DEEPWATER PORT LICENSE APPLICATION FOR THE BLUEWATER SPM PROJECT

VOLUME II – ENVIRONMENTAL EVALUATION

Section 16 – Cumulative Impact Assessment

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ac	acre
ACND	Aransas County Navigation District
Annova Project	Annova LNG Brownsville Project
APE	Area of Potential Effect
Bcf/d	billion cubic feet per day
BOEM	Bureau of Ocean Energy Management
BSC	Brownsville Ship Channel
BPD	Barrels per day
BWTT	Bluewater Texas Terminal, LLC
CCSC	Corpus Christi Ship Channel
CEQ	Concil on Environmental Quality
CFR	Code of Federal Regulations
Corpus Christi	Corpus Christi LNG, LLC
CWA	Clean Water Act of 1977
DOE	U.S. Department of Energy
DOI	Department of Interior
DWH	Deepwater Horizon
ESA	Endangered Species Act of 1973
FERC	Federal Energy Regulatory Commission
ft	feet
FTA	fair trade agreement
GOM	Gulf of Mexico
HDD	horizontal directional drill
HUC	Hydrologic Unit Code
km	kilometer
lf	linear feet
LNG	liquefied natural gas
LOOP	Louisiana Offshore Oil Port
m	meter
m^3	cubic meters
MARAD	Maritime Administration
MB/D	thousand barrels per day
mi	mile
MLLW	mean lower low water
MTPA	million tonnes per annum
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NGL	natural gas liquids
nm	nautical mile
NPDES	National Pollutant Discharge Elimination System
NSA	noise sensitive area
OCS	Outer Continental Shelf
PAMA	Port of Aransas Marina Association
PEIS	Preliminary Environmental Impact Statement
POCC	Port of Corpus Christi Authority
Port Arthur	Port Arthur LNG, LLC and Port Arthur Pipeline, LLC

Project	Bluewater Single Point Mooring (SPM) Project
RG LNG	Rio Grande LNG, LLC
SIL	significant impact level
SPM	Single point mooring
TCEQ	Texas Commission on Environmental Quality
Texas COLT	Texas COLT LLC
Texas LNG	Texas LNG Brownsville LLC
Texas SPOT	SPOT Terminal Serviecs LLC
TGTP	Texas Gulf Terminals Project
TPWD	Texas Parks and Wildlife
TSS	Total Suspended Solids
TxDOT	Texas Department of Transportation
U.S.	United States of America
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
VCP	Valley Crossing Pipeline
VLCC	Very large crude carrier

16 Cumulative Impact Analysis

16.1 Framework of Cumulative Impact Analysis

In accordance with the National Environmental Policy Act of 1969 (NEPA), the U.S. Maritime Administration (MARAD) is required to conduct a cumulative impact analysis for the Project. The Council on Environmental Quality (CEQ) defines cumulative impacts as impacts on the environment resulting from incremental impacts of an action in conjunction with other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations [CFR] 1508.7) (CEQ 2005).

Cumulative effects generally refer to impacts that are additive or synergistic in nature and result from the construction of multiple actions in the same vicinity and time frame. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time. In general, small- scale projects with minimal impacts of short duration do not significantly contribute to cumulative impacts.

Below we describe the methodology, geographic range, and cumulative impacts of existing and reasonably foreseeable projects included in this analysis. The impacts associated with the proposed Bluewater Single Point Mooring (SPM) Project (the Project) are also summarized below, as well as the incremental effects of the proposed Project when added to other past, present, or reasonably foreseeable actions, regardless of the agency or party undertaking such actions.

16.2 Cumulative Impact Scope of Analysis

Our cumulative impact analysis for the Project generally follows the methodology set forth in relevant guidance (CEQ 2005; U.S. Environmental Protection Agency [USEPA] 1999) and is consistent with the format and methodology of previous cumulative impact analyses published by MARAD for similar actions. Under these guidelines, inclusion of other actions in the analysis is based on identification of impacts on environmental resources from other actions that would directly or indirectly result in similar effects as the Proposed Action. The cumulative impacts analysis includes those past, present, and reasonably foreseeable projects meeting the following three criteria:

- significantly impacts a resource potentially affected by the Project;
- causes this impact within all, or part of, the timespan for potential impacts of the Project (50 years); and
- impacts a resource within all or part of the same geographic range affected by the proposed Project. The geographic range considered varies depending on the resource being discussed and includes the general area in which the projects could contribute to cumulative impacts on that resource (geographic scope of analysis).

Projects included in this cumulative analysis were identified by reviewing publicly available documents, including press releases and agency planning documents from the Bureau of Ocean Energy Management (BOEM), U.S. Army Corps of Engineers (USACE), Federal Energy Regulatory Commission (FERC), and U.S. Department of Transportation (USDOT), that occurred within the geographic scope of the Project (see Tables 16-1 and 16-2) Local projects were also identified through correspondence with regulatory and planning boards. Projects identified during these reviews are included in the cumulative impacts assessment when they meet the following standards:

1. an application has been submitted to a regulatory agency for permit review,
2. available press releases indicate that a project is moving forward, and
3. the project is within the appropriate geographic range (as identified below) of the proposed Project.

Because detailed information about future projects, actions, or facilities was limited in many cases, quantitative assessments of potential cumulative impacts were not possible; therefore, qualitative assessments were completed where applicable. In addition, there is a level of uncertainty when evaluating the potential cumulative impacts of in-

progress and proposed projects, since projects can be delayed, abandoned, or altered between the time they are announced and the time they are completed or abandoned. The specific sources for each project included in this analysis are noted in Table 16-2. Past actions are considered to be captured in the baseline evaluation of impacts.

The coastal bend of Texas, namely Aransas, Nueces, and San Patricio Counties have changed considerably over the last 50 years with industrialized development associated with oil and gas infrastructure and the establishment of multiple Port authorities. Recently completed development includes the Nueces River Rail Yard, the M&G Plant, the Oxy Ingleside Energy Center Terminal, as well ongoing maintenance and improvements in waterways to access these facilities (e.g., within the La Quinta Channel and Corpus Christi Ship Channel [CCSC]) (Port of Corpus Christi [POCC] 2018a; Guidry News Service 2018).

As previously noted, the geographic ranges assessed for the cumulative assessment vary based on the resource being considered. The western Gulf of Mexico (GOM), specifically BOEM's West Planning Area defines the geographic range for offshore projects, while the coast of Texas defines the geographic range for large onshore oil and gas projects. A maximum 31-mile (mi) (50-kilometer [km]) buffer is used to identify other projects that could contribute to cumulative impacts on resources in proximity to the Harbor Island Booster Station, Onshore and Inshore Pipelines. Table 16-1 provides the resource-specific geographic ranges considered in the cumulative analysis for the Project's Onshore Components. These projects have been compiled into eight groups to facilitate discussion and the cumulative analysis (see Table 16-2 and Figure 16-1):

- offshore oil and gas terminals;
- oil and gas exploration and production;
- onshore gas and oil storage and terminals;
- marine traffic (e.g., cruise ships, recreational and commercial fishing vessels);
- waterway improvement projects;
- pipeline projects;
- other industrial, commercial, and residential developments; and
- non-jurisdictional facilities.

