cumulative impacts; however, they were large enough projects to mention in the analysis to ensure a more complete picture of the types of projects occurring in the same region as the Projects. Although we were able to find the acreage affected by the majority of the projects listed in table 2.9-1, we were unable to gather resource-specific impacts for all the projects. Where appropriate, we have included conservative assumptions regarding the scope of these projects.

TABLE 2.9-1

Authorized and Planned Major Projects In the Vicinity of the Sabine Pass Liquefaction Expansion Project and the Cheniere Creole Trail Pipeline, L.P. Expansion Project

Project	Parish	Description	Project Status a/
Sabine Pass Liquefaction Project CP11-72-000	Cameron	Add four liquefaction trains (Stage 1 and 2) at the existing SPLNG Terminal, transforming it into a bi-directional facility capable of vaporizing foreign-sourced LNG or liquefying domestic natural gas for foreign export. The new liquefaction facilities will be located within the existing SPLNG Terminal. When complete, Trains 1 through 4 will be capable of a peak annual production of 1,005 Bcf/y. About 288.2 acres will be affected during construction and 191.2 acres during operation, all within the existing land leased for the SPLNG Terminal.	Approved, April 16, 2012 Begin Construction: 3rd Quarter 2012 In Service: 2016 (Stage 2)
Sabine Pass Liquefaction Project Modification CP13-2-000	Cameron	Addition of facilities and workspace to the approved Sabine Pass Liquefaction Project to enhance operability and reliability of the project. About 154.5 acres will be affected during construction and 153.6 acres during operation.	Approved, August 2, 2013 Begin Construction: 2013 In Service: 2015
Creole Trail Expansion Project CP12-351-000	Beauregard	Add a new compressor station at Gillis consisting of one 10,836 hp unit (first phase) and one 20,617 hp unit (second phase) on a 30-acre parcel leased by CCTPL and reconfigure three M&R stations to accommodate bi-directional gas flow. About 31.5 acres will be affected during construction and 15.7 acres during operation.	Approved, February 21, 2013 Begin Construction: 4th Quarter 2013 (first phase)

TABLE 2.9-1

Authorized and Planned Major Projects In the Vicinity of the Sabine Pass Liquefaction Expansion Project and the Cheniere Creole Trail Pipeline, L.P. Expansion Project

Project	Parish	Description	Project Status a/
			In Service: 2nd Quarter 2016 (second phase)
Cameron LNG Liquefaction Project CP13-25-000 Cameron Pipeline Expansion Project CP13-27-000	Cameron, Calcasieu, Beauregard	Add liquefaction facilities at the existing Cameron LNG Terminal to enable the liquefaction of natural gas and export LNG. About 430 acres of land will be used for construction and operation, including 50 acres of the existing Cameron LNG Terminal. Construct and operate a new 21-mile-long, 42-inch-diameter pipeline and a new 66,000 hp compressor station in Calcasieu Parish and associated pipeline facilities. About 368 and 80 acres of land will be used for construction and operation of the pipeline, respectively.	Approved, June 19, 2014 LNG terminal – Begin Construction: 2014 In Service: 4th quarter 2016 Pipeline – Begin Construction: 1st Quarter 2015 In Service: 2nd Quarter 2016
Lake Charles Liquefaction Project CP14-120-000	Calcasieu	Expansion of the existing LNG terminal in Calcasieu Parish, Louisiana, to add up to three liquefaction trains. The planned facility would be capable of processing about 2.4 Bcf/d of natural gas, which would be supplied by the existing pipeline currently used to send out regasified LNG from the existing LNG terminal, and be capable of exporting about 15 million tons per annum. The expansion would be on an approximate 268-acre tract.	Application pending Begin Construction: 3rd Quarter 2015 In Service: July 2019
Lake Charles Expansion Project <u>CP14-511-000</u>	Acadia; Evangeline; and Calcasieu	Upgrades, approximately 1.3 miles of header pipeline, and a new 64,000-hp compressor station to make the existing Kinder Morgan Louisiana Pipeline (which already lies directly under the proposed Magnolia LNG site) functional for the Magnolia LNG Project	Application pending Begin Construction: January 2017 In Service: January 2018
Magnolia LNG Project CP14-347-000	Calcasieu	Construction of a new LNG terminal in Calcasieu Parish, Louisiana, to enable liquefying natural gas and exporting LNG. About 115 acres of land would be used for construction and operation. Construct and operate two new LNG storage tanks with a net pumpable capacity of about 160,000 m^3 of LNG each and construct four LNG trains each with a nominal capacity of 8.0 million tons per annum of LNG.	Application pending Begin Construction: 1st Quarter 2015 Begin Construction: July 2015 In Service: June 2018 (Train 1) September 2018 (Train 2) December 2018 (Train 3) March 2019 (Train 4)

TABLE 2.9-1

Authorized and Planned Major Projects In the Vicinity of the Sabine Pass Liquefaction Expansion Project and the Cheniere Creole Trail Pipeline, L.P. Expansion Project

Project	Parish	Description	Project Status a/
Mississippi River Liquefied Natural Gas Project PF14-17-000	Plaquemines	Louisiana LNG Energy, LLC plans to construct and operate a liquefaction facility on the Mississippi River in Plaquemines Parish, Louisiana, consisting of four liquefaction trains; LNG truck loading facilities; electric power generation; and about 2.3 miles of 20-inch-diameter natural gas pipeline. The total annual export capacity of the Project would be about 100 billion cubic feet.	Project in pre-filing Begin Construction: January 2016 In Service: 2018
Cameron Access Project PF14-16-000	Jefferson Davis; Calcasieu; and Cameron	Construction of approximately 27 miles of new 36-inch-diameter pipeline, 10 miles of 30-inch-diameter pipeline and a new 10,200-hp compressor station in Jefferson Davis Parish.	Project in pre-filing Begin Construction: September 2016 In Service: July 2017
G2X Gas to Liquids Project b/	Calcasieu	Construction of a new gas-to-liquids refinery that would process natural gas into methanol and then into gasoline. About 200 acres of land would be used for construction and operation.	Begin Construction: 4th Quarter 2014 In Service: 2nd Quarter 2017
Sasol Ethylene Tetramerization Unit b/	Calcasieu	Construction of a new ethylene tetramerization unit within the existing Sasol Lake Charles Chemical Complex.	Began Construction: 2011 In Service: 3rd Quarter 2013
Virtual Engineering Operations Diesel Refinery b/	Allen	Construction of a new 20,000 barrels per day refinery in Allen Parish, Louisiana, to enable the processing of crude oil to diesel fuel. About 67 acres of land will be used for construction and operation.	Begin Construction: 4th Quarter 2013 In Service: January 2015
Pine Prairie Energy Center Phase III Expansion Project CP11-1-000	Evangeline	Development of two additional natural gas storage caverns (Cavern Nos. 6 and 7), each having working gas capacity of 12 Bcf; installation of two new 5,750 hp electric compressor units, and other modifications to increase PPEC's working gas capacity from 48 Bcf to 80 Bcf. The development of the two additional caverns and other modifications will impact about 49.94 acres and 12.26 acres for construction and operation of the new natural gas storage caverns, respectively.	Approved, May 19, 2011 Begin Construction: 2nd Quarter 2013 In Service: 2nd Quarter 2015
Golden Pass GPX Project CP14-517-000 CP14-518-000	Calcasieu	As part of a larger project to install liquefaction at the existing Golden Pass LNG Terminal, Golden Pass Pipeline LLC will install a 6-mile-long, 30- to 36-inch-diameter loop and a new 70,000 hp compressor station in Calcasieu Parish.	Application pending Begin Construction: June 2015 In Service: June 2018

TABLE 2.9-1 **Authorized and Planned Major Projects In the Vicinity of the Sabine Pass Liquefaction Expansion Project and the Cheniere Creole Trail Pipeline, L.P. Expansion Project**			
Project	**Parish**	**Description**	**Project Status a/**
Delfin LNG Liquefaction Terminal FE Docket No. 13–147–LNG b/	Cameron (Offshore)	Develop and operate a floating liquefaction facility (four floating liquefaction trains would be located on vessels) in WC 167 of the Gulf of Mexico, approximately 30 miles offshore of Cameron Parish, Louisiana.	In Service: 2017
Calcasieu Pass Project PF15-2	Cameron	Construction of a liquefaction facility near the mouth of the Calcasieu Ship Channel with a capacity of about 10 million metric tons of liquefied natural gas per annum for export overseas. Also, construction of two natural gas feed pipelines, totaling 43 miles, to connect the planned facility to the nearby existing natural gas pipeline network.	Project in pre-filing In Service: 2019
a “Project Status” dates are taken from project proponents’ projections. b Project is not under FERC jurisdiction; not filed with FERC.			

2.9.1 Potential Cumulative Impacts of the Proposed Action

Potential impacts most likely to be cumulative with the Projects’ impacts are related to water resources, wetlands, vegetation and wildlife, cultural resources, socioeconomics, air quality, and noise. Although the Projects could contribute to these cumulative impacts, Sabine Pass and CCTPL would minimize adverse impacts by implementing appropriate measures (described in sections 2.1 through 2.8 of this EA).

2.9.1.1 Water Resources and Wetlands

Each of these projects would be required to obtain an appropriate Section 404 permit from the USACE if “waters of the U.S.” are affected, and would also be required to implement BMPs during construction and provide compensatory mitigation for unavoidable wetland impacts.

If approved and constructed, the SPLE Project and CCTPL Extension Project and these other projects could cumulatively impact the amount and/or types of wetlands affected within the five parishes. Temporary impacts associated with construction include runoff from construction areas that could temporarily increase turbidity and sedimentation in adjacent waterbodies and wetlands. Surface water withdrawals and discharges related to hydrostatic testing could also temporarily impact surface water quality. Proponents of projects under the jurisdiction of the FERC would be required to comply with the FERC Procedures to minimize impacts on waterbodies and wetlands to the maximum extent practicable. Projects solely under the jurisdiction of the USACE will be required to implement BMPs.

Sabine Pass is presently constructing LNG export facilities at it existing SPLNG Terminal pursuant to authorizations it received from the FERC in Docket Nos. CP11-72-000 and CP13-2-000. The proposed SPLE Project would be within the SPLNG Terminal property. It would permanently affect 153.5 acres of emergent wetlands including 110.58 acres in Mitigation Area C, which were previously set aside as mitigation for wetlands affected by the authorized and existing SPLNG Terminal facilities. The remaining 42.95 acres of permanently affected wetland are part of applicant-designated Wetland 17 at the

SPLNG Terminal. Sabine Pass is proposing mitigation for all permanent wetland impacts on the SPLNG Terminal site. Because there would be no space available for on-site mitigation and there are currently no credits available from wetland banks within the watershed, Sabine Pass would develop appropriate mitigation areas on other properties in coordination with the USACE. Mitigation plans are under development at the time of this EA.

Construction of the CCTPL facilities would result in temporary and permanent impacts on about 276.64 acres of wetlands. Of these 276.64 acres, about 17.27 acres represent permanent conversion of forested wetlands to emergent wetlands, with the remaining acres being temporary impacts on emergent and scrub-shrub wetlands. Impacts on some wetlands would be avoided by using HDD. Permanent conversion of forested wetlands to emergent wetlands would cause the loss of forested vegetation and the associated habitat and function. However, the restoration of emergent wetland conditions in these areas following construction would retain some of the original function and habitat. Following construction and restoration of disturbed areas, CCTPL would monitor revegetation progress according to the CCTPL Procedures or as required by permitting agencies. CCTPL's facilities authorized in Docket No. CP12-351-000 were in upland areas and affected no wetlands.

Each project noted in table 2.9-1 may include the permanent loss of wetlands or conversion of forested wetlands to emergent or scrub-shrub wetlands. However, these impacts would be offset by compensatory mitigation either through the purchase of credits from established mitigation banks or in-lieu mitigation.

2.9.1.2 Vegetation and Wildlife

When projects are constructed at or near the same time and are relatively close to each other, there may be cumulative impacts on vegetation and wildlife within the immediate area. Temporary impacts from the removal of vegetation can alter wildlife habitat and displace wildlife. Generally, these impacts are temporary, and wildlife would return to affected areas following restoration.

Long-term impacts from construction and operation of multiple projects may include forest fragmentation and establishment of invasive plant species. The SPLE Project would not have any impacts on forests. However the CCTPL Expansion Project would impact about 267.1 acres and 188.2 acres of forests and pine plantations during construction, respectively. About 112.0 acres of forest would be within the operational right-of-way and 2.8 acres would be required at certain MLV and M&R station sites. About 64.7 acres of pine plantation would be required for pipeline right-of-way. CCTPL's facilities authorized in Docket No. CP12-351-000 affected no forested areas.

Since most of the projects listed in table 2.9-1 involve expansion of existing facilities in industrialized areas or the expansion of rights-of-way for new pipelines, we do not anticipate these cumulative impacts to be significant.

2.9.1.3 Cultural Resources

Disturbance of cultural resources sites can occur accidentally or through unintentional destruction during construction. All federal projects listed above are defined as federal actions, they will be required to comply with Section 106 of the National Historic Preservation Act; therefore, adverse effects on cultural resources would be avoided, minimized, or mitigated. Non-federal actions would need to comply with any measures required by the state or county. Currently, no adverse effects to historic properties are expected to occur as a result of the Projects; and, therefore, they would not add to a regional cumulative effect on cultural resources. If any additional historic properties are identified, we would ensure that they were avoided or mitigated. In addition, projects under the jurisdiction of the FERC would be required to implement an unanticipated discovery plan that will include procedures if a cultural resource site or human remains are discovered during construction.

2.9.1.4 Socioeconomics

All the projects listed in table 2.9-1 have or will generate temporary construction jobs. While many of the construction workers may reside locally, a number of non-local construction workers with specialized training for the specific project would be needed. Non-local laborers typically reside in hotels, motels, rental units, or mobile home parks in local communities near the project. Positive cumulative economic benefits from these projects would be local sales taxes on goods and services during construction and increased property taxes on the completed projects when operating. The projects would also add permanent jobs in facility operations to the region.

2.9.1.5 Air Quality and Noise

Construction activities have the potential to produce a temporary decrease in air quality and an increase in local noise levels. Temporary impacts would occur associated with each project due to fugitive dust from land clearing, grading, excavation, concrete work, and operation of fossil-fueled construction equipment and vehicles. However, with the exception of the current construction and proposed expansion at the SPLNG Terminal and at the Cameron LNG Terminal, these projects are geographically separated and would not result in cumulative impacts in any one specific area. The SPLNG Terminal and Cameron LNG Terminal are in the same parish (Cameron Parish), and the CCTPL Loop 2 and Cameron Pipeline Expansion Project would be installed in adjacent rights-of-way for approximately 0.6 mile and in the same general vicinity for most of the length of both pipelines in Calcasieu Parish. As currently proposed, both expansion projects at the LNG terminals and the pipelines are scheduled to start construction in 2015. The SPLNG and Cameron LNG terminals are about 37 miles apart, so cumulative impacts from fugitive dust would not occur. Although it is possible that both pipelines would be constructed at the exact same time, it is likely that construction would be staggered between the two projects. Cumulative construction impacts of the SPLE Project (expanding the existing SPLNG Terminal) and Mamou Compressor Station would not occur because the distance between the two sites is about 100 miles. Construction of the western end of Loop 1 of the CCTPL Expansion Project would occur near the construction activities occurring at the SPLNG Terminal for the SPLE Project, and partially overlap in time. However, only a small portion of Loop 1 is close to the SPLNG Terminal and duration of the construction of that portion of Loop 1 would be short. Emissions from construction equipment would be primarily restricted to daylight hours and would be minimized through typical control equipment. The construction equipment emissions would result in short-term emissions that would be highly localized. In addition, fugitive dust emissions would be controlled by implementing fugitive dust controls as needed. Due to the linear nature of the pipeline projects, both air quality and noise impacts would tend to be of short duration in any given area. Furthermore, because most construction activities would be limited to daylight hours (with the possible exception of HDD activities), noise impacts would not occur at night.

Permanent impacts on air quality and noise would largely be associated with the operation of aboveground facilities associated with the liquefaction trains, compressor stations, or other industrial facilities. Sabine Pass is also proposing to update emissions from the approved Trains 1 through 4 to reflect the final detailed design operating parameters. Air emissions from operation of the Projects would be additive because they would be discharged into a shared air basin. However, all five parishes in which the Projects would be constructed are in attainment for all NAAQS criteria pollutants. Furthermore, each project would be required to meet all applicable federal and state air quality standards. As discussed in section 2.7.1, detailed ambient air quality impact modeling was performed to quantitatively evaluate the impacts from operation of the existing SPLNG facility. The modeling also included other existing sources of air emissions in the project area and the updated emissions to trains 1 through 4. The results of the modeling analysis concluded that there would be no significant impact on air quality from operation of the Projects in the region.

Modeling was also performed to evaluate the impact of the Project on regional ozone. The modeling included emissions from existing sources, including portions of the existing Cameron LNG facility. The ozone modeling is a regional assessment tool, rather than a local impact identifier, that can be used to scale observed ozone concentrations on a relative basis. We also recognize that the Golden Pass LNG facility is also currently planning a liquefaction project in close proximity to the SPLNG Terminal. Given the limited availability of information about the Golden Pass LNG Project, its smaller scale, the general modeling approach to provide results on a relative basis, and the ozone modeling results for the SPLE Project demonstrating that ozone levels would not be significantly impacted, the addition of the Golden Pass LNG Project would not qualitatively result in a significant cumulative impact on ozone levels for the SPLE Project. Also, similar to Sabine Pass, the Golden Pass LNG Project would likely be required to conduct ozone modeling as part of the air permit application process and include emissions from all existing sources at the time of their respective modeling studies.

2.9.1.6 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer is not an indication of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the United States Global Change Research Program (USGCRP). Thirteen federal departments and agencies[33] participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs[34] have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);
- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests is primarily responsible for the accumulation of GHG;
- anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health.

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33 The following departments comprise the USGCRP: EPA, DOE, Department of Commerce, Department of Defense, Department of Agriculture, Department of the Interior, Department of State, DOT, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

34 See section 2.7.1.2.

The USGCRP issued a report, *Global Climate Change Impacts in the Unites States*[35], in June 2009 summarizing the impacts climate change has already had on the United States and what projected impacts climate change may have in the future. The report categorizes overall impacts by resource and impacts for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we will focus on the cumulative impacts of climate change in the project area.

The USGCRP's report notes the following continental Southeast and Coastal regional impacts:

- average temperatures have risen about 2°F since 1970 and are projected to increase another 4.5 to 9°F during this century;
- increases in illness and death due to greater summer heat stress;
- destructive potential of Atlantic hurricanes has increased since 1970 and the intensity (with higher peak wind speeds, rainfall intensity, and storm surge height and strength) is likely to increase during this century;
- in the United States, within the past century, relative sea level changes ranged from falling several inches to rising about 2 feet and are projected to increase another 3 to 4 feet this century;
- sea level rise and human alterations have caused 1,900 square miles of coastal wetland loss in Louisiana during the past century, reducing their capacity to protect against storm surge, and projected sea level rise is anticipated to result in the loss of a large portion of the nation's remaining coastal wetlands;
- declines in dissolved oxygen in streams and lakes have caused fish kills and loss of aquatic species diversity;
- moderate to severe spring and summer drought areas have increased 12 percent to 14 percent (with frequency, duration, and intensity also increasing also projected to increase);
- longer periods of time between rainfall events may lead to declines in recharge of groundwater and decreased water availability;
- responses to decreased water availability, such as increased groundwater pumping, may lead to stress or depletion of aquifers and strain on surface water sources;
- increases in evaporation and plant water loss rates may alter the balance of runoff and groundwater recharge, which would likely to lead to saltwater intrusion into shallow aquifers;
- coastal waters have risen about 2°F in several regions and are likely to continue to warm as much as 4 to 8°F this century; and
- coastal water warming may lead to the transport of invasive species through ballast water exchange during ship transit.

The GHG emissions associated with construction and operation of the SPLNG terminal and the Mamou Compressor Station, identified in section 2.7.1, would not have any direct impacts on the environment in the project area. The Projects would contribute approximately 2 percent of Louisiana's GHG emissions. Sabine Pass and CCTPL included a GHG BACT analysis as part of their air permit applications to the LDEQ.

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35 U.S. Global Change Research Program. 2009. *Global Climate Change Impacts in the United States*. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson (eds.). Cambridge University Press.

Sabine Pass provided information on the technical feasibility of using carbon capture and sequestration at the facility in its GHG BACT analysis. Carbon in the exhaust stream is captured and then permanently stored (e.g., injecting the recovered CO_2 underground through various means, including enhanced oil recovery, saline aquifers, and un-mineable coal seams). In its GHG BACT analysis, Sabine Pass indicated that it could not commit to carbon capture and sequestration because no CO_2 pipeline currently exists near the SPLNG Terminal. Sabine Pass stated it should not be expected to contract with a single pipeline supplier because there are currently no market conditions to regulate the availability and associated cost of such pipelines. In addition, the SPLE Project is in a region that does not have any geological formations that support sequestration.

During the analysis for authorization for liquefaction Trains 1 through 4, we asked Sabine Pass to analyze an alternative to capturing CO_2 and constructing a pipeline from the liquefaction facility to the nearest access point to the Denbury Green CO_2 pipeline under construction in Texas and Louisiana. In that analysis, one pipeline route would extend through an interconnect with the Denbury Green Pipeline at mainline valve-21, about 28.5 miles north of the SPLNG Terminal. To avoid impacts on the Sabine National Wildlife Refuge, Sabine Lake, and the metropolitan areas of Orange and Pinehurst, Texas, a constructible route to this point would be about 34 to 36 miles long. An alternative and more direct route would be a pipeline directed northwest of the SPLNG Terminal. To avoid residential and industrial areas of Port Arthur, Texas, the route would be at least 22.5 miles in length, would require crossing the Sabine Pass Channel, and would be constructed on approximately 10 miles of marsh wetlands.

Using either pipeline alternative, Sabine Pass would need to install a compressor to increase the pressure from the exhaust stream (near atmospheric) to the pressure in the pipeline that Denbury Pipeline operates (about 1,600 psig). This control technology would result in additional environmental and air quality impacts.

Sabine Pass has modified some portions of its initial stage liquefaction project for Trains 1 through 4 that increase some GHG emissions. The acid gas vents for Trains 1 through 4 will be routed to thermal oxidizers, which will increase emissions of CO_2. However, Sabine Pass selected LM2500+G4 turbines over heavy duty Frame 5D turbines for Trains 1 through 4 and for the expansion Project for Trains 5 and 6. The selected turbines have a better thermal efficiency and reduced CO_2 emissions. In addition, all turbines would be operated using natural gas, which has the lowest carbon intensity of any fuel available for the turbines. Sabine Pass has also selected good combustion/operating practices (operating with water injection for the refrigeration turbines and dry-low combustion for power generation turbines) as its BACT for CO_2 and CH_4 emissions from the turbines and has proposed BACT limits for CO_2, CH_4, and N_2O. CO_2 emissions from flaring would be reduced through Sabine Pass' selection of flare gas recovery. BACT limits for the marine flare and wet and dry flares were also selected for CO_2 and CH_4. Sabine Pass changed its use of natural gas-fired emergency generator engines for liquefaction Trains 1 to 4 to engines using diesel fuel and added use of two diesel-fired emergency generator engines for Trains 5 and 6. Sabine Pass re-evaluated BACT for these engines and selected BACT limits for CO_2, CH_4, and N_2O for the diesel-fired emergency generator engines. And finally, Sabine Pass has elected to use an optical gas imaging instrument for equipment leak detection for CH_4 BACT for fugitive emissions. Sabine Pass' design also includes a waste heat recovery system on each liquefaction train for regenerating the gas driers and amine system.

Similarly, CCTPL prepared a BACT analysis and has selected BACT limits for the Mamou Compressor Station. For the gas turbines driving the natural gas compressors, high thermal efficiency turbines using natural gas fuel, dry low NO_X combustion, and good combustion practices were selected. For fugitive leaks of methane from pipe valves, flanges and connectors, a leak detection and repair program was selected.

Climate change in the region would have two effects that may cause increased storm surges, increase temperatures of Gulf waters, which would increase storm intensity, and a rising sea level. In

Louisiana, relative sea level changes have been estimated by NOAA to be about 14 inches by 2050. This is greater than the global average because of regional ground subsidence. The SPLNG Terminal is designed for a 100-year storm surge elevation level of 14 feet amsl. Given that the elevation of the base of the SPLE Project site process equipment would be at 18.5 feet amsl and elevation of floors in critical building would be 19 feet amsl, climate change-enhanced sea level rise and subsidence are considered adequately addressed in the project design.

Currently there is no standard methodology to determine how the Projects' incremental contribution to GHGs would translate into physical effects on the global environment. However, the emissions would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to climate change that produces the impacts previously described. Because we cannot determine the Projects' incremental physical impacts due to climate change on the environment, we cannot determine whether the Projects would result in significant impacts related to climate change.

2.9.2 Conclusions

A thorough determination about the significance of cumulative impacts for specific environmental resources is difficult because of the lack of access to details about impacts on resources for the some of the projects listed in table 2.9-1. Some of the project sponsors will not file applications with the FERC because they are not under its jurisdiction. Some of the projects under FERC jurisdiction are early in their development and data about their impacts has not yet been assessed (projects that are in pre-filing and which have a "PF" docket number) or access to conduct surveys may be denied so information about resources is incomplete at this time. The most significant cumulative impacts would occur if all of these projects were constructed at the same time as the Projects; however, this is not anticipated. It can be assumed that construction and operation of the listed projects is likely to disturb various wildlife habitats and natural land use types. As a result, construction of the Projects would cumulatively contribute to the increasing industrialization of agricultural and/or open lands in the area.

Most of the cumulative impacts identified would be short-term and minor, such as impacts on water resources, wildlife, and vegetation. Permanent wetlands impacts would be offset by compensatory mitigation, either through the purchase of credits from established mitigation banks or in-lieu mitigation. CCTPL and Sabine Pass would comply with the terms and conditions of the Section 404 permit regarding mitigation.

Cumulative benefits would include enhancing the local economy through taxes, jobs, wages, and purchasing of goods and materials.

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3 ALTERNATIVES

As required by NEPA and Commission policy, we identified and evaluated alternatives to the proposed SPLE Project and the CCTPL Expansion Project. These alternatives were considered to determine whether they would be reasonable and environmentally preferable to the proposed action. These alternatives include the no-action alternative, energy alternatives, system alternatives, and alternative site configurations. The evaluation criteria for selecting potentially reasonable and environmentally preferable alternatives include the following:

- technical feasibility and practicality;
- significant environmental advantage over the Projects; and
- ability to meet the Projects' objectives.

Our alternative assessment is based on project-specific information provided by Sabine Pass and CCTPL, our expertise regarding the siting, construction, and operation of LNG export facilities and natural gas transmission pipelines and their potential effects on the environment, and takes into consideration the comments provided to the Commission about the Projects.

3.1 No-Action Alternative

Under the no-action alternative Sabine Pass and CCTPL would not construct the Projects. If the SPLE Project and the CCTPL Expansion Project were not constructed, then neither the adverse nor beneficial potential impacts described in this EA would occur. Implementing the no-action alternative would not allow the Projects to meet the Applicants' purpose and need as described in section 1.2. Further, we have concluded that the impacts associated with the Projects would not be significant; therefore, we do not recommend the no action alternative.

3.2 Alternative Energy Sources

The purpose of the Projects is to export natural gas to other countries in order to meet growing market demands for lower cost natural gas, as compared with other energy sources. As part of the alternative selection process, it is important to consider and evaluate other alternative energy sources, including other fossil fuels such as coal and oil as well as renewable sources such as wind and solar.

Studies have shown that when natural gas is used to fire a power plant it emits about half the CO_2 emissions as compared with conventional plants that use other fossil fuels. It has been termed a "bridge fuel" between the dominant fossil fuels used today and renewable energy sources because it is clean-burning and can reliably serve as a backup fuel to renewable energy facilities, which often provide power intermittently.

Renewable energy sources such as wind and solar are considered a cleaner alternative to fossil fuels because the amount of GHG emissions and other pollutants are less than energy produced by coal, oil, or natural gas. The United States and other countries around the world are using and exploring expanded use of these resources. The drawback to selecting these types of sources is that the resources are not consistently available, nor are they available at a quantity to be able to meet the energy demands of the global market.

Currently these alternatives cannot provide energy sources that are economically, environmentally, and technically more feasible or practical than the natural gas that would be provided by the Projects. Therefore, we do not recommend them.

3.3 System Alternatives

System alternatives to the proposed action would use existing or other proposed natural gas export facilities, natural gas transmission facilities, or other methods of transporting natural gas to meet the purpose of the Projects. Implementing a system alternative would make it unnecessary to construct all or part of the Project, although some modifications or additions to an existing transmission system or other proposed system may be necessary.

Currently, the SPLNG Terminal is only one of two existing LNG facilities in the Gulf Coast region that has been approved by FERC for exporting LNG. The SPLNG Terminal liquefaction facilities are being constructed and the export of LNG has already been approved by FERC and DOE. The SPLNG Terminal (Trains 1 through 4) is expected to begin exporting LNG in 2015 and has contracts in place for the current capacity. Sabine Pass has determined that the currently approved liquefaction facility (Trains 1 through 4), which will come on-line in 2015, does not have the capacity to support the additional needs of the SPLE Project (Trains 5 and 6). The other approved LNG export facility in the Gulf Coast area is the Freeport LNG Liquefaction and Phase II Modification Project (Docket Nos. CP12-509-000 and CP12-29-000) in Brazoria, Texas. However, its export capacity when fully operational would be 1.8 Bcf/d, which is less than the 1.96 Bcf/d design capacity of the SPLE Project; and the Freeport LNG facility does not have unsubscribed capacity that could accommodate the additional quantity of LNG that would be exported by the SPLE Project. Therefore, we do not consider it an alternative to the SPLE Project unless additional facilities were added.

Several companies are seeking authorizations to construct and operate LNG liquefaction facilities and to export LNG. Table 3.3-1 lists their location, anticipated in-service date, capacity, and whether the project would be co-located with existing LNG facilities. Seventeen such projects have been identified on the Gulf of Mexico region: six at existing LNG terminals, and eleven at new or greenfield LNG liquefaction facilities. The projects, assuming all are built, would liquefy 23.05 Bcf/d of natural gas; of this total, about 16.02 Bcf/d is already subscribed for export. Natural gas for all the projects would come from the interstate pipeline system, allowing gas to be supplied from any location. But the supply of gas to the liquefaction facilities may be limited by pipeline capacity in a given area.

Sufficient liquefaction capacity may be available in the region if all projects are built as proposed; however, unlike common carrier natural gas, LNG cannot be accessed with an off-take connection and traded readily. Currently each project has its own load out facility designed to complement plant output, and has or would have natural gas pipeline infrastructure connected to it. Only one proposed greenfield project (in Cameron, Texas) currently reports available capacity that would meet the applicant’s need for 1.96 Bcf/d of supply, other things being equal. Sabine Pass’s proposed expansion cannot be accomplished at the other existing facilities as no available capacity is reported.

The cost of a project is such that most, if not all, of the available capacity is subscribed to before construction is begun. Sabine Pass has reported that all of its authorized export capacity at its existing SPLNG Terminal has been subscribed. As a result, we determined that these other projects would not be economically or practically feasible alternatives to the SPLE Project. Thus, we do not recommend them as system alternatives.

TABLE 3.3-1

Gulf Coast System Alternatives

Project	Liquefaction Plant Location (Parish or County, State)	Liquefaction Plant In-Service Date	Plant Capacity a/ (Bcf/d)	Available Capacity b/ (Bcf/d)	Co-Location with Existing LNG Regasification Unit
Sabine Pass LNG Expansion (Trains 5-6)	Cameron, LA	2018	1.96	0	Yes
Existing LNG Regasification Facility, Proposing or Approved to add LNG Liquefaction c/					
Sabine Pass LNG (Trains 1-4)	Cameron, LA	2015	1.4	0	Yes
Trunkline LNG	Calcasieu, LA	2019	2.4	0	Yes
Freeport LNG	Brazoria, TX	2018	1.8	0	Yes
Golden Pass	Jefferson, TX	2020	2.1	0	Yes
Cameron LNG	Cameron, LA	2017	1.7	0	Yes
Gulf LNG Liquefaction Co., LLC	Jackson, MS	2019	1.5	0	Yes
Potential LNG Liquefaction Projects d/					
Magnolia LNG	Calcasieu, LA	2018	1.07	0.27	No
Gasfin Development USA, LLC	Cameron, LA	2020	0.20	0.20	No
Waller Energy Partners, LLC	Cameron, LA	2015	0.16	0.16	No
Venture Global LNG, LLC	Cameron, LA	2018	0.67	0.67	No.
Corpus Christi Liquefaction	San Patricio, TX	2018	2.1	0	No
CE-FLNG	Plaquemines, LA	2018	1.07	1.07	No
Excelerate Liquefaction	Lavaca, TX	2018	1.38	0	No
Texas LNG	Cameron, TX	2018	0.27	0	No
Annova LNG	Cameron, TX	2017 **e/**	0.94	0.94	No
EOS & Barca LNG	Cameron, TX	2018 **e/**	3.2	2.63	No
Pangea LNG	San Patricio, TX	2018	1.09	1.09	No

a FERC North American LNG Export Terminals for Design Capacity – Bcf/d.

b Unsubscribed export capacity.

c Existing LNG regasification plant with plans for expansion. Liquefaction trains operating or under construction.

d Potential Gulf of Mexico sites identified by project sponsors.

e Estimated based upon owner's press release contents.

3.4 Alternative Configurations and Designs

3.4.1 Alternative Configurations

Sabine Pass considered alternative configurations for the SPLE Project, including alternative layouts for the liquefaction facilities (location and configuration of major project components), in an attempt to identify ways to minimize environmental impacts while concurrently maximizing utilization. Specific environmental factors that were analyzed included presence of NSAs, storm water flow, soil stabilization, and wetland impacts. Other factors involved in evaluating the configurations include constructability (e.g., availability of laydown areas, type of existing infrastructure, and transportation logistics), cooling air recirculation, and pertinent safety criteria. Alternative configurations within the SPLNG Terminal's existing property boundary were reviewed by Sabine Pass. Due to the limited space within the property, design safety requirements, and construction sequencing, Sabine Pass reports that the proposed design represents the most efficient configuration for the proposed expansion at the SPLNG Terminal. We have reviewed Sabine Pass' filings and believe this is a reasonable conclusion.

3.4.2 Alternative Designs

In order to reduce emissions, Sabine Pass considered alternative designs for the SPLE Project, including alternatives to the refrigeration compressor drives and for control of oxides of nitrogen for the refrigeration compressor gas turbines.

3.4.2.1 Electric-Motor Driven Turbines

Project redesign with electric motors replacing the gas turbines driving the liquefaction compressors would require a considerable amount of electricity from the regional power transmission grid to run the electric motors. Sabine Pass estimated that 475 megawatts of electricity would be required to power the 12 motors for Trains 5 and 6. The use of electric motors would result in off-site criteria pollutant and GHG emissions by the power plants supplying the incremental electricity. Whether those emissions would be greater or less than projected emissions associated with the Project would be a function of load growth in the regional electricity market over time and the types of new capacity that would be built to meet that load, among other factors.

In addition to trading air emissions impacts from the terminal to other sources, routing of the electricity to the SPLE Project would result in other, additional environmental impacts that the current design would not create. Sabine Pass has indicated that additional facilities that would be needed include constructing at minimum a new 65-mile, 345 kV electrical line to the Lake Charles area where ample electrical generation is available to supply the new line. It is likely that construction or expansion of an electrical substation to accommodate the new power would also be required. The additional facilities that would be needed to supply electricity to the SPLE Project would result in the creation of new or expanded rights-of-way. Construction of the transmission line could cause impacts on people, wildlife, and vegetation, including potential impacts within the Sabine National Wildlife Refuge.

The proposed design includes waste-heat recovery units installed on the exhausts for the gas turbines for the ethylene compressors that would provide 100 percent of the plant heating needs (hot oil and regeneration services). Sabine Pass has indicated that if electric motors were substituted for the gas turbines, new and additional direct-fired heaters would be required at the plant to make up for lost heating service. Gas would be needed to fuel the direct-fired heaters, which would create additional emissions of GHGs and criteria pollutants. Plant heating needs would not result in additional emissions under Sabine Pass's proposed design.

Use of electric motors would also require variable frequency drive systems to control the motors, and this would require construction of an additional large building adjacent to each LNG train to house the variable frequency drive system. Electric motors and the variable frequency drive systems may also require water cooling.

Electric motors used as the main drivers for LNG refrigeration compressors are currently in operation only at one LNG plant, in Norway, and have not yet demonstrated the reliability necessary to sustain base load LNG production such that the technology can be recommended over the proposed design. We recognize that the Freeport LNG facility, which is located in the Houston-Galveston-Brazoria ozone nonattainment area, has been authorized with electric motors as well. However, this facility was required to meet more restrictive air permitting requirements for emissions control, which likely was an important factor in designing the facility with electricity-driven motors for compression. In contrast, the SPLE Project is in an ozone attainment area, and Sabine Pass has performed air quality modeling demonstrating compliance with applicable standards. Therefore, we find that an alternative design to replace the 12 gas turbines with electric motors is not an environmentally preferable alternative.

3.4.2.2 Selective Catalytic Reduction NO_X Control

Sabine Pass evaluated gas turbine NO_X control in its BACT analysis in the September 2013 permit application and in the September 2014 permit application addendum to the LDEQ. The BACT analysis considered available NO_X control technologies, including the use of selective catalytic reduction (SCR) on the gas turbines. Sabine Pass indicated in its analysis that there is no LNG industry operating experience with SCR applied to refrigeration compressor gas turbines used at liquefaction facilities. However, we are aware of one proposed liquefaction facility in Louisiana that is proposing use of SCR on refrigeration compressor gas turbines.

Sabine Pass states that SCR in a typical horizontal configuration is not feasible due to limited space for installation. Space constraints arise because the location of the SPLE Project necessitates certain basic design considerations, including placing the gas turbines and refrigerant compressors on an elevated platform about 55 feet above the ground. In addition, gas turbine exhaust temperatures are not within the operating temperature range of conventional SCR design.

However, to fully examine use of SCR, Sabine Pass evaluated a modified SCR configuration. The modified SCR configuration may operate within the gas turbine exhaust temperature range expected and accommodate space constraints by being vertically oriented.. Sabine Pass noted that this modified SCR configuration has only been operated at a power generating pilot test facility and not at an LNG facility. Despite the lack of published operating experience with the modified SCR configuration, Sabine Pass evaluated the modified design in its BACT analysis in the September 2014 permit application addendum.

In the analysis, Sabine Pass assumed that the vertically oriented SCR would achieve an 80 percent reduction in NO_X emissions when operated in conjunction with water injected or dry low NO_X emission technology. Sabine Pass determined this combination would reduce NO_X emissions by 100 tpy per gas turbine. However, Sabine Pass concluded that the modified SCR configuration does not represent BACT due to several factors. Adverse environmental impacts would occur due to emissions of ammonia, estimated to be 800 tons per year. Adverse energy impacts would also result due to operating the SCR support equipment and would result in slightly less efficiency from the gas turbines due to exhaust back pressure from the catalyst.

Although Sabine Pass identified and evaluated a modified SCR configuration, we find the unknowns involved in the technology may result in the chance of poor performance over time. There is also the potential for the emission of 800 tpy of ammonia to represent an adverse environmental impact. Air quality modeling has been performed for the proposed design, which demonstrated compliance with the NAAQS. Therefore, an alternative NO_X emission control design using SCR in addition to water injection to reduce NO_X emissions further is not considered an environmentally preferable alternative.

3.5 Alternative Pipeline Routes

3.5.1 Pipeline System Alternatives

Several pipeline system alternatives were identified and evaluated. Those examined include the existing CCTPL pipeline system, the Kinder Morgan Louisiana Pipeline pipeline system, the Natural Gas Pipeline Company of America (NGPL) pipeline system, and the Transcontinental Gas Pipe Line pipeline system. All of these systems operate in the vicinity of, connect directly to, or are being built to connect to the SPLNG Terminal.

The current CCTPL pipeline system has previously approved system changes (Docket No CP12-351-000) that will be put into place, but they are not sufficient to support the additional modifications requested as part of the SPLE Project. Kinder Morgan Louisiana Pipeline has an existing interconnect with the SPLNG Terminal but would require a) an additional interconnect to provide sufficient service for the proposed SPLE Project and b) multiple additional compression stations to support the gas flow required for the proposed SPLE Project. The NGPL pipeline system will be connecting to the previously approved SPLNG Terminal (Trains 1 through 4); however, additional facilities and a new M&R Station would be needed for the SPLE Project. The NGPL pipeline system, with its planned expansion for Trains 1 through 4, would not provide enough additional capacity needed for the SPLE Project (Trains 5 and 6). The Transcontinental Gas Pipe Line pipeline system would require facility modifications because its system could not provide the capacity required by the SPLE Project due to current contracts requiring flow away from the vicinity of the SLPNG Terminal. As a result, none of the pipeline system alternatives identified and evaluated would meet the purpose and need of the SPLE Project, nor offer significant environmental advantage because additional pipeline facilities would be required to accommodate additional capacity needs to deliver natural gas to the SPLNG terminal which would have their own environmental impacts that may be equal to, greater than, or less than the proposed CCTPL Expansion Project.

We conclude that there is no pipeline system alternative that would meet the proposed purpose and need of the Projects.

3.5.2 Pipeline Route Alternatives

The Commission previously authorized construction of 152 miles of pipeline on the CCTPL system in Louisiana;[36] however, only 94 miles were constructed. The remaining 58-mile pipeline segment was never constructed, and the authorization from FERC to construct it expired in 2012. CCTPL reviewed this previously authorized route to determine if it was a feasible option for the CCTPL Expansion Project. CCTPL concluded that this previously authorized route would not provide the necessary number of interconnects. Multiple interconnects are needed to provide variable flow rates to the SPLNG Terminal; therefore, this alternative does not meet the needs of the Projects and was not evaluated further.

3.5.3 Pipeline Looping Alternatives

CCTPL reviewed the possibility of adding additional compression along the existing pipeline to see if this would be sufficient instead of installing the loops as currently proposed in the CCTPL

36 For additional information, see FERC Docket No. CP05-360-000.

Expansion Project. An additional 30,000 hp would be required in two locations to provide the additional capacity. From a technical and engineering perspective, the prime location for one of these compressor stations would be along the existing CCTPL system in a location that places it within Lake Calcasieu, which is not possible. Moving this location outside of Lake Calcasieu and the surrounding wetland areas would place it near the existing Gillis Compressor Station. Preliminary studies by CCTPL indicated that the cumulative noise could be a significant issue if the two stations were constructed and operated so close to one another. We conclude, therefore, that the alternative of installing compressors rather than constructing looping pipeline is not a reasonable alternative and was not evaluated further.

3.5.4 Pipeline Route Realignments and Modifications

During the FERC pre-filing process and after developing the initial pipeline route, several short route realignments and modifications were investigated. These included changes and refinements to the route as a result of civil surveys, field surveys, agency consultations, landowner input, engineering design, etc. FERC staff has reviewed the modifications and concurs with the proposed changes. The following modifications are now reflected in the proposed route evaluated in this EA. As such, they are not, strictly speaking, “alternatives”; however, we are including them here to facilitate understanding of some of the options considered in the project design and development.

Loop 1 Modifications

Modification 1

Modification 1 is in Cameron Parish and adjusts the proposed route to parallel the pipeline next to the SPLNG Terminal entrance road, avoiding impacts that would be caused by diagonally crossing an open field. Although this increases the route by 0.2 mile we agree that it does not increase any adverse impacts. Therefore, Modification 1 was incorporated by CCTPL into the proposed route.

Modification 2

Modification 2 in Cameron Parish was reviewed to determine if an alternative on Loop 1 could avoid existing utilities in the area. Although Modification 2 would increase impacts on scrub land (1.7 acres) and wetlands (0.7 acre), it would reduce impacts on forested land (by 0.3 acre), commercial/industrial land (by 0.6 acre), agricultural land (by 0.3 acre), and open water (by less than 0.1 acre), with the overall area of impacts reduced by 1.4 acres. Therefore, Modification 2 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Extension Modifications

Modification 3

Modification 3 is along the Extension from MP 108.7 to MP 109.3 in Allen Parish. This modification provides a straighter path for the HDD crossing of Whiskey Chitto Creek. There is no substantial change to the route length. Therefore, Modification 3 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Modification 4

Modification 4 is on the Extension in Allen Parish from MP 114.5 to 116.1. This modification uses an HDD crossing to avoid a congested area at Highway 165 and a railroad crossing. By using HDD, 11.1 fewer total acres would be impacted, and there would be two less waterbody crossings and two less road crossings. To accomplish the HDD, the pipeline centerline would be shifted south for about 1.6 miles, resulting in only a minor increase of impact on forested wetlands (by 0.2 acre) and forested land (by 0.2 acres). Therefore, Modification 4 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Modification 5

Modification 5 is part of the Extension in Allen Parish from MP 119.7 to MP 122.4. Modification 5 is an adjustment of the crossing location of Bayou Blue River to a location immediately north of the previous site. Modification 5 is slightly longer than the original route (by 0.1 mile) but would impact the same type of land (forested, planted pine, and scrub). Using this new crossing would allow the pipeline construction route to avoid a portion of Bayou Blue River that runs parallel to the pipeline route for several hundred feet. Therefore, Modification 5 was incorporated by CCTPL into the proposed route. We agree that this modification minimizes potential impacts on the river from erosion and storm water flow during construction and restoration.