Table 16-1: Geographic Range for Cumulative Impact Analysis for the Project's Onshore Components

Environmental Resource	Geographic Scope and Justification
Water Quality	**Onshore/ Inshore:** Surface water impacts on water resources are assessed on a watershed level (Hydrologic Unit Code [HUC]) as recommended by the CEQ. Also, to include potential overlapping impacts from sedimentation, turbidity, and general water quality impacts for surface water resources. Ground Water is accessed on an aquifer level (Gulf Coast Aquifer). **Offshore:** Impacts to elements of the marine environment (e.g., bottom substrate, wave and tidal action, deepwater environment) occur within the vicinity of construction and up and operation activities and potentially up to 2.1 mi (3.5 km) away based on Total Suspended Solids (TSS) modeling conducted for the proposed Project.
Wetlands and Waters of the U.S.	HUC 12 watershed – impacts on Waters of the U.S. including wetlands, are traditionally assessed on a watershed level, as recommended by the CEQ.
Aquatic Environment	**Onshore/ Inshore:** Aquatic environment impacts are assessed on a watershed level (HUC 12) as recommended by the CEQ. Also, to include potential overlapping impacts from sedimentation, turbidity, and general water quality impacts for surface water resources. **Offshore:** Impacts to elements of the marine environment (e.g., bottom substrate, wave and tidal action, deepwater environment) occur within the vicinity of construction and up and operation activities and potentially up to 2.1 miles (3.5 km) away based on TSS modeling conducted for the proposed Project.
Commercial and Recreational Fisheries	Impacts occur where fishing is restricted; in this case, the restricted area is the established area to be avoided (ATBA) of approximately 0.84 mi (1350 meters) radius around the deepwater port.
Wildlife and Protected Species	**Onshore:** 1-mi (1.6-km) radius from the pipelines is commensurate with the scale of their construction (only a few months at a time in any single location) and operation (habitat largely restored). **Inshore/ Offshore:** The farthest distance underwater noise could travel from pile driving (3 miles) to create greater than negligible impacts. Of the Project impacts that could disturb underwater wildlife, construction noise effects extend the greatest distance. This is also a reasonable distance for identifying cumulative effects on birds.
Cultural Resources	Overlapping impacts within the Area of Potential Effect (APE)– direct impacts on cultural resources are highly localized, cumulative impacts would only occur if other projects are constructed in the same place or impact the same historic properties impacted by the proposed Project
Socioeconomics	Affected counties and municipalities – due to the Project's limited regional scope and relative short construction duration

Geologic Resources	Construction workspaces – impacts on geological resources and soils would be highly localized and primarily limited to the respective project footprints during active construction
Coastal Zone Use and Recreation	1-mi radius – to encompass any large areas with specialized or recreational uses
Viewshed and Aesthetics	0.25 mi and existing visual access points (e.g., road crossings) – to include the surrounding area from where a new facility could be visible
Air Quality and Meteorology – Operation	Based on USEPA, major source modeling guidance. It is the distance to which the cumulative air emissions model is predictive (31.1 mi [50.0 km]).
Air Quality and Meteorology – Construction	0.25 mi from pipeline or aboveground facilities – construction emissions are highly localized
Noise - Operations	Overlapping noise sensitive areas (NSAs) up to 0.5 mi from the aboveground facilities – to include the maximum distance for noise assessments that are traditionally required for aboveground facilities
Noise - Construction	0.25 mi from pipeline or aboveground facilities due to the localized effects of construction activities. 0.5 mi from horizontal direction drill or direct pipe installation – due to the longer duration of sustained noise from this type of construction activity
Navigation, Safety and Security	5-mi radius, nearest similar facility is within 5 mi

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
1	Annova LNG Brownsville (Annova LNG Common Infrastructure, LLC, Annova LNG Brownsville A, LLC, Annova LNG Brownsville B, LLC, and Annova LNG Brownsville C, LLC)	Brownsville, TX	2020 / 2024	550 acres (ac)	127 / 205	288 / 250	The applicants are proposing to construct and operate a liquefaction and liquefied natural gas (LNG) export terminal to include six LNG trains, two 160,000 cubic meters (m^3) LNG storage tanks, and a marine berth. The project would be located along the Brownsville Ship Channel in Cameron County, Texas.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics
2	Corpus Christi LNG (Cheniere)	Corpus Christi, TX	Under construction / 2021	2,000 ac	3 / 5	Unknown / 500	Corpus Christi LNG, LLC is currently constructing an LNG export terminal in San Patricio County, Texas, along the northeast side of Corpus Christi Bay. Upon completion the terminal will include three LNG trains, three 160,000-m^3 LNG storage tanks, and two LNG berthing docks (CP12-507). Also, currently under FERC review is a proposal for two additional LNG trains, one additional LNG storage tank, an about 22-mi-long natural gas pipeline with one compressor station (PF15-26).	Water, Socioeconomics, and Reliability and Safety

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3	Freeport LNG Development (Freeport LNG)	Freeport, TX	Under construction / 2020	661.4 ac	107 / 172	Between 600 and 940 / an additional 150 (incremental increase for anticipated upgrades)	FLNG Expansion and FLNG LNG, LLC are currently constructing LNG, storage, and export facilities at the existing Freeport LNG Terminal on Quintana Island in Brazoria County, Texas. The terminal was originally approved as an import facility. Also, currently under FERC review is a proposal for one additional LNG train and additional supporting infrastructure, utility, and auxiliary facilities, as well as an increase in the total LNG production from the previously authorized 13 million tonnes per annum (MTPA) to 15.3 MTPA.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics
4	Port Arthur LNG (Port Arthur LNG, LLC and PALNG Common Facilities Company, LLC)	Port Arthur, TX	2019 / 2023	890 ac	208 / 334	2,920 / 360	The applicants are proposing to construct an LNG export terminal to include two LNG trains, three 160,000-m^3 LNG storage tanks, a natural gas liquids (NGL) and refrigerant storage area, truck loading/unloading facility, and two LNG vessel berths. The project would be on the west side of the Sabine-Neches Waterway in Jefferson County, Texas.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics

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5	Rio Grande LNG (Rio Grande LNG and Rio Bravo Pipeline)	Brownsville, TX	2019 / 2023	1,137.0 ac	126 / 203	1,760 / 624	The applicant is proposing to construct an LNG export terminal to include six liquefaction trains, a marine berth capable of receiving two LNG carriers at a time, and four 180,000 m^3 LNG storage tanks. The project would be located along the Brownsville Ship Channel (BSC) in Cameron County, Texas.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics
6	Texas LNG Brownsville (Texas LNG)	Brownsville, TX	2020 / 2024	311.5 ac	125 / 200	218 / 150	The applicant is proposing to construct an LNG export terminal to include two LNG trains, two 210,000 m^3 LNG storage tanks, and a marine berth to accommodate one LNG vessel. The project would be located along the BSC in Cameron County, Texas.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics
7	Improvement of the confluence of Corpus Christi Ship Channel and the Aransas Pass Channel (Port Aransas Marina Association)	Port Aransas, TX	Unknown	70 linear feet (lf) extension 0.26 ac (of fill)	0.3 / 0.5	Unknown	The Port Aransas Marina Association is seeking authorization to install a sheetpile breakwater extension at the confluence of the CCSC and the Aransas Pass Channel (SWG-1998-02486).	All Resources, less cultural resources