Modification 6

Modification 6 is at MP 124.1 to MP 125.2 on the Extension in Allen Parish. This modification is a more perpendicular waterbody crossing than the original route and uses a single crossing of Sonnier Bayou instead of crossing it twice. The length of the pipeline route does not change significantly using this adjusted route. The route also follows the edge of the agricultural field, instead of intersecting the middle of the field. Therefore, Modification 6 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Modification 7

Modification 7 is in Allen Parish along the Extension from MP 125.3 to MP 128.2 and was developed to accommodate a request by a landowner. Modification 7 relocated this portion of the Extension to the north in order to avoid 2.5 acres of forested land and two roads. Although it increases impacts on agricultural lands by 4.0 acres and emergent wetlands by 2.0 acres, Modification 7 was incorporated by CCTPL into the proposed route to reduce overall impact, and we agree with this modification.

Modification 8

Modification 8 runs from MP 132.3 to 133.7 on the Extension in Evangeline Parish. The modification is 0.1 mile longer than the original route but instead of intersecting the agricultural fields at an angle it parallels Beiber Road, with fewer disturbances of the agricultural fields. Therefore, Modification 8 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Modification 9

Modification 9 is part of the Extension from MP 138.8 to MP 139.6. It is located in Evangeline Parish and was developed to design an HDD to cross under Highway 10 and multiple pipelines. Using this modification will reduce overall impacts by 8.2 acres, which includes 6.8 acres of forested land, 0.2 acre of wetlands (non-forested), and 0.6 acre of forested wetlands. Therefore, Modification 9 was incorporated by CCTPL into the proposed route, and we agree with this modification.

CGT Lateral Modifications

Modification 10

Modification 10, running from MP 0.0 to MP 0.5 along the CGT Lateral in Evangeline Parish, was developed because it moves the CGT Lateral interconnect to the north side of the Mamou Compressor Station site, which allows the lateral to lay east-west instead of diagonally through an agricultural field and residential backyards. This orientation also improves the crossing of Veterans Memorial Highway (State Route 13), making it perpendicular instead of at an angle. The overall length of this route (0.5 mile) would not change with the modification. Therefore, Modification 10 was incorporated by CCTPL into the proposed route, and we agree with this modification.

Modification 11

CCTPL altered the CGT Lateral from MP 11.2 to MP 11.5 in Evangeline Parish to allow the CGT M&R Station to be placed next to an existing facility instead of in open land. The modified route is 0.2 mile shorter than previously; therefore, Modification 11 was incorporated by CCTPL into the proposed route, and we agree with this modification.

PPEC Lateral Modifications

Modification 12

Modification 12 along the PPEC Lateral from MP 0.2 to MP 4.0 in Evangeline Parish modifies and improves the HDD crossing of Bayou Nezpique. It was also developed in order to provide a new tie-in to the PPEC Lateral from the PPEC M&R Station. Although this modification would impact an additional 6.6 acres of land, including 2.2 acres of wetland (non-forested), and 0.4 acres of forested wetlands, and has two additional waterbody crossings, Modification 12 improves constructability and operation of the lateral. Therefore, it was incorporated by CCTPL into the proposed route, and we agree with this modification.

3.5.5 Alternative Aboveground Facilities Locations

CCTPL identified and evaluated five alternative locations for the Mamou Compressor Station, as shown in figure 7. CCTPL used the following criteria when reviewing alternative compressor station sites:

- location along the pipeline to provide the required volumes of natural gas into the pipeline system;
- minimizing environmental impacts (wetlands, forested lands, etc.);
- avoiding flood plains;
- proximity to existing pipeline infrastructure and natural gas supplies; and
- adequate distances from NSAs.

All six compressor station alternative sites are in Evangeline Parish, Louisiana, and have site sizes of about 38 acres (Compressor Station Alternative 4) to about 40 acres (Compressor Station Alternatives 1, 2, 3, 5, and 6). Compressor Station Alternatives 2, 3, 4, and 5 were not evaluated further due to their location within and/or near forested areas, wetlands, or floodplains. Compressor Station Alternative 1 was evaluated because it meets the needs from a technical standpoint; however, it is within a floodplain, rendering it not a preferred option for an aboveground facility. Alternative 6 is the proposed location CCTPL selected for the Mamou Compressor Station. We did not identify any other locations that reduce the impacts associated with the proposed compressor station site.

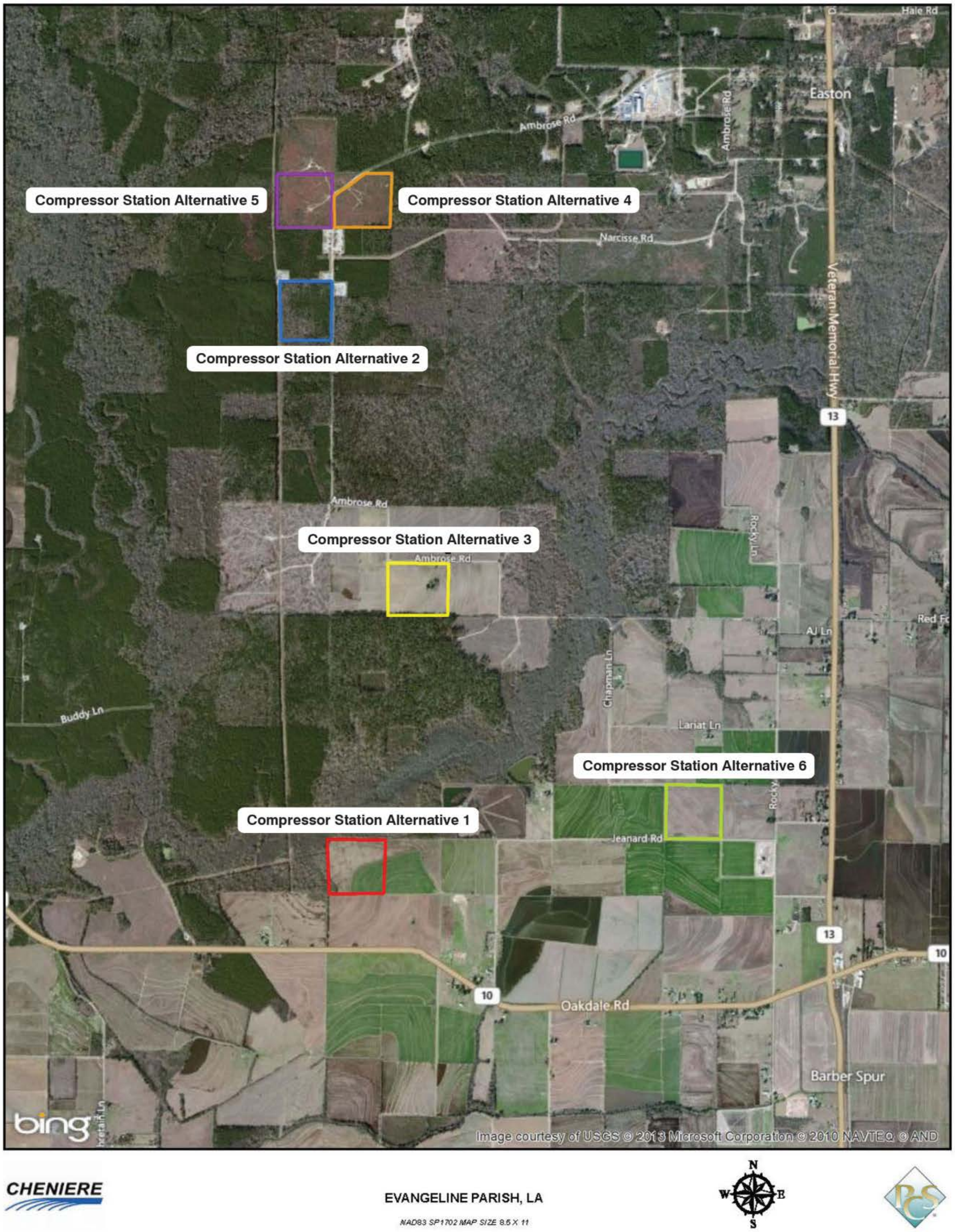

Figure 7 **Alternative Compressor Station Locations**

4 CONCLUSIONS AND RECOMMENDATIONS

We conclude that the approval of the Projects would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on our environmental analysis as described above; information provided in Sabine Pass' and CCTPL's application and supplemental filings; and their implementation of our recommended mitigation measures. We recommend that the Commission order include the mitigation measures listed below as conditions to any section 3 and 7 Authorization the Commission may issue.

1. Sabine Pass and CCTPL shall follow the construction procedures and mitigation measures described in their application and supplements, including responses to staff data requests and as identified in the EA, unless modified by the Order. Sabine Pass and CCTPL must:
   a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
   b. justify each modification relative to site-specific conditions;
   c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
   d. receive approval in writing from the Director of the OEP **before using that modification**.
2. For LNG facilities, the Director of OEP has delegated authority to take all steps necessary to ensure the protection of life, health, property, and the environment during SPLE Project construction and operation. This authority shall allow:
   a. stop-work authority and authority to cease operation; and
   b. the design and implementation of any additional measures deemed necessary to ensure compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from SPLE Project construction and operation.
3. **Prior to any construction,** Sabine Pass and CCTPL shall file affirmative statements with the Secretary, certified by senior company officials, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.
4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction,** Sabine Pass and CCTPL shall file with the Secretary any revised detailed survey alignment maps or sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must specify locations designated on these alignment maps or sheets.

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

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

   This requirement does not apply to route variations required herein or extra workspace allowed by FERC's Plan or minor field realignments per landowner needs and requirements that do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

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

   c. recommendations by state regulatory authorities; and

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

6. **Within 60 days of the acceptance of the Authorization and Certificate and before construction begins**, Sabine Pass and CCTPL shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP. Sabine Pass and CCTPL must file revisions to the plan as schedules change. The plan shall identify:

   a. how Sabine Pass and CCTPL will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EA, and required by the Order;

   b. how Sabine Pass and CCTPL will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to on-site construction and inspection personnel;

   c. the number of EIs assigned per spread and aboveground facility sites and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

   d. company personnel, including EIs and contractors, who will receive copies of the appropriate materials;

   e. the location and dates of the environmental compliance training and instructions Sabine Pass and CCTPL will give to all personnel involved with construction and restoration (initial and refresher training as the Projects progress and personnel change) with the opportunity for OEP staff to participate in the training session(s);

f. the company personnel (if known) and specific portion of Sabine Pass' and CCTPL's organization having responsibility for compliance;

g. the procedures (including use of contract penalties) Sabine Pass and CCTPL will follow if noncompliance occurs; and

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

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. Beginning with the filing of its Implementation Plans, Sabine Pass shall file updated status reports on a **monthly** basis for the SPLE Project and CCTPL shall file updated status reports, prepared by the head EI with the Secretary on a **weekly** basis for the CCTPL Expansion Project until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on Sabine Pass' and CCTPL's efforts to obtain the necessary federal authorizations;

b. the current construction status at the terminal site and of each spread of the pipeline, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

c. a list of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions or permit requirements imposed by other federal, state, or local agencies);

d. description of the corrective actions implemented in response to all instances of noncompliance and their cost;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner or resident complaints that may relate to compliance with the requirements of the Order and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by Sabine Pass and CCTPL from other federal, state, or local permitting agencies concerning instances of noncompliance and Sabine Pass and CCTPL's response.

8. **Prior to receiving written authorization from the Director of OEP to commence construction of any respective project facilities**, Sabine Pass and CCTPL shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

9. Sabine Pass must receive written authorization from the Director of OEP **prior to introducing hazardous fluids into the SPLE Project facilities**. Instrumentation and controls, hazard detection, hazard control, and security components/systems necessary for the safe introduction of such fluids shall be installed and functional.

10. Sabine Pass and CCTPL must receive written authorization from the Director of OEP **before placing the respective Projects into service**. Such authorization will only be granted following a determination that facilities have been constructed in accordance with FERC approval and applicable standards, can be expected to operate safely as designed, and the rehabilitation and restoration of the areas affected by the Project are proceeding satisfactorily.

11. **Within 30 days of placing the authorized facilities in service**, Sabine Pass and CCTPL shall file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the facilities have been constructed or installed in compliance with all applicable conditions and that continuing activities will be consistent with all applicable conditions; or

    b. identifying which of the certificate conditions Sabine Pass and CCTPL has complied with or will comply with. This statement shall also identify any areas affected by the respective Projects where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

12. Sabine Pass shall employ at least one EI for the SPLE Project and CCTPL shall employ at least one EI per construction spread. Each EI shall be:

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

    b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

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

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

    e. responsible for documenting compliance with the environmental conditions of the Order as well as any environmental conditions or permit requirements imposed by other federal, state, or local agencies; and

    f. responsible for maintaining status reports.

13. Sabine Pass file the following information, stamped and sealed by the professional engineer-of-record, with the Secretary:

    a. **prior to site preparation**: site preparation design drawings, specifications, and quality control procedures that will be used for design and construction; and

    b. **prior to their construction**: structure and foundation design drawings and calculations of the liquefaction facilities.

    In addition, Sabine Pass shall file, in its Implementation Plan, the schedule for producing this information. (page 27)

14. **Prior to beginning construction at the SPLE Terminal,** Sabine Pass shall file with the Secretary the USACE-approved wetland mitigation plan and associated correspondence. (page 45)

15. **Prior to beginning construction of the Extension between MPs 99 and 100,** CCTPL shall file with the Secretary documentation of approval from the mitigation bank owners and the

USACE authorizing crossing of the Clear Creek Mitigation Bank and Calcasieu Mitigation Bank. (page 47)

16. **Prior to beginning construction of the pipelines**, CCTPL shall file with the Secretary a USACE-approved wetland mitigation plan and associated correspondence. (page 47)

17. **Prior to beginning construction,** CCTPL shall file with the Secretary documentation of its consultation with the USFWS regarding project impacts on migratory birds for review and approval by the Director of the OEP. (page 53)

18. **Prior to beginning construction on the Extension,** CCTPL shall consult with the USFWS to determine if surveys for the American chaffseed are necessary for the segment between MPs 96.07 and 96.77, and file the results of that consultation with the Secretary. (page 55)

19. CCTPL shall **not begin** construction of facilities and/or use staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

    a. CCTPL files supplemental survey reports for areas where access was not previously granted, any realignments or reroutes, extra work spaces, access roads, contractor yards, or other areas requiring survey, and the Louisiana SHPO's comments on the reports;

    b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

    c. the Director of OEP reviews and approves all reports and plans and notifies CCTPL in writing that it may proceed with any treatment or construction.

    All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."** (page 79)

20. **Prior to beginning construction**, Sabine Pass shall file with the Secretary a statement verifying it will adopt its approved (in Docket No. CP11-72) Fugitive Dust Control Plan for use on the SPLE Project and identify any modification or additional measures needed for the SPLE Project. Any revised measures or modification to the approved plan shall also be filed with the Secretary, for review and written approval by the Director of OEP. (page 95)

21. CCTPL shall perform all HDD activities, with the exception of the pull-back, during daytime hours. If 24-hour operations are required at any location, CCTPL shall file with the Secretary for review and written approval by the Director of OEP an HDD noise analysis and mitigation plan prior to beginning the 24-hour HDD construction. The plan shall include:

    a. the distance and direction to each NSA within 0.5 mile of the 24-hour HDD entry and exit site and the proposed length of time HDD activities would occur;

    b. the background noise levels and the estimated drilling noise contributions at the NSAs using a day-night equivalent sound level (L_{dn});

    c. the noise mitigation measures CCTPL would commit to implement at each entry or exit site where estimated drilling noise contribution would exceed 55 dBA L_{dn} at a nearby NSA, and the resulting noise levels with the mitigations measures; and

    d. site-specific plans identifying any noise walls or barriers, equipment locations, equipment barriers, or any other noise mitigation measures. (page 116)

22. Sabine Pass shall file a full load noise survey of the SPLNG Terminal with the Secretary **no later than 60 days** after placing each liquefaction train (5 and 6) in service. If a full load condition noise survey is not possible, Sabine Pass should provide an interim survey at the maximum possible operation **within 60 days** of placing each liquefaction train in service and file the full load operational survey **within 6 months**. If the noise attributable to operation of all of the equipment at the SPLNG Terminal, including the liquefaction facilities, under interim or full load conditions, exceeds an L_{dn} of 55 dBA at any nearby NSA, Sabine Pass shall file a report on the changes that are needed and shall install the additional noise controls to meet the level **within one year** of the in-service date. Sabine Pass shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs additional noise controls. (page 117)

23. CCTPL shall file a noise survey with the Secretary **no later than 60 days** after placing the Mamou Compressor Station into service. If a full load condition noise survey is not possible, CCTPL shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the compressor station, under interim or full horsepower load conditions, exceeds an L_{dn} of 55 dBA at any nearby NSAs, CCTPL shall file a report on those changes needed and should install the additional noise controls to meet the level **within 1 year** of the in-service date. CCTPL shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (page 118)

24. **Prior to construction of the final design**, Sabine Pass shall file information/revisions with the Secretary, for review and written approval by the Director of the OEP, pertaining to Sabine Pass' response numbers 6, 9, 10, 12 of its February 12, 2014 filing, which indicated features to be included or considered in the final design and documentation. (page 131)

25. **Prior to construction of the final design**, Sabine Pass file with the Secretary for review and written approval by the Director of OEP, certification that the process design for trains 5 and 6 would duplicate trains 1 through 4, and the conditions from the April 16, 2012 and August 2, 2013 Orders (Docket Numbers CP11-72-000 and CP13-2-000, respectively) will be incorporated in the design for trains 5 and 6. (page 131)

Recommendations 26 through 61 shall apply to the SPLE Project. Information pertaining to these specific recommendations shall be filed with the Secretary for review and written approval by the Director of OEP either: **prior to initial site preparation; prior to construction of final design; prior to commissioning; prior to introduction of hazardous fluids; or prior to commencement of service**, as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, shall be submitted as critical energy infrastructure information pursuant to 18 CFR 388.112 (see Critical Energy Infrastructure Information, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006), FERC Stats. & Regs. ¶31,228 [2006]). Information pertaining to items such as off-site emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements will be subject to public disclosure. All information shall be filed a **minimum of 30 days** before approval to proceed is requested.

26. **Prior to initial site preparation,** Sabine Pass shall provide quality assurance and quality control procedures for construction activities. (page 132)

27. **Prior to initial site preparation,** Sabine Pass shall file an overall project schedule that includes the proposed stages of the commissioning plan. (page 132)

28. **Prior to initial site preparation,** Sabine Pass shall provide procedures for controlling access during construction. (page 132)

29. **Prior to initial site preparation,** Sabine Pass shall provide a plot plan of the final design showing all major equipment, structures, buildings, and impoundment systems. (page 132)

30. **Prior to the construction of the final design**, Sabine Pass shall file with the Secretary for review and written approval by the Director of OEP, certification that the final design is consistent with the information provided to DOT as described in the design spill determination letter dated April 11, 2014 (Accession Number 20140415-4004). In the event that any modifications to the design alters the candidate design spills on which the Title 49 CFR Part 193 siting analysis was based, Sabine Pass shall consult with DOT on any actions necessary to comply with Part 193. (page 143)

31. **Prior to initial site preparation**, Sabine Pass shall file with the Secretary for review and written approval by the Director of OEP, certification that DOT has found the Exclusion Zone Agreement and Declaration of Restrictive Covenants satisfactory for compliance with 49 CFR 193.2059. Sabine Pass shall consult with DOT on any actions necessary to demonstrate compliance with Part 193. (page 145)

32. Sabine Pass shall file an updated ERP which addresses on-site and off-site emergency response for the SPLE Project facilities. The ERP shall include evidence of consultation and coordination with all incident response organizations or personnel responsible for emergency response. Information pertaining to items such as off-site emergency response and procedures for public notification and evacuation would be subject to public disclosure. The ERP shall be filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation and a minimum of 30 days before approval to proceed would be requested.** (page 153)

33. The ERP shall include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan shall include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. Sabine Pass shall file the Cost-Sharing Plan for review and written approval by the Director of OEP **prior to initial site preparation**. (page 153)

34. The **final design** shall include change logs that list and explain any changes made from the FEED provided in the SPLE Project application and filings. A list of all changes with an explanation for the design alteration shall be provided and all changes shall be clearly indicated on all diagrams and drawings. (page 132)

35. The **final design** shall provide an up-to-date complete equipment list, process and mechanical data sheets, and specifications. (page 132)

36. The **final design** shall provide up-to-date process flow diagrams with heat and material balances and piping and instrumentation diagrams (P&IDs), which include the following information:

    a. equipment tag number, name, size, duty, capacity, and design conditions;

    b. equipment insulation type and thickness;

    c. storage tank pipe penetration size or nozzle schedule;

d. piping with line number, piping class specification, size, and insulation type and thickness;

e. piping specification breaks and insulation limits;

f. all control and manual valves numbered;

g. valve high pressure sides and cryogenic ball valve external and internal vent locations;

h. relief valves with set points; and

i. drawing revision number and date. (page 132)

37. The **final design** shall include a list of all car-sealed and locked valves consistent with the P&IDs. (page 132)

38. The **final design** shall provide P&IDs, specifications, and procedures that clearly show and specify the tie-in details required to safely connect the SPLE Project facilities to the existing facility. (page 132)

39. The **final design** shall include a HAZOP review of the completed design prior to issuing the P&IDs for construction. A copy of the review, a list of the recommendations, and actions taken on the recommendations shall be filed. (page 133)

40. The **final design** shall include spill containment system drawings with dimensions and slopes of curbing, trenches, and impoundments. (page 133)

41. The **final design** shall include electrical area classification drawings for the condensate storage and send-out area. (page 133)

42. The **final design** shall specify that for hazardous fluids, stainless steel and carbon steel branch piping and piping nipples are consistent with the existing facility's specifications. (page 133)

43. The **final design** shall include a plan for clean-out, dry-out, purging, and tightness testing. This plan shall address the requirements of the American Gas Association's Purging Principles and Practice required by 49 CFR 193 and shall provide justification if not using an inert or non-flammable gas for cleanout, dry-out, purging, and tightness testing. (page 133)

44. The **final design** shall include the cause-and-effect matrices for the process instrumentation, fire and gas detection system, and emergency shutdown system. The cause-and-effect matrices shall include alarms and shutdown functions, details of the voting and shutdown logic, and setpoints. (page 133)

45. The **final design** shall include a drawing showing the location of the emergency shutdown (ESD) buttons. ESD buttons shall be easily accessible, conspicuously labeled and located in an area which would be accessible during an emergency. (page 133)

46. The **final design** shall include an updated fire protection evaluation of the proposed facilities carried out in accordance with the requirements of NFPA 59A 2001, chapter 9.1.2 as required by 49 CFR 193. A copy of the evaluation, a list of recommendations, supporting justifications, and actions taken on the recommendations shall be filed. (page 133)

47. The **final design** of the hazard detectors shall account for the calibration gas when determining the LFL set points for methane, propane, and ethylene, and condensate. (page 133)

48. The **final design** shall include complete drawings and a list of the hazard detection equipment. The drawings shall clearly show the location and elevation of all detection equipment. The list shall include the instrument tag number, type and location, alarm indication locations, and shutdown functions of the proposed hazard detection equipment. (page 133)

49. The **final design** shall provide a technical review of its proposed facility design that:

    a. identifies all combustion/ventilation air intake equipment and the distances to any possible hazardous fluid release (LNG, flammable refrigerants, flammable liquids and flammable gases); and

    b. demonstrates that these areas are adequately covered by hazard detection devices and indicates how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency. (page 133)

50. The **final design** shall provide complete plan drawings and a list of the fixed and wheeled dry-chemical, hand-held fire extinguishers, and other hazard control equipment. Drawings shall clearly show the location by tag number of all fixed, wheeled, and hand-held extinguishers. The list shall include the equipment tag number, type, capacity, equipment covered, discharge rate, and automatic and manual remote signals initiating discharge of the units. (page 133)

51. The **final design** shall include facility plans and drawings showing the proposed location of the firewater and any foam systems. Drawings shall clearly show firewater and any foam piping; post indicator valves; and the location of, and area covered by, each monitor, hydrant, water curtain, deluge system, foam system, water mist system, and sprinkler. The drawings shall also include piping and instrumentation diagrams of the firewater and foam systems. (page 134)

52. **Prior to commissioning**, Sabine Pass shall file plans and detailed procedures for testing the integrity of on-site mechanical installation; functional tests; introduction of hazardous fluids; operational tests; and placing the equipment into service. (page 134)

53. **Prior to commissioning**, Sabine Pass shall provide a detailed schedule for commissioning through equipment startup. The schedule shall include milestones for all procedures and tests to be completed prior to introduction of hazardous fluids and during commissioning and startup. Sabine Pass shall file documentation certifying that each of these milestones has been completed before authorization to begin the next phase of commissioning and startup would be issued. (page 134)

54. **Prior to commissioning**, Sabine Pass shall tag all equipment, instrumentation, and valves in the field, including drain valves, vent valves, main valves, and car-sealed or locked valves. (page 134)

55. **Prior to commissioning**, Sabine Pass shall file Operation and Maintenance procedures and manuals which include safety procedures, hot work procedure and permits, abnormal operating conditions reporting procedures, and management of change procedures and forms. (page 134)

56. **Prior to commissioning**, Sabine Pass shall maintain a detailed training log to demonstrate that operating staff has completed the required training. (page 134)

57. **Prior to commissioning**, Sabine Pass shall file a tabulated list and drawings of the proposed hand-held fire extinguishers. The list shall include the equipment tag number, extinguishing

agent type, capacity, number, and location. The drawings shall show the extinguishing agent type, capacity, and tag number of all hand-held fire extinguishers. (page 134)

58. **Prior to introduction of hazardous fluids**, Sabine Pass shall complete all pertinent tests (Factory Acceptance Tests, Site Acceptance Tests, Site Integration Tests) associated with the Distributed Control System (DCS) and Safety Instrumented System (SIS) that demonstrates full functionality and operability of the system. (page 134)

59. **Prior to introduction of hazardous fluids**, Sabine Pass shall complete a firewater monitor and hydrant coverage test. The actual coverage area from each monitor and hydrant shall be shown on facility plot plan(s). (page 134)

60. **Prior to commencement of service**, Sabine Pass shall label piping with fluid service and direction of flow in the field in addition to the pipe labeling requirements of NFPA 59A. (page 134)

61. **Prior to commencement of service**, progress on the construction of the proposed systems in shall be reported in **monthly** reports filed with the Secretary. Details shall include a summary of activities, problems encountered, contractor non-conformance/deficiency logs, remedial actions taken, and current project schedule. Problems of significant magnitude shall be reported to the FERC **within 24 hours**. (page 134)

In addition, recommendations 62 through 64 shall apply throughout the life of the facility.

62. The facility shall be subject to regular FERC staff technical reviews and site inspections on at least an <u>annual basis</u> or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, Sabine Pass shall respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted annual report, shall be submitted. (page 134)

63. Semi-annual operational reports shall be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals/departures, quantity and composition of imported and exported LNG, liquefied and vaporized quantities, boil-off/flash gas, etc.), and plant modifications including future plans and progress thereof. Abnormalities shall include but are not limited to unloading/loading shipping problems, potential hazardous conditions caused by off-site vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, nonscheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, hazardous fluid releases, fires involving hazardous fluid, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility shall also be reported. Reports shall be submitted **within 45 days after each period ending June 30 and December 31**. In addition to the above items, a section entitled "Significant Plant Modifications Proposed for the Next 12 Months (dates)" shall also be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility. (page 135)

64. Significant non-scheduled events, including safety-related incidents (e.g., hazardous fluid releases, fires, explosions, mechanical failures, unusual over pressurization, and major

injuries) and security-related incidents (i.e., attempts to enter site, suspicious activities) shall be reported to FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made **immediately**, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to FERC staff **within 24 hours**. This notification practice shall be incorporated into the LNG facility's emergency plan. Examples of reportable hazardous fluids related incidents include:

a. fire;

b. explosion;

c. estimated property damage of $50,000 or more;

d. death or personal injury necessitating in-patient hospitalization;

e. release of hazardous fluid for five minutes or more;

f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes hazardous fluids;

g. any crack or other material defect that impairs the structural integrity or reliability of an facility that contains, controls, or processes a hazardous fluid;

h. any malfunction or operating error that causes the pressure of a pipeline or facility that contains or processes a hazardous fluid to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;

i. a leak in a facility that contains or processes a hazardous fluid that constitutes an emergency;

j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;

k. any safety-related condition that could lead to an imminent hazard and cause (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent reduction in operation of a pipeline or a facility that contains or processes a hazardous fluid;

l. safety-related incidents with hazardous material transportation occurring at or en route to and from the LNG facility; or

m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, FERC staff would determine the need for a separate follow-up report or follow-up in the upcoming semi-annual operational report. All company follow-up reports shall include investigations results and recommendations to minimize a reoccurrence of the incident. (page 135)

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APPENDIX 1 DETAILED USGS PROJECT MAPS

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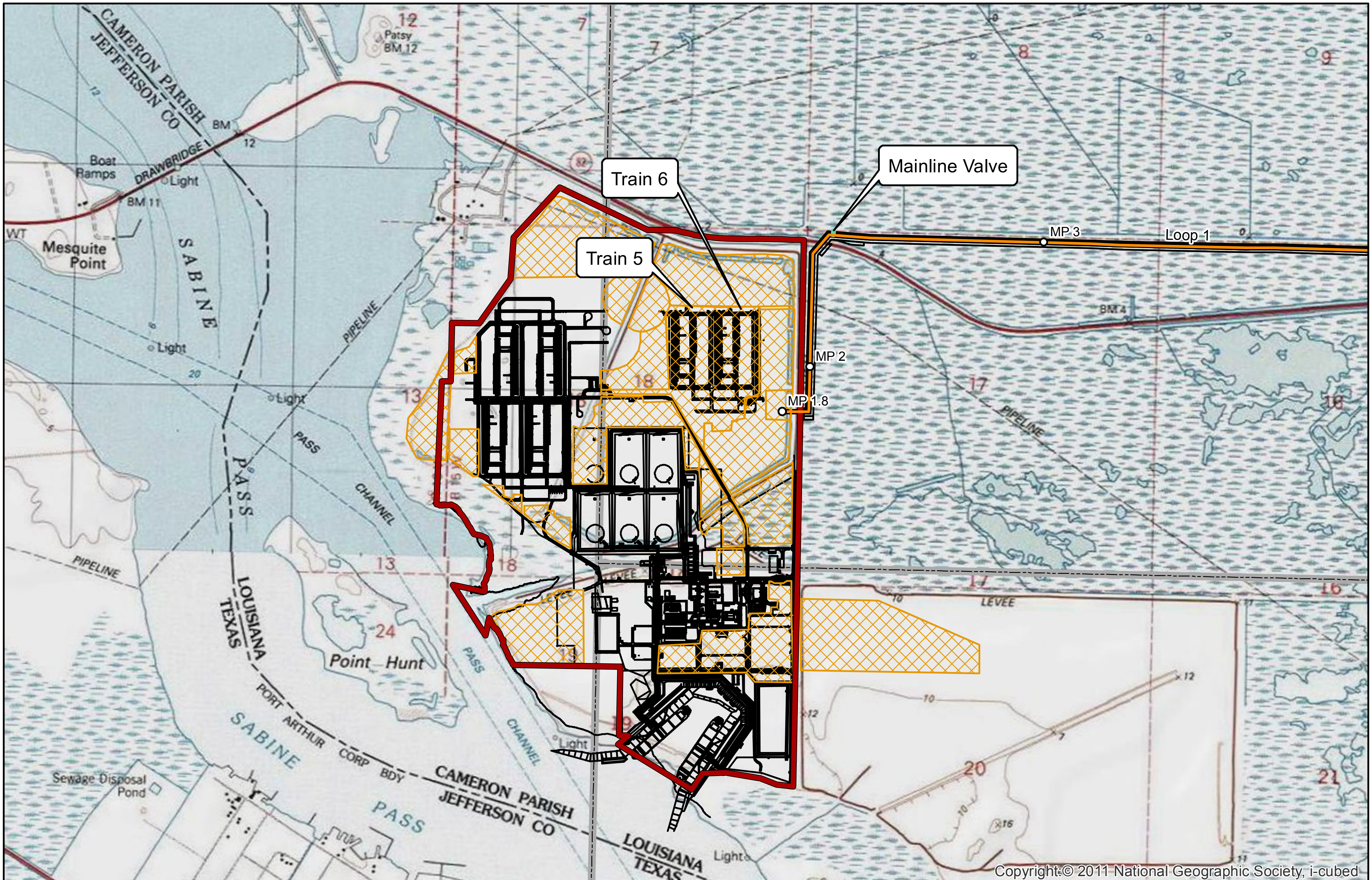

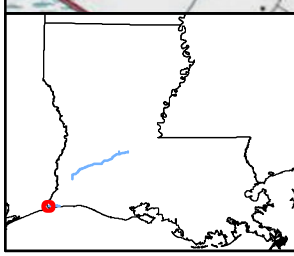

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- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Port Arthur South, Sabine Pass, West of Johnsons Bayou & Texas Point

CHENIERE

USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL
Expansion Projects

Sheet 1 of 32

September 2013

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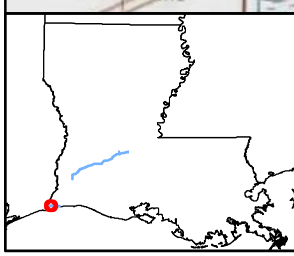

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- Contractor Yards
- USGS Boundary

SPLNG Terminal
- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
West of Johnsons Bayou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL
Expansion Projects

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September 2013

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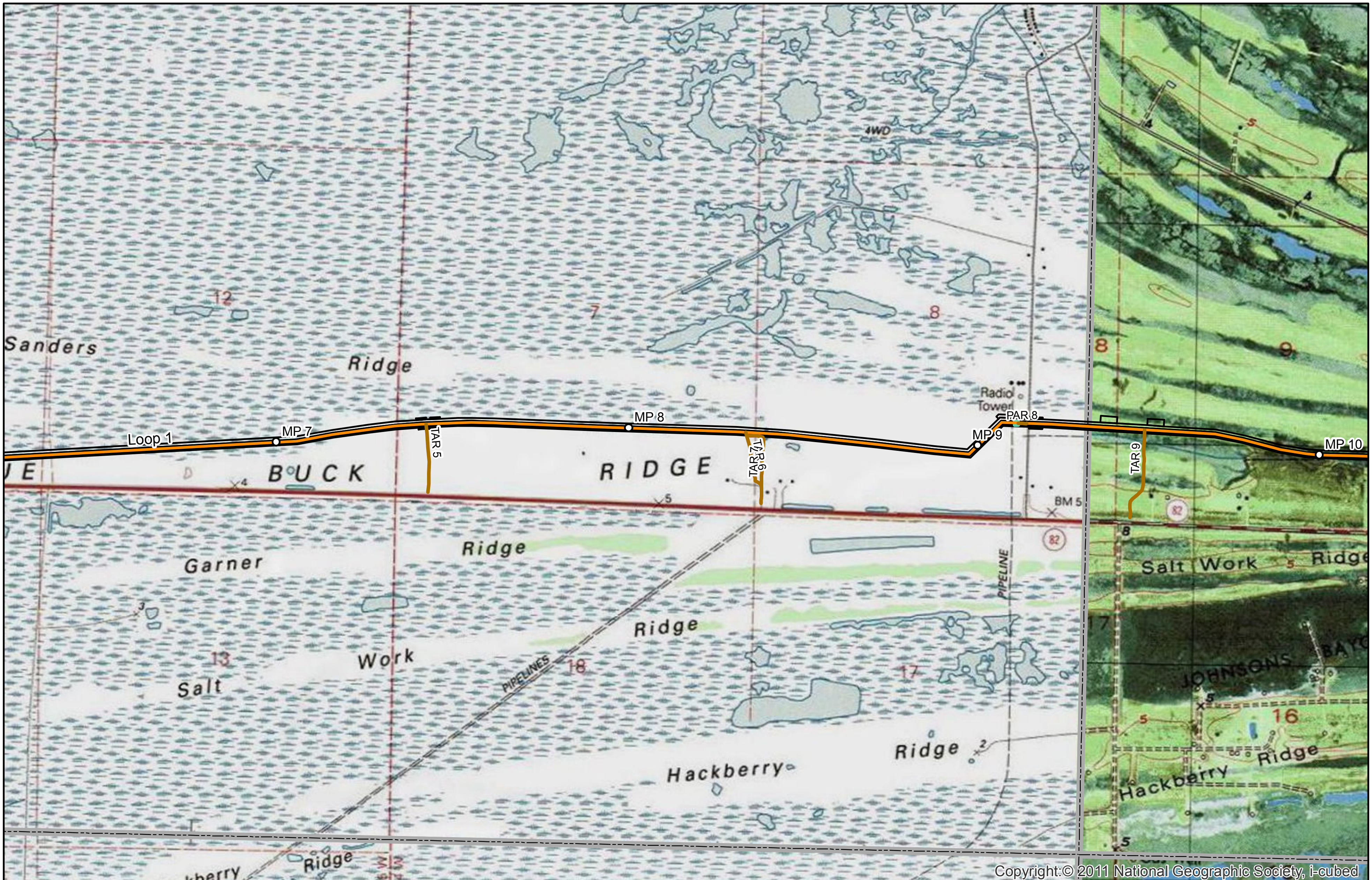

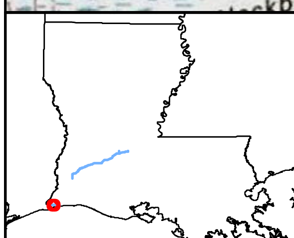

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Loop 1	Mileposts	**SPLNG Terminal**
Loop 2	Access Roads	Property Boundary
Extension	Workspace	Facilities
ANR Lateral	Aboveground Facilities	SPLNG Workspace
CGT Lateral	Contractor Yards	
PPEC Lateral	USGS Boundary	
TGT Lateral		

USGS Quadrangle(s):
West of Johnsons Bayou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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September 2013

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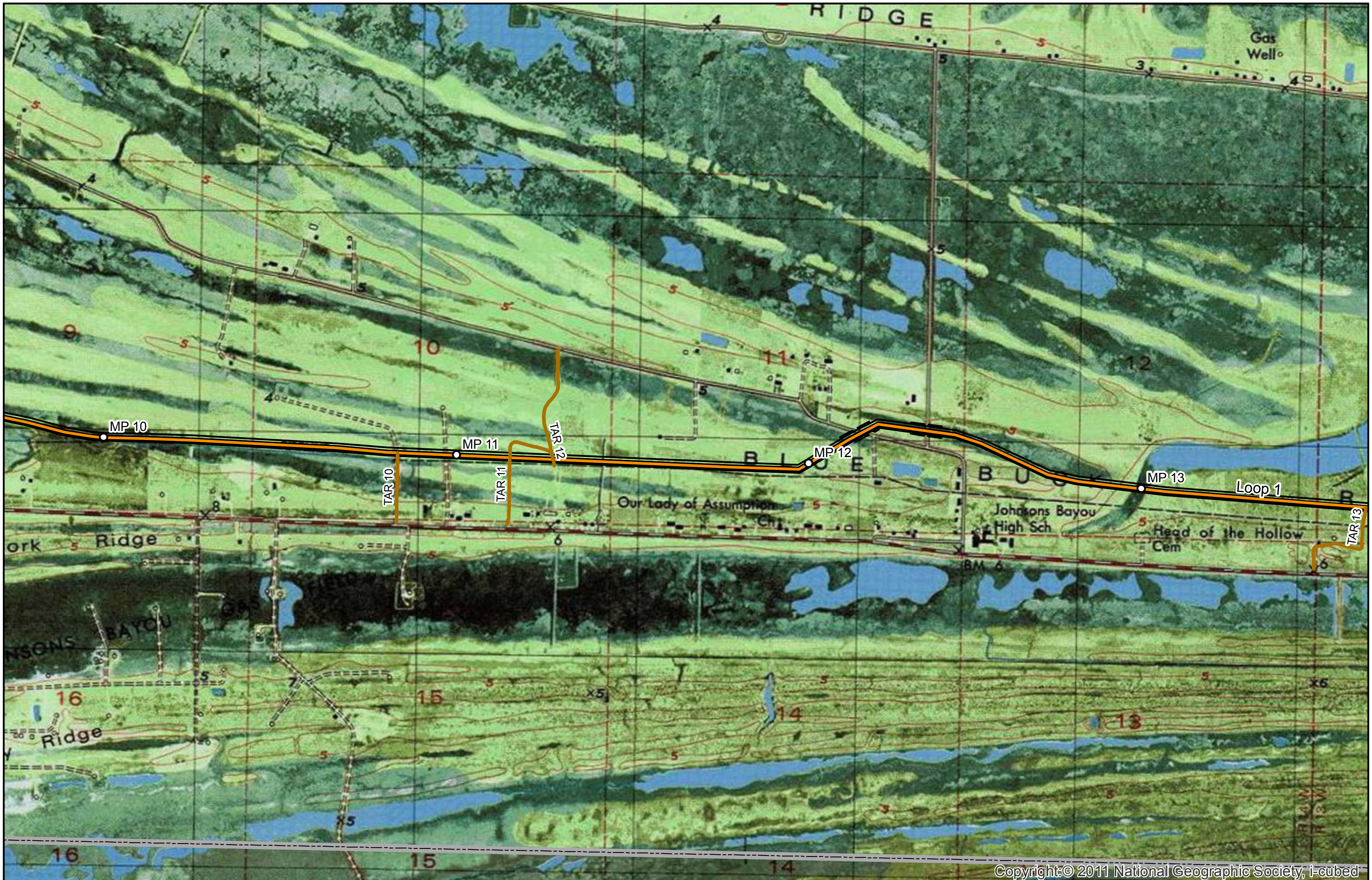

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CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s): Johnsons Bayou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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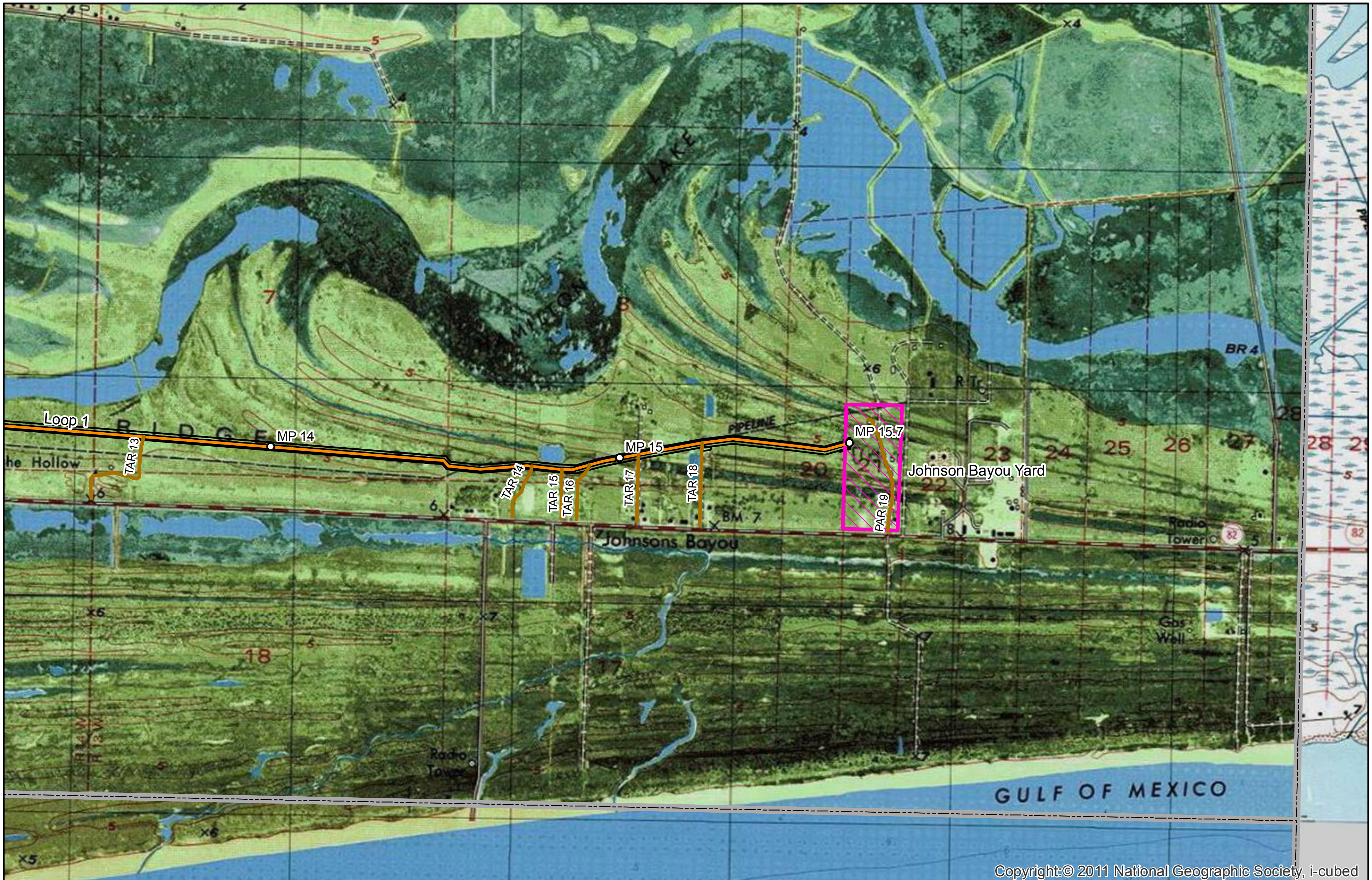

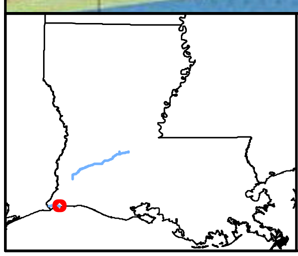

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Loop 1
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ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s): Johnsons Bayou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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September 2013

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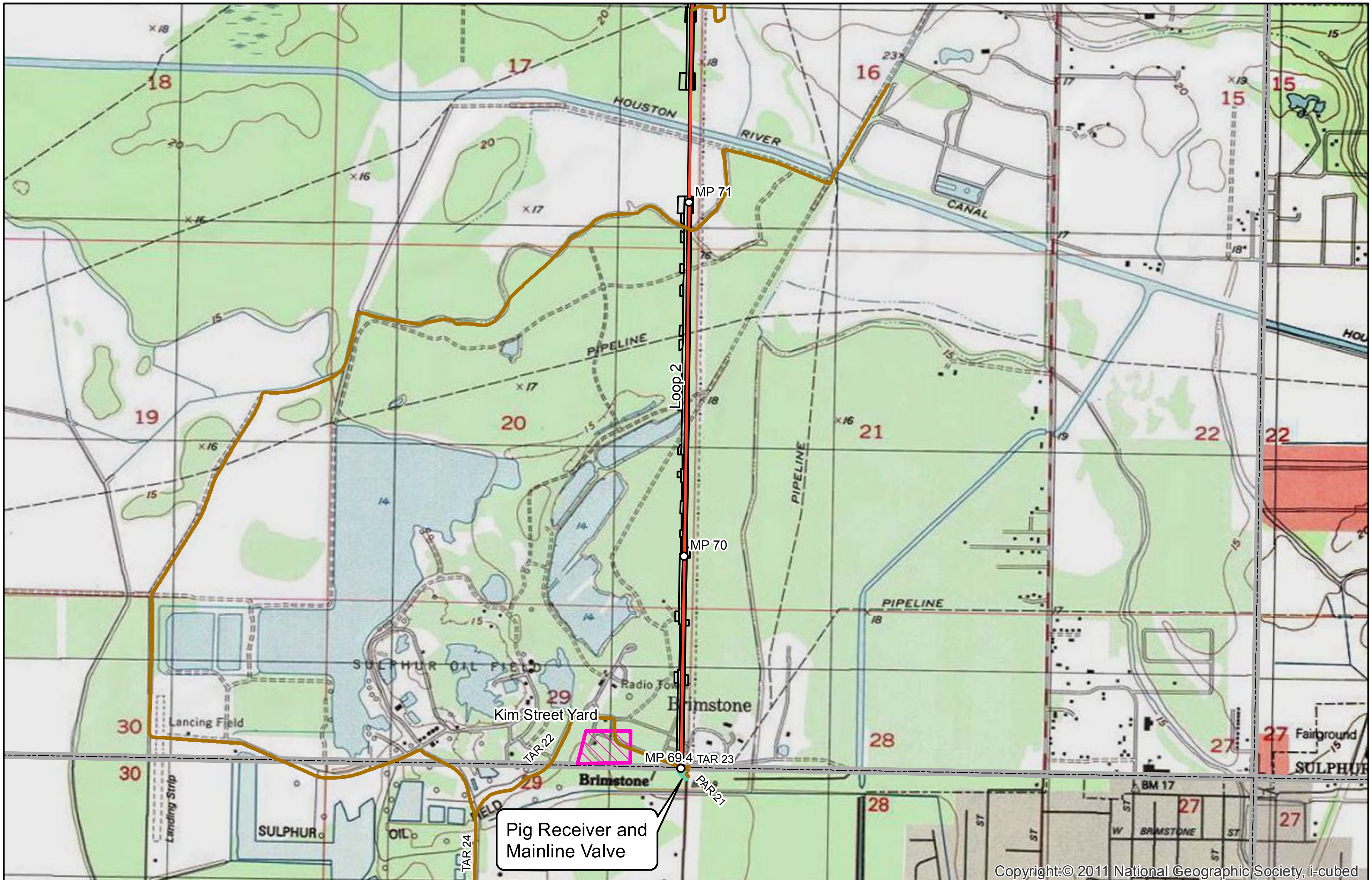

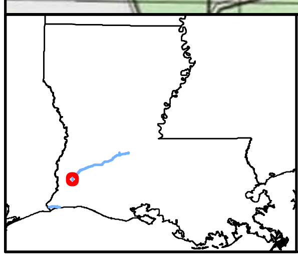

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Loop 1
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ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
Brimstone

CHENIERE

USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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September 2013

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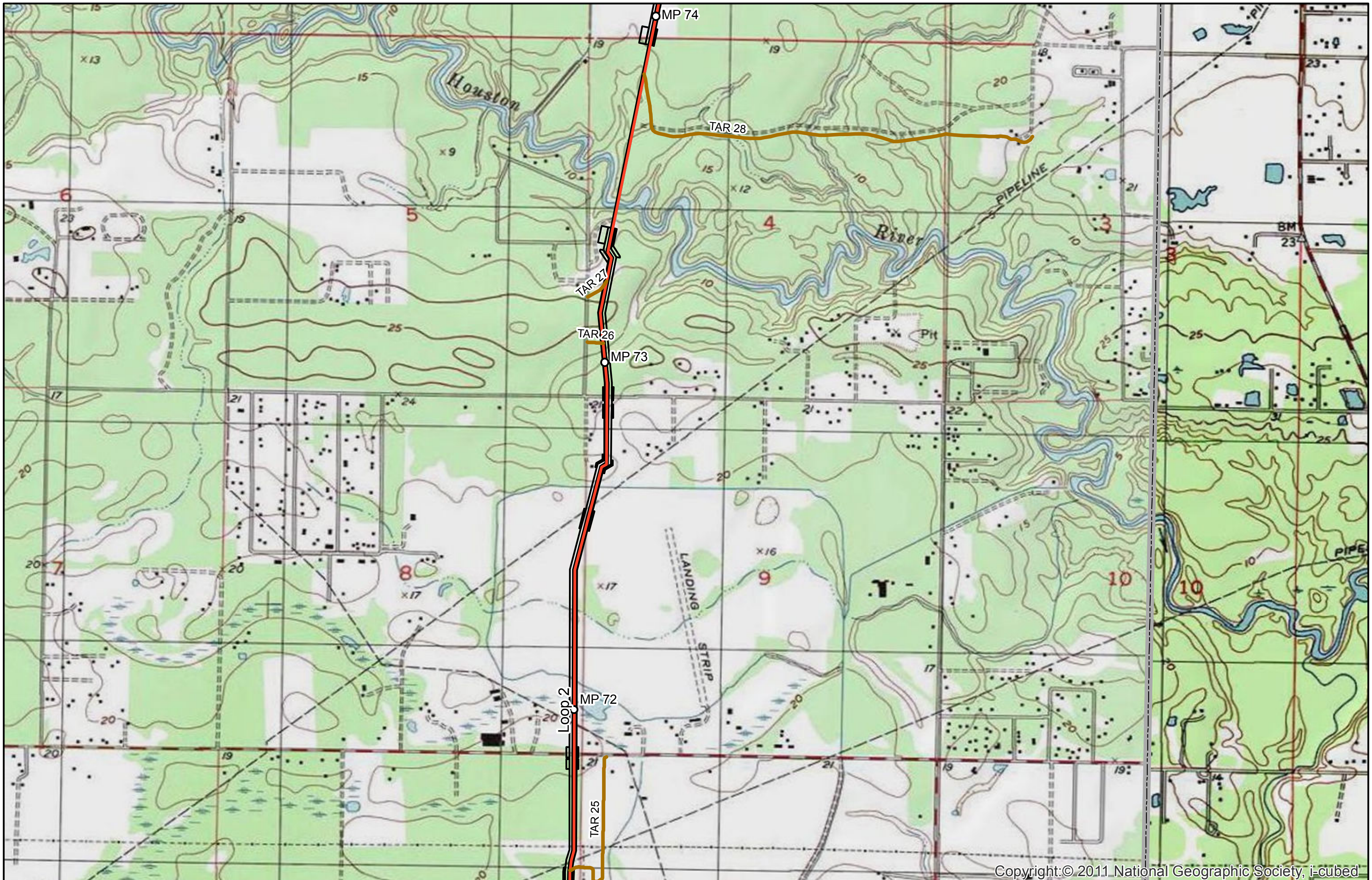

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Loop 1	Mileposts	**SPLNG Terminal**
Loop 2	Access Roads	Property Boundary
Extension	Workspace	Facilities
ANR Lateral	Aboveground Facilities	SPLNG Workspace
CGT Lateral	Contractor Yards	
PPEC Lateral	USGS Boundary	
TGT Lateral		

USGS Quadrangle(s):
Brimstone

CHENIERE

USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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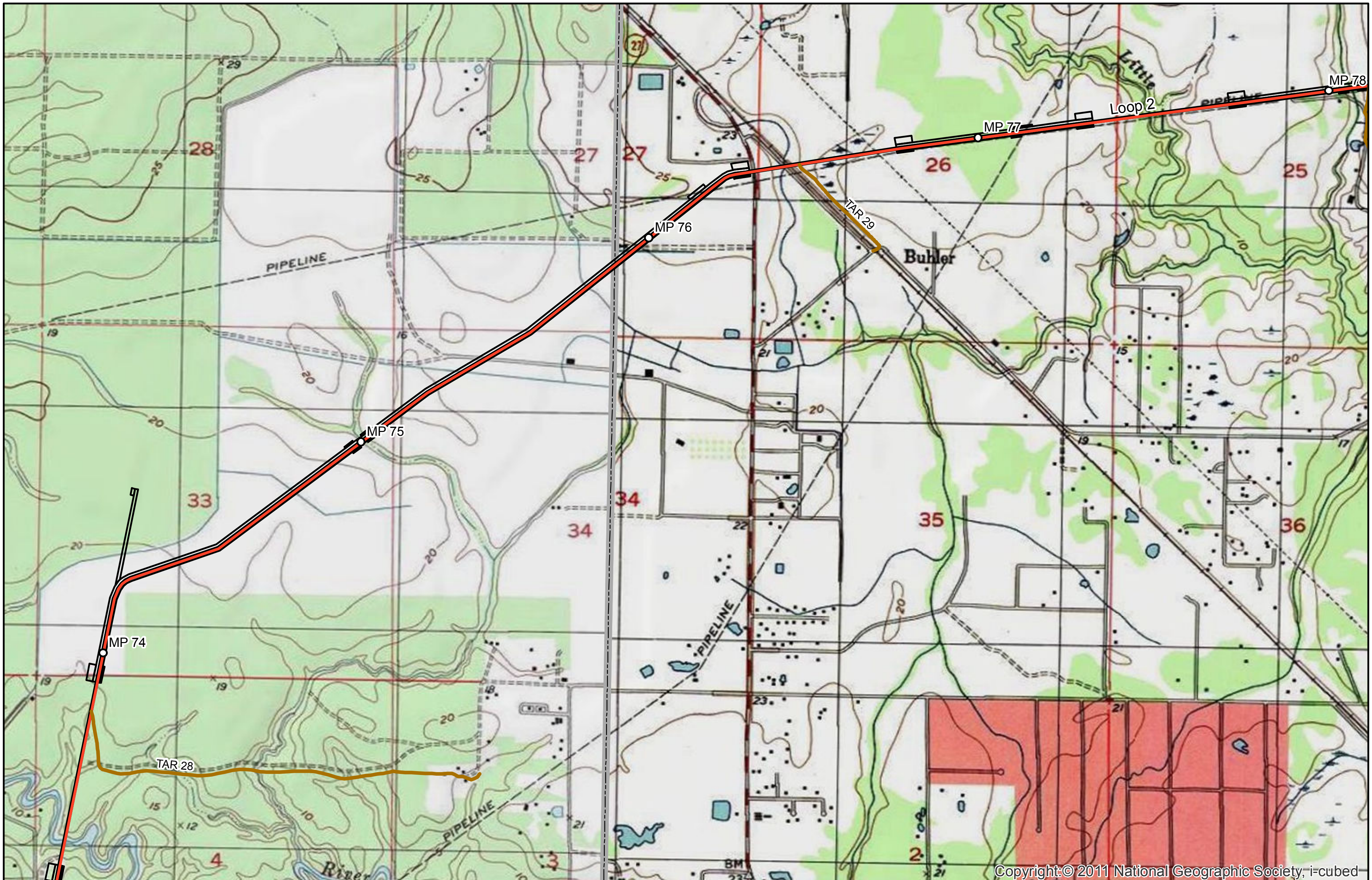

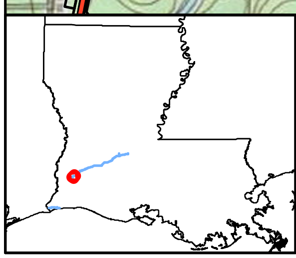

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Brimstone & Buhler

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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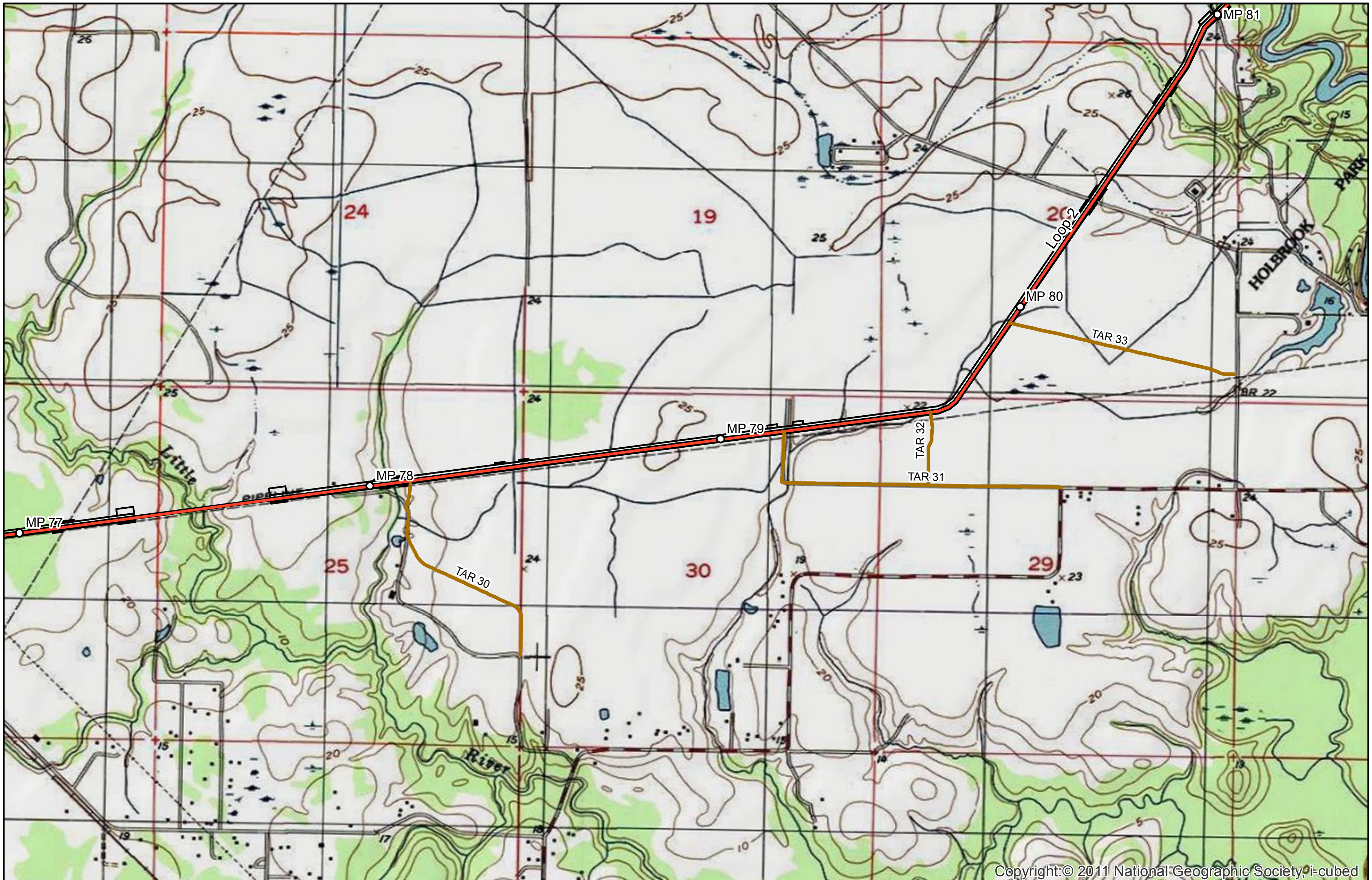

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0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s): Buhler

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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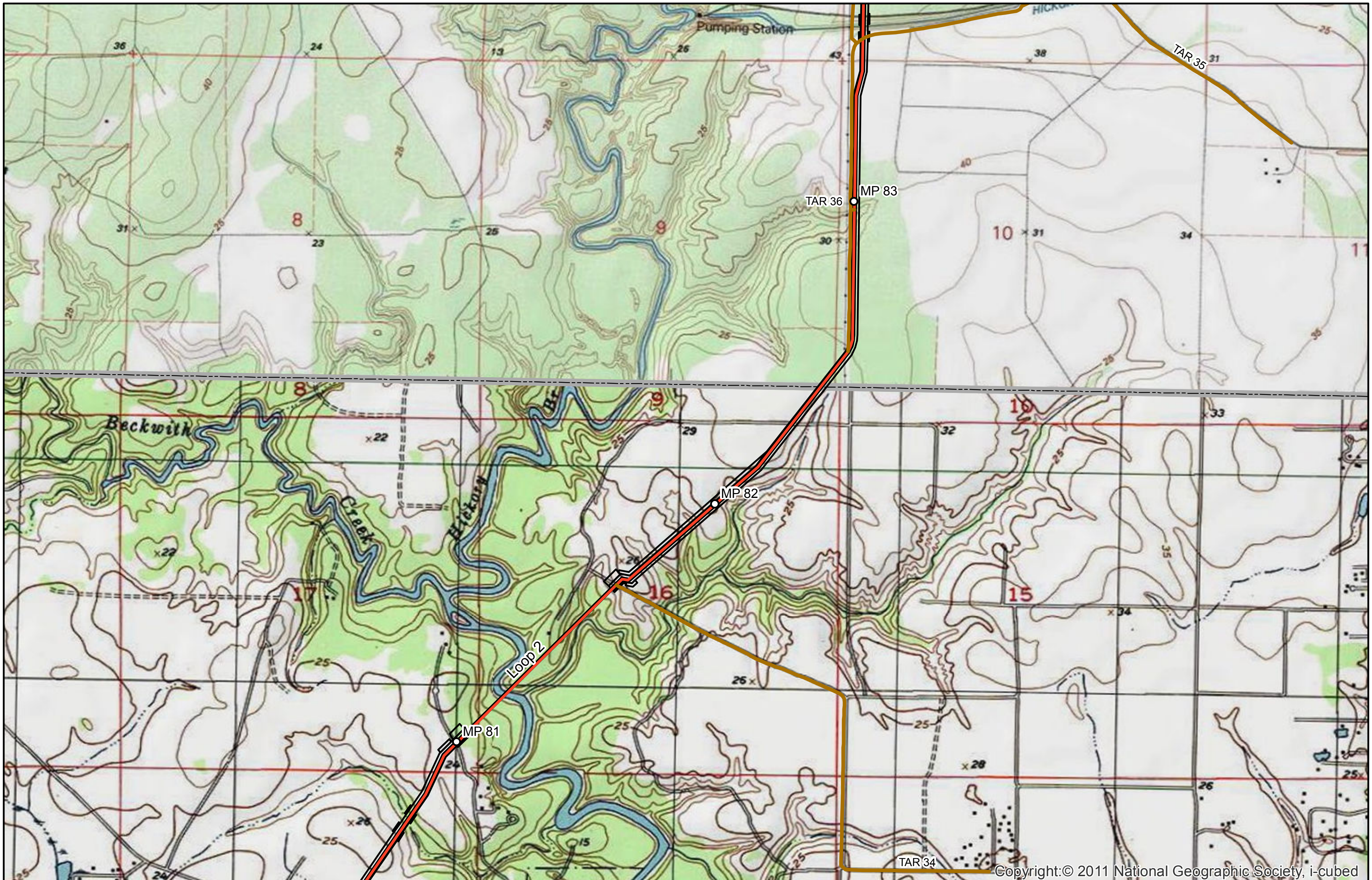

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N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Buhler & Gordon

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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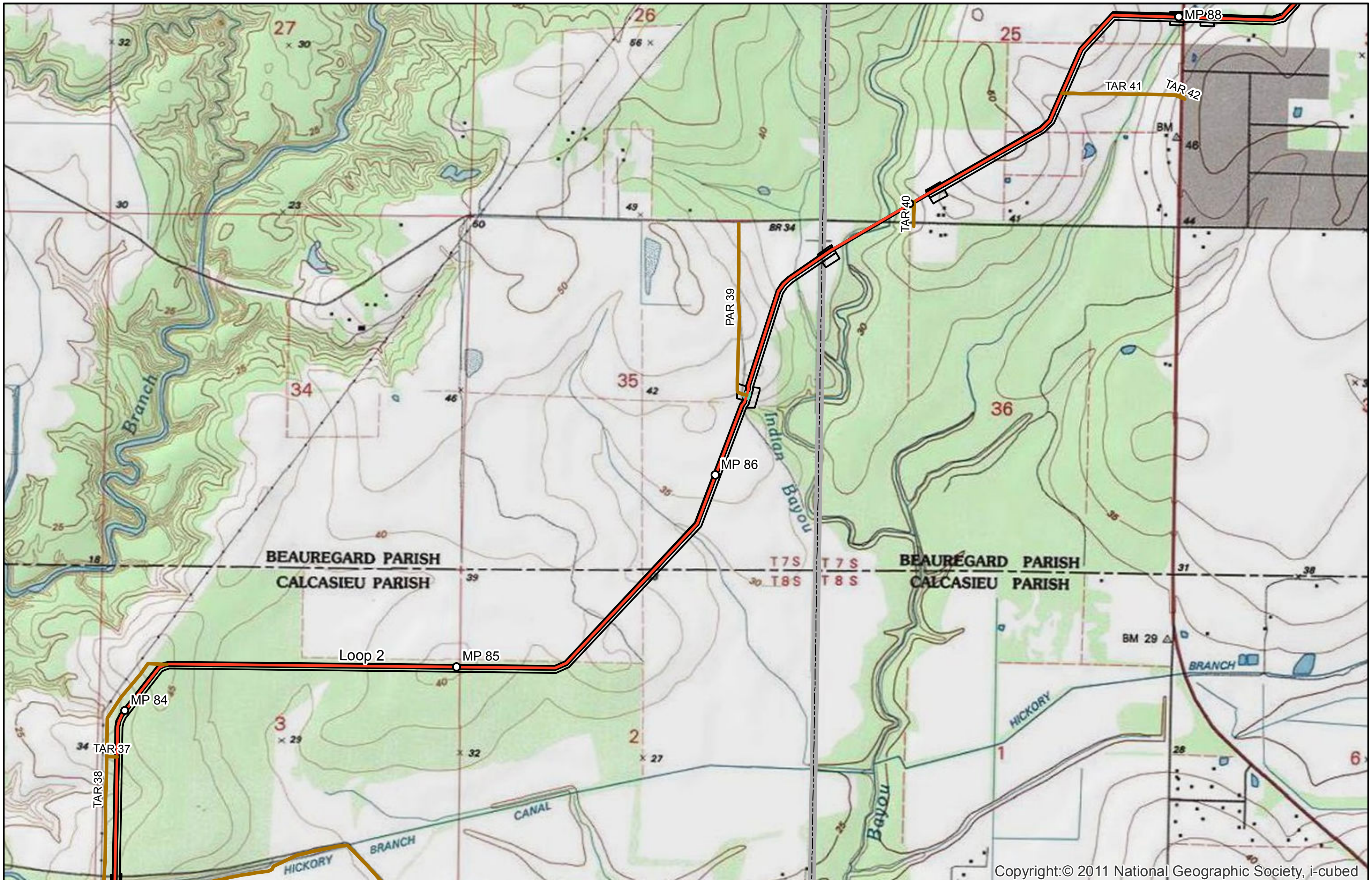

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Gordon & Gaytine

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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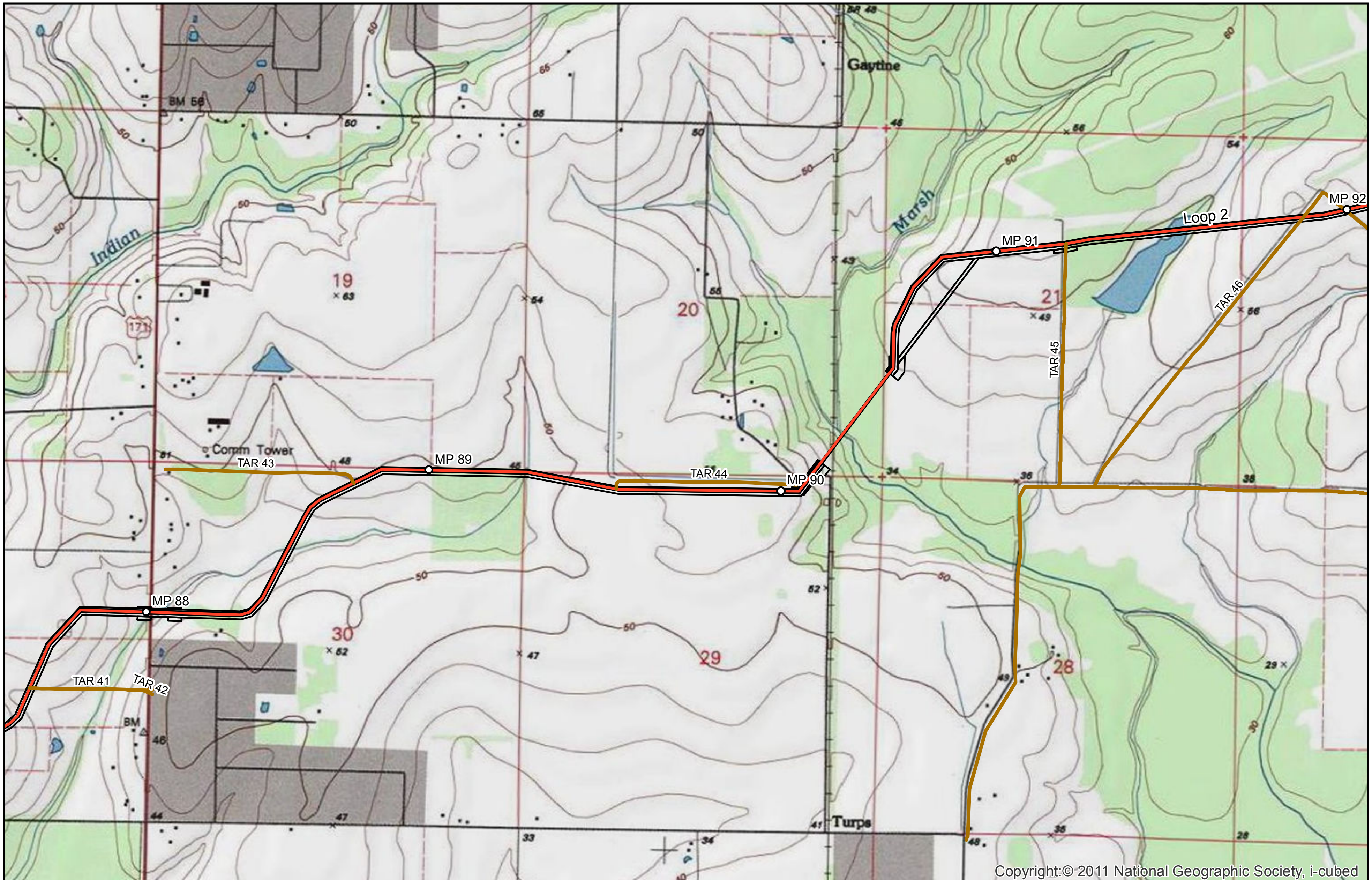

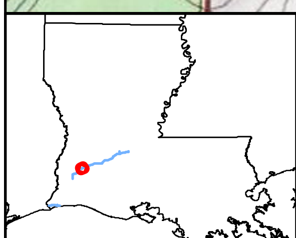

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s): Gaytine

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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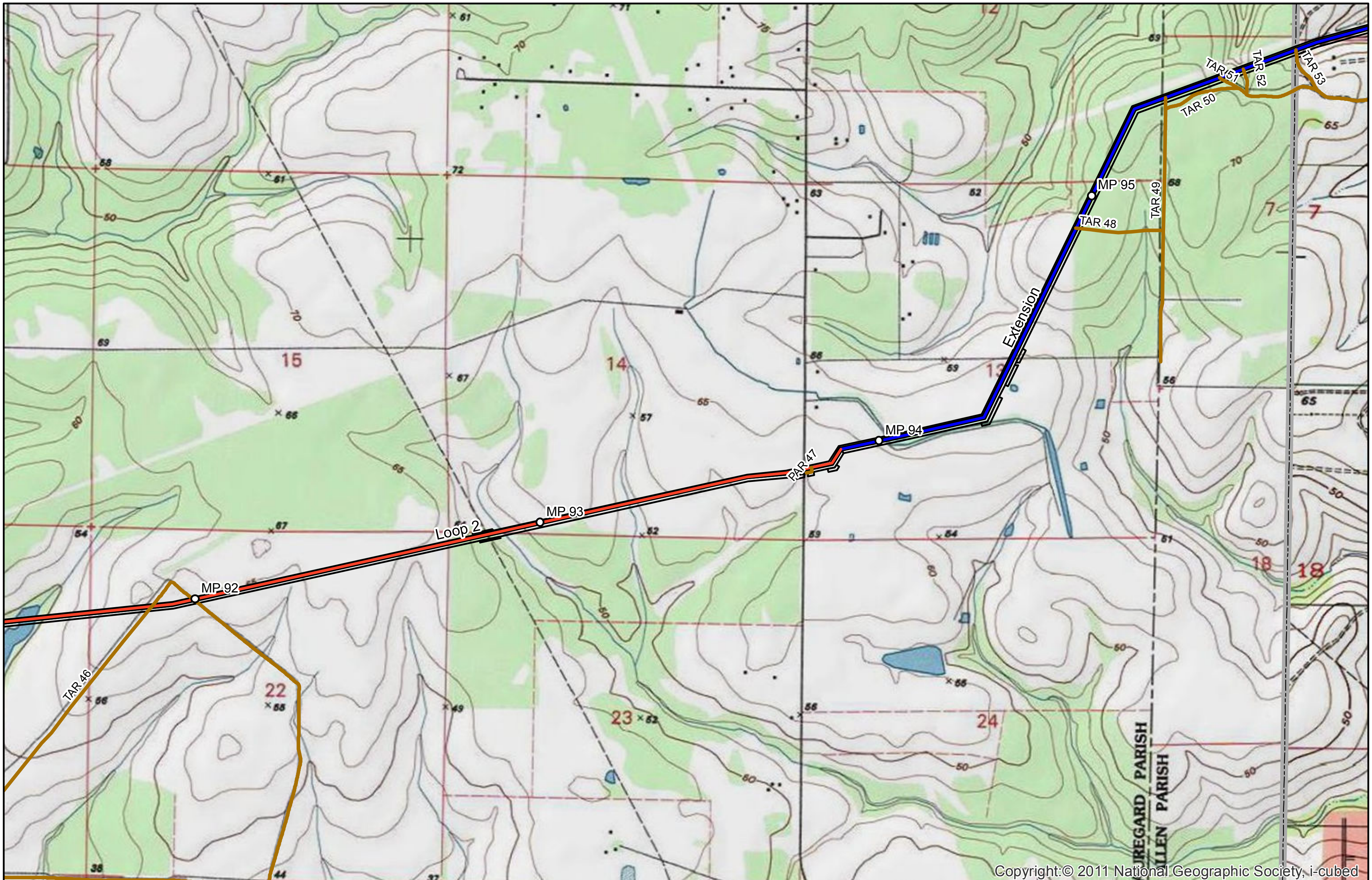

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s): Gaytine

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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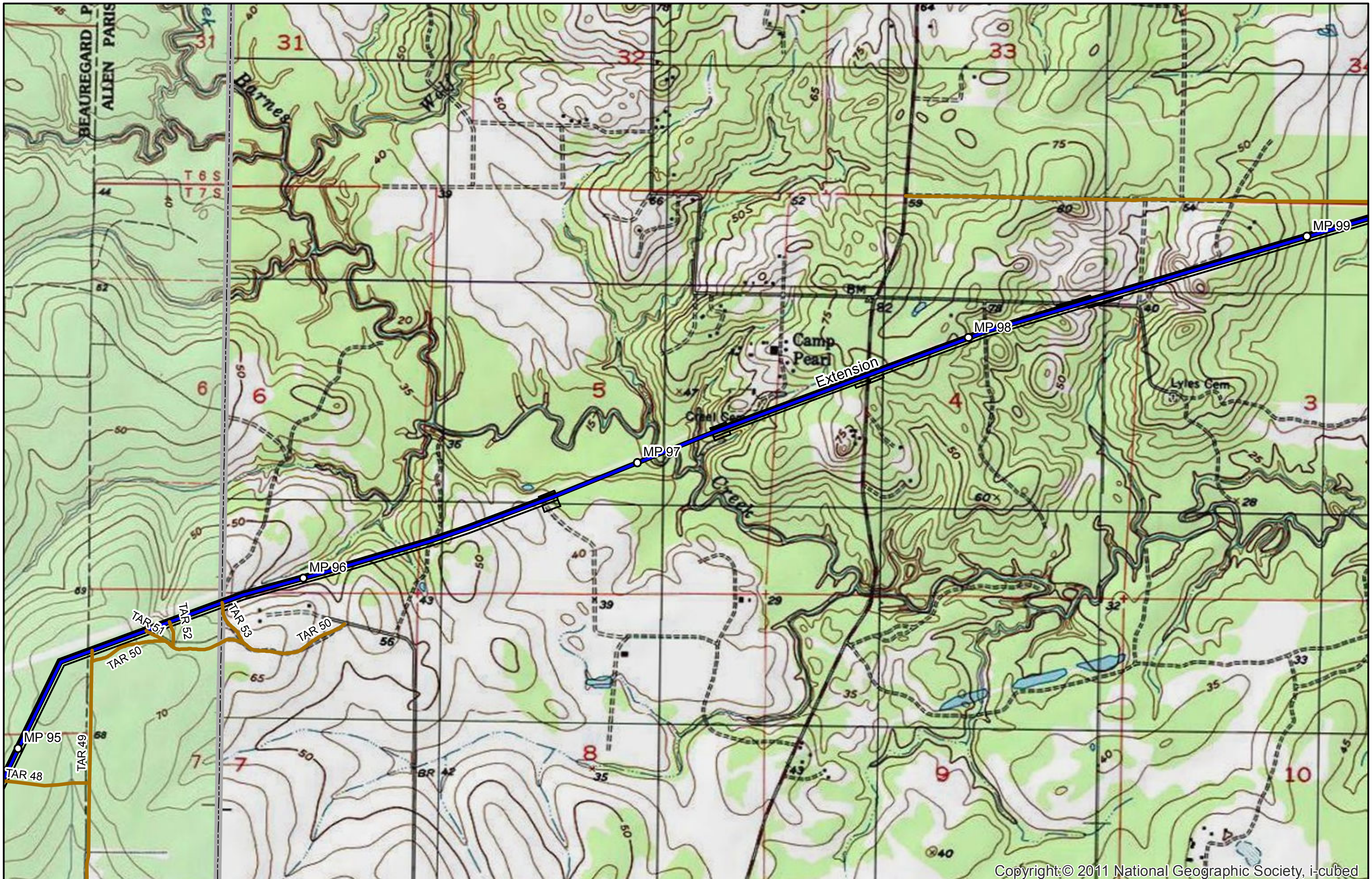

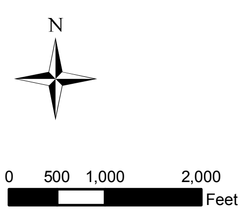

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s): Topsy

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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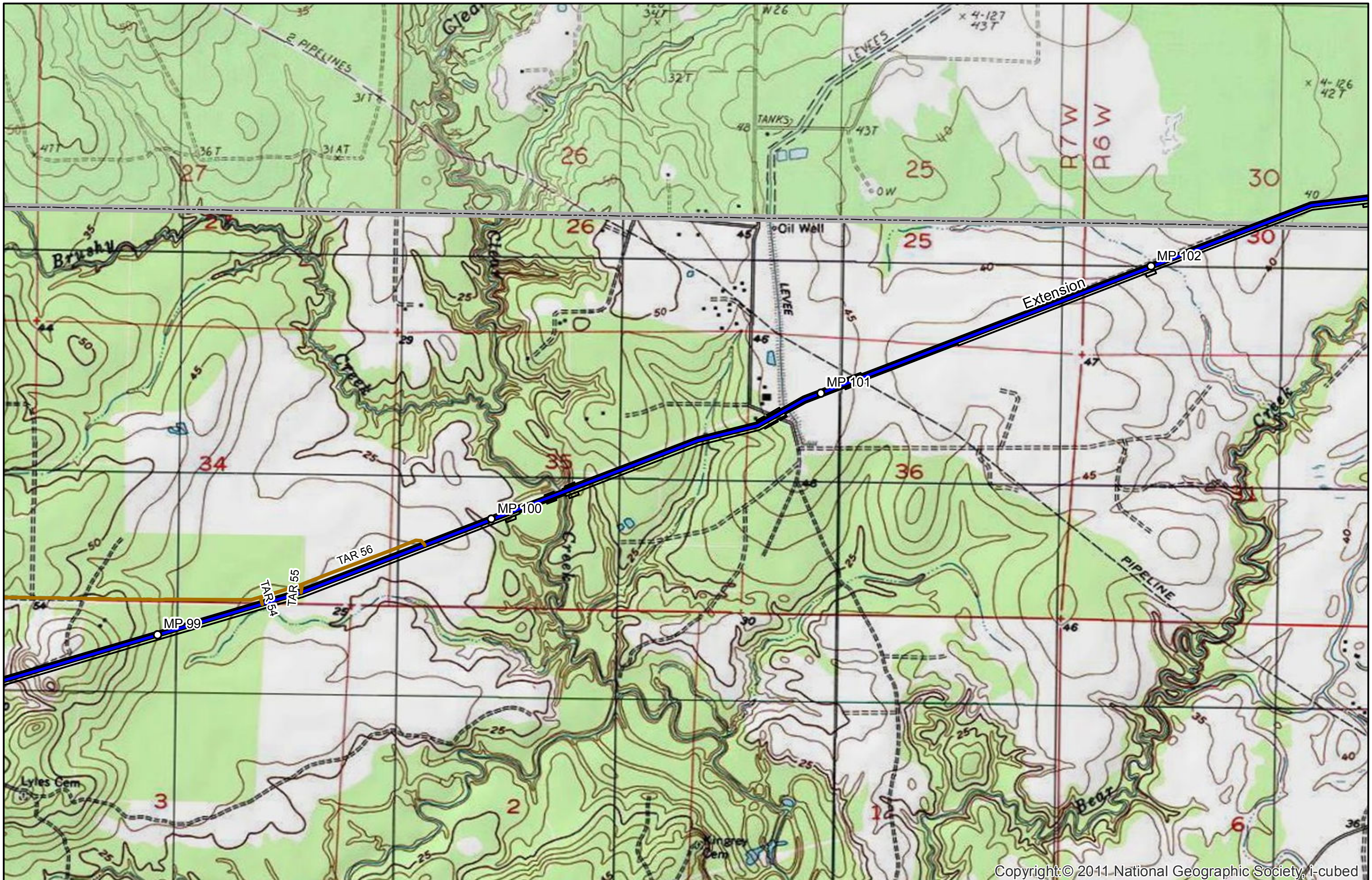

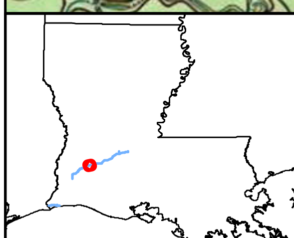

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N

0 500 1,000 2,000 Feet

Loop 1	Mileposts	**SPLNG Terminal**
Loop 2	Access Roads	Property Boundary
Extension	Workspace	Facilities
ANR Lateral	Aboveground Facilities	SPLNG Workspace
CGT Lateral	Contractor Yards	
PPEC Lateral	USGS Boundary	
TGT Lateral		

USGS Quadrangle(s):
Topsy & Reeves

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Topsy, Reeves & LeBlanc

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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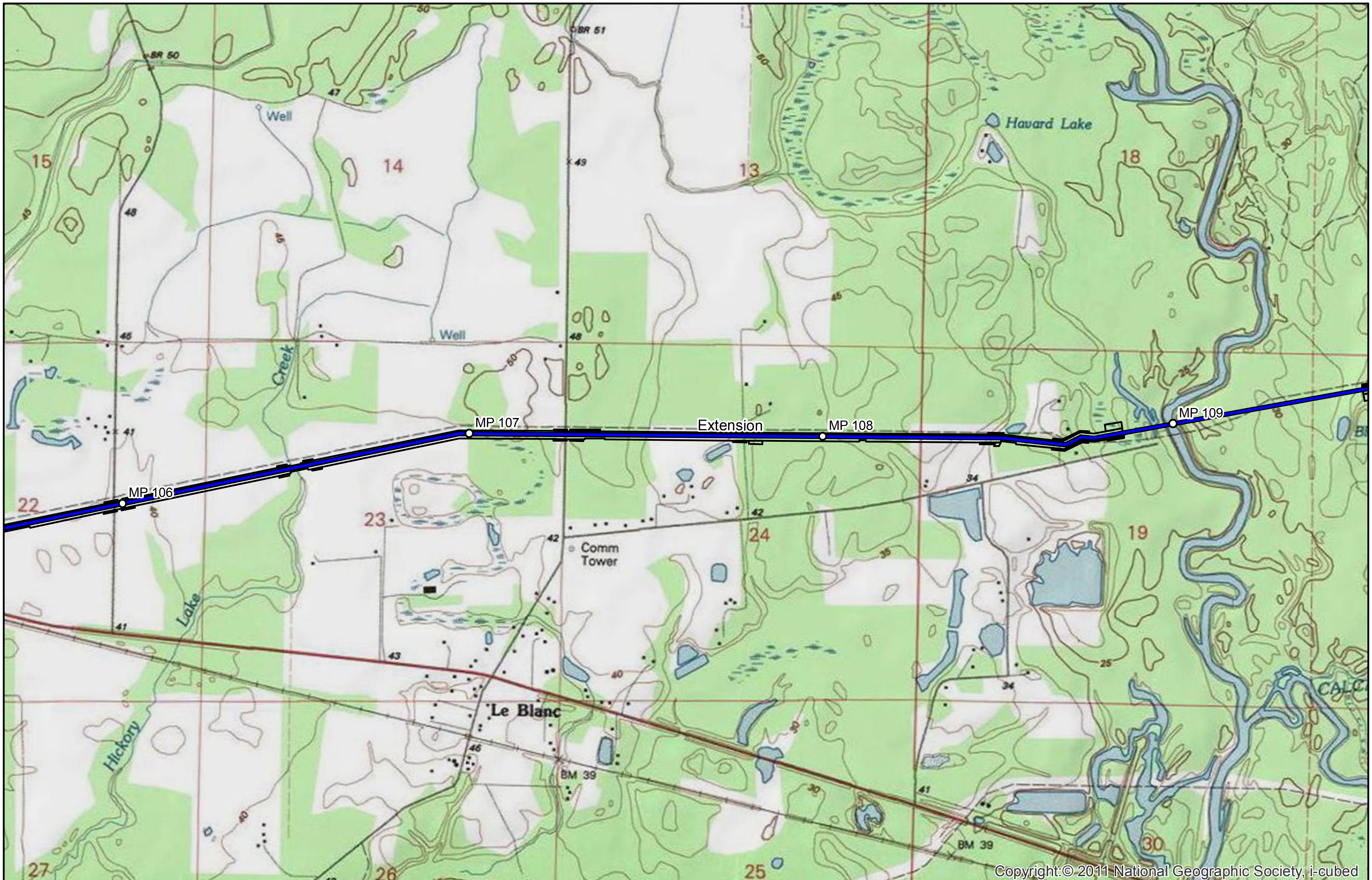