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

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8	Valley Crossing Pipeline	Nueces and Kleberg Counties, TX	Operational	168 mi	31 / 50	None expected	A 168-mi natural gas pipeline with peak day capacity of 2.6 billion cubic feet per day (Bcf/d) to provide new market opportunities for Texas gas producers. The project includes two new compressor stations in Agua Dulce and Brownsville, Texas, and a 14-mi fiber optic cable.	Socioeconomics
9	Gulf Coast Express (Kinder Morgan)	Nueces and Kleberg Counties, TX	2018/ 2019	448 mi	31/ 50	None expected	A 448-mi 42-inch natural gas pipeline with peak capacity of 1.98 Bcf/d). This project includes the main line, the midland lateral and compressor station at the Waha hub near, Coyanisa, Texas	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics, and Air Quality
10	EPIC NGL Pipeline	Nueces County, TX	2018 / 2020	700 mi	12 / 20	None expected	A NGL pipeline with initial capacity of 300 thousand barrels per day (MB/D) to provide producers access to Permian and Eagle Ford reserves. The pipeline route is adjacent to EPIC's Crude Pipeline.	Socioeconomics and Air Quality
11	EPIC Crude Pipeline	Nueces County, TX	2018 / 2020	700 mi	12 / 20	None expected	A crude oil pipeline with initial capacity of 590 MB/D from the Permian and Eagle Ford Basins. The pipeline route is adjacent to EPIC's NGL Pipeline.	Socioeconomics and Air Quality

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Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
12	EPIC Fractionation Facility	Robstown, TX	Underway / 2020	Unknown	14 / 22	None expected	Current capacity of 64 MB/D is currently being expanded to achieve a total of 68 MB/D. An additional 100 MB/D fraction unit is also under construction associated with product from the EPIC NGL pipelines. NGL service is expected in the first quarter of 2020 and crude service will be in January 2020.	Socioeconomics and Air Quality
13	Industrial Recycling and Production Facility	Aransas Pass, TX	Unknown	138 ac	2 / 3	N/A	Construction of a concrete Industrial Recycling and Production Facility.	Socioeconomics and Air Quality
14	Corpus Christi Ship Channel Improvement Projects (Port of Corpus Christi Authority [POCC])	Corpus Christi area of Texas	Various Phases	widen 530 feet (ft) up to 33-ft increase in depth	4 / 6	Unknown	The POCC is constructing ecosystem restoration features along the CCSC. The POCC is also seeking authorization to widen and deepen the channel and add Barge Shelves across the bay. down to -75 ft in some areas along the CCSC.	All Resources, less cultural resources
15	Redfish Bay Breakwater	Port Ingleside, TX	Unknown	Site 1: 2,268 cubic yards Site 2: 525,172 cubic yards	5 / 8	Unknown	Construction of nearshore breakwaters at two locations, as well as a beneficial use area at one of the locations.	Socioeconomics and Air Quality
16	Tule Lake Docks	Corpus Christi, TX	Unknown	49 ac	6 / 10	Unknown	Construction of Public Docks 20, 21, and 22 along the inner harbor of the POCC adjacent to the Corpus Christi Shipping Channel.	Socioeconomics and Air Quality

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
17	Lake Padre Development (Unknown)	Padre Island (north), TX	Under construction / Unknown	100 ac	19 / 30	Unknown	Expansion of Lake Padre and development of a 100-ac stretch.	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics, and Air Quality
18	Padre Isles (water oriented, recreational community) (Padre Isles Property Owners Association)	Padre Island (north), TX	Under construction / Unknown	3,700 ac[c]	21 / 34	None expected	Ongoing development of a water oriented, recreational community on North Padre Island. About 3,550 lots have not been developed.	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics, and Air Quality
19	Desalination Plant (POCC and City of Corpus Christi)	Port Aransas, TX	Unknown	33 ac	0.0 / 0.0	Unknown	The POCC filed a permit in June 2018 on behalf of the City of Corpus Christi seeking approval to construct and operate a desalination plant on Harbor Island. The plant would have the capacity to process 50-million gallons of water per day.	All Resources
20	Texas Gulf Terminals Project (Texas Gulf Terminals, Inc.)	Gulf of Mexico, Nueces and Kleberg Counties, TX	Unknown[d]	316.5 ac	26 / 42	1,039	Texas Gulf Terminals, Inc. is proposing to construct and operate and offshore crude oil facility in the GOM. The facility would include an offshore mooring point off the coast of North Padre Island and an onshore storage facility which would be connected via 26.7 mi of offshore and onshore pipelines.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
21	Improvements to Holly Road (Texas Department of Transportation [TxDOT])	Nueces County, TX	2019	0.75 mi	12 / 20	None expected	TxDOT is planning to make improvements to Holly Road between State Highway 286 and Greenwood Drive. The improvements would include two additional travel lanes, a four-lane curb and gutter facility with a raised median, sidewalks, and a bicycle lane.	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics
22	State Highway 200 (TxDOT)	San Patricio County, TX	2019	1.98 mi	3 / 5	None expected	TxDOT is planning to build a new highway to address traffic problems in the City of Ingleside. Upon completion State Highway 200 would include four 12-foot wide travel lanes and two 10-foot wide shoulders.	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics
23	Plastics Plant (Gulf Coast Growth Ventures)	San Patricio County, TX	Unknown	1,300 ac	0.8 / 0.1	Unknown	Gulf Coast Growth Ventures is proposing to construct and operate a plastics plant on 1,300 ac near Gregory, TX.	Water Quality, Wetlands, Vegetation, Wildlife, Socioeconomics
24	Residential Canal Development (Asset Development Corporation)	San Patricio County, TX	2019	133.79 ac	19 / 30	Unknown	Asset Development Corporation is seeking an extension to complete dredge and fill activities associated residential canal developments on North Padre Island. .	Socioeconomics
25	Desalination Plant (Seven Seas Water)	Port Aransas, TX	Unknown	10 ac	0.0 / 0.0	Unknown	Seven Seas Water is proposing to construct and operate a desalination plant on a 10-ac site on Harbor Island. The plant would have the capacity to process 10-million gallons of water per day.	All Resources

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26	SPOT Terminal Services Project (SPOT Terminal Services LLC)	Gulf of Mexico, Brazoria and Harris Counties, TX	2020 / 2022	1,130 ac	100 / 161	Unknown / 1,195	SPOT Terminal Services is proposing to construct and operate and offshore crude oil facility in the GOM. The facility would include one platform and two offshore mooring points off the coast of Brazoria County and an onshore storage facility which would be connected via 40.8 nautical mi of offshore and 62.3 mi of onshore pipelines.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics
27	Texas COLT Project (Texas COLT LLC)	Gulf of Mexico, Brazoria, Harris, and Galveston Counties, TX	2020 / 2022	Unknown	88 / 142	Unknown / 828	Texas COLT is proposing to construct and operate and offshore crude oil facility in the GOM. The facility would include a manned platform and a single offshore mooring buoy off the coast of Brazoria County and an onshore storage facility which would be connected via 27.8 nautical mi of offshore and 97 mi of onshore pipelines.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics

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Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
28	Marina Facility & Shore-side Improvements (Aransas County Navigation District)	Rockport Harbor, Texas	Unknown	5 ac	9 / 14	Unknown	To address non-compliance of a permit issued in 2011 to the Aransas County Navigation District (ACND) for construction of a breakwater structure, ACND would abandon the existing mitigation site and establishing about 0.25 ac of smooth cordgrass emergent marsh on the shoreline of Little Bay about 1.2 mi from the breakwater structure. In addition, the ACND is seeking approval to construct a new marina facility on a 5-ac site.	Socioeconomics
29	Axis Midstream Terminal (Axis Midstream Holdings, LLC)	Port Aransas, Texas	Unknown	37 ac	0.9 / 1.4	Unknown	Axis Midstream Holdings, LLC is proposing to construct and operate a marine terminal to load crude oil and/or crude oil condensates onto ships/barges.	Water Quality, Wetlands, Vegetation, Wildlife Land Use and Recreation, Visual, Air Quality, Socioeconomics

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30[e]	Oil and Gas Exploration & Production (Various)	Western Planning Area	2017 / 2022	78,000,000 ac[f]	0.0[g] / 0.0	Between 1,720 and 21,640[h]	BOEM's lease program proposes 10 lease sales over a five-year period. Activities associated with these leases could include seismic surveys, drilling oil, and natural gas exploration and installation of infrastructure such as on and offshore platforms and pipelines, as well as marine traffic to transportation of equipment and people and associated with support services.	All Resources, less cultural resources
31[i]	Recreation, cruise ships, etc. (Various)	Various Ports in TX	ongoing	unknown	0.9[j] / 1.4	Unknown	Nearby ports provide access to the GOM associated with mineral exploration, cruises, recreational fishing, diving, and military training. Established shipping lanes govern the movement of these vessels (33 CFR 166), the closest of which is the Brazos Santiago Pass to Aransas Pass Safety Fairway.	All Resources, less geology and cultural resources
32	South Texas Gateway Terminal (Buckeye Partners)	Ingleside, Texas	unknown	75 ac	6.0	Unknown	The applicant is proposing to construct an inshore marine terminal capable importing and exporting petroleum and bulk products.	Biological Resources, Coastal Zone Uses, Recreation, and Aesthetics

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Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
33	Midway Terminal (Phillips 66)	Taft, TX	2021	150	<1 mi.	N/A	Proposed Project will begin at a planned multi-use terminal south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines are the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.	Air quality and socioeconomics
34	Gray Oak Pipeline and Facility (Phillips 66)	Nueces and San Patricio county, TX	Under construction	850 mi.	1.5 mi.	None expected	The Gray Oak Pipeline will be a new, 850-mile-long pipeline transporting crude oil from the West Texas Permian Basin to destinations in the Corpus Christi, Sweeny and Freeport markets. It is expected to be in service by the end of 2019.	All resources, however; the majority of the pipeline is following existing pipeline corridors
35	Red Oak Pipeline (Phillips 66)	San Patricio county, TX	In development	To Be Determined	1.5 mi.	None Expected	The Red Oak Pipeline will run from Cushing, Oklahoma, to Corpus Christi, Houston and Beaumont, Texas. It's will be in service in the fourth quarter of 2020, and its initial throughput capacity is expected to be 400,000 barrels per day (BPD) with the ability to expand further depending on interest.	All Resources

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36	Pecos Trail Pipeline (NAmerico)	Kleberg and Nueces Counties, TX	In development	446 mi	31 / 50	None Expected	The 445.5-mi natural gas pipeline will have an initial capacity of 2.0 Bcfd. The Pipeline will serve to alleviate gas take-away constraints in the Permian Basin near the Waha hub and deliver to Gulf Coast pipelines and markets near the Agua Dulce Hub.	Socioeconomic
37	Cactus II Pipeline (Plains)	San Patricio county, TX	To be Completed in fall 2019	Approx. 455 mi.	1.5 mi.	Will supply inshore Dock along the Corpus Christi Ship Channel and other docks.	Connects the Permian Basin to the Corpus Christi/ Ingleside area with initial capacity of 585,000 bpd.	All Resources
38	MODA Midstream (SWG-1995-02221)	Ingleside, TX	Docks In development/ Tank Storage Under construction	900-acres	5 mi.	Unknown	MODA Midstream proposes to increase the permitted width of the West Ship Basin from 390 feet wide to 475 feet to allow VLCCs and Suezmax vessels at the facility and add a 1,700-foot-diameter turning basin at the West Ship Basin entrance to the Corpus Christi Ship Channel. Loading rate would be 80,000 bph (USACE 2019).	All Resources

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

Project Number	Project (Owner)	Location within Project Area	Estimated Timeframe (Construction / Operation)	Potential Impact Area	Closest Known Distance to Project (mi/km)	Vessel Transits[a] (Construction / Operation)	Description	Resource(s) Potentially Cumulatively Affected
40	Harbor Island Docks and Berth Facilities (Lone Star Port)	Nueces, TX	In Development	Unknown	< 1 mi.	Unknown	Lone Star Ports, LLC is developing a crude oil export terminal on Harbor Island. Through a partnership with the Port of Corpus Christi, Lone Star Ports will lead the development and operations of the first U.S. onshore export terminal servicing VLCCs. Connected to the EPIC Crude pipeline (See #10 in this table).	All Resources
Not Mapped[k]	Steel Mill (Steel Dynamics Inc.)	San Patricio County, TX	2020 / 2021	Unknown	Unknown	Unknown	San Patricio County is one of three locations under consideration by Steel Dynamics Inc's planned manufacturing plant. A location about four mi north of the Silton area is under consideration.	Socioeconomics

Table 16-2: Regional Projects Identified for Consideration in the Cumulative Impacts Analysis

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Note: Land Use, Recreation, and Aesthetics include both land- and water-based activities

a. Construction transits are based on the total number of vessel transits (one-way) required for the entire construction period. Operation transits are the expected number of vessel transits each year the project is in operation, including support vessels where known.

b. These vessel transits were authorized under the initial import terminal order (FERC docket CP04-386-000), the currently approved but not yet constructed project (FERC docket CP14-517) will not result in an increase in transits during operation.

c. Approximate size of the community, which includes previously and yet to be developed areas.

d. Texas Gulf Terminal, Inc. submitted its application to the MARAD in July of 2018 and anticipates construction would commence 18-months after receiving a permit.

e. BOEM's preferred alternative is a lease program for any inactive lease block, as depicted in Figure 16-1, such that future activity associated with oil and gas exploration and production could occur throughout the Western, Central, and Eastern Planning Areas, with exception of those blocks within the marine sanctuaries and as noted in BOEM 2017.

f. This is the total area available for lease as of March 2019 (Department of Interior [DOI] 2019).

g. Distance from the proposed Project to the closest existing pipeline. The closest existing platform to the Project, specifically the Offshore Pipelines, is 0.2 mi (0.3 km), while the closest platform to the SPM buoy systems is 1.9 mi (3.1 km).

h. This estimate is for transits throughout the GOM, so is not representative of activities exclusively within the Western Planning Area. In total this increase in transits represents a less than 2 percent increase in traffic in the GOM.

i. Recreational activities, in particular diving, occur with the marine sanctuaries depicted in Figure 16-1. Recreational activities including fishing, boating, and diving also occur throughout the near and offshore waters within the Project area.

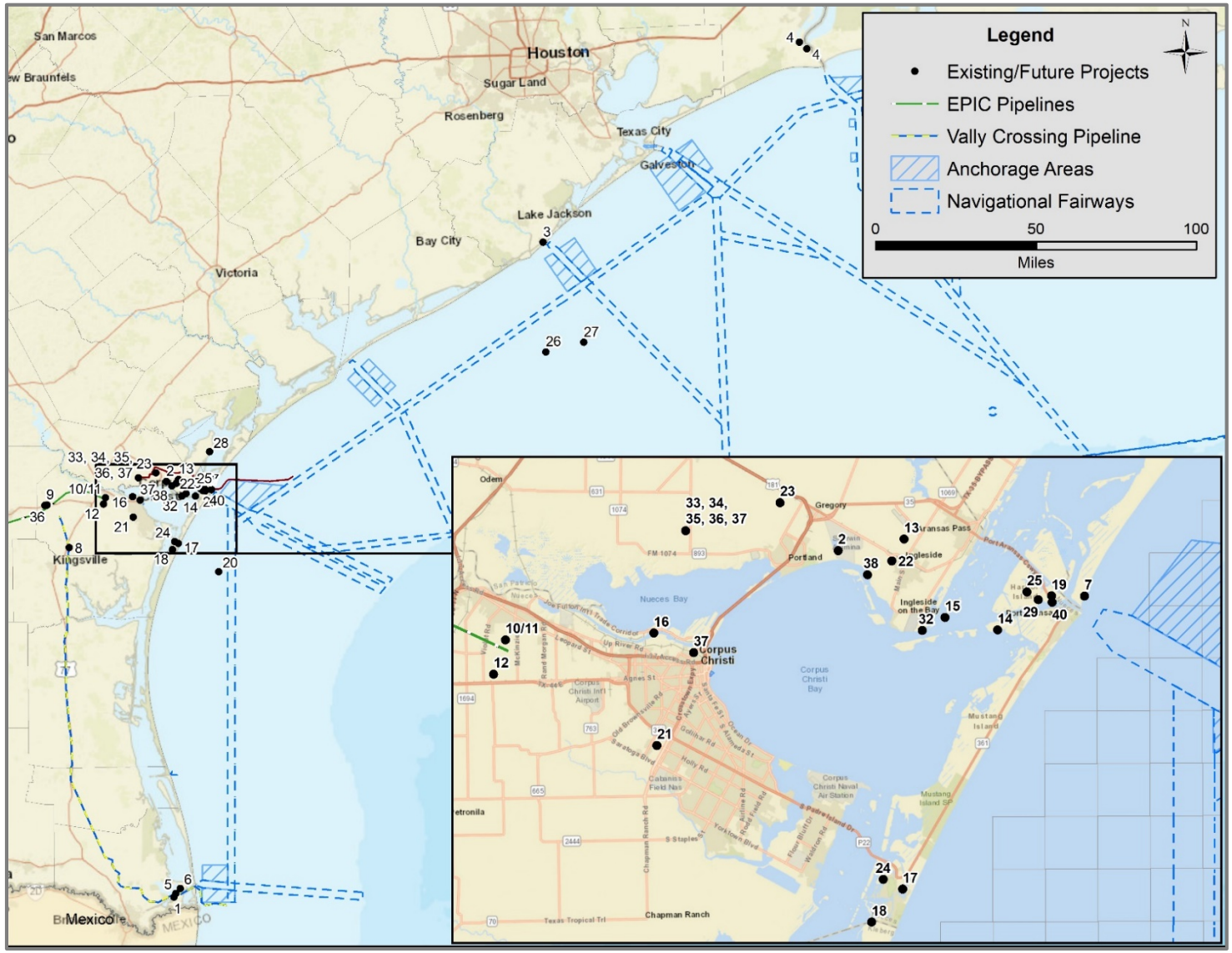
j. Distance from the proposed buoy location to the closest shipping lane.

k. Savage 2019.

Sources by Project Number:

1. FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket no. CP16-480.
2. Cheniere Energy, Inc. 2018, DiSavino 2018, and FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket no. CP12-507.
3. Cocklin 2018 and FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket nos. CP03-75, CP12-509, and CP17-470.
4. Port Arthur LNG 2019 and FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket no. CP17-20.
5. FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket no. CP16-454.
6. FERC Docket via https://www.ferc.gov/docs-filing/elibrary.asp, docket no. CP16-116.
7. USACE 2017a.
8. Enbridge 2018, Nemec 2018.
9. https://www.kindermorgan.com/pages/business/gas_pipelines/projects/kmtp/
10. & 11. EPIC, LP 2018 and 2019.
12. Acosta 2017, Business Wire 2018.
13. USACE 2018a.
14. POCC 2018a, 2018b.
15. USACE 2018b.
16. USACE 2018c.
17. KRIS Communications 2018.
18. Padre Isles POA 2017.
19. POCC 2019, Pesquera 2018
20. Texas Gulf Terminals 2019, MARAD 2018
21. & 22. FHA 2018
23. Exxon Mobil Corporation 2017 and Ramirez 2018
24. USACE 2019a
25. Pesquera 2018
26. MARAD 2019, Docket no. MARAD-2019-0011.
27. MARAD 2019, Docket no. MARAD-2019-0012.
28. USACE 2019b
29. TCEQ 2019
30. & 31. BOEM 2017 and 2018
32. USACE 2017b.
33. Per Communication Phillips 66
34. https://grayoakpipeline.com/
35. https://www.businesswire.com/news/home/20181109005080/en/
36. https://www.namerico-energy.com/portfolio/energy/pecos-trail-pipeline/
37. https://www.plainsallamerican.com/about-us/subsidiary-websites/permian-projects
38. USACE 2019c.
40. http://www.lonestarports.com/

Figure 16-1: Projects Identified for Consideration in the Cumulative Impacts Analysis for the Project



16.2.1 Offshore Oil and Gas Terminals

Several planned offshore liquefied natural gas (LNG) terminals have been approved but subsequently cancelled (4); in two instances the applicant withdrew the project application prior to authorization, and one LNG terminal was decommissioned in 2012 (A Barrel Full 2018; Excelerate Energy 2018).

There are no offshore terminals in BOEM's Western Planning Area currently in operation. The only offshore terminal in operation within the GOM is the Louisiana Offshore Oil Port (LOOP), which is located in BOEM's Central Planning Area (BOEM 2017). Since this port is outside the geographic range of the proposed Project it is excluded from our cumulative impact analysis.