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

0 500 1,000 2,000 Feet

USGS Quadrangle(s): LeBlanc

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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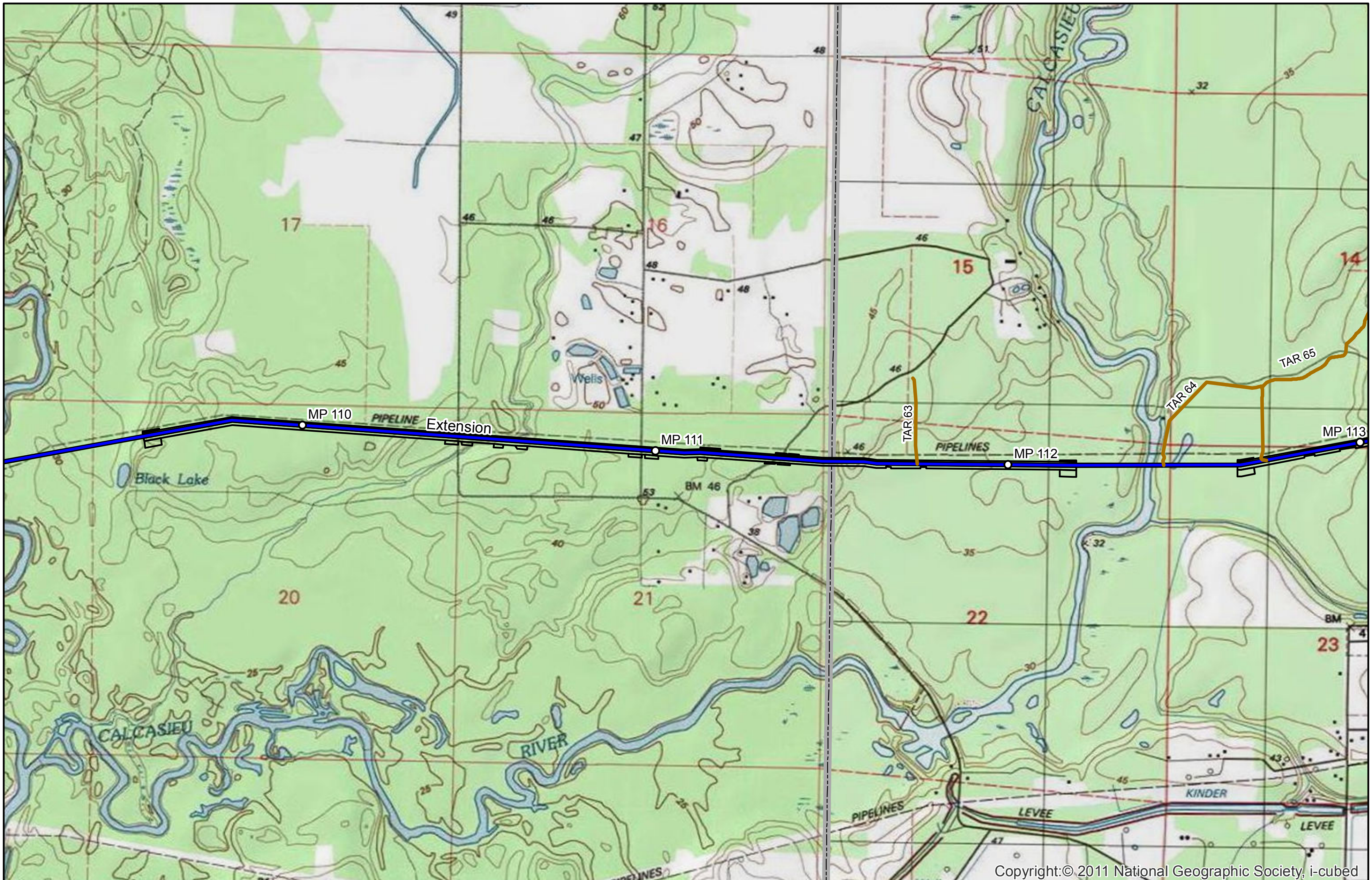

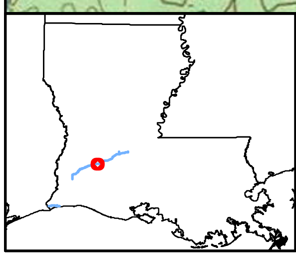

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
LeBlanc & Oberlin

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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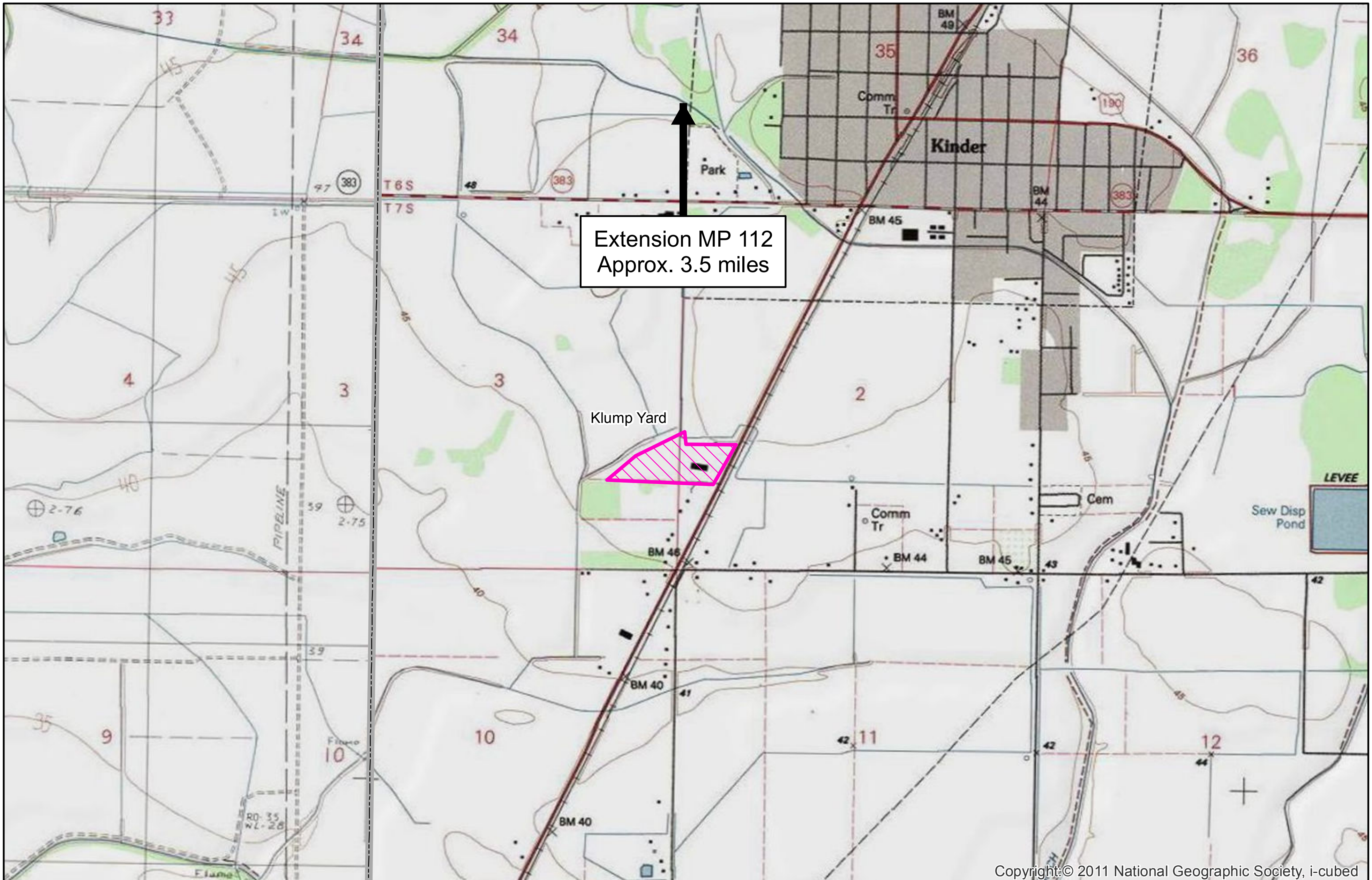

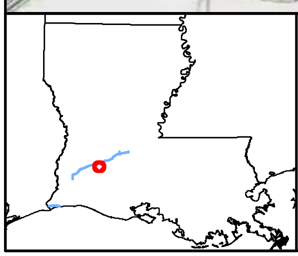

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
Kinder

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL
Expansion Projects

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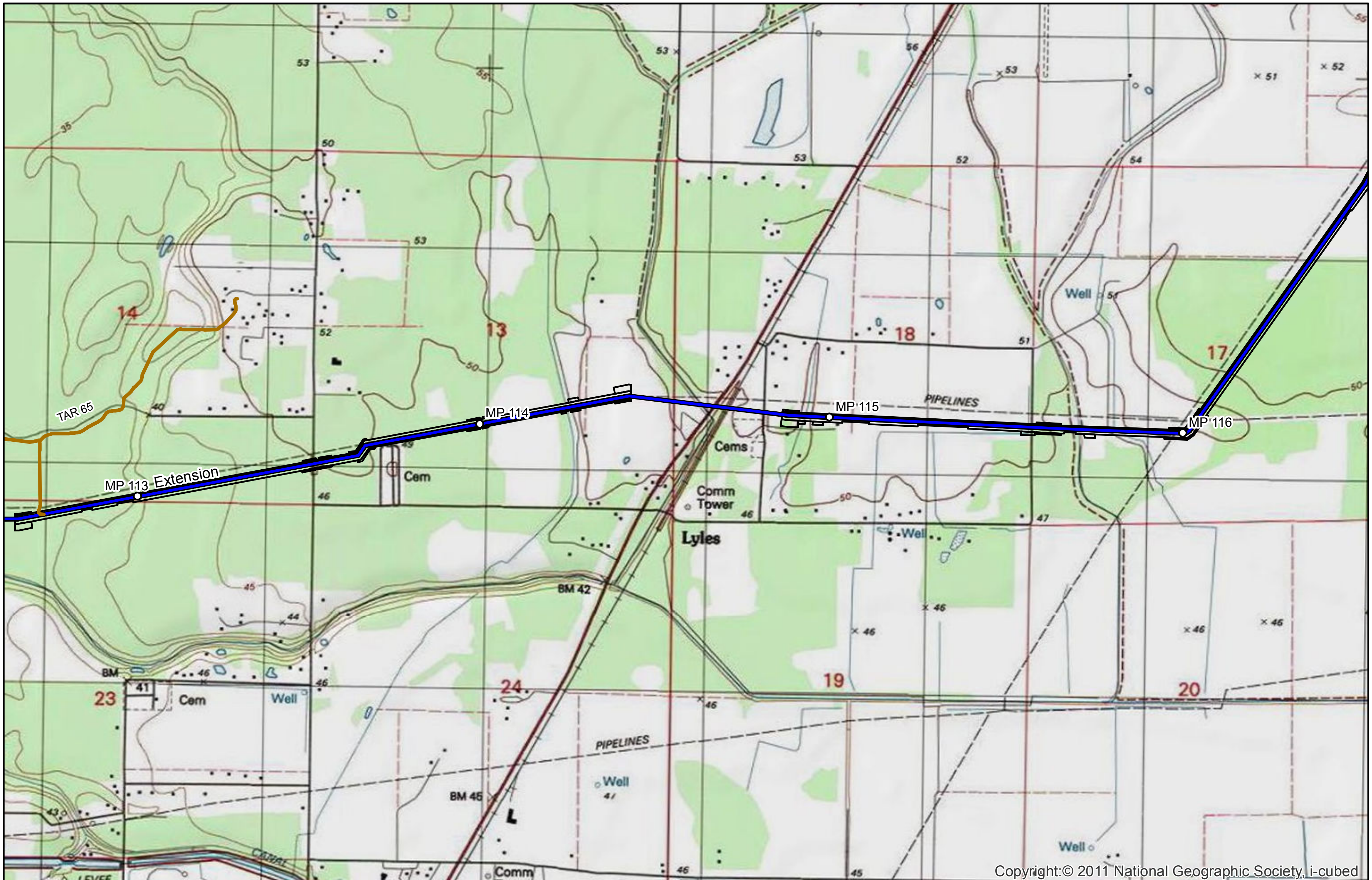

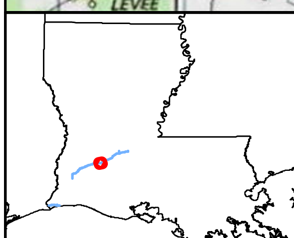

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
Oberlin

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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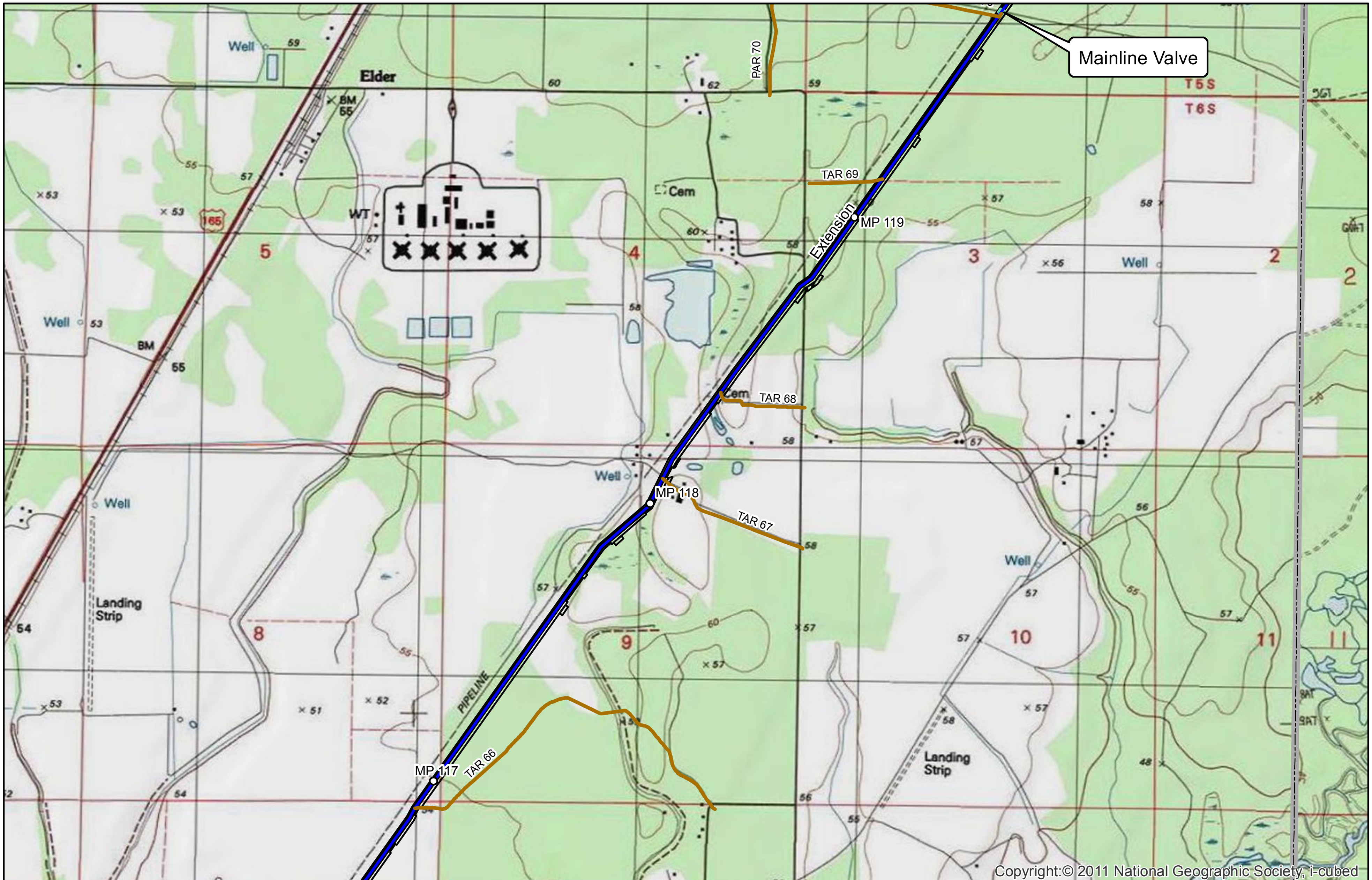

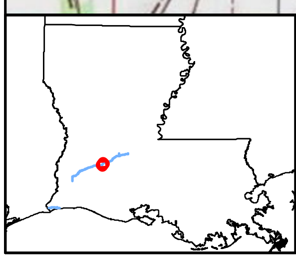

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

0 500 1,000 2,000 Feet

USGS Quadrangle(s):
Oberlin

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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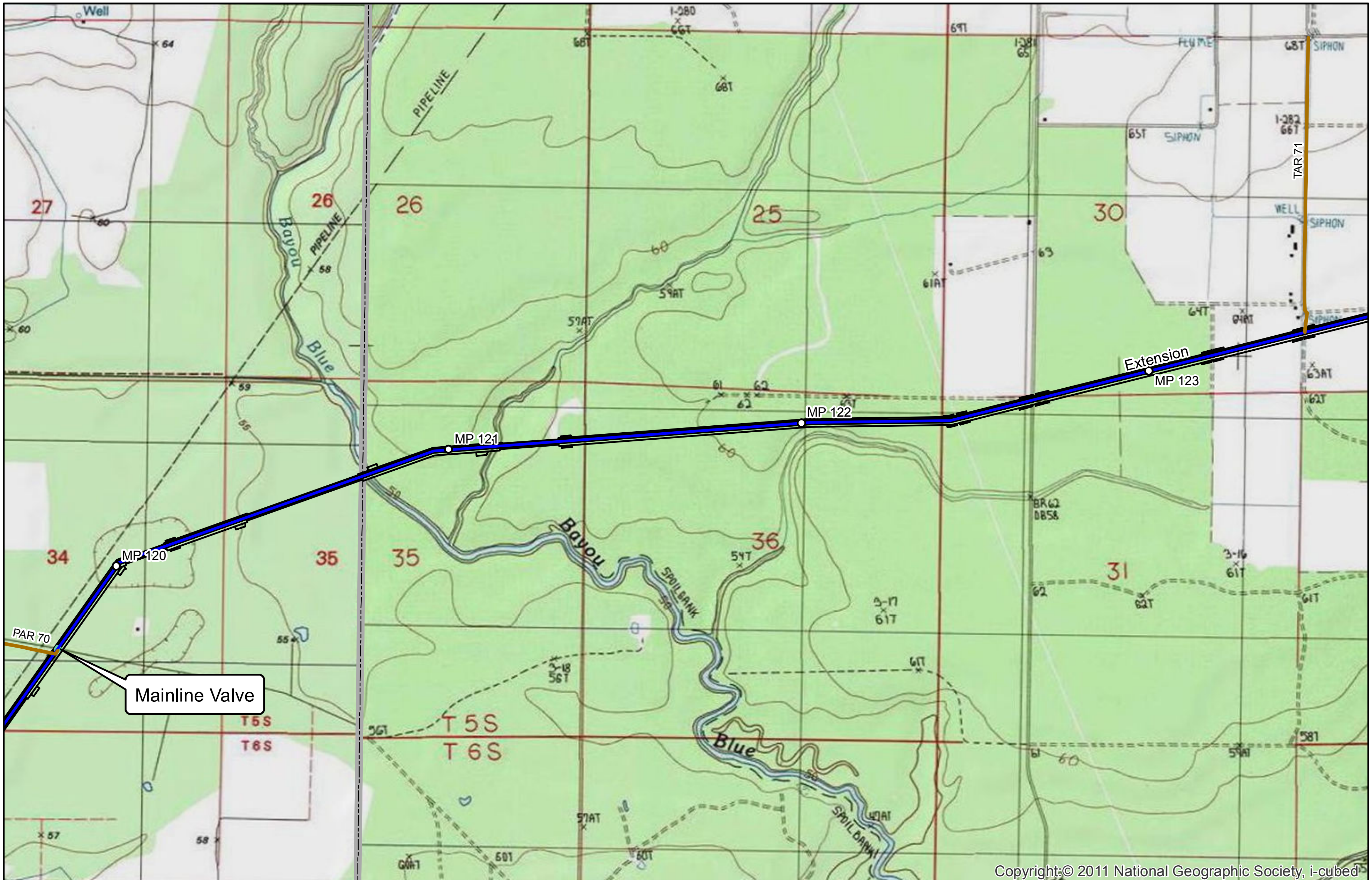

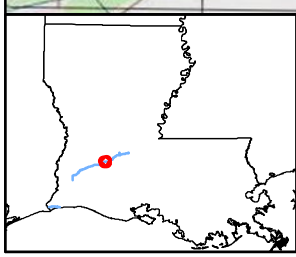

N

0 500 1,000 2,000 Feet

Loop 1	Mileposts
Loop 2	Access Roads
Extension	Workspace
ANR Lateral	Aboveground Facilities
CGT Lateral	Contractor Yards
PPEC Lateral	USGS Boundary
TGT Lateral	

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Oberlin & Soileau

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL
Expansion Projects

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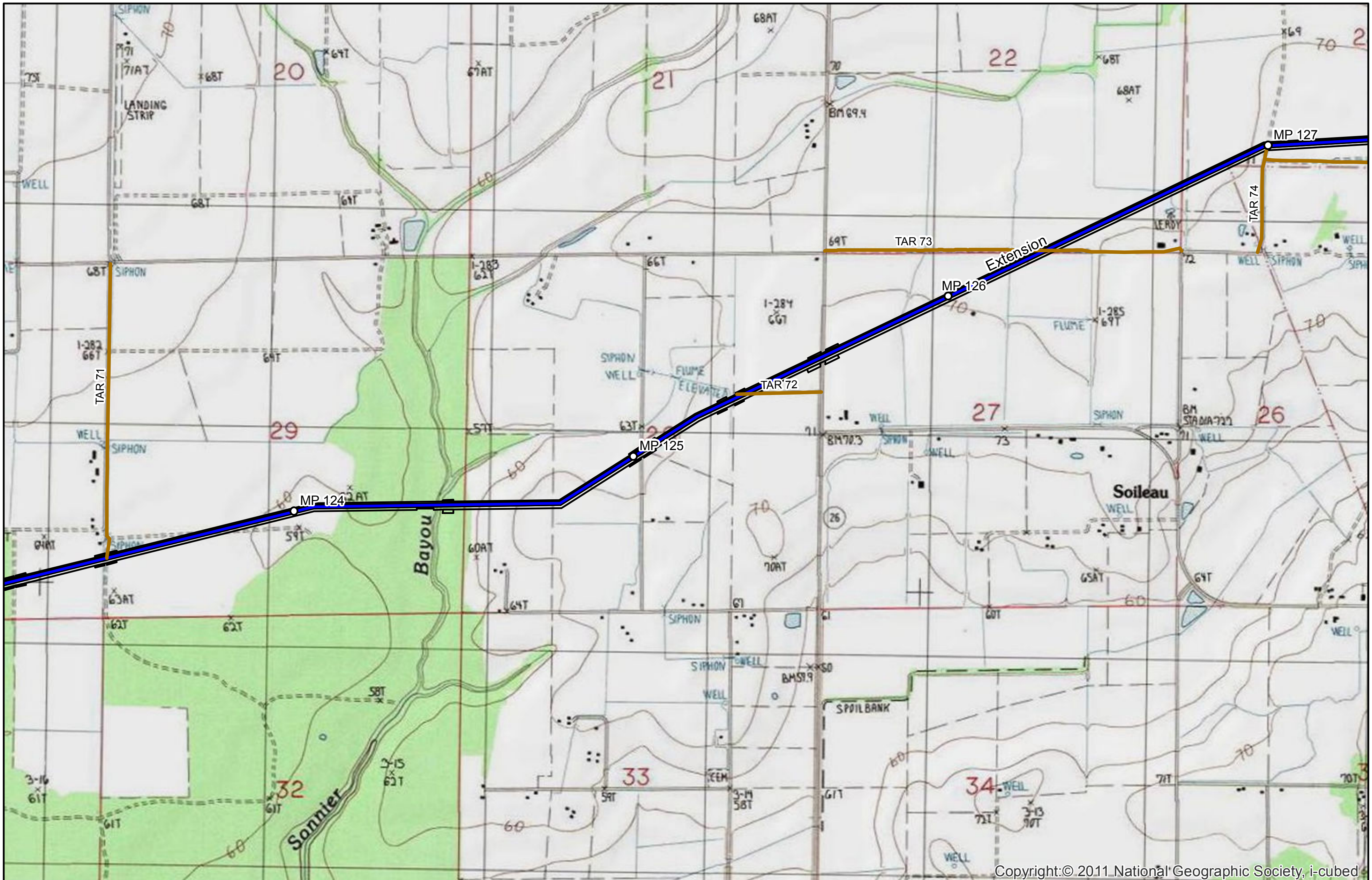

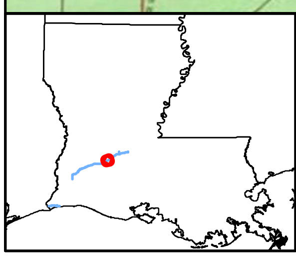

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
Soileau

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL
Expansion Projects

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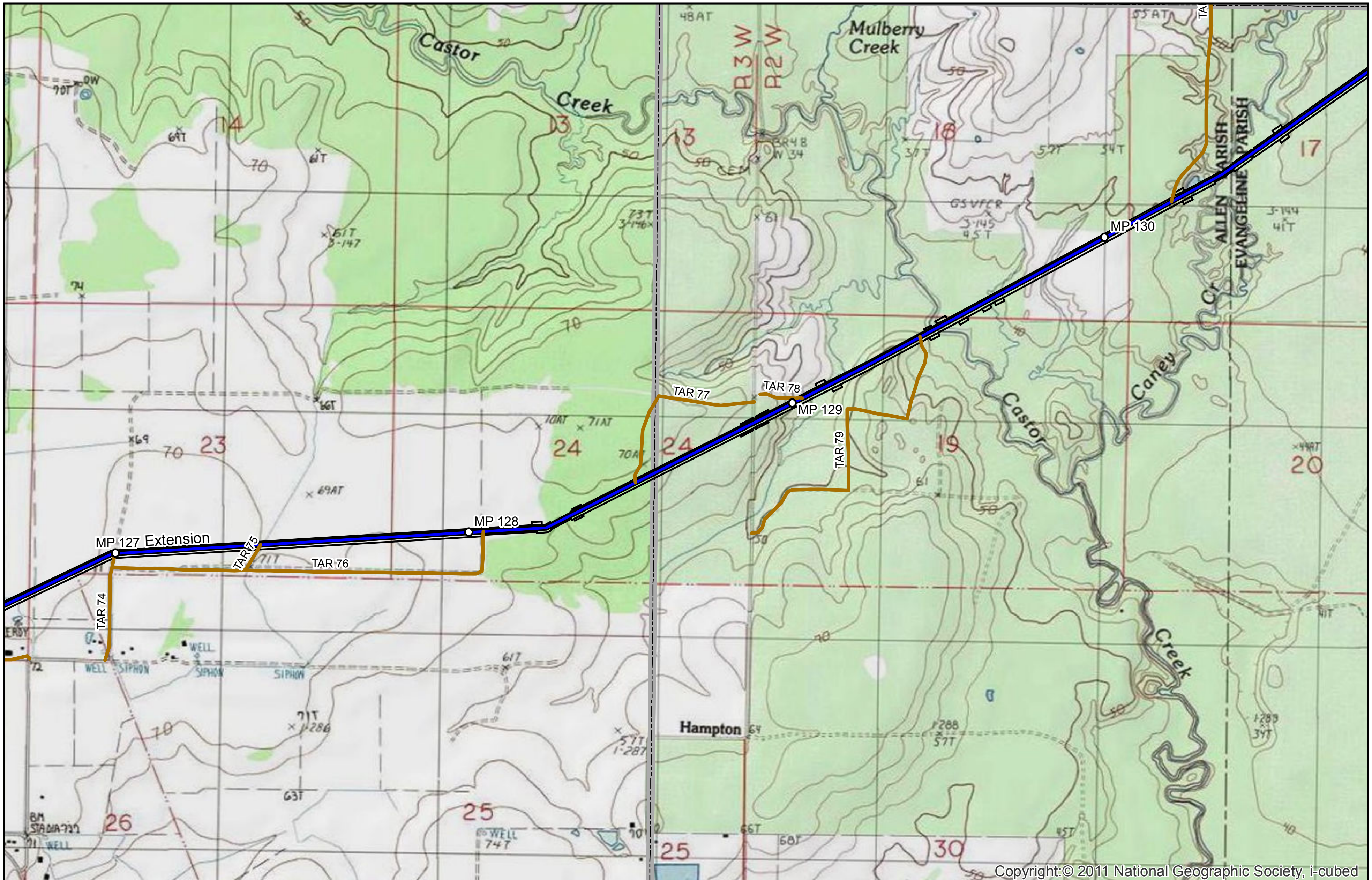

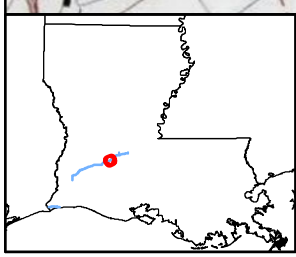

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Soileau & Duralde

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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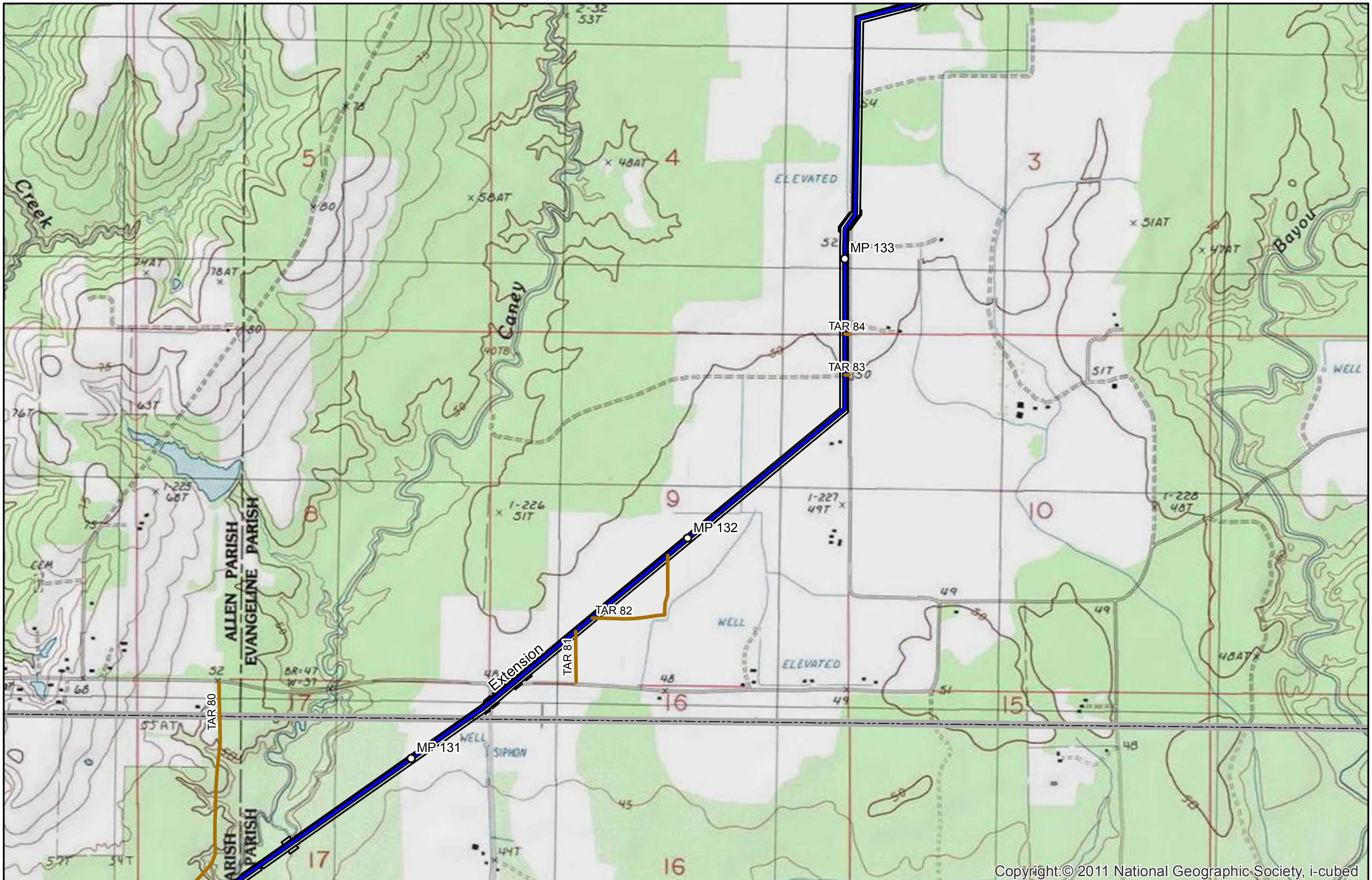

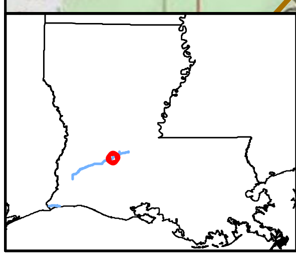

N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral

Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s):
Duralde & Bond

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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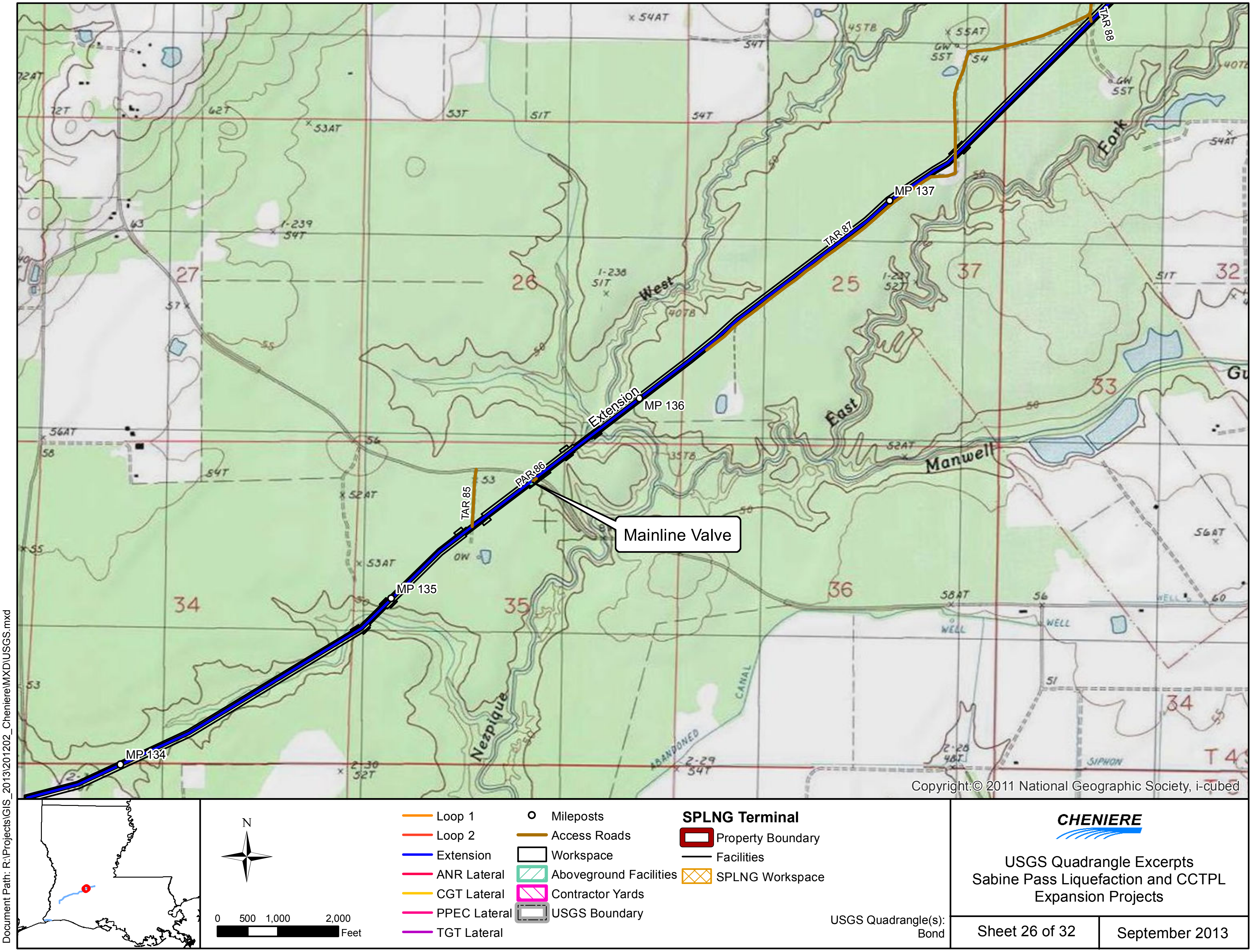

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Bond & Mamou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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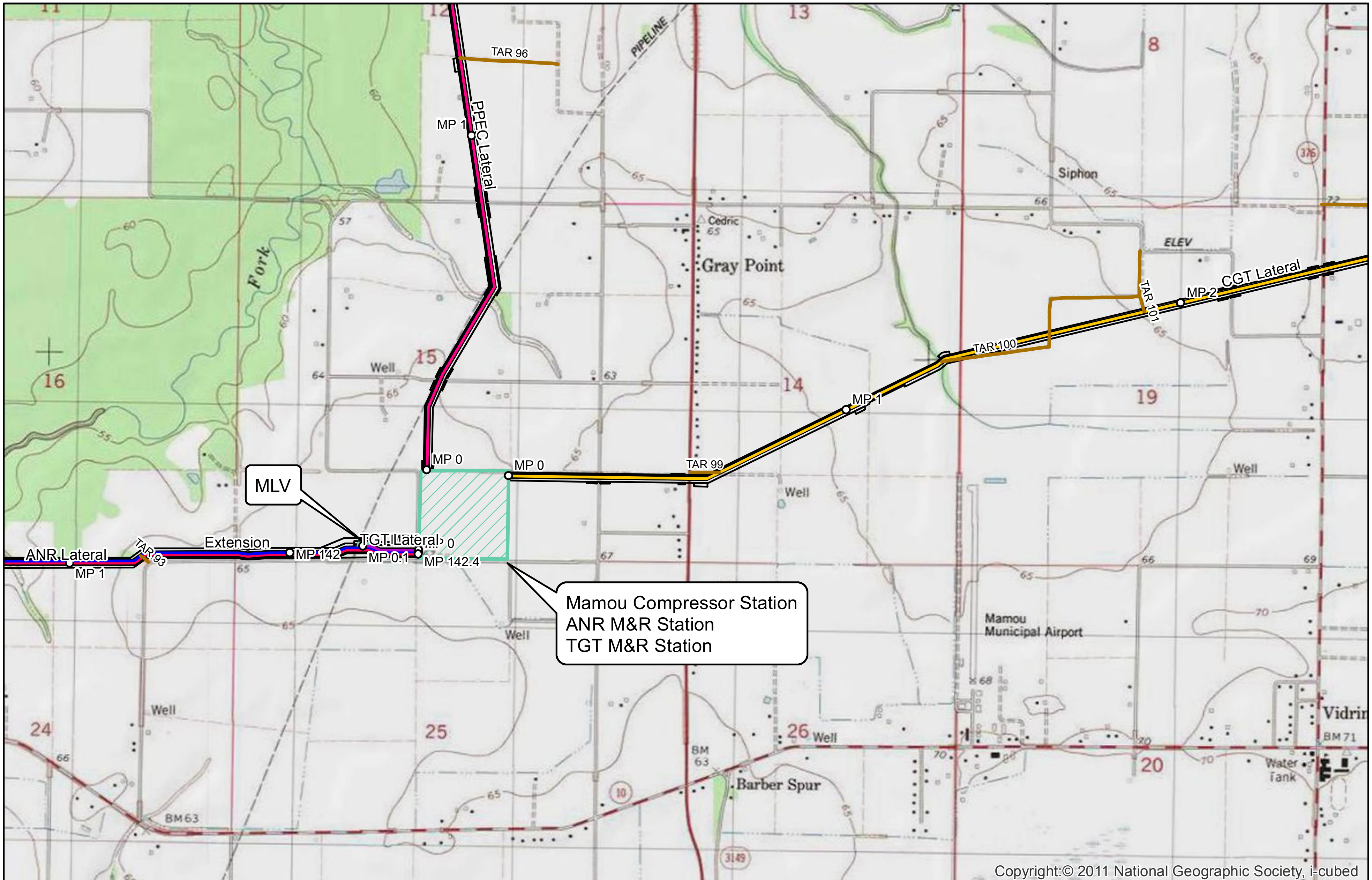

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N

0 500 1,000 2,000 Feet

Loop 1
Loop 2
Extension
ANR Lateral
CGT Lateral
PPEC Lateral
TGT Lateral
Mileposts
Access Roads
Workspace
Aboveground Facilities
Contractor Yards
USGS Boundary

SPLNG Terminal
Property Boundary
Facilities
SPLNG Workspace

USGS Quadrangle(s): Mamou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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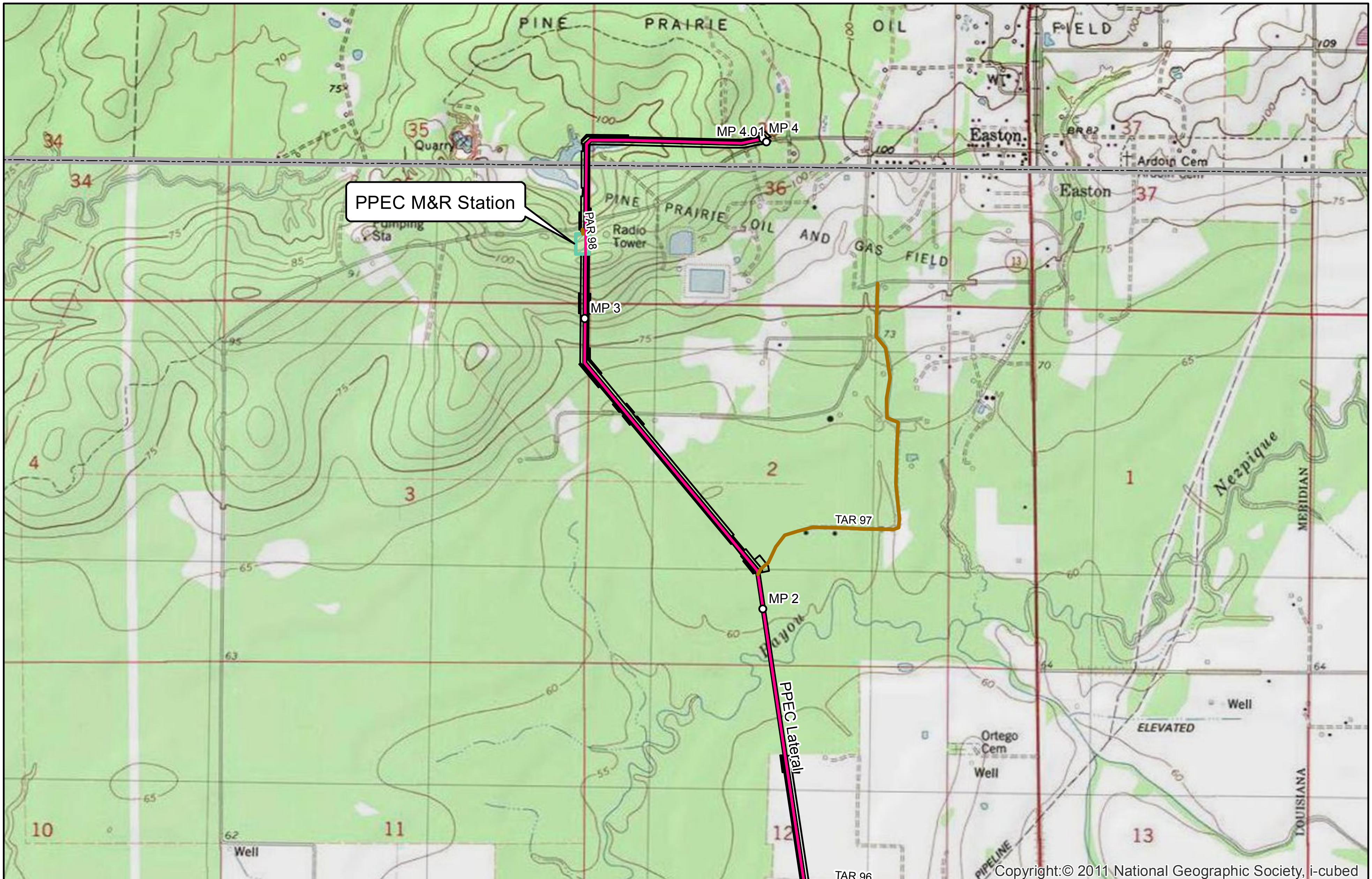

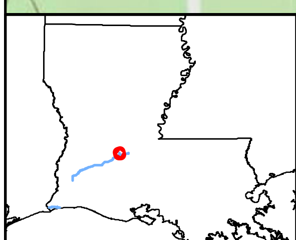

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s): Mamou

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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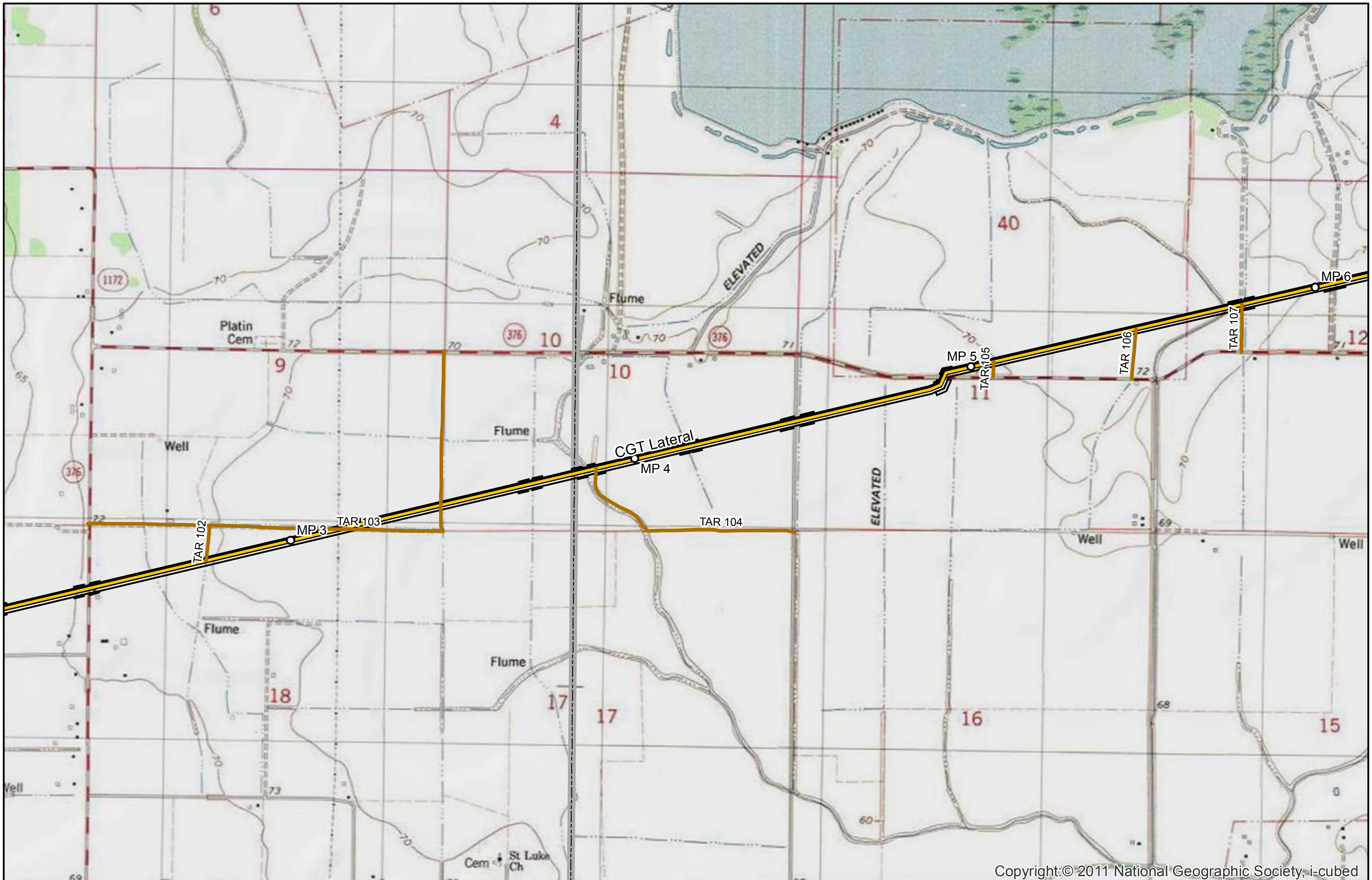

N

Loop 1	Mileposts
Loop 2	Access Roads
Extension	Workspace
ANR Lateral	Aboveground Facilities
CGT Lateral	Contractor Yards
PPEC Lateral	USGS Boundary
TGT Lateral	

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

0 500 1,000 2,000 Feet

USGS Quadrangle(s): Mamou & Ville Platte

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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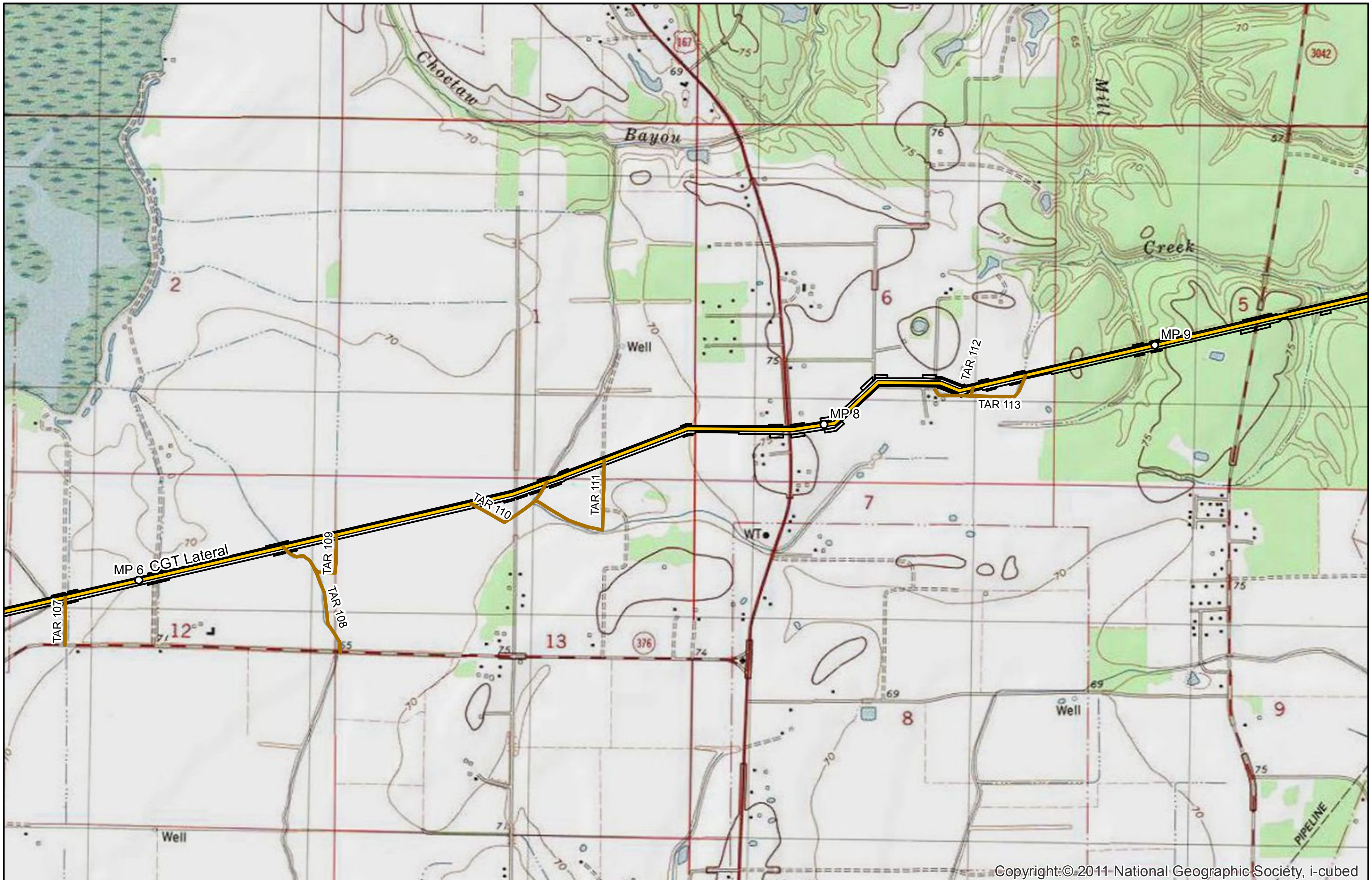

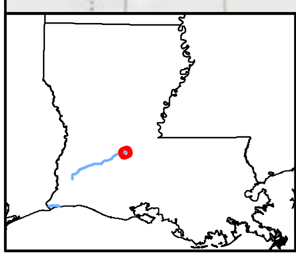

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Ville Platte

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USGS Quadrangle Excerpts
Sabine Pass Liquefaction and CCTPL Expansion Projects

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September 2013

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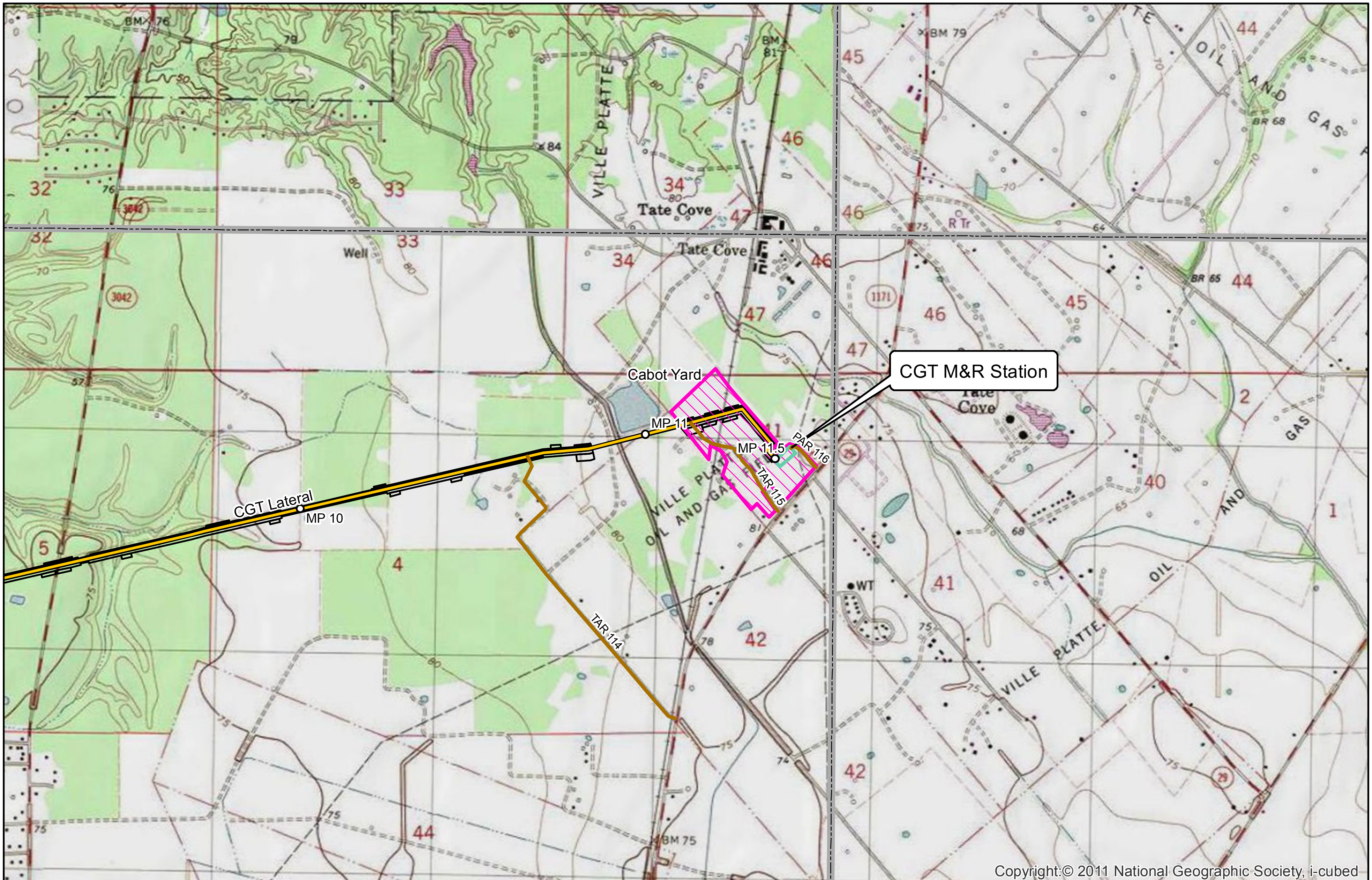

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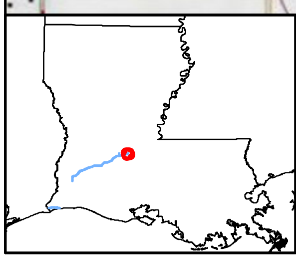

N

0 500 1,000 2,000 Feet

- Loop 1
- Loop 2
- Extension
- ANR Lateral
- CGT Lateral
- PPEC Lateral
- TGT Lateral
- Mileposts
- Access Roads
- Workspace
- Aboveground Facilities
- Contractor Yards
- USGS Boundary

SPLNG Terminal

- Property Boundary
- Facilities
- SPLNG Workspace

USGS Quadrangle(s):
Ville Platte

CHENIERE

USGS Quadrangle Excerpts
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APPENDIX 2 SABINE PASS AND CCTPL BEST MANAGEMENT PRACTICES

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Cheniere Creole Trail Pipeline Company, L.P.

CCTPL Expansion Project

PROJECT SPECIFIC

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

September 2013

TABLE OF CONTENTS

LIST OF TABLES

NOTE:Text boxes have been inserted into this document to identify specific areas where Cheniere Creole Trail Pipeline, L.P. ("CCTPL") is proposing modifications to the FERC Procedures due to site-specific conditions in the CCTPL Expansion Project ('Project") area.

I. APPLICABILITY

A. The intent of these Procedures is to assist project sponsors by identifying baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies. Project sponsors shall specify in their applications for a new FERC authorization, and in prior notice and advance notice filings, any individual measures in these Procedures they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in these Procedures (or the applicant's approved procedures). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;
2. is necessary because a portion of these Procedures is infeasible or unworkable based on project-specific conditions; or
3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on non-wetland areas are addressed in the staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

B. DEFINITIONS

1. “Waterbody” includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:

   a. “minor waterbody” includes all waterbodies less than or equal to 10 feet wide at the water’s edge at the time of crossing;

   b. “intermediate waterbody” includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water’s edge at the time of crossing; and

   c. “major waterbody” includes all waterbodies greater than 100 feet wide at the water’s edge at the time of crossing.

   d. “ditches” are primarily man-made drainage features that include agricultural ditches and canals in fields and pastures and roadside drainage ditches. Ditches are not considered part of stream systems mapped in the USGS hydrographic database and are not intermittent or perennial stream systems or channelized portions of these stream systems. As such, they typically do not fall under the jurisdiction of the U.S. Army Corps of Engineers (COE). Ditches are temporary in nature and are used to facilitate agriculture practices.

2. “Wetland” includes any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands.

II. PRECONSTRUCTION FILING

A. The following information must be filed with the Secretary of the FERC (Secretary) prior to the beginning of construction, for the review and written approval by the Director:

1. site-specific justifications for extra work areas that would be closer than 50 feet from a waterbody or wetland; and

2. site-specific justifications for the use of a construction right-of-way greater than 75-feet-wide in wetlands.

B. The following information must be filed with the Secretary prior to the beginning of construction. These filing requirements do not apply to projects constructed under the automatic authorization provisions in the FERC's regulations:

1. Spill Prevention and Response Procedures specified in section IV.A;

2. a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, within any designated coldwater fishery, and within any waterbody identified as habitat for federally-listed threatened or endangered species. The project sponsor will revise the schedule as necessary to provide FERC staff at least 14 days advance notice. Changes within this last 14-day period must provide for at least 48 hours advance notice;

3. plans for horizontal directional drills (HDD) under wetlands or waterbodies, specified in section V.B.6.d;

4. site-specific plans for major waterbody crossings, described in section V.B.9;

5. a wetland delineation report as described in section VI.A.1, if applicable; and

6. the hydrostatic testing information specified in section VII.B.3.

III. ENVIRONMENTAL INSPECTORS

A. At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread. The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.

B. The Environmental Inspector's responsibilities are outlined in the Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

IV. PRECONSTRUCTION PLANNING

A. The project sponsor shall develop project-specific Spill Prevention and Response Procedures that meet applicable requirements of state and federal agencies. A copy must be filed with the Secretary prior to construction and made available in the field on each construction spread. This filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

1. It shall be the responsibility of the project sponsor and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. The project sponsor and its contractors must, at a minimum, ensure that:

a. all employees handling fuels and other hazardous materials are properly trained;

b. all equipment is in good operating order and inspected on a regular basis;

c. fuel trucks transporting fuel to on-site equipment travel only on approved access roads;

d. all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

e. hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas;

f. concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

g. pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills; and

h. bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.

2. The project sponsor and its contractors must structure their operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum, the project sponsor and its contractors must:

   a. ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discoveries of contamination;

   b. ensure that each construction crew has on hand sufficient tools and material to stop leaks;

   c. know the contact names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and

   d. follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

B. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in these Procedures and in the FERC's Orders.

V. WATERBODY CROSSINGS

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply to the U.S. Army Corps of Engineers (COE), or its delegated agency, for the appropriate wetland and waterbody crossing permits.

2. Provide written notification to authorities responsible for potable surface water supply intakes located within 3 miles downstream of the crossing at least 1 week before beginning work in the waterbody, or as otherwise specified by that authority.

3. Apply for state-issued waterbody crossing permits and obtain individual or generic section 401 water quality certification or waiver.

4. Notify appropriate federal and state authorities at least 48 hours before beginning trenching or blasting within the waterbody, or as specified in applicable permits.

B. INSTALLATION

1. Time Window for Construction

   Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

   a. coldwater fisheries - June 1 through September 30; and

   b. coolwater and warmwater fisheries - June 1 through November 30.

2. Extra Work Areas

   a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the conditions that will not permit a 50-foot setback and measures to ensure the waterbody is adequately protected.

Table 1 identifies locations where site-specific conditions at certain waterbody crossings require that extra work areas (referred to as additional temporary work space or "ATWS") be located less than 50 feet from the water's edge. CCTPL will implement all applicable protection measures, such as installation of silt fencing and hay bales along ATWS limits to prevent off-site sedimentation, and any other measures appropriate for stabilizing the ATWS during and after construction.

c. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

3. General Crossing Procedures

a. Comply with the COE, or its delegated agency, permit terms and conditions.

b. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.

c. Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way, except where maintaining this offset will result in greater environmental impact.

d. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.

e. Maintain adequate waterbody flow rates to protect aquatic life, and prevent the interruption of existing downstream uses.

f. Waterbody buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

g. Crossing of waterbodies when they are dry or frozen and not flowing may proceed using standard upland construction techniques in accordance with the Plan, provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, the project sponsor must comply with all applicable Procedure requirements for "waterbodies" as defined in section I.B.1.

4. Spoil Pile Placement and Control

a. All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2.

b. Use sediment barriers to prevent the flow of spoil or silt-laden water into any waterbody.

5. Equipment Bridges

a. Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.

b. Construct and maintain equipment bridges to allow unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:

(1) equipment pads and culvert(s);
(2) equipment pads or railroad car bridges without culverts;
(3) clean rock fill and culvert(s); and
(4) flexi-float or portable bridges.

Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.

c. Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

d. Design and maintain equipment bridges to prevent soil from entering the waterbody.

e. Remove temporary equipment bridges as soon as practicable after permanent seeding.

f. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove temporary equipment bridges as soon as practicable after final cleanup.

g. Obtain any necessary approval from the COE, or the appropriate state agency for permanent bridges.

6. Dry-Ditch Crossing Methods

a. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally-designated as critical habitat.

b. Dam and Pump

(1) The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.

(2) Implementation of the dam-and-pump crossing method must meet the following performance criteria:

(i) use sufficient pumps, including on-site backup pumps, to maintain downstream flows;
(ii) construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
(iii) screen pump intakes to minimize entrainment of fish;
(iv) prevent streambed scour at pump discharge; and
(v) continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

c. Flume Crossing

The flume crossing method requires implementation of the following steps:

(1) install flume pipe after blasting (if necessary), but before any trenching;

(2) use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required to achieve an effective seal);

(3) properly align flume pipe(s) to prevent bank erosion and streambed scour;

(4) do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts; and

(5) remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

d. Horizontal Directional Drill

For each waterbody or wetland that would be crossed using the HDD method, file with the Secretary for the review and written approval by the Director, a plan that includes:

(1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;

(2) justification that disturbed areas are limited to the minimum needed to construct the crossing;

(3) identificationn of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;

(4) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and

(5) a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

The requirement to file HDD plans does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

7. Crossings of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours. Streambanks and unconsolidated streambeds may require additional restoration after this period;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section V.B.5.

8. Crossings of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. all other construction equipment must cross on an equipment bridge as specified in section V.B.5.

9. Crossings of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues. The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

10. Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

a. install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Removable sediment barriers (or driveable berms) must be installed across the travel lane. These removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;

b. where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes toward the waterbody, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the waterbody; and

c. use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

11. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.

2. For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.

3. Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector.

4. Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

5. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

6. Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques such as seeding and erosion control fabric.

7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes, and woody species, similar in density to adjacent undisturbed lands.

8. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the Plan.

   In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.

9. Sections V.C.3 through V.C.7 above also apply to those perennial or intermittent streams not flowing at the time of construction.

D. POST-CONSTRUCTION MAINTENANCE

1. Limit routine vegetation mowing or clearing adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in riparian areas that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of riparian areas.

VI. WETLAND CROSSINGS

A. GENERAL

1. The project sponsor shall conduct a wetland delineation using the current federal methodology and file a wetland delineation report with the Secretary before construction. The requirement to file a wetland delineation report does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

   This report shall identify:

   a. by milepost all wetlands that would be affected;

   b. the National Wetlands Inventory (NWI) classification for each wetland;

   c. the crossing length of each wetland in feet; and

   d. the area of permanent and temporary disturbance that would occur in each wetland by NWI classification type.

   The requirements outlined in this section do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

2. Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

Table 2 identifies locations where CCTPL proposes to install the loops at a greater than 25-foot offset from the existing pipeline for Loop 1 and Loop 2 due to the diameter of the pipeline (42 inches) and the unconsolidated soils found in the Project area. As proposed, Loop 1 will be located at a 50-foot offset and Loop 2 at a 35-foot offset. To move that offset from 50 feet (or 35 feet) to 25 feet would be unsafe, considering the construction work area would need to be located over an active high pressure gas pipeline.

3. Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.

Table 3 identifies locations where CCTPL is requesting approval for a construction right-of-way of greater than 75 feet in wetlands. Installation of a 42-inch diameter pipeline requires a construction right-of-way of more than 75 feet due to workspace requirements associated with installing large diameter pipelines, the associated larger equipment size, and soil conditions found in the Project area which tend to slump resulting in wider trenches to achieve adequate depth of cover and difficulty in containing spoil piles. A reduced construction right-of-way would require the pipe and equipment to be located closer to the ditch line posing a safety concern for construction personnel.

4. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

5. Implement the measures of sections V <u>and</u> VI in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections V and VI cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:

   a. spoil control;

   b. equipment bridges;

   c. restoration of waterbody banks and wetland hydrology;

   d. timing of the waterbody crossing;

   e. method of crossing; and

   f. size and location of all extra work areas.

6. Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations.

B. INSTALLATION

1. Extra Work Areas and Access Roads

a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

Table 1 identifies locations where site-specific conditions at certain wetlands require that extra work areas (referred to as additional temporary work space or “ATWS”) be located less than 50 feet from the wetland edge or within the wetland. CCTPL will implement all applicable protection measures, such as installation of silt fencing and hay bales along ATWS limits to prevent off-site sedimentation, and any other measures appropriate for stabilizing the ATWS during and after construction.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from wetland boundaries, except where adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the site-specific conditions that will not permit a 50-foot setback and measures to ensure the wetland is adequately protected.

c. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats).

In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

d. The only access roads, other than the construction right-of-way, that can be used in wetlands are those existing roads that can be used with no modifications or improvements, other than routine repair, and no impact on the wetland.

2. Crossing Procedures

   a. Comply with COE, or its delegated agency, permit terms and conditions.

   b. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

   c. Use “push-pull” or “float” techniques to place the pipe in the trench where water and other site conditions allow.

   d. Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.

   e. Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

   f. Cut vegetation just above ground level, leaving existing root systems in place, and remove it from the wetland for disposal.

      The project sponsor can burn woody debris in wetlands, if approved by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

   g. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless the Chief Inspector and Environmental Inspector determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction right-of-way.

   h. Segregate the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are saturated. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

   i. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to support equipment on the construction right-of-way.

j. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment, or operate normal equipment on timber riprap, prefabricated equipment mats, or terra mats.

k. Remove all project-related material used to support equipment on the construction right-of-way upon completion of construction.

3. Temporary Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below in section VI.B.3.c, maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

a. Install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all wetland crossings where necessary to prevent sediment flow into the wetland.

b. Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland.

c. Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

4. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Where the pipeline trench may drain a wetland, construct trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology.

2. Restore pre-construction wetland contours to maintain the original wetland hydrology.

3. For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

4. Do not use fertilizer, lime, or mulch unless required in writing by the appropriate federal or state agency.

5. Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan shall include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.

6. Until a project-specific wetland restoration plan is developed and/or implemented, temporarily revegetate the construction right-of-way with annual ryegrass at a rate of 40 pounds/acre (unless standing water is present).

7. Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after revegetation and stabilization of adjacent upland areas are judged to be successful as specified in section VII.A.4 of the Plan.

D. POST-CONSTRUCTION MAINTENANCE AND REPORTING

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in wetlands that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of wetland areas.

4. Monitor and record the success of wetland revegetation annually until wetland revegetation is successful.

5. Wetland revegetation shall be considered successful if all of the following criteria are satisfied:

   a. the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation);

   b. vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;

   c. if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and

   d. invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

6. Within 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts and documenting success as defined in section VI.D.5, above. The requirement to file wetland restoration reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advance notice provisions in the FERC's regulations.

   For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

VII. HYDROSTATIC TESTING

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply for state-issued water withdrawal permits, as required.

2. Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

3. Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

B. GENERAL

1. Perform 100 percent radiographic inspection of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.

2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address secondary containment and refueling of these pumps in the project's Spill Prevention and Response Procedures.

3. The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

C. INTAKE SOURCE AND RATE

1. Screen the intake hose to minimize the potential for entrainment of fish.

2. Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.

3. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

4. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

D. DISCHARGE LOCATION, METHOD, AND RATE

1. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow.

2. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

TABLE 1
Justification for Additional Temporary Work Space (ATWS) that is Located within 50 feet of a Waterbody or Wetland

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
Loop 1							
1.86	50 X 140	0.16	SPLNG Terminal Entrance Road	E2EM	W14LPA019	3	Large wetland complex with no upland locations available nearby.
2.34	50 X 200	0.25	Highway 82/Gulf Beach Highway	E2EM	W14LPA019	3	Large wetland complex with no upland locations available nearby.
2.40	50 X 200	0.36	Highway 82/Gulf Beach Highway	E2EM	W14LPA018	3	
4.30	25 X 150	0.09	Canal D14LPA003	E2EM P	W14LPA018 D14LPA003	3 1	Large wetland complex with no upland locations available nearby. Adjacent land is used for pasture. Canal is located on the east side of an access road.
4.30	25 X 150	0.09	Canal D14LPA003				
4.37	25 X 150	0.09	Canal D14LPA003				
4.37	25 X 150	0.09	Canal D14LPA003				
4.66	25 X 300	0.17	Duncan Pipeline	E2EM	W14LPA020	3	Large wetland complex with no upland locations available nearby.
4.66	25 X 300	0.17	Duncan Pipeline				
5.24	50 X 300	0.34	Davis Petroleum and CCTPL Pipeline	E2EM	W14LPA020	3	Large wetland complex with no upland locations available nearby.
5.24	50 X 300	0.34	Davis Petroleum and CCTPL Pipeline				
5.32	25 X 150	0.09	Access Road, Canal D14LPA004	E2EM P	W14LPA020 D14LPA004	3 1	Large wetland complex with no upland locations available nearby. Adjacent land is used for pasture. Canal is located on the east side of an access road.
5.33	25 X 150	0.09	Access Road, Canal D14LPA004				
5.36	25 X 150	0.09	Canal D14LPA004				
5.36	25 X 150	0.09	Canal D14LPA004				
7.43	25 X 150	0.09	Road	E2EM E2EM	W14LPA002 W14LPA001	4	Large wetland complex with no upland locations available nearby.
7.45	25 X 300	0.17	Road				
7.47	25 X 150	0.09	Road				

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9.14	50 X 410	0.50	Deep Bayou Rd, Bridgeline pipeline	PEM PSS PEM	W14LPA021 W14LPA022 W14LPA008	3	Large wetland complex with no upland locations available nearby.
9.21	25 X 200	0.11	Deep Bayou Road				
9.21	25 X 200	0.11	Deep Bayou Road				
9.42	100 X 250	0.57	Pond S14LPA006	PSS PEM	W14LPA022 W14LPA008	3	Large wetland complex with no upland locations available nearby.
9.55	100 X 250	0.57	Pond S14LPA006				
12.16	25 X 200	0.12	Middle Ridge Road	PEM	W14LPA006	3	Large wetland complex with no upland locations available nearby.
12.20	25 X 200	0.12	Middle Ridge Road				
12.22	25 X 165	0.10	Middle Ridge Road	PEM	W14LPA007	2	Large wetland complex with no upland locations available nearby.
12.24	25 X 70	0.05	Middle Ridge Road				
12.37	25 X 200	0.12	Berwick Road	PEM PEM	W14LPA007 W14LPA023	3	Large wetland complex with no upland locations available nearby.
12.37	25 X 200	0.12	Berwick Road				
12.42	25 X 200	0.12	Berwick Road				
12.42	25 X 200	0.12	Berwick Road				
15.29	50 X 135	0.15	Skyhawk Road and Pond	P PEM PSS PEM	S14LPA007 W14LPA015 W14LPA016 W15LPA037	1 2 2 2	Large wetland complex with limited upland area available between private road and pond. Partially located within wetland.
15.69	25 X 90	0.05	Tie-in at Johnson Bayou M&R Station	PSS	W14LPA017	2	Only usable space on north side of construction right-of-way.
	Sub-Total	***5.79***					

TABLE 1
Justification for Additional Temporary Work Space (ATWS) that is Located within 50 feet of a Waterbody or Wetland

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
Loop 2							
70.00	50 X 150	0.17	Wetland W25LPA061, W25LPA060, W25LPA058	PEM	W25LPA061	2	ATWS will be used for staging across three wetlands along a 1,000-foot segment.
70.28	50 X 150	0.15	Ditches D25LPA023 and D25LPA022	PFO I	W25LPA056 D25LPA023	2 1	ATWS is for crossing of agricultural ditches. Only available upland location between ditches and wetland. Not possible to maintain 50 foot set back due to configuration of wetland and ditch.
70.41	50 X 150	0.17	Pond S25LPA021	PEM	W25LPA055	4	Tip of wetland extends into ATWS for pond crossing. Cannot move ATWS south without putting it within 50 feet of pond.
70.59	50 X 145	0.17	Dixie Pipeline and Wetland W25LPA049	PEM	W25LPA049	2	Wetland W25LPA049 is within Dixie pipeline right-of-way. The tip of wetland W25LPA050 is along the southern edge of ATWS. Only upland location for ATWS.
70.63	50 X 150	0.18	Dixie Pipeline and Wetland W25LPA049				
70.80	50 X 130	0.15	Wetland W25LPA044	PSS/PEM PSS/PEM	W25LPA045 W25LPA044	2 2	ATWS between wetlands. No other upland location for ATWS.
71.51	25 X 190	0.11	Florida Gas Pipeline and Wetland W25LPA039	PEM/PFO	W25LPA039	2	Wetland wraps around ATWS. Relocating the ATWS to maintain 50 feet between the western edge of the ATWS and the wetland puts ATWS too far from the pipeline crossing.
71.51	25 X 220	0.13	Florida Gas Pipeline and Wetland W25LPA039				
73.30	50 X 150	0.22	Crossover of CCTPL Pipeline	PEM	W25LPA070	3	Small wetland is located within temporary construction right-of-way and ATWS. No other upland location.
73.34	25 X 250	0.14	Houston River HDD				
74.95	25 X 150	0.09	Stream S25LPA040	I	S25LPA040	1	Stream wraps around ATWS. ATWS needed to cross stream.
76.76	100 X 250	0.58	Hwy 27/Bankens Rd/Railroad HDD	PEM	W25LPA012	4	No other upland location for HDD workspace.

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Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
77.09	25 X 150	0.09	Enerfin Pipeline & Wetland W25LPA015	PEM	W25LPA015	2	No other usable upland location for pipeline crossing.
77.10	25 X 300	0.17	Enerfin Pipeline & Wetland W25LPA015				
77.28	100 X 250	0.57	Little River HDD	PEM	W25LPA017	2	ATWS for HDD located between two wetlands. No other upland location for HDD workspace.
77.28	25 X 250	0.14	Little River HDD	PEM	W25LPA019	4	ATWS located within footprint of HDD for existing CCTPL pipeline to the greatest extent practicable. Relocating to maintain 50 feet between this wetland and next would require additional upland forest clearing.
77.71	25 X 250	0.14	Little River HDD				
78.36	25 X 150	0.09	Natural Drainage	PEM	W25LPA087	2	Wetland located within the permanent and southern construction rights-of-way. Two ATWS are located north of temporary construction right-of-way in upland. No other location for steep drainage crossing within pine plantation.
78.43	25 X 150	0.09	Natural Drainage				
79.14	50 X 150	0.17	Stream S25LPA007, TAR 31	PEM	W25LPA021	2	Wetland located along the northern edge of the permanent right-of-way. No other location for stream and access road crossing
79.21	50 X 150	0.17	Wetland W25LPA022, TAR 31	PEM/PSS PEM	W25LPA023	2	Wetland located along the northern edge of the permanent right-of-way. No other upland location for wetland and access road crossing
80.37	25 X 200	0.12	Holbrook Park Road	PEM	W25LPA026	2	Wetland encroaches into construction right-of-way. No other upland location for ATWS for road crossing.
80.37	25 X 200	0.12	Holbrook Park Road				

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Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
80.69	25 X 150	0.09	Stream S25LPA008	E	S25LPA008	1	Only upland location available for workspace required for stream crossing.
80.75	25 X 150	0.09	Stream S25LPA008				
81.67	50 X 2905	3.19	False Right-of-Way for HDD	E E PEM	S25LPA011 S25LPA012 W25LPA032	5 5 2	No other location for staging of pipeline pullback.
86.22	110 X 215	0.56	MLV	PEM	W25LPA008	2	No other location for staging for MLV.
86.70	25 X 250	0.14	Indian Bayou/Camp Edgewood Road HDD	PEM	W25LPA009	4	No other location for staging of HDD.
88.06	25 X 200	0.12	U.S. Highway 171	E	S25LPA014	5	Stream crosses ATWS and construction ROW. No other location for staging of road crossing
88.06	50 X 200	0.23	U.S. Highway 171		S25LPA014	1	
	Sub-Total	***8.55***					
Extension							
97.23	25 X 250	0.14	Barnes Creek HDD	E	S45NBB022	1	No other location for staging of HDD.
100.16	25 X 150	0.09	Stream S45NBB025	PFO	W45NBB041	3	Waterbody is 40 feet wide at crossing and within wetland. No other location for waterbody crossing.
100.16	25 X 150	0.09	Stream S45NBB025				
100.85	25 X 110	0.07	Lyles Street and Wetland W45NBB024	PSS	W45NBB024	2	ATWS between wetland and Lyles Road. No other location for staging area.
101.07	25 X 300	0.17	Two (2) Trunkline Gas Pipelines	PEM	W45NBB024	3	No other location for staging area for long wetland crossing and pipeline crossing
101.07	25 X 300	0.17	Two (2) Trunkline Gas Pipelines	PSS		3	
101.98	50 X 150	0.17	Stream S45NBB011	PSS	W45NBB022	2	Wetland in construction right-of-way. No other upland location for ATWS for stream crossing.
103.30	25 X 150	0.09	Wetland W45NBA020	PEM	W45NBA020	2	Wetland in construction right-of-way. No other upland location for ATWS for stream crossing.

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Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
103.39	25 X 80	0.05	Wetland W45NBA020 and W45NBA021	PEM PEM	W45NBA020 W45NBA021	2	ATWS between two wetlands. No other upland location for ATWS for wetland crossings.
103.48	25 X 150	0.10	Wetland W45NBA021	PEM	W45NBA021	2	ATWS needed for wetland crossing.
103.64	50 X 200	0.23	Snooky Road	E	D45NBB031	5	Ditch along Snooky Road. Crosses construction right-of-way and ATWS. No other location for ATWS for road crossing
105.19	50 X 200	0.24	Railroad and U.S. 190	PEM	W45NBA084	2	Wetland in construction right-of-way. No other upland location for ATWS for railroad crossing.
107.75	25 X 200	0.12	Gill Road	P	S45NBB019	1	Pond located south of ATWS. No other upland location for ATWS for road crossing.
108.50	50 X 75	0.09	Shorty Rawlings Road	PSS	W45NBA037	2	ATWS between wetland and road. No other location for staging of road crossing.
108.81	100 X 250	0.57	Whiskey Chitto Creek HDD	PFO	W45NBA092	4	Large wetland complex. No other location for staging of HDD.
108.81	25 X 250	0.14	Whiskey Chitto Creek HDD				
109.55	25 X 250	0.14	Whiskey Chitto Creek HDD	PEM	W45NBA105	2	No other location for staging of HDD.
110.45	50 X 200	0.23	Carpenters Bridge Road	I	S45NBA040	1	Waterbody meanders through and adjacent to the south side of the construction right-of-way. No other location for ATWS for Carpenters Bridge Road crossing.
110.54	50 X 140	0.16	Stream S45NBA040	I	S45NBA040	1	Waterbody meanders through and adjacent to the south side of the construction right-of-way. No other location for ATWS for road and multiple waterbody crossings.
110.60	50 X 150	0.19	Stream S45NBA040				
111.12	50 X 150	0.17	El Paso pipeline	PFO	W45NBA088	2	No other location for ATWS for pipeline crossing.

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112.15	25 X 250	0.14	Calcasieu River HDD	PEM PFO	W45NBA098	3 2	No other location for staging of HDD.
112.15	100 X 250	0.57	Calcasieu River HDD				
112.65	25 X 250	0.14	Calcasieu River HDD	PEM	W45NBA102	4	Wetland extends into construction right-of-way. No other location for staging of HDD.
113.96	25 X 200	0.11	Enerfin Pipeline	E	S45NBA027	1	No other location for staging area for pipeline and waterbody crossing.
113.97	25 X 200	0.11	Enerfin Pipeline				
114.00	25 X 100	0.06	Stream S45NBA027				
114.01	25 X 100	0.06	Stream S45NBA027				
114.23	25 X 70	0.04	Stream S45NBA028	PEM P	W45NBA067 S45NBA028	2 1	ATWS between wetland and stream.
114.38	25 X 250	0.14	U.S 165 HDD	PEM	W45NBA026	2	No other location for staging of HDD.
118.08	50 X 65	0.10	Road and Wetland W45NBA002	PSS	W45NBA002	2	No other location for staging area for Kingrey road and wetland crossing
118.12	25 X 150	0.09	Wetland W45NBA002				
118.77	50 X 85	0.11	Lauderdale Woodyard Road and Stream S45NBB012	E PSS	S45NBB012 W45NBB025	1 2	No other location for staging for road and waterbody crossing. Wetland within construction right-of-way.
118.79	50 X 150	0.21	Stream S45NBB012				
120.76	50 X 150	0.17	Stream S45NBA035	P	S45NBA035	1	Workspace required for wide waterbody crossing.
121.32	25 X 150	0.09	Wetland W45NBA080	PEM	W45NBA080	2	No other location for staging area for road and long wetland crossing.
121.32	25 X 150	0.09	Wetland W45NBA080				
122.40	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115	E	D45NBA115	1	Existing pipelines within ditch.
122.41	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115				
122.44	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115				
122.45	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115				

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123.15	25 X 150	0.09	Ditch D45NBA032	I	D45NBA032	1	ATWS configured for optimal crossing of ditch.
123.16	25 X 150	0.09	Ditch D45NBA032				
123.19	25 X 150	0.09	Ditch D45NBA032				
123.19	25 X 150	0.09	Ditch D45NBA032				
123.41	25 X 150	0.09	Ditch D45NBA031	I	D45NBA031	1	ATWS configured for optimal crossing of ditch.
123.42	25 X 150	0.09	Ditch D45NBA031				
123.45	25 X 150	0.09	Ditch D45NBA031				
123.45	25 X 150	0.09	Ditch D45NBA031				
128.18	50 X 150	0.17	Wetland W45NBA022	PEM	W45NBA022	3	ATWS needed for wetland crossing.
129.43	25 X 115	0.07	Stream S45NBA017	P	S45NBA016 S45NBA017	1	ATWS located between two streams. No other location available for staging of 40-foot crossing of Stream S45NBA017.
129.60	50 X 130	0.15	Stream S45NBB205	I	S45NBB206	1	Waterbody meaders across construction right-of-way. ATWS needed for crossing.
129.64	50 X 130	0.16	Stream S45NBB205				
130.24	50 X 150	0.17	Wetland W45NBB029 and streams	PFO	W45NB030	2	ATWS needed for wetland and stream crossing
138.25	50 X 150	0.21	Crosstex pipeline	PEM	W45NBA011	2	Wetland within Conoco Phillips pipeline right-of-way. ATWS configured for optimal crossing of pipelines.
138.96	25 X 250	0.14	Highway 10 HDD	E	S45NBA055	1	No other location for staging of HDD.
140.46	50 X 150	0.17	Wetland W45NBA047	PEM/PSS PEM/PFO	W45NBA046 W45NBA047	2	Wetland W45NBA047 within construction right-of-way. ATWS located between two wetlands and configured for optimal crossing of Wetland W45NBA047.