In July 2018, Texas Gulf Terminal, Inc. submitted an application to the MARAD for the Texas Gulf Terminals Project (TGTP; Texas Gulf Terminals 2019). The project would include a SPM buoy system in the GOM that would connect to an onshore storage terminal facility via a series of offshore, inshore, and onshore pipelines totaling about 26.7 mi. The SPM buoy systems would be anchored in about 983 ft of water off the coast of North Padre Island. This project would be about 26 mi south of the Bluewater SPM Project, and construction is expected to occur between 2019 and 2020.

SPOT Terminal Services LLC submitted an application to the MARAD in January 2019 for the SPOT Terminal Services Project (MARAD 2019). The project would include a platform and two SPMs located at a water depth of about 115 ft in the GOM. The project would about 29 mi of the coast of Brazoria County, Texas. The project would utilize existing and new onshore storage facilities which would be connected via 40.8 nautical mi of offshore and 62.3 mi of onshore pipelines. The project would be located about 100 mi northeast of the Bluewater SPM Project, and construction is expected to occur between 2020 and 2022.

Texas COLT LLC submitted an application to the MARAD in January 2019, for the Texas COLT Project (MARAD 2019). The project would include a manned platform and a SPM buoy in the GOM. The project would be located off the coast of Brazoria County and would connect to an onshore storage facility via 27.8 nautical mi of offshore and 97 mi of onshore pipelines. The SPM buoy systems would be anchored in about 110 ft of water. This project would be about 88 mi northeast of the Bluewater SPM Project, and construction is expected to occur between 2020 and 2022.

16.2.2 Oil and Gas Exploration and Production

BOEM manages oil and gas leases in the GOM Outer Continental Shelf (OCS), which encompasses the Western and Central Planning Areas, and portions of the Eastern Planning Area. Currently there are 1,031 platforms and 6,554 mi of pipeline in the Western Planning Area (BOEM 2018). Additionally, there are 82 platforms in the state waters of Texas.

BOEM's lease program proposes 10 lease sales over a five-year period. Oil and gas development associated with these sales would help meet domestic demand for liquid hydrocarbon products such as gasoline, aviation, and diesel fuel, as well as enhancing national economic security.

Information on reasonably foreseeable actions in the Western Planning Area was obtained from BOEM's final environmental impact statement for 2017-2022 as summarized in Table 16-2. BOEM's projected future lease sales in the Western Planning Area would include the following activities:

- exploration and delineation of between 354 and 1,032 wells;
- development and production of between:
  - 330 and 764 oil wells and
  - 903 and 2,291 gas wells;
- installation of between 561 and 1,788 production structures;
- removal of between 740 and 1,892 production structures;
- installation of between 3,049 and 6,930 mi (4,907 and 11,153 km) of pipeline;
- between 830,000 and 3,085,000 service vessel trips; and
- between 3,214,000 and 18,941,000 helicopter trips.

16.2.3 Onshore Gas and Oil Storage and Terminals

As discussed above, existing oil and gas storage and terminals such as the Ingleside Energy Center Terminal in Corpus Christi, Texas, are captured in the baseline evaluation of impacts. Therefore, the projects described below are greenfield facilities or existing facilities that have approved or proposed expansion or modifications. Applying these criteria, no onshore oil storage or terminal facilities were identified for inclusion in this analysis. Thus, the following projects are all under FERC jurisdiction, and the project name, proponent, and FERC docket number are provided below:

Approved/Under Construction

- Corpus Christi LNG / Cheniere (CP12-507) – Corpus Christi, Texas;
- Expansion/modifications to Freeport LNG / Sempra (CP12-509; CP15-518) – Freeport, Texas;

Proposed

- Annova LNG / Annova LNG (CP16-480) – Brownsville, Texas;
- Expansion/modifications, Freeport LNG / Sempra (CP17-470) – Freeport, Texas;
- Port Arthur LNG / Port Arthur LNG (CP17-20) – Port Arthur, Texas;
- Rio Grande LNG Terminal/ Rio Grande LNG (CP16-454) – Brownsville, Texas;
- Texas LNG Brownsville / Texas LNG (CP16-116) – Brownsville, Texas.
- Harbor Island Docks and Berth Facilities -Nueces County, Texas
- South Texas Gateway Terminal – Ingleside, Texas
- Axis Midstream – Nueces County, Texas
- MODA Midstream - Ingleside, Texas

The locations of these facilities relative to the proposed Project are depicted in Figure 16-1 and are discussed in greater detail below.

Annova LNG Brownsville Project

Annova is planning a liquefaction and LNG export terminal that would be located along the Brownsville Ship Channel (BSC) in Cameron County, Texas. The Annova LNG Brownsville Project (Annova Project) would be located about 127 mi (205 km) south of the proposed Project with an overall LNG capacity of about 6 MTPA and berthing facilities to accommodate one LNG vessel at a time. Annova filed its formal application with FERC in 2016 under Docket No. CP16-480 and anticipates that construction of the project will begin in 2020, with an in-service date of 2024.

Corpus Christi LNG

Corpus Christi LNG, LLC (Corpus Christi) is constructing an LNG export terminal about 3 mi (5 km) west of the Project. The LNG export terminal is located in San Patricio County, Texas, along the northeast side of Corpus Christi Bay.

Originally, Corpus Christi was authorized as an import terminal; however, due to market changes, the import terminal was never constructed. On December 30, 2014, the FERC issued an Order authorizing Corpus Christi's LNG export project (CP12-507-000) and construction began in February 2015. The facility is designed to have a cumulative 13.5 MTPA send out capacity. The project also includes two compressor stations and an approximately 23-mi-long, 48-inch-diameter pipeline which connects the Corpus Christi LNG Terminal to five inter- and intrastate gas transmission lines which originate in south Texas. Additional expansions to increase the send out capacity to achieve a cumulative capacity of 23.5 MTPA are currently planned and under FERC's review (CP18-512-000 and CP18-513-000). If approved, Cheniere Corpus Christi anticipates the project would begin operations in 2021.

Freeport LNG Terminal

The Freeport LNG Terminal and related expansion projects include three separate applications to the U.S. Department of Energy (DOE) and/or FERC, including the original import terminal (CP03-75-000) and two LNG export terminal expansions (CP12-509-000 and CP17-470-000).

The Freeport LNG Terminal is located on Quintana Island in Brazoria County, Texas, about 107 mi (172 km) northeast of the proposed Project. The import terminal commenced operations in 2008 but was subsequently granted authorization to re-export foreign-sourced LNG with a maximum send out capability of approximately 1.5 Bcf/d of natural gas product. Expansion of the facility is currently underway and will provide an export capacity of about 13 MPTA (1.8 Bcf/d of vaporized natural gas). FLNG anticipates that facilities associated with this expansion effort will be completed in 2019.

Also, currently under FERC review is a proposal to increase capacity of the terminal (about 5.1 MTPA), as well as increase the total LNG production from the previously authorized 13 MTPA to 15.3 MTPA (2.1 Bcf/d of vaporized natural gas). If approved, Freeport Development anticipates the project would enter into service in 2020.

Port Arthur LNG

Port Arthur LNG, LLC and Port Arthur Pipeline, LLC (collectively Port Arthur) are currently proposing to construct an LNG export terminal on the west side of the Sabine-Neches Waterway in Jefferson County, Texas. This project would be located about 208 mi (334 km) northeast from the Proposed Action. As designed, the export terminal would have a cumulative send out capacity of 12.0 MTPA and the ability to accommodate transport by truck or LNG vessel.

Port Arthur has received DOE approval for the export to FTA countries over a 25-year period, but approval to export to non-FTA countries is pending, as is FERC's approval. Port Arthur anticipates an in- service date of 2023, if all approvals are received.

Rio Grande LNG Terminal

Rio Grande LNG, LLC (RG LNG) is proposing to construct and operate a new LNG export terminal that would be located along the BSC in Cameron County, Texas as part of its Rio Grande LNG Project. The Rio Grande LNG Project would be capable of producing 27 MTPA of LNG for export and receiving two LNG carriers at a time. The Rio Grande LNG Project would be located 126 mi (203 km) south of the proposed Project.

The formal application for the project was filed with FERC in 2016 under Docket No. CP16-480-000. Rio Grande LNG, LLC anticipates beginning construction of the Rio Grande LNG Project in 2019 with the first liquefaction train operational by 2020 and the remainder of the project complete by 2023.

Texas LNG Brownsville

Texas LNG Brownsville LLC (Texas LNG) is planning a liquefaction and LNG export terminal that would be located on the BSC in Cameron County, Texas bordering the northeast boundary of the Rio Grande LNG Terminal site. As designed the terminal will have an overall LNG capacity of about 4.0 MTPA and berthing facilities to accommodate one LNG vessel at a time. The Texas LNG Brownsville Project would be located 125 mi (200 km) south of the proposed Project.

Texas LNG filed its formal application with FERC in 2016 (Docket No. CP16-116) and anticipates construction of the project will begin in 2020 with an in-service date of 2023.

Axis Midstream Terminal

Axis Midstream Holdings, LLC is proposing to construct and operate a marine terminal on a site about 1-mi northwest of State Highway 361 ferry landing. The terminal would be capable of loading crude oil or condensates onto ocean going vessels, as well as inland barges via POCC's Terminal on Harbor Island.

Axis Midstream Holdings, LLC applied for an air quality permit in 2018. As of February 2019, Texas Commission on Environmental Quality (TCEQ) is preparing an initial draft permit (TCEQ 2019).

MODA Midstream Terminal

MODA Midstream proposes to increase the permitted width of the West Ship Basin from 390 feet wide to 475 feet to allow VLCCs and Suezmax vessels at the facility and add a 1,700-foot-diameter turning basin at the West Ship Basin entrance to the Corpus Christi Ship Channel. Loading rate would be 80,000 bph (USACE 2019c).

Harbor Island Docks and Berth Facilities

Lone Star Ports, LLC is developing a crude oil export terminal on Harbor Island. Through a partnership with the Port of Corpus Christi, Lone Star Ports will lead the development and operations of the first U.S. onshore export terminal servicing VLCCs. Connected to the EPIC Crude pipeline.

South Texas Gateway Terminal

South Texas Gateway Terminal LLC is proposing to modify an existing permit to construct and operate a deep water terminal with the necessary infrastructure and dock facilities to safely support normal vessel loading and unloading for the transportation, importing and exporting of petroleum products, petrochemicals and other bulk liquids. The project is located in Ingleside, Texas and would consist of two ship docks and approach trestle (USACE 2017b). Approximately 55 acres would be dredged to -54 feet mean lower low water with -2 feet of allowable over depth for a total of 2.54 million cubic yards of dredge material (USACE 2017b).

16.2.4 Marine Traffic

Marine traffic in the Western Planning Area and state waters of Texas occurs within areas of "federally designated shipping safety fairways and anchorage areas" (33 CFR 166) as depicted in Figure 16-1. In 2015, over 12,500 vessels calls were made to ports in Texas via these fairways (MARAD 2018). Tankers were the predominate vessel type (57 percent) utilizing the fairways but also included dry bulk (13 percent), cargo (11 percent), container and gas (8 percent each), and Roll on – Roll off cargo ships (3 percent). In 2012 the Houston Ship Channel and Sabine-Neches Waterway handled the greatest vessel traffic in Texas, about 238 thousand and 137 thousand short tons, respectively (BOEM 2017).

The POCC is the closest port to the proposed Project and is the fifth largest port in the U.S., providing access to the GOM, inland waterways, and offering connections to three railroad systems (POCC 2018b). About 14 percent of the vessel calls to Texas ports in 2015 were to the POCC. Vessel calls to this port were also comprised mostly of tankers (67 percent) and included dry bulk (16 percent), gas (9 percent), and cargo (8 percent). Aransas Pass Safety Fairway provides access to the POCC. Vessels approaching the port from the north would do so via Aransas Pass to Calcasieu Pass, while the Brazos Santiago Pass to Aransas Pass provides access from the south and is the closest shipping lane to the proposed Project (about 0.9 mi southeast of the proposed buoy systems location).

In addition to marine vessel traffic associated with oil and gas activity in the Western Planning Area, state waters of Texas, and onshore terminals and ports, marine vessel traffic may also be associated with mineral exploration, recreation (cruises, diving, and fishing), and military training. Recreational activities such as fishing, boating, and diving in the Project area occur in Aransas Bay and Corpus Christi Bay, as well as in near shore and offshore locations. The marine sanctuaries depicted in Figure 16-1, are also well-known destinations for recreational fishing and diving and can be assessed by private boat or charter (NOAA 2017).

Between 2004 and 2007, about 1,050 cruise ships departed from the Ports of Galveston and Houston (MARAD 2018). However, in subsequent years (2008 through 2012), departures in Texas have occurred exclusively from the Port of

Galveston and during this time the number of departures has continued to decline. These ports are over 147 mi (238 km) north of the proposed Project, see Figure 16-1.

16.2.5 Waterway Improvement Projects

Several dredging and waterway maintenance efforts were identified as having the potential to contribute to cumulative impacts within the defined geographic range of northern Padre Island (POCC 2018a). The POCC is currently constructing ecosystem restoration features along the CCSC to protect endangered species, wetlands, and seagrass. Initially the POCC was seeking authorization to widen the CCSC between Port Aransas to the Harbor Bridge (up to 530 ft), deepen the CCSC to a depth of 54 ft mean lower low water (MLLW), and add barge shelves at 14 ft MLLW across Corpus Christi Bay. In January 2019, POCC filed an application to increase the desired depth of the CCSC up to a maximum of -80 ft MLLW (Port Aransas Conservancy 2019).

On December 21, 2017, the USACE issued a Public Notice for work proposed by the Port of Aransas Marina Association (PAMA) at the confluence of the CCSC and the Aransas Pass Channel (USACE 2017a). PAMA is seeking authorization to install a sheetpile breakwater extension to the existing concrete breakwater on the west side of the inlet. In addition, PAMA is proposing to install scour protection along 130 ft of the bulkhead on the east side of the inlet, which will involve placement of about 0.26 acre (ac) of fill material.