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Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
140.56	25 X 390	0.23	Two TransCanada pipelines, wetlands, and ANR interconnect	PEM/PFO	W45NBA047 W45NBA048	2	No other location for staging of pipeline crossings and for workspace for interconnect.
140.56	50 X 520	0.61	Two TransCanada pipelines, wetlands, and ANR interconnect				
Sub-Total		***8.81***					
CGT Lateral							
0.46	15 X 200	0.07	Highway 13 / Veterans Memorial Highway	E PEM	D45NBA033 W45NBA072	1 2	Stream adjacent to north side of ATWS. Wetland within construction right-of-way. ATWS configured for optimal crossing of road.
0.48	25 X 100	0.06	Highway 13 / Veterans Memorial Highway				
1.02	50 X 150	0.19	Ditch DCGTLTB017	P	DCGTLTB017	1	ATWS required for optimal crossing of ditch.
1.04	25 X 150	0.09	Ditch DCGTLTB017				
3.17	25 X 300	0.20	Ditch DCGTLTB011	E	DCGTLTB011	1	Ditch located within construction right-of-way.
3.66	25 X 150	0.09	Ditch DCGTLTB013	E	DCGTLTB013	1	ATWS located for optimal crossing of ditch.
3.67	25 X 150	0.09	Ditch DCGTLTB013				
3.70	25 X 150	0.09	Ditch DCGTLTB013				
3.70	25 X 150	0.09	Ditch DCGTLTB013				
3.82	25 X 150	0.09	Wetland WCGTLTB014	PEM	WCGTLTB014	2	ATWS located for optimal crossing of wetland.
3.83	25 X 150	0.09	Wetland WCGTLTB014				
3.87	25 X 90	0.06	Wetland WCGTLTB014	E PEM	DCGTLTB005 WCGTLTB014	1	ATWS located for optimal crossing of ditch.
3.89	25 X 150	0.09	Wetland WCGTLTB014				
4.12	25 X 150	0.09	Ditch DCGTLTB015	E	DCGTLTB015	1	ATWS located for optimal crossing of ditch.
4.13	25 X 150	0.09	Ditch DCGTLTB015				
4.16	25 X 150	0.09	Ditch DCGTLTB015				
4.16	25 X 150	0.09	Ditch DCGTLTB015				

TABLE 1
Justification for Additional Temporary Work Space (ATWS) that is Located within 50 feet of a Waterbody or Wetland

Facility / Approx. Enter MP	Approximate Dimensions (ft)			Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
4.42	25	X	200	0.12	Hilly Road / Ditch DCGTLTB016	E	DCGTLTB016	1	ATWS located for optimal crossing of ditch.
4.43	25	X	200	0.12	Hilly Road / Ditch DCGTLTB016				
5.75	25	X	185	0.11	Stream SCGTLTB006 and Ditch DCGTLTB007	E	DCGTLTB006	1	ATWS located for optimal crossing of ditch.
5.75	25	X	200	0.12	Stream SCGTLTB006 and Ditch DCGTLTB007				
5.79	25	X	150	0.09	Ditch DCGTLTB007	E	DCGTLTB007	1	ATWS located for optimal crossing of ditch.
5.79	25	X	150	0.09	Ditch DCGTLTB007				
6.37	25	X	150	0.09	Ditch DCGTLTB008	E	DCGTLTB008	1	ATWS located for optimal crossing of ditch.
6.39	25	X	150	0.09	Ditch DCGTLTB008				
6.41	25	X	150	0.09	Ditch DCGTLTB008				
6.42	25	X	150	0.09	Ditch DCGTLTB008				
8.57	25	X	150	0.09	Ditch DCGTLTA001 and Wetland WCGTLTA003	I PEM	DCGTLTA001 WCGTLTA003	1 2	ATWS located for optimal crossing of ditch and wetland.
8.59	25	X	150	0.09	Ditch DCGTLTA001 and Wetland WCGTLTA003	I	DCGTLTA001	1	ATWS located for optimal crossing of ditch.
10.22	25	X	180	0.10	Wetland WCGTLTA011	PEM/PFO	WCGTLTA011	2	ATWS located between two wetlands and configured for optimal placement between wetlands.
10.47	20	X	1205	0.55	Wetland WCGTLTA009	PFO	WCGTLTA009	3	ATWS required adjacent to construction right-of-way for long wetland crossing (1,280 feet).
10.48	15	X	1275	0.44	Wetland WCGTLTA009				
10.73	50	X	150	0.17	Wetland WCGTLTA009	PEM	WCGTLTA009	2	ATWS required for long wetland crossing.
10.80	100	X	250	0.59	Wetland WCGTLTA016 HDD	PFO	WCGTLTA016	4	ATWS located for optimal HDD crossing.
11.10	25	X	250	0.15	Wetland WCGTLTA016 HDD	PEM	WCGTLTA001	4	Wetland along edge of ATWS. ATWS located for optimal HDD crossing.

TABLE 1
Justification for Additional Temporary Work Space (ATWS) that is Located within 50 feet of a Waterbody or Wetland

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres[1]	Reason for ATWS	Wetland / Stream Classif.[2]	Feature ID Wetland (W) Stream (S) Ditch (D)	Location[3] of ATWS	Justification
11.11	100 X 250	0.62	Wetland WCGTLTA016 HDD	PFO PEM	WCGTLTA016 WCGTLTA002	2 4	Wetland WCGTLTA016 along edge of ATWS. Wetland WCGTLTA002 goes through ATWS. ATWS located for optimal HDD crossing.
11.16	50 X 210	0.25	Railroad and Wetland WCGTLTA015	PEM	WCGTLTA015	4	Wetland encroaches into construction right-of-way and ATWS. ATWS located for optimal crossing of Wetland WCGTLTA015.
11.18	25 X 200	0.12	Railroad and Wetland WCGTLTA015				
11.23	50 X 200	0.24	Railroad and Wetland WCGTLTA015	PSS	WCGTLTA015	4	ATWS located for optimal crossing of Wetland WCGTLTA015.
Sub-Total		***6.08***					
PPEC Lateral							
0.53	25 X 600	0.35	Stream SPPECLTA001	I	SPPECLTA001	2	ATWS located for optimal crossing of waterbody.
1.53	100 X 250	0.59	East Fork Bayou Nezpique HDD	PSS/PFO	WPPECLTA002	3	ATWS required for HDD crossing.
1.53	25 X 250	0.14	East Fork Bayou Nezpique HDD				
2.69	25 X 150	0.09	Narcisse Road	I	DPPECLTA003	2	ATWS located for optimal crossing of road.
2.70	25 X 150	0.09	Narcisse Road				
Sub-Total		***1.26***					
TOTAL		**30.49**					

1 Acreage calculated from actual footprint, which may not correspond to the approximate dimensions.

2 Wetland: E2EM = Estuarine; PFO = Palustrine Forested; PSS = Palustrine Scrub-shrub; PEM = Palustrine emergent
Waterbody: P = perennial; I = Intermittent; E = Ephemeral

TABLE 2
Justification for Placing Loops 1 and 2 at a Greater than 25-foot Offset from the Existing CCTPL Pipeline

Facility / Approx.Enter MP	Parish	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Justification
Loop 1					
1.9	Cameron	2,476	W14LPA019	E2EM	CCTPL proposes a 35-foot offset between the existing pipeline and proposed loop due to the unconsolidated soils found in the Project area and the large diameter (42 inches) of both the existing and loop pipelines. To reduce the offset from 35 feet to 25 feet would be unsafe, considering that the construction right-of-way would now overlap an active high pressure gas pipeline. This is not a standard industry practice and is usually more environmentally disruptive due to the amount of fill material that needs to be imported to the right-of-way, placed over the active pipeline, and then removed upon completion of construction.
2.4	Cameron	10,332	W14LPA018	E2EM	
4.4	Cameron	7,945	W14LPA020	E2EM	
5.9	Cameron	8,197	W14LPA002	E2EM	
7.5	Cameron	2,597	W14LPA001	E2EM	
8.0	Cameron	2,826	W14LPA001	PSS	
8.9	Cameron	962	W14LPA021	PSS	
8.9	Cameron	333	W14LPA021	PEM	
9.2	Cameron	7,887	W14LPA008	PEM	
9.2	Cameron	0	W14LPA022	PSS	
10.9	Cameron	1,375	W14LPA009	PEM	
10.9	Cameron	112	W14LPA009	PSS	
11.5	Cameron	1,277	W14LPA004	PEM	
12.0	Cameron	0	W14LPA005	PEM	
12.1	Cameron	295	W14LPA006	PEM	
12.2	Cameron	765	W14LPA007	PEM	
12.4	Cameron	2,371	W14LPA023	PEM	
13.0	Cameron	3,352	W14LPA024	PEM	
14.3	Cameron	1,022	W14LPA025	PSS	
14.5	Cameron	36	W14LPA025	PEM	
14.5	Cameron	0	W14LPA011	PSS	
14.6	Cameron	683	W14LPA011	PEM	
14.7	Cameron	9	W14LPA012	PEM	
14.8	Cameron	4	W14LPA038	PEM	
15.0	Cameron	512	W14LPA014	PEM	
15.1	Cameron	914	W14LPA015	PEM	
15.3	Cameron	675	W14LPA016	PSS	

TABLE 2
Justification for Placing Loops 1 and 2 at a Greater than 25-foot Offset from the Existing CCTPL Pipeline

Facility / Approx.Enter MP	Parish	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Justification
	Sub-Total	***56,957***			
Loop 2					
69.4	Calcasieu	52	W25LPA068	PEM	CCTPL proposes a 35-foot offset between the existing pipeline and proposed loop due to the unconsolidated soils found in the Project area and the large diameter (42 inches) of both the existing and loop pipelines. To reduce the offset from 35 feet to 25 feet would be unsafe, considering that the construction right-of-way would now overlap an active high pressure gas pipeline. This is not a standard industry practice and is usually more environmentally disruptive due to the amount of fill material that needs to be imported to the right-of-way, placed over the active pipeline, and then removed upon completion of construction.
69.4	Calcasieu	0	W25LPA068	PFO	
69.6	Calcasieu	41	W25LPA067	PSS	
69.6	Calcasieu	24	W25LPA067	PEM	
69.7	Calcasieu	277	W25LPA066	PEM	
69.7	Calcasieu	378	W25LPA066	PFO	
69.8	Calcasieu	14	W25LPA065	PEM	
69.9	Calcasieu	0	W25LPA064	PFO	
69.9	Calcasieu	92	W25LPA064	PEM	
69.9	Calcasieu	0	W25LPA061	PFO	
70.0	Calcasieu	168	W25LPA061	PEM	
70.1	Calcasieu	144	W25LPA060	PEM	
70.1	Calcasieu	161	W25LPA060	PFO	
70.2	Calcasieu	0	W25LPA058	PFO	
70.2	Calcasieu	254	W25LPA058	PEM	
70.2	Calcasieu	0	W25LPA056	PFO	
70.3	Calcasieu	190	W25LPA056	PEM	
70.3	Calcasieu	0	W25LPA057	PEM	
70.4	Calcasieu	0	W25LPA055	PSS	
70.4	Calcasieu	62	W25LPA055	PEM	
70.4	Calcasieu	0	W25LPA054	PSS	
70.5	Calcasieu	0	W25LPA053	PEM	
70.5	Calcasieu	0	W25LPA052	PSS	
70.5	Calcasieu	95	W25LPA052	PEM	
70.5	Calcasieu	0	W25LPA051	PSS	
70.6	Calcasieu	0	W25LPA050	PSS	

TABLE 2
Justification for Placing Loops 1 and 2 at a Greater than 25-foot Offset from the Existing CCTPL Pipeline

Facility / Approx.Enter MP	Parish	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Justification
70.6	Calcasieu	0	W25LPA049	PEM	CCTPL proposes a 35-foot offset between the existing pipeline and proposed loop due to the unconsolidated soils found in the Project area and the large diameter (42 inches) of both the existing and loop pipelines. To reduce the offset from 35 feet to 25 feet would be unsafe, considering that the construction right-of-way would now overlap an active high pressure gas pipeline. This is not a standard industry practice and is usually more environmentally disruptive due to the amount of fill material that needs to be imported to the right-of-way, placed over the active pipeline, and then removed upon completion of construction.
70.7	Calcasieu	0	W25LPA048	PSS	
70.7	Calcasieu	201	W25LPA048	PEM	
70.8	Calcasieu	0	W25LPA047	PEM	
70.8	Calcasieu	35	W25LPA046	PEM	
70.8	Calcasieu	44	W25LPA045	PSS	
70.8	Calcasieu	0	W25LPA045	PEM	
70.8	Calcasieu	183	W25LPA044	PSS	
70.8	Calcasieu	0	W25LPA044	PEM	
71.2	Calcasieu	47	W25LPA042	PSS	
71.3	Calcasieu	15	W25LPA041	PSS	
71.4	Calcasieu	147	W25LPA040	PEM	
71.4	Calcasieu	0	W25LPA040	PSS	
71.6	Calcasieu	91	W25LPA039	PSS	
71.6	Calcasieu	207	W25LPA039	PEM	
73.3	Calcasieu	0	W25LPA069	PSS	
73.3	Calcasieu	0	W25LPA070	PEM	
73.5	Calcasieu	168	W25LPA071	PFO	
73.6	Calcasieu	1,352	W25LPA073	PFO	
73.8	Calcasieu	128	W25LPA074	PFO	
74.1	Calcasieu	216	W25LPA097	PEM	
74.2	Calcasieu	0	W25LPA098	PEM	
74.4	Calcasieu	117	W25LPA099	PEM	
75.3	Calcasieu	0	W25LPA100	PSS	
75.4	Calcasieu	211	W25LPA100	PEM	
76.5	Calcasieu	357	W25LPA010	PEM	
76.5	Calcasieu	0	W25LPA010	PSS	
76.7	Calcasieu	2	W25LPA011	PEM	

TABLE 2
Justification for Placing Loops 1 and 2 at a Greater than 25-foot Offset from the Existing CCTPL Pipeline

Facility / Approx.Enter MP	Parish	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Justification
76.7	Calcasieu	127	W25LPA012	PEM	CCTPL proposes a 35-foot offset between the existing pipeline and proposed loop due to the unconsolidated soils found in the Project area and the large diameter (42 inches) of both the existing and loop pipelines. To reduce the offset from 35 feet to 25 feet would be unsafe, considering that the construction right-of-way would now overlap an active high pressure gas pipeline. This is not a standard industry practice and is usually more environmentally disruptive due to the amount of fill material that needs to be imported to the right-of-way, placed over the active pipeline, and then removed upon completion of construction.
76.9	Calcasieu	191	W25LPA013	PEM	
77.0	Calcasieu	569	W25LPA014	PEM	
77.1	Calcasieu	223	W25LPA015	PEM	
77.2	Calcasieu	218	W25LPA016	PEM	
77.5	Calcasieu	26	W25LPA018	PSS	
77.7	Calcasieu	66	W25LPA019	PEM	
77.8	Calcasieu	123	W25LPA020	PEM	
77.8	Calcasieu	83	W25LPA101	PEM	
78.0	Calcasieu	69	W25LPA086	PEM	
78.2	Calcasieu	4,038	W25LPA087	PEM	
79.2	Calcasieu	1,114	W25LPA021	PEM	
79.2	Calcasieu	26	W25LPA022	PSS	
79.6	Calcasieu	1,294	W25LPA023	PEM	
79.6	Calcasieu	254	W25LPA023	PSS	
79.7	Calcasieu	976	W25LPA024	PEM	
79.9	Calcasieu	1,064	W25LPA025	PSS	
80.2	Calcasieu	229	W25LPA025	PEM	
80.4	Calcasieu	482	W25LPA026	PEM	
80.9	Calcasieu	17	W25LPA027	PSS	
80.9	Calcasieu	0	W25LPA028	PEM	
81.1	Calcasieu	54	W25LPA029	PFO	
81.4	Calcasieu	580	W25LPA031	PFO	
82.2	Calcasieu	175	W25LPA032	PEM	
82.3	Calcasieu	10	W25LPA033	PEM	
82.7	Calcasieu	373	W25LPA034	PEM	
84.6	Calcasieu	210	W25LPA001	PSS	
84.6	Calcasieu	547	W25LPA001	PEM	

TABLE 2
Justification for Placing Loops 1 and 2 at a Greater than 25-foot Offset from the Existing CCTPL Pipeline

Facility / Approx.Enter MP	Parish	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Justification
84.8	Calcasieu	82	W25LPA002	PEM	CCTPL proposes a 35-foot offset between the existing pipeline and proposed loop due to the unconsolidated soils found in the Project area and the large diameter (42 inches) of both the existing and loop pipelines. To reduce the offset from 35 feet to 25 feet would be unsafe, considering that the construction right-of-way would now overlap an active high pressure gas pipeline. This is not a standard industry practice and is usually more environmentally disruptive due to the amount of fill material that needs to be imported to the right-of-way, placed over the active pipeline, and then removed upon completion of construction.
85.0	Calcasieu	0	W25LPA003	PEM	
85.2	Calcasieu	453	W25LPA005	PSS	
85.2	Calcasieu	0	W25LPA005	PEM	
85.3	Calcasieu	8	W25LPA006	PEM	
85.7	Beauregard	0	W25LPA007	PEM	
85.7	Beauregard	922	W25LPA007	PSS	
86.2	Beauregard	0	W25LPA008	PEM	
86.8	Beauregard	33	W25LPA009	PEM	
88.2	Beauregard	0	W25LPA035	PEM	
89.2	Beauregard	0	W25LPA036	PSS	
89.2	Beauregard	177	W25LPA036	PEM	
90.2	Beauregard	541	W25LPA037	PFO	
91.4	Beauregard	763	W25LPA038	PSS	
91.4	Beauregard	0	W25LPA038	PEM	
	Sub-Total	***21,590***			
	Total	**78,547**			

1 E2EM = Estuarine; PFO = Palustrine Forested; PSS = Palustrine Scrub-shrub; PEM = Palustrine emergent.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
Loop 1					
1.9	2,476	W14LPA019	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
2.4	10,332	W14LPA018	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
2.4	10,332	W14LPA018	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
4.4	7,945	W14LPA020	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
5.9	8,197	W14LPA002	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
7.5	2,597	W14LPA001	E2EM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
8.0	2,826	W14LPA001	PSS	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
8.9	962	W14LPA021	PSS	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
					into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
8.9	333	W14LPA021	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
9.2	7,887	W14LPA008	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
10.9	1,375	W14LPA009	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
10.9	112	W14LPA009	PSS	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
11.5	1,277	W14LPA004	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
12.1	295	W14LPA006	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
12.2	765	W14LPA007	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
12.4	2,371	W14LPA023	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
13.0	3,352	W14LPA024	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
14.3	1,022	W14LPA025	PSS	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
14.5	36	W14LPA025	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
14.6	683	W14LPA011	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
15.0	512	W14LPA014	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
15.1	914	W14LPA015	PEM	120	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
Loop 2					
69.4	52	W25LPA068	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
69.7	277	W25LPA066	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
69.7	378	W25LPA066	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.0	168	W25LPA061	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.1	144	W25LPA060	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.1	161	W25LPA060	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.2	254	W25LPA058	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.3	190	W25LPA056	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.4	62	W25LPA055	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.5	95	W25LPA052	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
70.7	201	W25LPA048	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.8	35	W25LPA046	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.8	44	W25LPA045	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
70.8	183	W25LPA044	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
71.4	147	W25LPA040	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
71.6	91	W25LPA039	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
71.6	207	W25LPA039	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
75.4	211	W25LPA100	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
77.7	66	W25LPA019	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
77.8	83	W25LPA101	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
78.0	69	W25LPA086	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
78.2	4,038	W25LPA087	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
79.2	26	W25LPA022	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
79.6	1,294	W25LPA023	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
79.6	254	W25LPA023	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
79.7	976	W25LPA024	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
79.9	1,064	W25LPA025	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
80.2	229	W25LPA025	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
84.6	210	W25LPA001	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
84.6	547	W25LPA001	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
85.7	922	W25LPA007	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
89.2	177	W25LPA036	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.
91.4	763	W25LPA038	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland. Approved for installation of original pipeline.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
Extension					
100.2	612	W45NBB041	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
100.9	730	W45NBB024	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
101.0	2,010	W45NBB024	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
102.7	196	W45NBB042	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
103.4	307	W45NBA020	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
103.4	317	W45NBA021	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
104.1	522	W45NBB034	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
104.3	218	W45NBB035	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
104.3	164	W45NBB035	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
104.9	352	W45NBA040	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
105.5	1,458	W45NBA085	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
106.5	184	W45NBB039	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
108.1	17	W45NBA035	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
108.5	168	W45NBA037	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
108.8	773	W45NBA092	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
111.7	36	W45NBA094	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
111.8	37	W45NBA095	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
112.1	268	W45NBA098	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
112.8	146	W45NBA100	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
112.9	185	W45NBA061	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
114.9	5	W45NBA028	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
115.0	338	W45NBA029	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
115.3	679	W45NBA031	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
115.7	70	W45NBA032	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
115.7	54	W45NBA032	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
116.8	128	W45NBA059	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
116.9	85	W45NBA058	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
117.6	1,969	W45NBA004	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
117.8	106	W45NBA004	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
118.0	82	W45NBA003	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
118.0	338	W45NBA003	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
118.1	78	W45NBA002	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
118.3	188	W45NBA001	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
119.3	1,359	W45NBB028	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
120.0	638	W45NBA078	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
120.4	1,758	W45NBA079	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
121.1	851	W45NBA080	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
121.3	45	W45NBA080	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
124.4	183	W45NBA069	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
128.0	832	W45NBA022	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
128.2	332	W45NBA023	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
129.1	57	W45NBA024	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
130.5	1,369	W45NBB029	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
134.9	324	W45NBA005	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
135.3	76	W45NBA006	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
135.3	125	W45NBA007	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
135.8	417	W45NBA008	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
138.1	8	W45NBA010	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
138.7	121	W45NBA013	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.1	25	W45NBA041	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.1	4	W45NBA042	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.2	732	W45NBA045	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.5	38	W45NBA046	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.5	463	W45NBA047	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
140.6	512	W45NBA048 [1]	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
CGT Lateral					
1.1	560	WCGTLTB038	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
3.9	28	WCGTLTB014	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
7.6	636	WCGTLTB020	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
8.5	160	WCGTLTA018	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
8.6	393	WCGTLTA003	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
9.4	136	WCGTLTA013	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
10.2	1,485	WCGTLTA011	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
10.5	1,174	WCGTLTA009	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

TABLE 3
Justification for Construction Right-of-Way Width in Wetlands

Facility / Approx. Enter MP	Crossing Length (ft)	Wetland ID	NWI Classification[1]	Construction ROW Width (Feet)	Justification
11.2	101	WCGTLTA002	PEM	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
11.2	21	WCGTLTA015	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
PPEC Lateral					
1.2	1,858	WPPECLTA002	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
2.2	237	WPPECLTA006	PFO	85	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
3.4	61	WPPECLTA005	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.
3.5	109	WPPECLTA004	PSS	100	OSHA Type C soil conditions affect slope stability of pipeline trench and saturated soil conditions make it difficult to contain spoil. Wider construction right-of-way will ensure excavated material does not run into adjacent wetland.

1 E2EM = Estuarine; PFO = Palustrine Forested; PSS = Palustrine Scrub-shrub; PEM = Palustrine emergent.

Cheniere Creole Trail Pipeline Company, L.P.
CCTPL Expansion Project

Spill Prevention and Response Procedures

September 2013

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ACRONYMS AND ABBREVIATIONS

CCTPL	Cheniere Creole Trail Pipeline Company, L.P.
CWA	Clean Water Act
FEMA	Federal Emergency Management Agency
FERC or Commission	Federal Energy Regulatory Commission
LNG	liquefied natural gas
M&R	meter and regulation
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
Plan	FERC’s *Upland Erosion Control, Revegetation, and Maintenance Plan*
Procedures	FERC’s *Wetland and Waterbody Construction and Mitigation Procedures*
Project	Creole Trail Expansion Project
SPRP Plan	Spill Prevention and Response Procedures
SPLNG Terminal	Sabine Pass LNG Terminal
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1.0 INTRODUCTION AND SCOPE

1.1 Introduction

The purpose of the Spill Prevention and Response Procedures ("SPRP") are to establish protocol to prevent the discharge of hazardous materials, particularly into or upon the navigable waters of the United States or their tributaries during construction of the Cheniere Creole Trail Pipeline Company, L.P. (CTPL) Creole Trail Expansion Project (Project) in Louisiana. The Project involves:

- Construction of the new Mamou Compressor Station in Evangeline Parish on an approximate 40-acre parcel;
- Construction of four meter and regulation stations, of which two are co- located on the parcel for the proposed Mamou Compressor Station;
- Construction of 104.3 miles of new pipeline including:
  - Loop 1 – 13.9 miles of 42-inch pipeline in Cameron Parish;
  - Loop 2 – 24.5 miles of 42-inch pipeline in Calcasieu and Beauregard Parishes;
  - Extension – 48.5 miles of 42-inch pipeline in Beauregard, Allen and Evangeline Parishes;
  - CGT Lateral – 11.5 miles of 36-inch pipeline in Evangeline Parish;
  - PPEC Lateral – 4.0 miles of 42-inch pipeline in Evangeline Parish;
  - ANR Lateral – 1.7 miles of 36-inch pipeline in Evangeline Parish;
  - TGT Lateral – 0.2 mile of 36-inch pipeline in Evangeline Parish; and
  - Construction of mainline valves ("MLV") and launcher/receivers.

This SPRP Plan is intended to comply with the requirements of Section IV of the Federal Energy Regulatory Commission's *Wetland and Waterbody Construction and Mitigation Procedures* (May 2013) and is designed to complement existing laws, regulations, rules, standards, policies and procedures pertaining to safety standards and pollution rules, in order to minimize the potential for unauthorized releases of hazardous materials including fuel and lubricants. While the SPRP Plan is intended to identify necessary preventative measures for foreseeable potential unauthorized releases, not every potential situation can be foreseen.

1.2 Scope

This SPRP Plan applies to all construction and reclamation activities of the Project. The operating phase of the Project is not covered in this SPRP Plan.

The SPRP Plan applies to use of hazardous materials at the Project sites and all ancillary areas. This includes the refueling or servicing of all equipment with diesel fuel, gasoline, lubricating oils, grease, hydraulic and other fluids during construction of Project facilities.

2.0 SPILL PREVENTION

The following spill prevention measures will be implemented by CCTPL:

- CCTPL will require all contractors and employees attend environmental compliance training, in which the handling of fuels and other hazardous materials will be addressed.
- CCTPL will require all contractors to ensure that all equipment is in good operating order and inspected on a regular basis.
- Fuel trucks transporting fuel to on-site equipment will travel only on approved access roads.
- Fuels and lubricants will be stored only at designated staging areas. As part of the construction contract, guidelines will be established to minimize the potential for fuels and lubricants to enter waters of the U.S.
- CCTPL will require its contractors to perform all routine equipment maintenance at the designated staging areas and contain, collect, and dispose of wastes in an appropriate manner.
- Secondary containment will be utilized around any above-ground bulk tanks, drums, or storage containers (if single-walled), so that potential spill materials will be contained and collected in specified areas isolated from any waterbodies. Double-walled tanks, if used, will be manually filled and attended while filling. Tanks, drums or any containers will not be placed in areas subject to periodic flooding or washout.
- A supply of sorbent and barrier materials sufficient to allow the rapid containment and recovery of any spill will be maintained at the Project sites. Sorbent and barrier materials will also be utilized to contain runoff from contaminated areas.
- Shovels and storage containers will be kept at each of the Project sites. In the event that small quantities of soil become contaminated, shovels will be utilized to collect the soil and the material will be stored in a sealed container. Large quantities of contaminated soil may be bioremediated on-site, subject to government and CCTPL approval and landowner permission, or collected utilizing heavy equipment, and stored in drums or other suitable containers prior to disposal. Should contamination occur adjacent to areas as a result of runoff, shovels and/or heavy equipment will be utilized to collect the contaminated material. Contaminated soil will be disposed of in accordance with state and federal regulations.
- All containers and fuel tanks will be subject to visual inspection on a daily basis and when the tank is refilled. Tanks will be monitored continuously so that potential leaks or spills will be quickly detected.
- Visible fuel leaks will be stopped or contained immediately, then reported to the contractor's and CCTPL's designated representative, and cleaned up as soon as reasonably possible.
- Drain valves on secondary containments will be closed and locked to prevent accidental or unauthorized discharges from the tank. All stormwater collected in the secondary containments

will be inspected for trash or sheen prior to discharge. Any sheen will be removed with absorbent pads, and disposed of properly prior to discharge. Trash will be removed prior to discharge of stormwater. If collected stormwater cannot be cleared of sheen or debris, an approved vendor will be utilized to remove contaminated stormwater and disposed of in accordance with state and federal regulations.

- All equipment will be parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary, unless otherwise approved by FERC. These activities can also occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

- Hazardous materials, including chemicals, fuels, and lubricating oils, will not be stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is previously approved according to the FERC Procedures.

- Concrete coating activities will not be performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities may occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

- Pumps operating within 100 feet of a waterbody or wetland boundary will utilize appropriate secondary containment systems to prevent spills.

3.0 SPILL REPONSE

In the event of a spill or leak, initial control and containment measures that can be safely performed will be implemented immediately by individuals at the site utilizing the spill-response equipment and materials described in Section 4.0. The contractor will immediately notify the CCTPL designated representative and ensure that all proper procedures are followed. The CCTPL designated representative will inspect the spill site as soon as possible and determine if further action is necessary to contain the spill.

4.0 EQUIPMENT AND MATERIALS

Spill response equipment, in the form of portable Spill Response Kits, will be available at each construction spread and wherever hazardous materials and/or fuels and lubricants are handled or stored. This equipment will be readily available to respond to a hazardous material spill or release. Such equipment will include, but not be limited to, the following:

- Personal Protective Equipment (i.e. gloves, goggles.);
- Absorbent materials (Pads and Booms) and storage containers; and
- Small shovel.

Contractors will be responsible for inspecting spill kits weekly as well as maintaining and restocking equipment and supplies as needed.

5.0 EMERGENCY NOTIFICATION

Emergency notification procedures will be established in the preplanning stages of construction, and a CCTPL designated representative will be identified to serve as contact in the event of a spill during construction activities. Upon notification of a spill the CCTPL designated representative will immediately determine if the event meets government reporting criteria and, if required, will notify the appropriate regulatory agencies. The CCTPL designated representative will use the Louisiana Uniform Hazardous Materials Reporting Form (see Appendix A, Attachment 1) to collect information and report the event.

The CCTPL designated representative will make internal notifications to CCTPL personnel as directed for all spill events occurring during construction.

See Appendix A, Attachment 2 for Spill Reporting Information

6.0 SPILL CONTAINMENT AND COUNTERMEASURES

In the event of a spill of hazardous material, the contractor will:

- Immediately notify the CCTPL designated representative and/or Environmental Inspector;
- Identify the product hazards related to the spilled material and implement appropriate safety measures, based on the nature of the hazard;
- Isolate or shutdown the source of the spill if it can be done safely;
- Block culverts to limit spill travel;
- Initiate containment procedures to limit the spill to as small an area as possible, to prevent damage to property or areas of environment concern (e.g., watercourses); and
- Commence recovery of the spill and clean-up operations.

When notified of a spill, the CCTPL designated representative will immediately ensure that:

- Action is taken to control danger to the public and personnel in the project area;
- Spill contingency plans are implemented and that necessary equipment and manpower are available and mobilized if required;

- Measures are taken to isolate or shutdown the source of the spill;
- All resources necessary to contain, recover and clean up the spill are available;
- Any resources requested by the contractor are provided;
- Appropriate agencies are notified.

On a land spill, actions will immediately be taken to physically contain the spill (i.e. absorbent pads, socks, kitty litter, etc). Personnel entry and travel on contaminated soils will be limited to that which is necessary for control and cleanup activities. Sorbent materials will be applied as needed to contain or clean up the spilled material. Contaminated sorbent materials, soil, and vegetation will also be collected and disposed of at an approved facility.

7.0 PROJECT NOTIFICATION LIST

Cheniere Creole Trail Pipeline		
Vice President, Pipeline Operations and Maintenance	Bill Hall	713-375-5619
Director, Environmental Projects	Cathy Rourke	713-375-5399
Director, Environmental	David Ayers	713-375-5473
Manager, Environmental	Kyle Purvis	713-375-5676
Project Consulting Services		
Project Director	David Ferer	713-407-2477
Project Manager	Mona Shaarawi	713-407-2420
Director, Construction	Frank Johnson	205-529-8300
Environmental Inspector	To Be Determined	

APPENDIX A

REPORTING FORM

SPILL CONTACT INFORMATION

Cheniere Creole Trail Pipeline Company, L.P.
CCTPL Expansion Project

Horizontal Directional Drilling (HDD)
Drilling Mud/Frac-out Contingency Plan

September 2013

I. Purpose and Objective

All stages of horizontal directional drilling (HDD) operations involve circulating drilling fluid from equipment on the surface, through a drill pipe, and back to the surface through the drilled annulus. Drilling fluid plays a critical role in the HDD process including transportation of soil and rock cuttings to the surface and stabilization of the hole. Just as critical, the fluid reduces drilling friction, cools and cleans the drill cutters, transmits hydraulic power to the drill bit, and performs the hydraulic excavation of the cuttings.

The primary component of drilling fluid used in HDD pipeline installation is water. To enhance the fluid performance, a viscosifier may be added to the water to improve its properties. The primary viscosifier used on HDD installations is the naturally occurring bentonite clay. Specific soils and drilling conditions may require the addition of various constituents to vary the properties of the drilling fluid to meet the needs of the particular situation.

The most likely occurrence of inadvertent mud developing during the drilling operations is from 'frac-outs'. Frac-outs usually occur when the down-hole pressures are too high and overcome the restraining forces of the surrounding formation. This most often occurs during the pilot hole drilling operations when the pressures are the highest. Therefore, moderation of down-hole pressures aid in avoiding frac-outs. The nature of the soil formation in the project area is mainly silt, clay and some sand which lends itself to reducing frac-outs.

The purpose of this plan is to identify procedures to be followed in the event of a frac-out involving an inadvertent drilling mud release during HDD operations. A frac-out is a condition in which drilling mud is released through fractures in the soil and migrates toward the surface. Drilling mud consists mainly of a bentonite clay-water mixture, which is not considered to be hazardous or toxic. However, the objective is to minimize the potential of a frac-out and identify response measures in the event that a frac-out occurs, in order to mitigate any potential adverse impact to waterbodies, wetlands and associated habitats. Escape of drilling mud from a frac-out is most common near the directional drill entry and exit locations. However, frac-outs can occur at any location along a directional drill.

This plan provides operational procedures and responsibilities for the prevention, containment, and clean-up of frac-outs associated with HDD operations.

The objectives of this plan includes:

- Minimize the potential for a frac-out due to HDD operations.
- Identify timely detection of frac-outs.
- Provide for environmental protection of sensitive resources such as waterbodies, wetlands and associated habitats.

- Establish response procedures in the event of a frac-out.

II. Layout and Design for Horizontal Directionally Drilled Crossings

The pipeline alignment drawings show the entry and exit locations and staging areas for HDD crossings. The staging areas have been limited to the minimum needed to construct the crossing. Further, these layouts have been designed to minimize the potential for impacts to waterbodies and wetlands by providing no less than 50 foot buffers to the sensitive resource. Additionally, the entry and exit locations have been sited with maximum design depth clearance to provide the greatest buffer between the sensitive resource and the drilling activity/installed pipe. The combination of the buffer and the depth of the pipe beneath the sensitive resource is anticipated to minimize and avoid any adverse impacts.

For some of the HDD crossings, pumps for obtaining water for the drilling fluid and/or for hydrostatic testing will require that a 10 to 15-foot wide temporary access path be available on one or both sides of the crossing to allow access for the placement of the pump and the laying of water pipe from the water source to the drilling or hydrostatic testing operation. This same path may also be required for the temporary deployment of telemetry cable to guide the drilling cutter. Access may be along and within the existing or new permanent pipeline right-of-way, or via a temporary path from the HDD entry/exit site to the waterbody. If forested, clearing will be limited to brush trimming. Table 1 lists planned HDDs and the locations where access paths will be used.

TABLE 1. CCTPL Expansion Project, HDDs

Facility / Approximate Milepost	HDD Crossing	Pipe Diameter (inches)	Access Path
Loop 2			
71.0	Houston River Canal	42	10-foot path on CCTPL right-of-way
73.4	Houston River	42	10-foot path on CCTPL right-of-way
76.3	U,S. Highway 27/Bankens Road/Railroad	42	None
77.3	Little River	42	10-foot path on CCTPL right-of-way
81.0	West Fork of Calcasieu River	42	10-foot path on CCTPL right-of-way
86.7	Indian Bayou/Camp Edgewood Road	42	10-foot path on CCTPL right-of-way
90.1	Marsh Bayou	42	10-foot path on CCTPL right-of-way
Extension			
96.7	Barnes Creek	42	10-foot path on CCTPL right-of-way
108.8	Whiskey Chitto Creek	42	10-foot path on CCTPL right-of-way
112.2	Calcasieu River	42	10-foot path on CCTPL right-of-way
114.4	Highway 165	42	None
139.0	Highway 10	42	None

TABLE 1. CCTPL Expansion Project, HDDs

Facility / Approximate Milepost	HDD Crossing	Pipe Diameter (inches)	Access Path
CGT Lateral			
10.8	WCGTLTA016 Wetland	36	10-foot path on CCTPL right-of-way
PPEC Lateral			
1.6	East Fork Bayou Nezpique	42	10-foot path on CCTPL right-of-way

III. Environmental Inspection and Training

Prior to the start of construction, Creole Trail's Environmental Inspector will conduct a training session with all key contractor, drilling and inspection personnel. All personnel working at the HDD site will be thoroughly trained in the applicable frac-out contingency plan items. In addition, the EI will ensure that the contractor has proper equipment and materials available on-site at all times or access to the in a timely manner, and that the necessary procedures are followed. Tailgate meetings will ensure ongoing effective communications and awareness measures regarding prevention, mitigation and response associated with potential frac-outs.

IV. Mitigation Measures

- Applicable regulatory agencies will be contacted as required should a frac-out occur. The Environmental Inspector will have a complete list of the applicable agencies should a response notification be required.
- All equipment will be checked and maintained daily.
- Sufficient supplies of spill containment materials and hay bales will be available on-site at all times.
- Frac-out barrels will be located on-site at all times.
- Entry and exit drill pits will be contained utilizing berms and/or sediment control devices where possible. Any abandoned HDD drill holes will be filled and capped with native material or a grout mixture.
- Visual observation (on-land and sensitive resources) will occur on a regular basis throughout HDD operations so that a potential surface frac-out can be identified.
- At the first sign of release of drilling fluids (frac-out) the contractor will take immediate actions to control the release. Depending on the location and the amount of fluid being released, the actions taken may include:
- Stop or slowing the drilling operations and stop or reduce the mud pumping to allow time for the leak to self-heal
- Reduce the drilling fluid pressures
- Add thickening or blocking additives to the fluid mixture.

- In the event of a frac-out, the on-site Environmental Inspector will evaluate the situation and provide direction for mitigation actions.
- Clean up of all frac-outs/spills shall begin immediately.
- In the event of a frac-out that reaches the surface, but not the sensitive resource, bentonite shall be contained, removed and disposed at an approved facility.
- In the event that a frac-out reaches a sensitive resource, corrective action will be taken immediately. Clean-up work will be performed by hand to the extent possible. A vacuum truck will be used to vacuum up the associated bentonite and soils as necessary. The materials will be properly disposed at an approved facility.
- All cleanup materials will be disposed on a daily basis as applicable, and at the completion of the project.
- In the event that a drill hole must be abandoned, the bore will be sealed by the injection of a high-viscosity bentonite slurry.
- Documentation will be prepared for any frac-outs that occur during HDD operations.

APPENDIX 3 SABINE PASS AND CCTPL ACCESS ROADS

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TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
Loop 1				
1.86	50 X 140	0.16	SPLNG Terminal Entrance Road	Open Land
2.34	50 X 200	0.25	Highway 82/Gulf Beach Highway	Open Land
2.40	50 X 200	0.36	Highway 82/Gulf Beach Highway	Open Land
4.30	25 X 150	0.09	Canal D14LPA003	Open Land
4.30	25 X 150	0.09	Canal D14LPA003	Open Land
4.35	25 X 150	0.09	Canal D14LPA003	Open Land
4.35	25 X 150	0.09	Canal D14LPA003	Open Land
4.62	25 X 300	0.17	Duncan Pipeline	Open Land
4.62	25 X 300	0.17	Duncan Pipeline	Open Land
5.20	50 X 300	0.34	Davis Petroleum and CCTPL Pipeline	Open Land
5.20	50 X 300	0.34	Davis Petroleum and CCTPL Pipeline	Open Land
5.30	25 X 150	0.09	Canal D14LPA004	Open Land
5.30	25 X 150	0.09	Canal D14LPA004	Open Land
5.34	25 X 150	0.09	Canal D14LPA004	Open Land
5.34	25 X 150	0.09	Canal D14LPA004	Open Land
7.40	25 X 150	0.09	Road	Open Land
7.41	25 X 300	0.17	Road	Open Land
7.44	25 X 150	0.09	Road	Open Land
9.10	50 X 410	0.50	Deep Bayou Road and Bridgeline Holdings pipeline	Open Land
9.17	25 X 200	0.11	Deep Bayou Road	Open Land
9.17	25 X 200	0.11	Deep Bayou Road	Open Land
9.37	100 X 250	0.57	Pond S14LPA006	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
9.50	100 X 250	0.57	Pond S14LPA006	Open Land
12.11	25 X 200	0.12	Middle Ridge Road	Open Land
12.15	25 X 200	0.12	Middle Ridge Road	Open Land
12.19	25 X 165	0.10	Middle Ridge Road	Open Land
12.19	25 X 70	0.05	Middle Ridge Road	Open Land
12.31	25 X 200	0.12	Berwick Road	Open Land
12.32	25 X 200	0.12	Berwick Road	Open Land
12.37	25 X 200	0.12	Berwick Road	Open Land
12.37	25 X 200	0.12	Berwick Road	Open Land
15.24	50 X 135	0.15	Skyhawk Road and Pond	Agricultural
15.63	25 X 150	0.09	Tie-in, Gulf South, Crosstex, and Two (2) El Paso pipelines	Agricultural
15.64	25 X 90	0.05	Tie-in, Gulf South, Crosstex, and Two (2) El Paso pipelines	Agricultural
	Sub-Total	*5.88*		
Loop 2				
69.63	50 X 150	0.18	Wetland W25LPA066	Open Land
69.64	50 X 150	0.18	Wetland W25LPA066	Forest
69.80	50 X 80	0.10	Wetland W25LPA066	Open Land
69.81	50 X 150	0.17	Wetland W25LPA066	Forest
70.00	50 X 150	0.17	Wetland W25LPA061, W25LPA060, W25LPA058	Open Land
70.22	50 X 90	0.10	Wetland W25LPA056	Forest
70.28	50 X 150	0.15	Ditches D25LPA023 and D25LPA022	Forest
70.41	50 X 150	0.17	Pond S25LPA021	Forest
70.59	50 X 145	0.17	Dixie Pipeline and Wetland W25LPA049	Forest

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
70.63	50 X 150	0.18	Dixie Pipeline and Wetland W25LPA049	Forest
70.74	50 X 150	0.19	Wetland W25LPA046	Forest
70.80	50 X 130	0.15	Wetland W25LPA044	Forest
70.89	50 X 150	0.19	Ditch D25LPA020 and Access Road TAR 24	Forest
70.94	50 X 140	0.18	Ditch D25LPA020 and Access Road TAR 24	Forest
70.97	25 X 250	0.14	Houston River Canal HDD	Open Land
70.97	100 X 250	0.57	Houston River Canal HDD	Open Land
71.32	25 X 250	0.14	Houston River Canal HDD	Open Land
71.32	100 X 250	0.57	Houston River Canal HDD	Forest
71.51	25 X 190	0.11	Florida Gas Pipeline and Wetland W25LPA039	Open Land
71.51	25 X 220	0.13	Florida Gas Pipeline and Wetland W25LPA039	Forest
71.83	50 X 150	0.17	West Houston River Road	Open Land
71.83	25 X 150	0.09	West Houston River Road	Open Land
71.87	50 X 150	0.17	West Houston River Road	Open Land
71.87	25 X 150	0.09	West Houston River Road	Open Land
72.51	25 X 300	0.17	Denbury Onshore & Air Products Pipelines	Open Land
72.51	25 X 300	0.17	Denbury Onshore & Air Products Pipelines	Open Land
72.68	25 X 250	0.14	Crossover of CCTPL Pipeline	Open Land
72.69	25 X 250	0.15	Crossover of CCTPL Pipeline	Open Land
72.84	25 X 200	0.11	Koonce Road	Open Land
72.84	25 X 200	0.11	Koonce Road	Open Land
72.89	25 X 200	0.11	Koonce Road	Forest
72.89	25 X 200	0.11	Koonce Road	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
73.28	50 X 150	0.22	Crossover of CCTPL Pipeline	Open Land
73.30	50 X 150	0.22	Crossover of CCTPL Pipeline	Open Land
73.34	100 X 250	0.57	Houston River HDD	Open Land
73.34	25 X 250	0.14	Houston River HDD	Open Land
73.92	25 X 250	0.14	Houston River HDD	Open Land
73.92	100 X 250	0.57	Houston River HDD	Open Land
74.19	50 X 1375	1.63	False Right-of-Way for HDD	Open Land
--	50 X 100	0.11	Truck Turnaround at end of False Right-of-Way	Forest
74.95	25 X 150	0.09	Stream S25LPA040	Pine Plantation
74.96	25 X 150	0.09	Stream S25LPA040	Open Land
75.01	25 X 150	0.09	Stream S25LPA040	Pine Plantation
75.02	25 X 150	0.09	Stream S25LPA040	Open Land
76.16	50 X 300	0.34	Foreign Pipeline	Pine Plantation
76.30	100 X 250	0.57	Hwy 27/Bankens Rd/Railroad HDD	Pine Plantation
76.30	25 X 250	0.14	Hwy 27/Bankens Rd/Railroad HDD	Open Land
76.76	100 X 250	0.58	Hwy 27/Bankens Rd/Railroad HDD	Pine Plantation
76.76	25 X 250	0.14	Hwy 27/Bankens Rd/Railroad HDD	Open Land
77.09	25 X 150	0.09	Enerfin Pipeline & Wetland W25LPA015	Open Land
77.10	25 X 300	0.17	Enerfin Pipeline & Wetland W25LPA015	Pine Plantation
77.28	100 X 250	0.57	Little River HDD	Open Land
77.28	25 X 250	0.14	Little River HDD	Open Land
77.71	25 X 250	0.14	Little River HDD	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
77.71	100 X 250	0.57	Little River HDD	Open Land
78.01	25 X 150	0.09	Stream S25LPA033	Open Land
78.03	25 X 150	0.09	Stream S25LPA033	Open Land
78.08	25 X 150	0.09	Stream S25LPA033	Agricultural
78.08	25 X 150	0.09	Stream S25LPA033	Open Land
78.36	25 X 150	0.09	Natural Drainage	Open Land
78.43	25 X 150	0.09	Natural Drainage	Open Land
79.14	50 X 150	0.17	Stream S25LPA007, TAR 31	Pine Plantation
79.21	50 X 150	0.17	Wetland W25LPA022, TAR 31	Pine Plantation
80.32	25 X 200	0.12	Holbrook Park Road	Open Land
80.33	25 X 200	0.12	Holbrook Park Road	Open Land
80.37	25 X 200	0.12	Holbrook Park Road	Open Land
80.37	25 X 200	0.12	Holbrook Park Road	Open Land
80.67	25 X 150	0.09	Stream S25LPA008	Open Land
80.69	25 X 150	0.09	Stream S25LPA008	Forest
80.73	25 X 150	0.09	Stream S25LPA008	Open Land
80.75	25 X 150	0.09	Stream S25LPA008	Forest
80.95	50 X 225	0.26	Zachary Exploration Pipeline and Bill Prewitt Road	Forest
81.00	25 X 255	0.15	West Fork Calcasieu River HDD	Open Land
81.00	100 X 205	0.50	West Fork Calcasieu River HDD	Open Land
81.62	25 X 250	0.14	West Fork Calcasieu River HDD	Open Land
81.62	100 X 250	0.57	West Fork Calcasieu River HDD	Pine Plantation

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
81.66	50 X 150	0.20	West Fork Calcasieu River HDD	Pine Plantation
81.67	50 X 2905	3.19	False Right-of-Way for HDD	Open Land
83.45	25 X 150	0.09	Stream S25LPA013	Open Land
83.46	25 X 150	0.09	Stream S25LPA013	Open Land
83.50	25 X 150	0.09	Stream S25LPA013	Open Land
83.51	25 X 150	0.09	Stream S25LPA013	Forest
86.20	100 X 300	0.72	MLV	Agricultural
86.22	110 X 215	0.56	MLV	Agricultural
86.70	100 X 250	0.57	Indian Bayou/Camp Edgewood Road HDD	Agricultural
86.70	25 X 250	0.14	Indian Bayou/Camp Edgewood Road HDD	Agricultural
87.06	25 X 250	0.14	Indian Bayou/Camp Edgewood Road HDD	Open Land
87.06	100 X 250	0.57	Indian Bayou/Camp Edgewood Road HDD	Agricultural
87.98	25 X 200	0.11	U.S. Highway 171	Open Land
87.98	50 X 200	0.23	U.S. Highway 171	Open Land
88.06	25 X 200	0.12	U.S. Highway 171	Open Land
88.06	50 X 200	0.23	U.S. Highway 171	Open Land
90.03	25 X 200	0.10	Parish Road 138/Coonie Jackson Road	Agricultural
90.05	25 X 200	0.12	Parish Road 138/Coonie Jackson Road	Agricultural
90.09	100 X 220	0.59	Marsh Bayou HDD	Agricultural
90.10	25 X 250	0.14	Marsh Bayou HDD	Agricultural
90.47	100 X 200	0.69	Marsh Bayou HDD	Agricultural
90.47	25 X 250	0.14	Marsh Bayou HDD	Agricultural

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
90.50	50 X 1885	2.23	False Right-of-Way for HDD	Agricultural
91.16	50 X 150	0.18	Natural Drainage and Targa Louisiana pipeline	Open Land
91.20	50 X 150	0.18	Natural Drainage and Targa Louisiana pipeline	Forest
92.80	25 X 300	0.18	Gulf South Pipeline and Stream S25LPA017	Open Land
92.82	25 X 300	0.18	Gulf South Pipeline and Stream S25LPA017	Forest
93.72	50 X 200	0.24	Texas Eastern Road and Two (2) Trunkline pipelines	Open Land
93.77	50 X 95	0.10	Texas Eastern Road and Two (2) Trunkline pipelines	Open Land
93.83	50 X 150	0.20	CCTPL pipeline	Open Land
	Sub-Total	*28.69*		
Extension				
94.29	50 X 500	0.60	Three (3) Williams pipelines	Open Land
94.41	50 X 325	0.39	Spectra Energy pipeline and Al Gormier Road	Open Land
94.48	50 X 200	0.24	Spectra Energy pipeline and Al Gormier Road	Agricultural
95.76	50 X 150	0.18	Staging area for HDD at Access Road TAR 53	Pine Plantation
96.70	25 X 250	0.14	Barnes Creek HDD	Open Land
96.70	100 X 250	0.58	Barnes Creek HDD	Forest
97.23	25 X 250	0.14	Barnes Creek HDD	Open Land
97.23	50 X 250	0.29	Barnes Creek HDD	Forest
97.66	50 x 200	0.24	Topsy Bell Road	Forest
97.70	50 x 200	0.24	Topsy Bell Road	Forest
98.27	25 X 200	0.14	Lyles Cemetery Road	Open Land
98.34	25 X 200	0.14	Lyles Cemetery Road	Open Land
98.35	25 X 200	0.14	Lyles Cemetery Road	Forest

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)			Acres a/	Reason for ATWS	Land Use
98.39	25	X	200	0.14	Lyles Cemetery Road	Forest
100.04	50	X	150	0.18	Wetland W45NBB041	Forest
100.16	25	X	150	0.09	Stream S45NBB025	Forest
100.16	25	X	150	0.09	Stream S45NBB025	Open Land
100.22	25	X	150	0.09	Stream S45NBB025	Open Land
100.22	50	X	150	0.17	Stream S45NBB025	Forest
100.80	25	X	125	0.08	Lyles Street	Open Land
100.81	25	X	200	0.12	Lyles Street	Forest
100.85	25	X	195	0.12	Lyles Street and Wetland W45NBB024	Open Land
100.85	25	X	110	0.07	Lyles Street and Wetland W45NBB024	Forest
101.07	25	X	300	0.17	Two (2) Trunkline Gas Pipelines	Open Land
101.07	25	X	300	0.17	Two (2) Trunkline Gas Pipelines	Open Land
101.98	50	X	150	0.17	Stream S45NBB011	Pine Plantation
102.63	50	X	150	0.17	Wetland W45NBB042 and Stream W45NBB042	Pine Plantation
102.65	25	X	150	0.09	Wetland W45NBB042 and Stream W45NBB042	Open Land
102.74	25	X	150	0.09	Wetland W45NBB042 and Stream W45NBB042	Open Land
102.74	50	X	150	0.17	Wetland W45NBB042 and Stream W45NBB042	Pine Plantation
103.30	25	X	150	0.09	Wetland W45NBA020	Open Land
103.39	25	X	80	0.05	Wetland W45NBA020 and W45NBA021	Open Land
103.48	25	X	150	0.10	Wetland W45NBA021	Open Land
103.59	50	X	200	0.23	Snooky Road	Open Land
103.64	50	X	200	0.23	Snooky Road	Open Land
103.95	25	X	200	0.12	Brady Drive	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
103.96	25 X 200	0.12	Brady Drive	Forest
104.00	25 X 200	0.12	Brady Drive	Open Land
104.00	25 X 200	0.12	Brady Drive	Forest
104.85	50 X 150	0.17	Wetland W45NBA040	Forest
104.86	25 X 150	0.09	Wetland W45NBA040	Open Land
105.03	50 X 150	0.19	Stream S45NBA023	Pine Plantation
105.03	25 X 150	0.09	Stream S45NBA023	Open Land
105.19	50 X 200	0.24	Railroad and U.S. 190	Pine Plantation
105.27	50 X 200	0.24	Railroad and U.S. 190	Pine Plantation
105.94	25 X 200	0.12	Parish Road 105/Walker Road	Open Land
105.95	25 X 200	0.12	Parish Road 105/Walker Road	Open Land
106.00	25 X 200	0.12	Parish Road 105/Walker Road	Pine Plantation
106.00	25 X 200	0.12	Parish Road 105/Walker Road	Open Land
106.45	25 X 150	0.09	Wetland W45NBB039	Open Land
106.45	25 X 150	0.09	Wetland W45NBB039	Pine Plantation
106.52	25 X 150	0.09	Wetland W45NBB039	Open Land
106.54	25 X 150	0.09	Wetland W45NBB039	Open Land
107.24	25 X 200	0.11	Methodist Camp Road	Forest
107.24	25 X 200	0.11	Methodist Camp Road	Open Land
107.28	25 X 200	0.11	Methodist Camp Road	Open Land
107.28	25 X 450	0.26	Methodist Camp Road	Open Land
107.74	25 X 200	0.12	Gill Road	Open Land
107.75	25 X 200	0.12	Gill Road	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)			Acres a/	Reason for ATWS	Land Use
107.79	50	X	200	0.23	Gill Road	Forest
108.44	25	X	200	0.12	Shorty Rawlings Road, JPC Energy LLC pipeline	Open Land
108.47	25	X	200	0.12	Shorty Rawlings Road	Open Land
108.50	50	X	75	0.09	Shorty Rawlings Road	Open Land
108.65	50	X	580	0.33	Two (2) Spectra pipelines and J Potter Road	Forest
108.65	50	X	575	0.33	Two (2) Spectra pipelines and J Potter Road	Open Land
108.81	100	X	250	0.57	Whiskey Chitto Creek HDD	Forest
108.81	25	X	250	0.14	Whiskey Chitto Creek HDD	Forest
109.55	25	X	250	0.14	Whiskey Chitto Creek HDD	Open Land
109.55	100	X	250	0.57	Whiskey Chitto Creek HDD	Forest
110.40	50	X	200	0.23	Carpenters Bridge Road	Forest
110.45	50	X	200	0.23	Carpenters Bridge Road	Forest
110.54	50	X	140	0.16	Stream S45NBA040	Forest
110.60	50	X	150	0.19	Stream S45NBA040	Forest
110.92	50	X	200	0.23	Rester Road	Forest
110.97	50	X	200	0.23	Rester Road	Forest
111.12	50	X	150	0.17	El Paso pipeline	Forest
111.13	25	X	300	0.17	El Paso pipeline	Open Land
111.31	25	X	150	0.10	Dempsey Langley Road	Forest
111.34	25	X	150	0.09	Dempsey Langley Road	Open Land
111.36	25	X	150	0.10	Dempsey Langley Road	Forest
111.37	25	X	150	0.09	Dempsey Langley Road	Open Land
112.15	25	X	250	0.14	Calcasieu River HDD	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
112.15	100 X 250	0.57	Calcasieu River HDD	Scrub
112.65	100 X 250	0.59	Calcasieu River HDD	Forest
112.65	25 X 250	0.14	Calcasieu River HDD	Open Land
113.47	25 X 200	0.12	Green Oak Road	Pine Plantation
113.48	25 X 200	0.12	Green Oak Road	Open Land
113.52	25 X 200	0.12	Green Oak Road	Pine Plantation
113.52	25 X 200	0.11	Green Oak Road	Open Land
113.61	25 X 350	0.20	Two (2) Spectra pipelines	Pine Plantation
113.63	25 X 350	0.20	Two (2) Spectra pipelines	Pine Plantation
113.96	25 X 200	0.11	Enerfin Pipeline	Open Land
113.97	25 X 200	0.11	Enerfin Pipeline	Pine Plantation
114.00	25 X 100	0.06	Stream S45NBA027	Open Land
114.01	25 X 100	0.06	Stream S45NBA027	Pine Plantation
114.23	25 X 70	0.04	Stream S45NBA028	Open Land
114.26	50 X 150	0.17	Green Oak Cemetery Road	Forest
114.26	25 X 150	0.09	Green Oak Cemetery Road	Open Land
114.38	25 X 250	0.14	U.S 165, Gulf South, Spectra pipelines HDD	Open Land
114.39	100 X 250	0.60	U.S 165, Gulf South, Spectra pipelines HDD	Open Land
114.86	100 X 250	0.58	U.S 165, Gulf South, Spectra pipelines HDD	Forest
114.86	25 X 250	0.14	U.S 165, Gulf South, Spectra pipelines HDD	Open Land
114.91	50 X 100	0.12	Stream S45NBA020	Forest
114.96	50 X 150	0.18	Stream S45NBA020	Forest
115.54	50 X 200	0.23	Botley Cemetery Road	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
115.58	25 x 370	0.21	Botley Cemetery Road and Wetland W45NBA032	Open Land
115.58	25 x 370	0.21	Botley Cemetery Road and Wetland W45NBA032	Forest
115.72	50 X 150	0.18	Stream S45NBA021	Forest
115.95	25 X 800	0.47	Kinder Morgan and Two (2) Spectra pipelines	Agricultural
115.96	25 X 600	0.35	Kinder Morgan and Two (2) Spectra pipelines	Agricultural
117.60	50 X 150	0.17	Wetland W45NBA004	Pine Plantation
117.85	50 X 150	0.17	Wetland W45NBA004	Forest
118.08	50 X 65	0.10	Road and Wetland W45NBA002	Open Land
118.12	25 X 150	0.09	Wetland W45NBA002	Open Land
118.71	50 X 200	0.26	Lauderdale Woodyard Road	Forest
118.77	50 X 85	0.11	Lauderdale Woodyard Road and Stream S45NBB012	Pine Plantation
118.79	50 X 150	0.21	Stream S45NBB012	Pine Plantation
119.26	50 X 150	0.17	Wetland W45NBB028	Forest
119.57	50 X 150	0.17	Wetland W45NBB028	Forest
119.98	50 X 150	0.16	Wetland W45NBA078	Pine Plantation
120.16	25 X 150	0.09	Wetland W45NBA078	Forest
120.17	25 X 150	0.09	Wetland W45NBA078	Forest
120.36	50 X 150	0.18	Wetland W45NBA079	Scrub
120.76	50 X 150	0.17	Stream S45NBA035	Forest
121.08	50 X 150	0.19	Stream S45NBA038	Scrub
121.10	50 X 150	0.19	Stream S45NBA038	Scrub
121.32	25 X 150	0.09	Wetland W45NBA080	Scrub
121.32	25 X 150	0.09	Wetland W45NBA080	Scrub

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
122.40	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115	Pine Plantation
122.41	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115	Pine Plantation
122.44	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115	Pine Plantation
122.45	25 X 150	0.09	Gulf South Pipeline and Ditch D45NBA115	Pine Plantation
122.62	25 X 200	0.12	Powell Road	Pine Plantation
122.63	25 X 200	0.12	Powell Road	Forest
122.67	25 X 200	0.12	Powell Road	Pine Plantation
122.67	25 X 200	0.12	Powell Road	Pine Plantation
123.15	25 X 150	0.09	Ditch D45NBA032	Pine Plantation
123.16	25 X 150	0.09	Ditch D45NBA032	Pine Plantation
123.19	25 X 150	0.09	Ditch D45NBA032	Agricultural
123.19	25 X 150	0.09	Ditch D45NBA032	Agricultural
123.41	25 X 150	0.09	Ditch D45NBA031	Agricultural
123.42	25 X 150	0.09	Ditch D45NBA031	Agricultural
123.45	25 X 150	0.09	Ditch D45NBA031	Pine Plantation
123.45	25 X 150	0.09	Ditch D45NBA031	Pine Plantation
124.42	50 X 150	0.18	Stream S45NBA030	Pine Plantation
124.42	25 X 150	0.09	Stream S45NBA030	Pine Plantation
124.97	25 X 150	0.12	Papillon Road	Open Land
124.99	25 X 150	0.12	Papillon Road	Open Land
125.04	25 X 150	0.12	Papillon Road	Open Land
125.04	25 X 150	0.12	Papillon Road	Agricultural
125.27	25 X 150	0.09	Ditch D45NBB020	Open Land

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
125.28	25 X 150	0.09	Ditch D45NBB020	Open Land
125.32	25 X 150	0.09	Ditch D45NBB020	Agricultural
125.34	25 X 150	0.09	Ditch D45NBB020	Agricultural
125.55	50 X 200	0.24	Highway 26	Agricultural
125.57	25 X 200	0.12	Highway 26	Agricultural
125.61	50 X 200	0.25	Highway 26	Agricultural
125.61	25 X 200	0.12	Highway 26	Agricultural
128.18	50 X 150	0.17	Wetland W45NBA022	Open Land
128.30	25 X 150	0.09	Wetland W45NBA023	Forest
128.30	25 X 150	0.09	Wetland W45NBA023	Forest
128.83	25 X 200	0.12	Cottongin Castor Road	Forest
128.84	25 X 200	0.12	Cottongin Castor Road	Forest
128.88	25 X 200	0.12	Cottongin Castor Road	Pine Plantation
128.88	25 X 200	0.12	Cottongin Castor Road	Pine Plantation
129.08	50 X 150	0.17	Wetland W45NBA024	Open Land
129.12	50 X 150	0.17	Wetland W45NBA024	Pine Plantation
129.43	25 X 115	0.07	Stream S45NBA017	Forest
129.43	50 X 150	0.17	Stream S45NBA017	Scrub
129.47	50 X 150	0.19	Stream S45NBA017	Forest
129.52	50 X 150	0.17	Drainage associated with Wetland W45NBB201	Forest
129.60	50 X 130	0.15	Stream S45NBB205	Forest
129.64	50 X 130	0.16	Stream S45NBB205	Forest
130.23	50 X 150	0.17	Wetland W45NBB029 and streams	Forest

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
130.24	50 X 150	0.17	Wetland W45NBB029 and streams	Forest
130.57	50 X 150	0.17	Wetland W45NBB029 and streams	Forest
130.57	50 X 150	0.17	Wetland W45NBB029 and streams	Forest
131.25	25 X 100	0.05	Howard Lane	Agricultural
131.26	25 X 100	0.06	Howard Lane	Agricultural
131.29	25 X 100	0.06	Howard Lane	Agricultural
131.29	25 X 220	0.14	Howard Lane	Agricultural
131.35	25 X 100	0.07	Howard Lane	Agricultural
131.37	25 X 100	0.07	Howard Lane	Agricultural
131.38	25 X 100	0.07	Howard Lane	Agricultural
133.08	25 X 300	0.19	Beiber Road	Agricultural
133.11	25 X 300	0.19	Beiber Road	Agricultural
134.84	25 X 150	0.09	Wetland W45NBA005 and Stream S45NBA002	Forest
134.86	25 X 150	0.09	Wetland W45NBA005 and Stream S45NBA002	Forest
134.96	25 X 150	0.09	Wetland W45NBA005 and Stream S45NBA002	Pine Plantation
134.98	25 X 150	0.09	Wetland W45NBA005 and Stream S45NBA002	Forest
135.28	50 X 150	0.17	Wetland W45NBA006	Forest
135.37	50 X 150	0.17	Unknown pipeline and Wetland W45NBA007	Forest
135.54	25 X 200	0.12	Highway 376	Forest
135.56	25 X 200	0.12	Highway 376	Forest
135.60	25 X 200	0.12	Highway 376	Forest
135.60	25 X 200	0.12	Highway 376	Forest
135.70	25 X 150	0.09	Wetland W45NBA008 and Stream S45NBA003	Forest

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
135.70	50 X 150	0.17	Wetland W45NBA008 and Stream S45NBA003	Forest
135.81	25 X 150	0.09	Wetland W45NBA008 and Stream S45NBA003	Forest
135.86	50 X 150	0.17	Wetland W45NBA008 and Stream S45NBA003	Pine Plantation
137.24	25 X 300	0.17	Crosstex pipeline	Open Land
137.27	25 X 150	0.09	Crosstex pipeline	Pine Plantation
138.25	50 X 150	0.21	Crosstex pipeline	Forest
138.30	25 X 200	0.12	Crosstex pipeline	Forest
138.32	25 X 200	0.13	Crosstex pipeline	Pine Plantation
138.49	50 X 300	0.34	Louisiana Interstate Gas, PPEC, and Targa pipelines	Forest
138.65	25 X 150	0.09	Wetland W45NBA013	Scrub
138.66	25 X 150	0.09	Wetland W45NBA013	Open Land
138.72	25 X 150	0.08	Wetland W45NBA013	Open Land
138.73	25 X 150	0.08	Wetland W45NBA013	Scrub
138.96	100 X 250	0.57	Highway 10 and multiple pipelines HDD	Scrub
138.96	25 X 250	0.14	Highway 10 and multiple pipelines HDD	Scrub
139.54	100 X 250	0.59	Highway 10 and multiple pipelines HDD	Agricultural
139.54	25 X 250	0.14	Highway 10 and multiple pipelines HDD	Agricultural
140.14	50 X 150	0.17	Wetland W45NBA045	Forest
140.34	50 X 150	0.17	Wetland W45NBA045	Forest
140.46	50 X 150	0.17	Wetland W45NBA047	Forest
140.56	25 X 390	0.23	Two TransCanada pipelines, wetlands, and ANR interconnect	Open Land
140.56	50 X 520	0.61	Two TransCanada pipelines, wetlands, and ANR interconnect	Forest
140.76	50 X 150	0.20	Wetland W45NBA048 **b**/	Forest

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
141.81	50 X 200	0.23	Joe's Lane b/	Open Land
141.85	50 X 150	0.23	Joe's Lane b/	Agricultural
142.08	130 X 1410	1.89	Three (3) Texas Gas pipelines, TGT Interconnect, Chapman Road b/	Agricultural
142.13	160 X 475	0.68	Three (3) Texas Gas pipelines and TGT interconnect b/	Agricultural
	Sub-Total	*39.38*		
CGT Lateral				
0.22	25 X 150	0.09	Rocky Lane	Agricultural
0.26	25 X 150	0.09	Rocky Lane	Agricultural
0.46	15 X 200	0.07	Highway 13 / Veterans Memorial Highway	Agricultural
0.48	25 X 100	0.06	Highway 13 / Veterans Memorial Highway	Scrub
0.52	15 X 200	0.07	Highway 13 / Veterans Memorial Highway	Agricultural
0.52	50 X 200	0.23	Highway 13 / Veterans Memorial Highway	Agricultural
1.02	50 X 150	0.19	Ditch DCGTLTB017	Agricultural
1.04	25 X 150	0.09	Ditch DCGTLTB017	Agricultural
1.30	50 X 150	0.20	Slope	Agricultural
2.10	25 X 150	0.09	Darrel Road	Open Land
2.11	25 X 150	0.09	Darrel Road	Open Land
2.15	25 X 150	0.09	Darrel Road	Open Land
2.15	25 X 150	0.09	Darrel Road	Open Land
2.36	25 X 150	0.09	Highway 376 / Heritage Road	Agricultural
2.37	25 X 150	0.09	Highway 376 / Heritage Road	Agricultural
2.41	25 X 150	0.09	Highway 376 / Heritage Road	Agricultural

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
2.42	25 X 150	0.09	Highway 376 / Heritage Road	Agricultural
3.17	25 X 300	0.20	Ditch DCGTLTB011	Agricultural
3.66	25 X 150	0.09	Ditch DCGTLTB013	Agricultural
3.67	25 X 150	0.09	Ditch DCGTLTB013	Agricultural
3.70	25 X 150	0.09	Ditch DCGTLTB013	Agricultural
3.70	25 X 150	0.09	Ditch DCGTLTB013	Agricultural
3.82	25 X 150	0.09	Wetland WCGTLTB014	Agricultural
3.83	25 X 150	0.09	Wetland WCGTLTB014	Agricultural
3.87	25 X 90	0.06	Wetland WCGTLTB014	Agricultural
3.89	25 X 150	0.09	Wetland WCGTLTB014	Agricultural
4.12	25 X 150	0.09	Ditch DCGTLTB015	Agricultural
4.13	25 X 150	0.09	Ditch DCGTLTB015	Agricultural
4.16	25 X 150	0.09	Ditch DCGTLTB015	Agricultural
4.16	25 X 150	0.09	Ditch DCGTLTB015	Agricultural
4.42	25 X 200	0.12	Hilly Road / Ditch DCGTLTB016	Agricultural
4.43	25 X 200	0.12	Hilly Road / Ditch DCGTLTB016	Agricultural
4.48	25 X 200	0.12	Hilly Road	Agricultural
4.48	25 X 200	0.12	Hilly Road	Agricultural
4.87	25 X 100	0.05	Highway 376 / Miller's Lake Road	Open Land
4.88	50 X 275	0.35	Highway 376 / Miller's Lake Road	Open Land
4.92	25 X 200	0.13	Highway 376 / Miller's Lake Road	Agricultural
5.75	25 X 185	0.11	Stream SCGTLTB006 and Ditch DCGTLTB007	Agricultural
5.75	25 X 200	0.12	Stream SCGTLTB006 and Ditch DCGTLTB007	Agricultural

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
5.79	25 X 150	0.09	Ditch DCGTLTB007	Open Land
5.79	25 X 150	0.09	Ditch DCGTLTB007	Open Land
6.02	25 X 150	0.09	Farm Road	Agricultural
6.03	25 X 150	0.09	Farm Road	Agricultural
6.06	25 X 150	0.09	Farm Road	Agricultural
6.06	25 X 150	0.09	Farm Road	Agricultural
6.37	25 X 150	0.09	Ditch DCGTLTB008	Agricultural
6.39	25 X 150	0.09	Ditch DCGTLTB008	Agricultural
6.41	25 X 150	0.09	Ditch DCGTLTB008	Agricultural
6.42	25 X 150	0.09	Ditch DCGTLTB008	Agricultural
7.06	25 X 150	0.09	Colt Avenue	Agricultural
7.10	25 X 150	0.09	Colt Avenue	Agricultural
7.13	25 X 150	0.09	Stream SCGTLTB009	Agricultural
7.16	25 X 150	0.09	Stream SCGTLTB009	Agricultural
7.20	25 X 150	0.09	Stream SCGTLTB009	Agricultural
7.22	25 X 150	0.09	Stream SCGTLTB009	Agricultural
7.60	25 X 150	0.08	Wetland WCGTLTB020	Agricultural
7.60	25 X 150	0.08	Wetland WCGTLTB020	Agricultural
7.84	25 X 200	0.12	U.S. Highway 167	Open Land
7.84	50 X 200	0.23	U.S. Highway 167	Open Land
7.90	50 X 200	0.23	U.S. Highway 167	Agricultural
7.90	25 X 200	0.12	U.S. Highway 167	Agricultural
8.00	50 X 300	0.33	Plains pipeline	Agricultural

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
8.00	50 X 300	0.36	Plains pipeline	Agricultural
8.15	50 X 200	0.26	Buller Road	Agricultural
8.19	50 X 200	0.22	Buller Road	Agricultural
8.32	50 X 200	0.23	Buller Road	Agricultural
8.37	25 X 430	0.25	Buller Road and Crosstex pipeline	Agricultural
8.37	25 X 435	0.25	Crosstex pipeline	Open Land
8.50	25 X 150	0.09	Wetland WCGTLTA018	Open Land
8.51	25 X 150	0.09	Wetland WCGTLTA018	Open Land
8.57	25 X 150	0.09	Ditch DCGTLTA001 and Wetland WCGTLTA003	Open Land
8.59	25 X 150	0.09	Ditch DCGTLTA001 and Wetland WCGTLTA003	Open Land
8.94	25 X 150	0.09	Stream SCGTLTA003	Forest
8.94	25 X 150	0.09	Stream SCGTLTA003	Open Land
8.99	25 X 150	0.09	Stream SCGTLTA003	Forest
8.99	25 X 150	0.09	Stream SCGTLTA003	Open Land
9.25	50 X 200	0.24	Highway 3042 / Chicot Park Road	Forest
9.26	25 X 200	0.12	Highway 3042 / Chicot Park Road	Open Land
9.30	50 X 200	0.24	Highway 3042 / Chicot Park Road	Forest
9.30	25 X 200	0.12	Highway 3042 / Chicot Park Road	Open Land
9.48	50 X 150	0.17	Stream SCGTLTA006	Forest
9.73	25 X 350	0.20	Stream SCGTLTA004	Open Land
9.91	50 X 150	0.17	Wetland WCGTLTA011	Open Land
10.22	25 X 180	0.10	Wetland WCGTLTA011	Open Land
10.26	50 X 150	0.17	Wetland WCGTLTA011	Scrub

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
10.43	50 X 150	0.18	Wetland WCGTLTA009	Scrub
10.47	20 X 1205	0.55	Wetland WCGTLTA009	Scrub
10.48	15 X 1275	0.44	Wetland WCGTLTA009	Forest
10.73	50 X 150	0.17	Wetland WCGTLTA009	Open Land
10.80	25 X 250	0.14	Wetland WCGTLTA016 and Hillcorp Energy pipelines HDD	Open Land
10.80	100 X 250	0.59	Wetland WCGTLTA016 and Hillcorp Energy pipelines HDD	Scrub
11.10	25 X 250	0.15	Wetland WCGTLTA016 and Hillcorp Energy pipelines HDD	Open Land
11.11	100 X 250	0.62	Wetland WCGTLTA016 and Hillcorp Energy pipelines HDD	Open Land
11.16	50 X 210	0.25	Railroad and Wetland WCGTLTA015	Open Land
11.18	25 X 200	0.12	Railroad and Wetland WCGTLTA015	Open Land
11.23	50 X 200	0.24	Railroad and Wetland WCGTLTA015	Open Land
11.23	25 X 200	0.12	Railroad and Wetland WCGTLTA015	Open Land
	Sub-Total	*14.32*		
PPEC Lateral				
0.01	25 X 150	0.09	Crosstex pipeline	Agricultural
0.01	25 X 150	0.09	Crosstex pipeline	Agricultural
0.23	25 X 150	0.09	Lariat Lane and three (3) TGT pipelines	Agricultural
0.24	25 X 150	0.09	Lariat Lane and three (3) TGT pipelines	Agricultural
0.27	25 X 150	0.09	Lariat Lane and three (3) TGT pipelines	Agricultural
0.27	25 X 150	0.09	Lariat Lane and three (3) TGT pipelines	Agricultural
0.53	25 X 600	0.35	Texas Gas pipelines and Stream SPPECLTA001	Agricultural
0.55	25 X 600	0.34	Texas Gas pipelines and Stream SPPECLTA001	Agricultural
0.76	25 X 200	0.12	Chapman Road	Agricultural

TABLE 3-1

CCTPL Pipelines - Additional Temporary Work Space

Facility / Approx. Enter MP	Approximate Dimensions (ft)	Acres a/	Reason for ATWS	Land Use
0.77	25 X 200	0.12	Chapman Road	Agricultural
0.81	25 X 200	0.12	Chapman Road	Agricultural
0.81	25 X 200	0.12	Chapman Road	Agricultural
1.18	50 X 200	0.23	Wetland WPPECLTA002	Agricultural
1.53	100 X 250	0.59	East Fork Bayou Nezpique HDD	Agricultural
1.53	25 X 250	0.14	East Fork Bayou Nezpique HDD	Agricultural
2.10	100 X 250	0.58	East Fork Bayou Nezpique HDD	Open Land
2.10	25 X 250	0.14	East Fork Bayou Nezpique HDD	Forest
2.64	25 X 150	0.09	Narcisse Road	Scrub
2.66	25 X 150	0.09	Narcisse Road	Scrub
2.69	25 X 150	0.09	Narcisse Road	Scrub
2.70	25 X 150	0.09	Narcisse Road	Scrub
2.80	25 X 450	0.26	One (1) Crosstex and Two (2) Plains pipeline	Forest
2.83	25 X 450	0.25	One (1) Crosstex and Two (2) Plains pipeline	Open Land
3.01	25 X 300	0.17	Three (3) Crosstex pipelines	Forest
3.01	25 X 300	0.17	Three (3) Crosstex pipelines	Forest
3.26	25 X 250	0.15	Ambrose Road and Three (3) Plains pipelines	Open Land
3.26	25 X 250	0.15	Ambrose Road and Three (3) Plains pipelines	Open Land
3.50	25 x 700	0.41	Wetland WPPECLTA004 and Stream SPPECLTA005	Open Land
3.99	50 X 150	0.22	Ambrose Road	Commercial/Industrial
Sub-Total		*5.53*		
Total		**93.80**		

a Acreage calculated from actual footprint, which may not correspond to the approximate dimensions.

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
Loop 1								
TAR 2	4.34	Temp	Existing	Gravel	519	12	0.14	--
TAR 3	4.86	Temp	Existing	Dirt	270	12	0.07	--
TAR 4	5.33	Temp	Existing	Dirt	635	12	0.17	--
TAR 5	7.43	Temp	Existing	Dirt	1,017	18	0.42	--
TAR 6	8.33	Temp	Existing	Dirt	1,125	12	0.31	--
TAR 7	8.33	Temp	Existing	Dirt	996	12	0.27	--
PAR 8	9.16	Perm	Existing	Gravel	128	10	0.03	0.03
TAR 9	9.5	Temp	Existing	Dirt	1,386	12	0.38	--
TAR 10	10.83	Temp	Existing	Gravel	1,033	12	0.28	--
TAR 11	11.15	Temp	Existing	Gravel	1,894	12	0.52	--
TAR 12	11.27	Temp	Existing	Gravel	1,820	12	0.5	--
TAR 13	13.64	Temp	Existing	Dirt	1,667	12	0.46	--
TAR 14	14.75	Temp	Existing	Gravel	835	12	0.23	--
TAR 15	14.83	Temp	Existing	Gravel	731	12	0.2	--
TAR 16	14.91	Temp	Existing	Gravel	867	12	0.24	--
TAR 17	15.05	Temp	Existing	Asphalt	1,001	15	0.34	--
TAR 18	15.24	Temp	Existing	Gravel	1,220	12	0.34	--
PAR 19	N/A	Perm	Existing	Gravel	1,769	12	0.49	0.49
						Sub-Total	*5.39*	*0.52*

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
Loop 2								
PAR 21	69.4	Perm	Existing	Gravel	43	18	0.02	0.02
TAR 22	69.41	Temp	Existing	Gravel	4,344	10	1.0	--
TAR 23	69.41	Temp	Existing	Gravel	86	12	0.02	--
TAR 24	70.92	Temp	Existing	Rock	26,109	15	8.99	--
TAR 25	71.54	Temp	Existing	Gravel	2,517	12	0.69	--
TAR 26	73.05	Temp	Existing	Dirt	241	12	0.07	--
TAR 27	73.23	Temp	Existing	Asphalt	373	10	0.09	--
TAR 28	73.83	Temp	Existing	Rock	6,632	7	1.07	--
TAR 29	76.49	Temp	Existing	Dirt	1,840	15	0.63	--
TAR 30	78.11	Temp	Existing	Gravel	3,620	10	0.83	--
TAR 31	79.18	Temp	Existing	Dirt	4,940	12	1.36	--
TAR 32	79.6	Temp	Existing	Dirt	1,121	12	0.31	--
TAR 33	79.95	Temp	Existing	Dirt	3,440	15	1.18	--
TAR 34	81.63	Temp	Existing	Gravel	8,548	12	2.35	--
TAR 35	82.57/83.46	Temp	Existing	Gravel	12,101	10	2.78	--
TAR 36	82.98	Temp	Existing	Dirt	57	10	0.01	--
TAR 37	83.86	Temp	Existing	Dirt	158	10	0.04	--
TAR 38	84.18	Temp	Existing	Gravel	4,085	10	0.94	--
PAR 39	86.24	Perm	Existing	Gravel	2,658	8	0.49	0.49
TAR 40	87.1	Temp	Existing	Dirt	368	12	0.1	--
TAR 41	87.55	Temp	Existing	Gravel	1,835	10	0.42	--
TAR 42	N/A	Temp	Existing	Gravel	170	6	0.02	--

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
TAR 43	88.78	Temp	Existing	Gravel	2,879	8	0.53	--
TAR 44	89.53	Temp	Existing	Dirt	2,816	25	1.62	--
TAR 45	91.2	Temp	Existing	Dirt	3,637	10	0.83	--
TAR 46	91.87	Temp	Existing	Gravel	22,448	10	5.15	--
PAR 47	93.78	Perm	Existing	Dirt	141	20	0.06	0.06
						Sub-Total	*31.6*	*0.57*
Extension								
TAR 48	94.9	Temp	Existing	Dirt	1,310	12	0.36	--
TAR 49	95.37	Temp	Existing	Dirt	3,947	12	1.09	--
TAR 50	N/A	Temp	Existing	Dirt	4,072	12	1.12	--
TAR 51	95.53	Temp	Existing	Dirt	341	12	0.09	--
TAR 52	95.6	Temp	Existing	Dirt	400	12	0.11	--
TAR 53	95.76	Temp	Existing	Dirt	710	12	0.2	--
TAR 54	99.31	Temp	Existing	Dirt	105	9	0.02	--
TAR 55	99.42	Temp	Existing	Dirt	121	9	0.03	--
TAR 56	99.8	Temp	Existing	Gravel	10,174	10	2.34	--
TAR 57	102.94	Temp	Existing	Gravel	3,569	8	0.66	--
PAR 58	103.63	Perm	New	N/A	255	10	0.06	0.06
TAR 59	104	Temp	Existing	Gravel	2,241	12	0.62	--
TAR 60	104.15	Temp	Existing	Dirt	221	10	0.05	--
TAR 61	104.48	Temp	Existing	Gravel	4,382	15	1.51	--
TAR 62	105.45	Temp	Existing	Rock	786	15	0.27	--
TAR 63	111.74	Temp	Existing	Dirt	1,288	6	0.18	--

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
TAR 64	112.44	Temp	Existing	Gravel	2,329	12	0.64	--
TAR 65	112.73	Temp	Existing	Gravel	5,230	12	1.44	--
TAR 66	116.91	Temp	Existing	Rock	5,936	14	1.91	--
TAR 67	118.08	Temp	Existing	Gravel	2,389	15	0.82	--
TAR 68	118.37	Temp	Existing	Rock	1,379	13	0.41	--
TAR 69	119.13	Temp	Existing	Dirt	1,099	8	0.2	--
PAR 70	119.7	Perm	Existing	Gravel	5,468	8	1.0	1.00
TAR 71	123.45	Temp	Existing	Dirt	4,410	8	0.81	--
TAR 72	125.36	Temp	Existing	Dirt	1,261	15	0.43	--
TAR 73	126.3	Temp	Existing	Dirt	5,368	12	1.48	--
TAR 74	127	Temp	Existing	Gravel	1,608	12	0.44	--
TAR 75	127.41	Temp	Existing	Dirt	444	12	0.12	--
TAR 76	128.04	Temp	Existing	Dirt	6,125	12	1.69	--
TAR 77	128.5	Temp	Existing	Dirt	2,811	12	0.77	--
TAR 78	129.03	Temp	Existing	Gravel	648	12	0.18	--
TAR 79	129.41	Temp	Existing	Grass	5,176	10	1.19	--
TAR 80	130.21	Temp	Existing	Dirt	3,613	12	1.0	--
TAR 81	131.59	Temp	Existing	Dirt	761	15	0.26	--
TAR 82	131.7, 131.9	Temp	Existing	Dirt	1,980	12	0.55	--
TAR 83	132.67	Temp	Existing	Gravel	59	10	0.01	--
TAR 84	132.79	Temp	Existing	Dirt	62	6	0.01	--
TAR 85	135.34	Temp	Existing	Gravel	951	10	0.22	--
PAR 86	135.58	Perm	New	N/A	69	10	0.02	0.02

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
TAR 87	137.25	Temp	Existing	Gravel	14,885	12	4.1	--
TAR 88	137.85	Temp	Existing	Dirt	126	12	0.03	--
TAR 89	138.33	Temp	Existing	Dirt	3,156	9	0.65	--
TAR 90	138.95	Temp	Existing	Rock	1,057	12	0.29	--
TAR 91	139.43	Temp	Existing	Gravel	750	6	0.1	--
TAR 92	140.05	Temp	Existing	Rock	1,675	6	0.23	--
TAR 93 a/	141.58	Temp	Existing	Gravel	151	10	0.03	--
						Sub-Total	*29.74*	*1.08*
CGT Lateral								
TAR 99	0.6	Temp	Existing	Dirt	425	10	0.1	--
TAR 100	1.3/1.62	Temp	Existing	Dirt	4,325	12	1.19	--
TAR 101	1.89	Temp	Existing	Dirt	246	6	0.03	--
TAR 102	2.75	Temp	Existing	Dirt	531	12	0.15	--
TAR 103	3.14/3.44	Temp	Existing	Dirt	8,008	12	2.21	--
TAR 104	3.89	Temp	Existing	Dirt	3,519	12	0.97	--
TAR 105	5.06	Temp	Existing	Dirt	224	20	0.1	--
TAR 106	5.48	Temp	Existing	Dirt	754	25	0.43	--
TAR 107	5.79	Temp	Existing	Dirt	715	12	0.2	--
TAR 108	6.42	Temp	Existing	Dirt	1,957	12	0.54	--
TAR 109	6.57	Temp	Existing	Dirt	920	16	0.34	--
TAR 110	6.96/7.19	Temp	Existing	Dirt	1,462	12	0.4	--
TAR 111	7.36	Temp	Existing	Dirt	2,145	10	0.49	--
TAR 112	8.47	Temp	Existing	Dirt	132	8	0.02	--

TABLE 3-2

CCTPL Pipelines: Temporary and Permanent Access Roads

Facility / Access Road ID	Approx. Crossing MP	Temp. / Perm.	Existing / New	Existing Surface Type	Length (ft)	Width (ft)	Acres Affected	
							Const.	Oper.
TAR 113	8.62	Temp	Existing	Dirt	1,592	10	0.37	--
TAR 114	10.66	Temp	Existing	Dirt	5,145	8	0.94	--
TAR 115	11.13	Temp	Existing	Dirt	1,927	10	0.44	--
PAR 116	N/A	Perm	Existing	Rock	518	15	0.18	0.18
						Sub-Total	*9.1*	*0.18*
PPEC Lateral								
TAR 96	1.22	Temp	Existing	Dirt	1,466	12	0.4	--
TAR 97	2.1	Temp	Existing	Dirt	6,268	12	1.73	--
PAR 98	3.24	Perm	New	N/A	68	10	0.02	0.02
						Sub-Total	*2.15*	*0.02*
						Total	**77.98**	**2.37**

a Access Road TAR 93 will be used for both the Extension and ANR Lateral.

Notes:
All access roads may require some modifications.

N/A = Not Available

There are no access roads proposed for the TGT Lateral.

APPENDIX 4 SOILS TABLES

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TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
Loop 1										
1.80	1.84	0.04	UD	Udifluvents, 1 to 20 percent slopes	Somewhat poorly drained	No	No	N/A	8	N/A
1.84	2.21	0.37	AN	Aquents, frequently flooded	Very poorly drained	Yes	No	N/A	8	N/A
2.21	4.52	2.30	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
4.52	4.65	0.13	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
4.65	4.73	0.08	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
4.73	5.24	0.52	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
5.24	5.43	0.19	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
5.43	6.18	0.75	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
6.18	6.64	0.46	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
6.64	7.01	0.37	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
7.01	8.11	1.10	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
8.11	8.17	0.06	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
8.17	8.35	0.19	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
8.35	8.46	0.11	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
8.46	9.00	0.54	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good

TABLE 4-1 **Soils Along the Proposed Pipeline Segments**										
Begin MP	**End MP**	**Length (Miles)**	**Map Symbol**	**Map Unit**	**Drainage Class**	**Hydric**	**Prime Farmland**	**HEL a/**	**WEG b/**	**Reveg Potential**
9.00	9.05	0.05	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
9.05	9.11	0.07	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
9.11	9.16	0.04	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
9.16	9.23	0.08	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
9.23	9.69	0.45	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
9.69	9.76	0.07	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
9.76	10.81	1.06	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
10.81	10.93	0.11	Hb	Hackberry loamy fine sand	Somewhat poorly drained	No	Yes	N/A	3	Good
10.93	11.02	0.09	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
11.02	12.14	1.13	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
12.14	12.19	0.05	ME	Mermentau clay	Poorly drained	Yes	No	N/A	4	Very poor
12.19	12.29	0.10	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
12.29	12.66	0.37	CR	Creole mucky clay	Very poorly drained	Yes	No	N/A	4	Very poor
12.66	13.00	0.34	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
13.00	13.04	0.04	BA	Bancker muck	Very poorly drained	Yes	No	N/A	8	Very poor
13.04	15.52	2.48	Hm	Hackberry-Mermentau complex, gently undulating	Somewhat poorly drained	No	No	N/A	3	Good
15.52	15.70	0.18	Hb	Hackberry loamy fine sand	Somewhat poorly drained	No	Yes	N/A	3	Good
Loop 2										
69.40	70.35	0.95	Gy	Guyton-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
70.35	70.42	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
70.42	70.46	0.04	Gy	Guyton-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
70.46	70.88	0.42	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
70.88	71.01	0.13	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
71.01	71.19	0.18	Mt	Mowata-Vidrine silt loams	Poorly drained	Yes	Yes	No	5	Good
71.19	71.22	0.02	W	Water		No	No	No		
71.21	71.35	0.14	Mt	Mowata-Vidrine silt loams	Poorly drained	Yes	Yes	No	5	Good
71.35	71.41	0.06	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
71.41	71.77	0.36	Mt	Mowata-Vidrine silt loams	Poorly drained	Yes	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
71.77	71.95	0.18	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
71.95	72.03	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
72.03	72.13	0.10	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
72.13	72.22	0.09	Mt	Mowata-Vidrine silt loams	Poorly drained	Yes	Yes	No	5	Good
72.22	72.31	0.09	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
72.31	72.40	0.09	Mr	Morey loam	Poorly drained	No	Yes	No	6	Fair
72.40	72.58	0.18	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
72.58	72.66	0.08	Mr	Morey loam	Poorly drained	No	Yes	No	6	Fair
72.66	72.77	0.11	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
72.77	72.90	0.13	Mt	Mowata-Vidrine silt loams	Poorly drained	Yes	Yes	No	5	Good
72.90	72.99	0.09	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
72.99	73.04	0.06	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
73.04	73.15	0.11	Bn	Bienville-Cahaba-Guyton-Complex, gently undulating	Somewhat excessively drained	No	No	No	2	Fair
73.15	73.22	0.08	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
73.22	73.38	0.15	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
73.38	73.44	0.06	BB	Basile and Guyton silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
73.44	73.45	0.01	W	Water		No	No	No		
73.45	73.90	0.45	BB	Basile and Guyton silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
73.90	73.92	0.02	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
73.92	74.36	0.45	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
74.36	74.42	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
74.42	74.61	0.19	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
74.61	74.66	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
74.66	74.95	0.28	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
74.95	75.03	0.09	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
75.03	75.32	0.28	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
75.32	75.82	0.50	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
75.82	75.98	0.16	Bo	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
75.98	76.42	0.44	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
76.42	76.64	0.22	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
76.64	77.40	0.76	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
77.40	77.44	0.03	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
77.44	77.53	0.09	BB	Basile and Guyton silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
77.53	77.62	0.09	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
77.62	77.69	0.07	Bo	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
77.69	77.77	0.08	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
77.77	77.96	0.19	Bo	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
77.96	78.03	0.06	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
78.03	78.08	0.05	BB	Basile and Guyton silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
78.08	78.11	0.03	Ac	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
78.11	78.62	0.51	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
78.62	78.70	0.08	GU	Guyton and bienville soils frequently flooded	Poorly drained	Yes	No	No	5	Fair
78.70	78.75	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
78.75	79.06	0.31	Bo	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
79.06	79.15	0.10	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
79.15	79.20	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
79.20	79.34	0.14	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
79.34	79.67	0.33	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
79.67	79.73	0.06	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
79.73	79.81	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
79.81	80.18	0.37	Kd	Kinder-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
80.18	80.61	0.43	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
80.61	80.93	0.32	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
80.93	81.02	0.09	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
81.02	81.08	0.06	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
81.08	81.18	0.11	GU	Guyton and bienville soils frequently flooded	Poorly drained	Yes	No	No	5	Fair
81.18	81.21	0.03	W	Water		No	No	No		
81.21	81.57	0.35	GU	Guyton and bienville soils frequently flooded	Poorly drained	Yes	No	No	5	Fair
81.57	81.61	0.04	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
81.61	81.72	0.11	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
81.72	81.77	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
81.77	81.87	0.10	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
81.87	81.92	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
81.92	82.84	0.92	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
82.84	82.85	0.01	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
82.85	82.96	0.11	Gg	Gore silt loam, 1 to 5 percent slopes	Moderately well-drained	No	No	No	5	Good
82.96	83.38	0.42	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
83.38	83.45	0.07	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
83.45	83.52	0.07	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
83.52	84.33	0.80	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
84.33	84.56	0.23	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
84.56	84.72	0.16	Gy	Guyton-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
84.72	84.79	0.07	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
84.79	85.17	0.39	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
85.17	85.25	0.08	Gy	Guyton-Messer silt loams	Poorly drained	Yes	Yes	No	5	Fair
85.25	85.49	0.23	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
85.49	85.56	0.07	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
85.56	85.69	0.12	Cd	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
85.69	85.93	0.24	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
85.93	85.99	0.06	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
85.99	86.06	0.08	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
86.06	86.55	0.48	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
86.55	86.61	0.07	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
86.61	86.66	0.04	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
86.66	86.78	0.12	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
86.78	86.97	0.19	GYA	Guyton-Ouachita silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
86.97	87.04	0.07	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
87.04	87.67	0.64	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
87.67	87.78	0.11	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
87.78	87.92	0.14	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
87.92	88.04	0.13	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
88.04	88.10	0.06	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
88.10	88.11	0.01	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
88.11	88.45	0.34	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
88.45	88.53	0.08	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
88.53	88.65	0.12	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
88.65	88.81	0.16	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
88.81	88.85	0.04	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
88.85	88.98	0.13	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
88.98	89.06	0.08	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
89.06	89.09	0.03	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
89.09	89.11	0.02	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
89.11	89.23	0.11	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
89.23	89.34	0.11	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
89.34	89.44	0.10	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
89.44	89.49	0.06	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
89.49	89.76	0.27	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
89.76	89.82	0.06	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
89.82	90.02	0.21	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
90.02	90.20	0.18	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
90.20	90.26	0.06	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
90.26	90.34	0.08	GYA	Guyton-Ouachita silt loams, frequently flooded	Poorly drained	Yes	No	No	5	Fair
90.34	90.54	0.20	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
90.54	90.69	0.15	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
90.69	91.03	0.33	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
91.03	91.36	0.33	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
91.36	91.48	0.12	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
91.48	91.59	0.11	W	Water		No	No	No		
91.59	91.65	0.06	BzA	Brimstone silt loam	Poorly drained	Yes	No	No	5	Fair
91.65	91.82	0.17	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
91.82	92.03	0.21	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
92.03	92.13	0.11	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
92.13	92.23	0.09	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
92.23	92.36	0.13	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
92.36	92.59	0.23	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
92.59	92.66	0.08	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
92.66	92.81	0.15	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
92.81	92.88	0.07	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
92.88	92.93	0.04	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
92.93	93.25	0.32	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
93.25	93.28	0.03	GtA	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
93.28	93.51	0.23	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
93.51	93.63	0.12	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
93.63	93.70	0.07	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
93.70	93.90	0.20	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
Extension										
93.90	93.95	0.05	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
93.95	94.07	0.11	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
94.07	94.09	0.03	W	Water		No	No	No		
94.09	94.50	0.40	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
94.50	95.19	0.70	GnB	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
95.19	95.38	0.19	CdA	Caddo-Messer silt loams	Poorly drained	Yes	Yes	No	6	Fair
95.38	95.48	0.10	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
95.48	95.91	0.44	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
95.91	96.11	0.20	Cf	Gore (cadeville) very fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	No	No	5	Good
96.11	96.29	0.18	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
96.29	96.32	0.03	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
96.32	96.44	0.12	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
96.44	96.55	0.10	Ma	Malbis fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	Yes	No	3	Good
96.55	96.74	0.20	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
96.74	97.23	0.49	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
97.23	97.37	0.14	Rt	Ruston fine sandy loam, 1 to 5 percent slopes	Well-drained	No	Yes	No	3	Good
97.37	97.40	0.04	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
97.40	97.61	0.21	Rt	Ruston fine sandy loam, 1 to 5 percent slopes	Well-drained	No	Yes	No	3	Good
97.61	98.00	0.38	Ma	Malbis fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	Yes	No	3	Good
98.00	98.46	0.46	Rt	Ruston fine sandy loam, 1 to 5 percent slopes	Well-drained	No	Yes	No	3	Good
98.46	98.52	0.07	Ma	Malbis fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	Yes	No	3	Good
98.52	98.57	0.05	Be	Beauregard silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
98.57	98.60	0.03	Ma	Malbis fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	Yes	No	3	Good
98.60	98.69	0.09	Rt	Ruston fine sandy loam, 1 to 5 percent slopes	Well-drained	No	Yes	No	3	Good
98.69	98.95	0.26	Ma	Malbis fine sandy loam, 1 to 5 percent slopes	Moderately well-drained	No	Yes	No	3	Good
98.95	99.03	0.08	Be	Beauregard silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
99.03	99.31	0.28	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
99.31	99.33	0.02	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
99.33	99.58	0.26	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
99.58	99.83	0.25	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
99.83	99.98	0.15	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
99.98	100.13	0.14	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
100.13	100.23	0.11	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
100.23	100.36	0.12	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
100.36	100.40	0.04	BB	Basile and Guyton soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
100.40	100.91	0.52	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
100.91	100.98	0.06	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
100.98	101.09	0.11	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
101.09	101.15	0.06	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
101.15	101.22	0.06	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
101.22	101.67	0.45	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
101.67	102.00	0.34	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
102.00	102.08	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
102.08	102.24	0.16	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
102.24	102.56	0.32	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
102.56	102.69	0.13	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
102.69	102.77	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
102.77	102.83	0.06	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
102.83	102.99	0.16	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
102.99	103.19	0.19	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
103.19	103.44	0.25	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
103.44	103.50	0.06	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
103.50	103.55	0.06	Bn	Bienville loamy fine sand, 1 to 5 percent slopes	Somewhat excessively drained	No	No	No	2	Fair
103.55	103.95	0.39	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
103.95	103.99	0.04	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
103.99	104.04	0.05	Bn	Bienville loamy fine sand, 1 to 5 percent slopes	Somewhat excessively drained	No	No	No	2	Fair
104.04	104.16	0.12	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
104.16	104.23	0.07	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
104.23	104.31	0.08	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
104.31	104.38	0.07	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
104.38	104.89	0.51	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
104.89	104.94	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
104.94	105.04	0.10	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
105.04	105.09	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
105.09	105.28	0.19	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
105.28	105.34	0.06	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
105.34	105.40	0.06	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
105.40	105.48	0.08	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
105.48	105.54	0.06	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
105.54	106.51	0.96	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
106.51	106.54	0.04	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
106.54	106.95	0.41	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
106.95	107.08	0.12	Ck	Cahaba-Bienville-Guyton complex, gently undulating	Well-drained	No	No	No	3	Good
107.08	107.13	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
107.13	107.37	0.24	Ck	Cahaba-Bienville-Guyton complex, gently undulating	Well-drained	No	No	No	3	Good
107.37	107.47	0.10	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
107.47	107.49	0.02	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
107.49	107.61	0.12	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
107.61	107.78	0.17	Ck	Cahaba-Bienville-Guyton complex, gently undulating	Well-drained	No	No	No	3	Good
107.78	107.80	0.02	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
107.80	107.96	0.15	Ck	Cahaba-Bienville-Guyton complex, gently undulating	Well-drained	No	No	No	3	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
107.96	108.08	0.13	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
108.08	108.14	0.06	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
108.14	108.20	0.06	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
108.20	108.29	0.09	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
108.29	108.38	0.09	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
108.38	108.48	0.10	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
108.48	108.53	0.05	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
108.53	108.55	0.02	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
108.55	108.83	0.27	Bn	Bienville loamy fine sand, 1 to 5 percent slopes	Somewhat excessively drained	No	No	No	2	Fair
108.83	108.99	0.17	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
108.99	109.01	0.02	W	Water		No	No	No		

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
109.01	109.37	0.36	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
109.37	109.51	0.14	Bn	Bienville loamy fine sand, 1 to 5 percent slopes	Somewhat excessively drained	No	No	No	2	Fair
109.51	109.54	0.03	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
109.54	109.59	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
109.59	109.92	0.34	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
109.92	110.17	0.25	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
110.17	110.37	0.20	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
110.37	110.44	0.07	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
110.44	110.45	0.00	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
110.45	110.52	0.07	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
110.52	110.65	0.13	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
110.65	110.79	0.15	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
110.79	110.85	0.06	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
110.85	111.09	0.23	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
111.09	111.59	0.50	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
111.59	111.98	0.40	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
111.98	112.41	0.43	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
112.41	112.44	0.03	W	Water		No	No	No		
112.44	112.66	0.22	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
112.66	112.99	0.32	Ck	Cahaba-Bienville-Guyton complex, gently undulating	Well-drained	No	No	No	3	Good
112.99	113.44	0.45	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
113.44	114.12	0.68	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
114.12	114.66	0.54	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
114.66	114.73	0.07	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
114.73	114.95	0.22	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
114.95	114.99	0.04	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
114.99	115.12	0.14	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
115.12	115.28	0.15	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
115.28	115.36	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
115.36	115.49	0.13	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
115.49	115.55	0.07	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
115.55	115.59	0.03	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
115.59	115.64	0.05	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
115.64	115.76	0.12	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
115.76	115.83	0.07	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
115.83	116.16	0.32	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
116.16	116.23	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
116.23	116.79	0.56	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
116.79	116.84	0.05	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
116.84	116.88	0.04	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
116.88	117.65	0.77	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
117.65	117.88	0.23	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
117.88	118.00	0.12	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
118.00	118.13	0.13	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
118.13	118.32	0.19	Bn	Bienville loamy fine sand, 1 to 5 percent slopes	Somewhat excessively drained	No	No	No	2	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
118.32	118.38	0.06	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
118.38	118.54	0.16	Ch	Cahaba fine sandy loam, 1 to 3 percent slopes	Well-drained	No	Yes	No	3	Good
118.54	118.66	0.12	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
118.66	118.89	0.23	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
118.89	118.92	0.02	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
118.92	119.22	0.31	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
119.22	119.33	0.11	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
119.33	119.61	0.27	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
119.61	119.71	0.10	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
119.71	120.03	0.32	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
120.03	120.19	0.16	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
120.19	120.58	0.39	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
120.58	120.84	0.26	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
120.84	121.10	0.26	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
121.10	121.29	0.19	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
121.29	121.55	0.26	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
121.55	121.63	0.08	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
121.63	121.93	0.30	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
121.93	122.33	0.40	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
122.33	122.75	0.42	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
122.75	122.93	0.18	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
122.93	123.08	0.15	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
123.08	123.15	0.07	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
123.15	123.49	0.34	Fd	Frost silt loam	Poorly drained	Yes	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
123.49	124.28	0.80	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
124.28	124.40	0.12	Gu	Guyton-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
124.40	124.49	0.09	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
124.49	124.55	0.06	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
124.55	124.58	0.03	Go	Guyton silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
124.58	125.13	0.55	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
125.13	125.21	0.08	Mm	Mamou silt loam	Somewhat poorly drained	No	Yes	No	5	Good
125.21	126.06	0.85	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
126.06	126.27	0.21	Fd	Frost silt loam	Poorly drained	Yes	Yes	No	5	Fair
126.27	126.51	0.24	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
126.51	126.61	0.11	Fd	Frost silt loam	Poorly drained	Yes	Yes	No	5	Fair
126.61	126.84	0.22	Fo	Frost silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
126.84	127.19	0.35	Fd	Frost silt loam	Poorly drained	Yes	Yes	No	5	Fair
127.19	127.31	0.13	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
127.31	127.78	0.47	Fd	Frost silt loam	Poorly drained	Yes	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
127.78	127.97	0.19	Cr	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
127.97	128.23	0.27	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
128.23	128.32	0.09	Fo	Frost silt loam, occasionally flooded	Poorly drained	Yes	No	No	5	Fair
128.32	128.46	0.13	Cd	Caddo-Messer complex	Poorly drained	Yes	Yes	No	6	Fair
128.46	129.16	0.70	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
129.16	129.20	0.04	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
129.20	129.43	0.23	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
129.43	129.69	0.25	GY	Guyton and Cascilla soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair
129.69	130.05	0.36	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
130.05	130.20	0.15	Kd	Kinder-Messer complex	Poorly drained	Yes	Yes	No	5	Fair
130.20	130.31	0.11	Ge	Glenmora silt loam, 1 to 3 percent slopes	Moderately well-drained	No	Yes	No	5	Good
130.31	130.44	0.13	BB	Basile and Guyton soils, frequently flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
130.44	130.53	0.09	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
130.53	134.05	3.52	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
134.05	134.09	0.04	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
134.09	134.33	0.25	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
134.33	134.53	0.19	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
134.53	134.71	0.18	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
134.71	134.73	0.03	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
134.73	134.81	0.07	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
134.81	134.93	0.13	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
134.93	134.97	0.03	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
134.97	135.00	0.03	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
135.00	135.74	0.75	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
135.74	135.77	0.03	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
135.77	135.87	0.10	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
135.87	135.94	0.06	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
135.94	136.87	0.93	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
136.87	137.00	0.13	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
137.00	137.06	0.05	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
137.06	137.26	0.21	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
137.26	138.72	1.46	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
138.72	138.75	0.03	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
138.75	138.79	0.04	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
138.79	138.83	0.04	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
138.83	139.05	0.22	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
139.05	139.31	0.26	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
139.31	139.45	0.15	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
139.45	139.46	0.01	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
139.46	139.53	0.07	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
139.53	139.66	0.13	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
139.66	139.77	0.11	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
139.77	139.86	0.09	Md	Midland silty clay loam	Poorly drained	Yes	Yes	No	7	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
139.86	140.23	0.37	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
140.23	140.33	0.10	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
140.33	140.46	0.13	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
140.46	140.57	0.11	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
140.57	140.67	0.10	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
140.67	140.80	0.12	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
140.80	141.01	0.21	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
141.01	141.06	0.06	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
141.06	141.44	0.38	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
141.44	142.40	0.96	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
ANR Lateral										
0.00	0.93	0.93	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
0.93	1.28	0.35	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
1.28	1.37	0.09	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
1.37	1.57	0.20	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
1.57	1.65	0.08	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
1.65	1.70	0.05	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
CGT Lateral										
0.00	0.27	0.27	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
0.27	0.32	0.04	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
0.32	0.75	0.44	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
0.75	0.89	0.14	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
0.89	2.31	1.42	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
2.31	2.91	0.61	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
2.91	3.01	0.10	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
3.01	3.38	0.37	Md	Midland silty clay loam	Poorly drained	Yes	Yes	No	7	Fair
3.38	3.67	0.29	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
3.67	3.84	0.17	Md	Midland silty clay loam	Poorly drained	Yes	Yes	No	7	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
3.84	4.31	0.47	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
4.31	4.86	0.55	Md	Midland silty clay loam	Poorly drained	Yes	Yes	No	7	Fair
4.86	4.92	0.06	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
4.92	4.94	0.02	Md	Midland silty clay loam	Poorly drained	Yes	Yes	No	7	Fair
4.94	5.22	0.28	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
5.22	5.40	0.18	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
5.40	5.52	0.12	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
5.52	5.67	0.15	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
5.67	5.77	0.09	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
5.77	5.81	0.04	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
5.81	7.12	1.31	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
7.12	8.06	0.94	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
8.06	8.67	0.60	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
8.67	8.93	0.26	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
8.93	8.98	0.06	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
8.98	9.02	0.04	Cs	Cascilla silt loam, frequently flooded	Well-drained	Yes	No	No		Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
9.02	9.06	0.04	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
9.06	9.15	0.09	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
9.15	9.28	0.13	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
9.28	9.30	0.03	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
9.31	9.41	0.11	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
9.41	9.46	0.05	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
9.46	9.50	0.04	Cs	Cascilla silt loam, frequently flooded	Well-drained	Yes	No	No		Fair
9.50	9.61	0.11	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
9.61	9.66	0.05	Cs	Cascilla silt loam, frequently flooded	Well-drained	Yes	No	No		Fair
9.66	9.84	0.18	AcB	Acadia silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	6	Good
9.84	10.69	0.84	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
10.69	10.78	0.09	Pc	Patoutville-Crowley complex	Somewhat poorly drained	No	Yes	No	5	Good
10.78	11.46	0.68	Ch	Calhoun silt loam	Poorly drained	Yes	Yes	No	5	Fair

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
11.46	11.50	0.04	PaB2	Patoutville silt loam, 1 to 3 percent slopes, eroded	Somewhat poorly drained	No	Yes	No	5	Good
PPEC Lateral										
0.00	0.24	0.24	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
0.24	0.44	0.21	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
0.44	0.51	0.07	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
0.51	0.64	0.13	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
0.64	0.69	0.05	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
0.69	0.87	0.18	Mt	Mowata silt loam	Poorly drained	Yes	Yes	No	5	Good
0.87	1.04	0.17	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair
1.04	1.70	0.66	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
1.70	1.92	0.22	Bw	Basile-Wrightsville complex, frequently flooded	Poorly drained	Yes	No	No	5	Fair
1.92	3.05	1.13	Wv	Wrightsville-Vidrine complex	Poorly drained	Yes	Yes	No	6	Fair
3.05	3.23	0.18	DuB	Duralde silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	5	Good
3.23	3.46	0.23	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good

TABLE 4-1

Soils Along the Proposed Pipeline Segments

Begin MP	End MP	Length (Miles)	Map Symbol	Map Unit	Drainage Class	Hydric	Prime Farmland	HEL a/	WEG b/	Reveg Potential
3.46	3.49	0.02	W	Water		No	No	No		
3.49	3.76	0.28	MuD2	Muskogee-McKamie complex, 3 to 8 percent slopes, eroded	Moderately well-drained	No	No	Yes		Good
3.76	4.01	0.25	DuB	Duralde silt loam, 1 to 3 percent slopes	Somewhat poorly drained	No	Yes	No	5	Good
TGT Lateral										
0.00	0.10	0.10	Cv	Crowley-Vidrine complex	Somewhat poorly drained	No	Yes	No	5	Fair

a HEL = high erodible land.

b WEG = wind erodibility group.

APPENDIX 5 WATER RESOURCES – WATERBODIES AND HYDROSTATIC TESTING

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TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/
Loop 1								
4.35	Cameron	Sabine Lake	D14LPA003	Ditch	Perennial	32	N/A	Open cut
5.34	Cameron	Sabine Lake	D14LPA004	Ditch	Perennial	27	N/A	Open cut
9.5	Cameron	Sabine Lake	S14LPA006	Pond	Perennial	360	N/A	Within
15.2	Cameron	Lower Calcasieu	S14LPA007	Pond	Perennial	86	N/A	Within
Loop 2								
69.57	Calcasieu	West Fork Calcasieu	S25LPA024	Unnamed	Perennial	13	N/A	Open cut
70.3	Calcasieu	West Fork Calcasieu	S25LPA021	Pond	Perennial	92	N/A	Within
70.35	Calcasieu	West Fork Calcasieu	D25LPA023	Ditch	Intermittent	28	N/A	Open cut
70.37	Calcasieu	West Fork Calcasieu	D25LPA022	Ditch	Perennial	50	N/A	Open cut
70.92	Calcasieu	West Fork Calcasieu	D25LPA020	Ditch	Ephemeral	10	N/A	Open cut
71.19	Calcasieu	West Fork Calcasieu	D25LPA019	Houston River Canal	Perennial	122	A, B, C, D, F	HDD
73.00	Calcasieu	West Fork Calcasieu	S25LPA025	UT Houston River	Intermittent	4	A, B, C, F	Open cut
73.4	Calcasieu	West Fork Calcasieu	S25LPA026	UT Houston River	Intermittent	2	A, B, C, F	Within
73.43	Calcasieu	West Fork Calcasieu	S25LPA027	Houston River	Perennial	92	A, B, C, F	HDD
75.00	Calcasieu	West Fork Calcasieu	S25LPA040	UT Houston River	Intermittent	18	A, B, C, F	Open cut
75.78	Calcasieu	West Fork Calcasieu	D25LPA042	Ditch	Ephemeral	9	N/A	Open cut
76.44	Calcasieu	West Fork Calcasieu	D25LPA004	Ditch	Ephemeral	7	N/A	HDD
76.47	Calcasieu	West Fork Calcasieu	D25LPA004	Ditch	Ephemeral	8	N/A	HDD
77.49	Calcasieu	West Fork Calcasieu	S25LPA005	Litte River	Perennial	49	A, B, C	HDD
77.52	Calcasieu	West Fork Calcasieu	S25LPA006	UT Little River	Ephemeral	3	A, B, C	HDD
78.07	Calcasieu	West Fork Calcasieu	S25LPA033	UT Little River	Ephemeral	8	A, B, C	Open cut
79.17	Calcasieu	West Fork Calcasieu	S25LPA007	UT Little River	Ephemeral	4	A, B, C	Open cut

TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/
80.73	Calcasieu	West Fork Calcasieu	S25LPA008	UT West Fork Calcasieu River	Ephemeral	5	A, B, C, F	Open cut
81.18	Calcasieu	West Fork Calcasieu	S25LPA009	West Fork Calcasieu River	Perennial	157	A, B, C, F	HDD
81.37	Calcasieu	West Fork Calcasieu	S25LPA010	UT West Fork Calcasieu River	Perennial	64	A, B, C, F	HDD
81.76	Calcasieu	West Fork Calcasieu	S25LPA011	UT West Fork Calcasieu River	Ephemeral	2	A, B, C, F	Open cut
81.91	Calcasieu	West Fork Calcasieu	S25LPA012	UT West Fork Calcasieu River	Ephemeral	2	A, B, C, F	Open cut
83.50	Calcasieu	West Fork Calcasieu	S25LPA013	Hickory Branch Canal	Ephemeral	9	A, B, C, F	Open cut
85.22	Calcasieu	West Fork Calcasieu	S25LPA001	UT Hickory Branch Canal	Ephemeral	3	A, B, C, F	Open cut
86.63	Beauregard	West Fork Calcasieu	S25LPA002	UT Indian Bayou	Intermittent	5	A, B, C, F	Open cut
86.95	Beauregard	West Fork Calcasieu	S25LPA003	Indian Bayou	Perennial	20	A, B, C, F	HDD
88.08	Beauregard	West Fork Calcasieu	S25LPA014	UT Indian Bayou	Ephemeral	5	A, B, C, F	Open cut
88.50	Beauregard	West Fork Calcasieu	S25LPA015	UT Indian Bayou	Ephemeral	5	A, B, C, F	Open cut
90.23	Beauregard	Upper Calcasieu	S25LPA016	UT Marsh Bayou	Ephemeral	2	A, B, C	HDD
92.89	Beauregard	Upper Calcasieu	S25LPA017	UT Marsh Bayou	Intermittent	3	A, B, C	Open cut
93.26	Beauregard	Upper Calcasieu	D25LPA018	Ditch	Intermittent	2	N/A	Open cut
Extension								
95.62	Allen	Upper Calcasieu	S45NBB001	UT Barnes Creek	Ephemeral	2	A, B, C	Open cut
95.88	Allen	Upper Calcasieu	S45NBA034	UT Barnes Creek	Ephemeral	3	A, B, C	Open cut
96.86	Allen	Upper Calcasieu	S45NBB200	UT Barnes Creek	Ephemeral	7	A, B, C	HDD
97.06	Allen	Upper Calcasieu	S45NBB203	Barnes Creek	Perennial	29	A, B, C	HDD

TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/
97.20	Allen	Upper Calcasieu	S45NBB021	UT Barnes Creek	Ephemeral	1	A, B, C	HDD
100.21	Allen	Upper Calcasieu	S45NBB025	Brushy Creek	Perennial	40	A, B, C	Open cut
100.31	Allen	Upper Calcasieu	S45NBB024	UT Brushy Creek	Ephemeral	1	A, B, C	Open cut
100.66	Allen	Upper Calcasieu	S45NBB010	UT Brushy Creek	Ephemeral	1	A, B, C	Open cut
102.0	Allen	Upper Calcasieu	S45NBB011	UT Bearn Creek	Ephemeral	8	A, B, C	Within
102.71	Allen	Upper Calcasieu	S45NBB026	Bear Creek	Perennial	17	A, B, C	Open cut
103.66	Allen	Upper Calcasieu	D45NBB031	Ditch	Ephemeral	8	N/A	Open cut
103.78	Allen	Upper Calcasieu	D45NBB032	Ditch	Ephemeral	9	N/A	Open cut
105.03	Allen	Upper Calcasieu	S45NBA023	Bunchs Creek	Perennial	27	A, B, C, F	Open cut
108.30	Allen	Whiskey Chitto	S45NBA022	UT Calcasieu River	Ephemeral	3	A, B, C, F	Open cut
108.99	Allen	Whiskey Chitto	S45NBA042	Whiskey Chitto Creek	Perennial	121	A, B, C, G	HDD
110.60	Allen	Upper Calcasieu	S45NBA040	UT Calcasieu River	Intermittent	8	A, B, C, F	Open cut
110.60	Allen	Upper Calcasieu	S45NBA040	UT Calcasieu River	Intermittent	27	A, B, C, F	Open cut
110.64	Allen	Upper Calcasieu	S45NBA040	UT Calcasieu River	Intermittent	8	A, B, C, F	Open cut
111.5	Allen	Upper Calcasieu	S45NBA043	UT Calcasieu River	Ephemeral	3	A, B, C, F	Within
112.31	Allen	Upper Calcasieu	D45NBA044	Ditch	Perennial	51	N/A	HDD
112.41	Allen	Upper Calcasieu	S45NBA045	Calcasieu River	Perennial	205	A, B, C, F, G	HDD
113.2	Allen	Upper Calcasieu	S45NBA026	UT Calcasieu River	Ephemeral	2	A, B, C, F	Within
114.02	Allen	Upper Calcasieu	S45NBA027	UT Calcasieu River	Ephemeral	6	A, B, C, F	Open cut
114.26	Allen	Upper Calcasieu	S45NBA028	UT Kinder Levee Canal	Perennial	29	B, C	Open cut
114.65	Allen	Upper Calcasieu	S45NBA018	UT Kinder Levee Canal	Perennial	22	B, C	HDD
114.96	Allen	Upper Calcasieu	S45NBA020	UT Kinder Levee Canal	Intermittent	8	B, C	Open cut

TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/
115.72	Allen	Upper Calcasieu	S45NBA021	UT Kinder Levee Canal	Perennial	21	B, C	Open cut
116.17	Allen	Upper Calcasieu	S45NBB207	UT Calcasieu River	Ephemeral	5	A, B, C, F	Open cut
117.37	Allen	Upper Calcasieu	S45NBA001	UT Kinder Levee Canal	Intermittent	6	B, C	Open cut
118.81	Allen	Upper Calcasieu	S45NBB012	UT Bayou Blue	Ephemeral	2	A, B, C	Open cut
120.78	Allen	Mermantau Headwaters	S45NBA035	Bayou Blue	Perennial	51	A, B, C	Open cut
121.15	Allen	Mermantau Headwaters	S45NBA038	UT Bayou Blue	Ephemeral	18	A, B, C	Open cut
122.04	Allen	Mermantau Headwaters	S45NBA037	UT Bayou Blue	Ephemeral	3	A, B, C	Open cut
122.46	Allen	Mermantau Headwaters	D45NBA115	Ditch	Ephemeral	23	N/A	Open cut
123.21	Allen	Mermantau Headwaters	D45NBA032	Ditch	Intermittent	8	N/A	Open cut
123.47	Allen	Mermantau Headwaters	D45NBA031	Ditch	Intermittent	8	N/A	Open cut
124.43	Allen	Mermantau Headwaters	S45NBA030	Sonnier Bayou	Perennial	18	A, B, C	Open cut
125.34	Allen	Mermantau Headwaters	D45NBB020	Ditch	Ephemeral	11	N/A	Open cut
127.44	Allen	Mermantau Headwaters	D45NBA114	Ditch	Ephemeral	15	N/A	Open cut
128.69	Allen	Mermantau Headwaters	S45NBA014	UT Castor Creek	Ephemeral	3	A, B, C	Open cut
129.1	Allen	Mermantau Headwaters	D45NBA015	Ditch	Intermittent	0	N/A	Within
129.45	Allen	Mermantau Headwaters	S45NBA016	UT Castor Creek	Ephemeral	2	A, B, C	Open cut
129.48	Allen	Mermantau Headwaters	S45NBA017	Castor Creek	Perennial	41	A, B, C	Open cut
129.5	Allen	Mermantau Headwaters	S45NBB206	UT Castor Creek	Intermittent	6	A, B, C	Within
129.67	Allen	Mermantau Headwaters	S45NBB205	UT Castor Creek	Intermittent	8	A, B, C	Open cut
129.85	Allen	Mermantau Headwaters	S45NBB204	UT Caney Creek	Intermittent	5	A, B, C, F	Open cut
130.40	Allen	Mermantau Headwaters	S45NBB013	Caney Creek	Perennial	34	A, B, C, F	Open cut
130.42	Evangeline	Mermantau Headwaters	S45NBB014	Caney Creek	Perennial	31	A, B, C, F	Open cut

TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/
130.51	Evangeline	Mermantau Headwaters	S45NBB015	UT Caney Creek	Perennial	29	A, B, C, F	Open cut
133.32	Evangeline	Mermantau Headwaters	D45NBB002	Ditch	Ephemeral	5	N/A	Open cut
134.95	Evangeline	Mermantau Headwaters	S45NBA002	UT Nezpique Bayou	Intermittent	9	A, B, C, F	Open cut
135.79	Evangeline	Mermantau Headwaters	S45NBA003	West Fork Nezipique	Perennial	79	A, B, C, F	Open cut
136.6	Evangeline	Mermantau Headwaters	D45NBA005	Ditch	Ephemeral	3	N/A	Within
137.23	Evangeline	Mermantau Headwaters	S45NBA006	Pond	Perennial	30	A, B, C, F	Open cut
137.29	Evangeline	Mermantau Headwaters	S45NBA007	Pond	Intermittent	30	A, B, C, F	Open cut
138.97	Evangeline	Mermantau Headwaters	S45NBA055	UT East Fork Bayou Nezpique	Ephemeral	2	A, B, C, F	Open cut
139.15	Evangeline	Mermantau Headwaters	S45NBA009	East Fork Bayou Nezpique	Perennial	51	A, B, C, F	HDD
139.26	Evangeline	Mermantau Headwaters	S45NBA011	UT East Fork Bayou Nezpique	Intermittent	8	A, B, C, F	HDD
139.74	Evangeline	Mermantau Headwaters	S45NBA013	UT Manwell Gully	Ephemeral	3	A, B, C, F	Open cut
141.24	Evangeline	Mermantau Headwaters	S45NBB016 e/	UT East Fork Bayou Nezpique	Ephemeral	2	A, B, C, F	Open cut
CGT Lateral								
1.07	Evangeline	Mermantau Headwaters	DCGTLTB017	Ditch	Perennial	18	N/A	Open cut
2.60	Evangeline	Mermantau Headwaters	DCGTLTB003	Ditch	Ephemeral	5	N/A	Open cut
2.75	Evangeline	Mermantau Headwaters	DCGTLTB012	Ditch	Ephemeral	12	N/A	Open cut
3.17	Evangeline	Mermantau Headwaters	DCGTLTB011	Ditch	Ephemeral	36	N/A	Open cut
3.70	Evangeline	Mermantau Headwaters	DCGTLTB013	Ditch	Ephemeral	12	N/A	Open cut
3.89	Evangeline	Mermantau Headwaters	DCGTLTB005	Ditch	Ephemeral	5	N/A	Open cut
4.16	Evangeline	Mermantau Headwaters	DCGTLTB015	Ditch	Ephemeral	8	N/A	Open cut
4.48	Evangeline	Mermantau Headwaters	DCGTLTB016	Ditch	Ephemeral	9	N/A	Open cut

TABLE 5-1 **Waterbodies Crossed by the CCTPL Pipelines**								
Facility / MP	**Parish**	**HUC-8 Sub-Basin Name**	**Waterbody Identifier**	**Waterbody Name a/**	**Class/Flow Status**	**Estimated Crossing Width (ft) b/**	**Water Quality Classification c/**	**Crossing Method d/**
5.75	Evangeline	Mermantau Headwaters	SCGTLTB006	UT Millers Lake	Intermittent	13	A, B, C, F	Open cut
5.80	Evangeline	Mermantau Headwaters	DCGTLTB007	Ditch	Ephemeral	8	N/A	Open cut
6.43	Evangeline	Mermantau Headwaters	DCGTLTB008	Ditch	Ephemeral	6	N/A	Open cut
6.98	Evangeline	Mermantau Headwaters	DCGTLTB019	Ditch	Ephemeral	8	N/A	Open cut
7.21	Evangeline	Bayou Teche	SCGTLTB009	UT Bayou Choctaw	Perennial	8	A, B, C	Open cut
8.64	Evangeline	Bayou Teche	DCGTLTA001	Ditch	Intermittent	5	N/A	Open cut
8.87	Evangeline	Bayou Teche	DCGTLTA002	Ditch	Ephemeral	4	N/A	Open cut
9.00	Evangeline	Bayou Teche	SCGTLTA003	UT Mill Creek	Ephemeral	5	A, B, C	Open cut
9.50	Evangeline	Bayou Teche	SCGTLTA006	UT Mill Creek	Ephemeral	11	A, B, C	Open cut
9.60	Evangeline	Bayou Teche	DCGTLTA005	Ditch	Ephemeral	2	N/A	Within
9.75	Evangeline	Bayou Teche	SCGTLTA004	UT Mill Creek	Ephemeral	8	A, B, C	Open cut
PPEC Lateral								
0.53	Evangeline	Mermantau Headwaters	SPPECLTA001	East Fork Bayou Nezpique	Intermittent	10	A, B, C, F	Open cut
1.80	Evangeline	Mermantau Headwaters	SPPECLTA008	East Fork Bayou Nezpique	Intermittent	4	A, B, C, F	HDD
1.86	Evangeline	Mermantau Headwaters	SPPECLTA007	East Fork Bayou Nezpique	Intermittent	20	A, B, C, F	HDD
2.10	Evangeline	Mermantau Headwaters	SPPECLTA006	Pond	Perennial	220	N/A	Within
2.70	Evangeline	Mermantau Headwaters	DPPECLTA003	Ditch	Intermittent	11	N/A	Open cut
3.63	Evangeline	Mermantau Headwaters	SPPECLTA005	UT Unnamed Pond	Perennial	12	A, B, C, F	Open cut
3.68	Evangeline	Mermantau Headwaters	SPPECLTA004	UT Unnamed Pond	Intermittent	23	A, B, C, F	Open cut

TABLE 5-1

Waterbodies Crossed by the CCTPL Pipelines

Facility / MP	Parish	HUC-8 Sub-Basin Name	Waterbody Identifier	Waterbody Name a/	Class/Flow Status	Estimated Crossing Width (ft) b/	Water Quality Classification c/	Crossing Method d/

a UT = Unnamed Tributary.

b Estimated wetted width, based on observation at time of field survey.

c Designated uses for Louisiana are: Primary Contact Recreation (A), Secondary Contact Recreation (B), Fish and Wildlife Propagation (C), Drinking Water Supply (D), Oyster Propagation (E), Agriculture (F), and Outstanding Natural Resource Water (G). N/A = Not Applicable.

d Open cut = excavation of the pipeline trench across the waterbody. HDD = Horizontal directional drill. Within = waterbody encroaches into the temporary or permanent right-of-way.

e Crossed on both the Extension and ANR Lateral.

NOTE: All waterbodies are classified as warmwater fisheries, except for the two ditches on Loop 1 that may contain warmwater estuarine fisheries.

TABLE 5-2

Hydrostatic Test Water Source/Discharge Locations for the CCTPL Pipelines

Crossing Name	Approximate Entry MP	Approximate Exit MP	Horizontal Distance (feet)	Approximate Volume (gallons)	Planned Water Source	Planned Discharge Location
Loop 1						
Pipeline (13.9 miles)	N/A	N/A	N/A	5,793,043	Harrington Pond (MP 8.4)	CCTPL right-of-way
Loop 2						
Pipeline (24.5 miles)	N/A	N/A	N/A	10,215,938	Whiskey Chitto Creek or Calcasieu River	Whiskey Chitto Creek or Calcasieu River
Houston River Canal HDD	71.0	71.3	1,694	134,102	Houston River Canal	HDD Exit Site within CCTPL right-of-way
Houston River HDD	73.4	73.9	2,892	228,938	Houston River	HDD Exit Site within CCTPL right-of-way
US 27/Bankens Road/Railroad HDD	76.3	76.8	2,317	183,420	Municipal or Private Water	HDD Exit Site within CCTPL right-of-way
Little River HDD	77.3	77.7	2,148	170,121	Little River	HDD Exit Site within CCTPL right-of-way
West Fork of Calcasieu River HDD	81.0	81.6	3,130	247,779	West Fork of Calcasieu River	HDD Exit Site within CCTPL right-of-way
Indian Bayou/Camp Edgewood Road HDD	86.7	87.1	1,725	136,556	Indian Bayou or Municipal Water	HDD Exit Site within CCTPL right-of-way
Marsh Bayou HDD	90.1	90.5	1,722	140,276	Marsh Bayou or Municipal Water	HDD Exit Site within CCTPL right-of-way
Extension						
Pipeline (48.5 miles)	N/A	N/A	N/A	20,283,763	Whiskey Chitto Creek or Calcasieu River	Whiskey Chitto Creek or Calcasieu River
Barnes Creek HDD	96.7	97.2	2,607	206,377	Barnes Creek	HDD Exit Site within CCTPL right-of-way

TABLE 5-2

Hydrostatic Test Water Source/Discharge Locations for the CCTPL Pipelines

Crossing Name	Approximate Entry MP	Approximate Exit MP	Horizontal Distance (feet)	Approximate Volume (gallons)	Planned Water Source	Planned Discharge Location
Whiskey Chitto Creek HDD	108.8	109.6	3,734	295,593	Whiskey Chitto Creek	HDD Exit Site within CCTPL right-of-way
Calcasieu River HDD	112.7	112.2	2,502	198,065	Calcasieu River	HDD Exit Site within CCTPL right-of-way
Highway 165 HDD	114.4	114.9	2,350	186,032	Municipal or Private Water	HDD Exit Site within CCTPL right-of-way
Highway 10 HDD	139.0	139.6	2,908	230,205	Municipal or Private Water	HDD Exit Site within CCTPL right-of-way
CGT Lateral						
Pipeline (11.3 miles)	N/A	N/A	N/A	3,522,886	Municipal or Private Water	HDD Exit Site within CCTPL right-of-way
Wetland WCGTLTA016 HDD	10.8	11.1	1,458	85,089	Municipal or Private Water	HDD Exit Site within CCTPL right-of-way
PPEC Lateral						
Pipeline (4.0 miles)	N/A	N/A	N/A	1,678,090	East Fork Bayou Nezpique or Municipal	HDD Exit Site within CCTPL right-of-way
East Fork Bayou Nezpique HDD	2.1	1.6	2,830	223,951	East Fork Bayou Nezpique	HDD Exit Site within CCTPL right-of-way
ANR Lateral						
Pipeline (1.7 miles)	N/A	N/A	N/A	535,075	Municipal or Private Water	CCTPL right-of-way

TABLE 5-2

Hydrostatic Test Water Source/Discharge Locations for the CCTPL Pipelines

Crossing Name	Approximate Entry MP	Approximate Exit MP	Horizontal Distance (feet)	Approximate Volume (gallons)	Planned Water Source	Planned Discharge Location
TGT Lateral						
Pipeline (0.2 mile)	N/A	N/A	N/A	49,262	Municipal or Private Water	CCTPL right-of-way
			Total	**44,744,561**		

N/A = Not applicable