A Public Notice for the Redfish Bay Breakwater Project was issued by USACE on July 17, 2017. Texas Parks and Wildlife (TPWD) is seeking approval to construct nearshore rock breakwaters at two locations (Sites 1 and 2) within the Redfish Bay State Scientific Areas, as well as a beneficial use area at Site 2 (USACE 2018b). The rock breakwater at Site 1 would be constructed with riprap scour protection parallel to the shoreline and would require shallow water barges to transport rock. A similar nearshore, rock breakwater would be constructed at Site 2 and would involve similar construction procedures. In addition, a 28-ac containment site would be created to accept suitable dredge material to serve as a beneficial use site and containment levees would be constructed within the site using materials excavated during construction. These waterway improvement projects are in or near the CCSC, about 4 and 0.3 mi (6 and 0.5 km) south of the proposed landfall location, see Figure 16-1.

The USACE has issued a Public Notice for Asset Development Corporation's request for an extension to complete dredge and fill activities associated residential canal developments on North Padre Island (USACE 2019a). If approved the project would result in the permanent fill of about 133.8 ac of water, including palustrine and estuarine wetlands, as well as sand flats.

16.2.6 Pipeline Projects

Valley Crossing Pipeline

Valley Crossing Pipeline, LLC, a subsidiary of Enbridge, installed a 168-mi intrastate pipeline to supply gas to Comisión Federal de Electricidad, Mexico's stated-owned utility (Enbridge 2018). The Valley Crossing Pipeline (VCP), which originates near the Agua Dulce Hub in Nueces County, Texas was placed in service in October 2018 (Nemec 2018). The terminus of the pipeline is about 9 mi offshore of the Brownsville Shipping Channel. The VCP is about 31 mi west of the proposed Project's land-based facilities.

EPIC Projects

EPIC L.P, a Texas-based firm, is currently constructing a natural gas liquids (NGL) pipeline and crude oil pipeline to provide producers on the Gulf Coast access to reserves in the Permian and Eagle Ford Basins (EPIC 2018). The pipelines, which are being constructed adjacent to one another for about 700 mi, will provide initial capacities of 590 MB/D, respectively. Both pipelines are expected to be fully operational by 2020 (Business Wire 2018). Plans for a fractionation complex to receive the pipelines' volume are underway and anticipated to be built east of Robstown along Violet Road in Nueces County,

Texas. As part of the approved tax abatement agreement, the company is required to maintain at least 10 new full-time positions during operation of the facility (Acosta 2017).

Gray Oak Pipeline

The Gray Oak Pipeline will be a new, 850-mile-long pipeline transporting crude oil from the West Texas Permian Basin to destinations in the Corpus Christi, Sweeny and Freeport markets. It is expected to be in service by the end of 2019. 850,000 plus barrels connecting West Texas to Corpus Christi

Red Oak Pipeline

The Red Oak Pipeline will run from Cushing, Oklahoma, to Corpus Christi, Houston and Beaumont, Texas. It will be in service in the fourth quarter of 2020, and its initial throughput capacity is expected to be 400,000 BPD with the ability to expand further depending on interest.

Cactus II Pipeline

Houston-based Plains All American announced in February that it was going forward with its Cactus II pipeline. Opening in 2019, that would provide at least 585,000 barrels per day between the Permian Basin and the Corpus Christi area.

Pecos Trail Pipeline

The Pecos Trail Pipeline is proposed to be approximately 466 mi. of natural gas from the Permian Basin to Agua Dulce. It is slated to be operational in 2019, with anticipated deliveries into numerous intrastate pipelines.

Gulf Coast Express Pipeline

Kinder Morgan started construction on the Gulf Coast Express Pipeline Project in May 2018. The Gulf Coast Express is designed to transport up to 2 Bcf/d of natural gas from the Permian Basin to the Agua Dulce, Texas area and is now fully subscribed under long-term, binding transportation agreements. The schedule in-service date is October 2019.

16.2.7 Other Industrial, Commercial, and Residential Developments

On June 20, 2017, USACE issued a Public Notice for a project that would be located on about 138 ac adjacent to McCampbell Slough in Aransas Pass, Texas (USACE 2018a). The proposed Industrial Recycling and Production Facility would provide municipalities and the public with increased demand for such services in San Patricio County. Construction of the facility would involve discharge of fill material (about 33,700 cubic yards) into waters of the United States (U.S.).

The proponent is proposing to construct and operate public docks on about 22 ac of land and 27 ac of open water along the Tule Lake Channel in Nueces County, Texas (USACE 2018c). The Public Notice for this project was issued on November 9, 2017. The primary project components include a 40-ft by 40-ft barge dock, three barge breasting dolphins, about 4,155 ft of bulkhead, and about 2,924 ft of elevated concrete wharf platform. Construction of these project components would require excavation and dredging of a 37-ac area, in total about 2.9 million cubic yards of material would be disturbed. The project, which would provide public docks waterborne commerce, would be about 6 mi southwest of the proposed Project,

Two development projects were identified as having the potential to contribute to cumulative impacts. Padre Isles, a water oriented, recreational community on North Padre Island was established in 1965 and currently has 5,408 lots, of a total of 8,950, to be developed. The community is comprised of single-family lots, multi-family residential units, and commercial and recreational facilities including an 18-hole golf course and country club, a fire station, charter schools, banks, and restaurants.

A multi-phase development effort on the man-made Lake Padre is currently underway to enlarge the lake and establish boating routes through connecting canals and to Schlitterbahn Beach Resort (KRIS Communications 2018). The first phase of the project involved 8,000 cubic yards of sand per day to be removed from around the lake, to allow for development

of a 100-ac area and bulkheading the lake. Future phases of development will focus on the establishment of infrastructure such as restaurants, a marina, a hotel, and a condominium. These developments are on Padre Island, 19 and 21 mi (30 and 34 km) south of the propose landfall location, see Figure 16-1.

Two desalination plants are proposed to be sited on Harbor Island in Rockport, Texas (Pesquera 2018). The plant proposed to be constructed and operated by Seven Seas Water would be located on a 10-ac site owned by the Ed Rachel Foundation, currently held by lease, and is projected to process 10 million gallons of water per day. POCC is seeking permits for a plant that would be constructed and operated by the City of Corpus Christi with the capability to process 50 million gallons of water per day (POCC 2019). The plant would be located on a 33-ac site of a former fuel tank storage area across from Roberts Point Park and the ferry landing (Pesquera 2018).

TxDOT is planning modifications to Holly Road in Corpus Christi, Texas. The project would include construction of two additional travel lanes from SH-286 to Greenwood Drive, as well as curb, gutter facility with a raised median, sidewalks, and bicycle lanes (FHA 2018). The goal of the project is to improve traffic flow and safety. TxDOT is also planning to construct a 1.98-mi-long principal arterial roadway (SH 200) from SH-361 to FM 1069 to provide commercial/industrial traffic access to developed portions of Ingleside while avoiding the city center. The project will initially include two 12-ft wide lanes with 10-ft wide shoulders, with a final design of four 12-ft wide lanes (FHA 2018). These TxDOT projects would be about 12 and 3 mi southwest and north, respectively, of the Bluewater SPM Project, with unknown construction schedules.

Gulf Coast Growth Ventures are proposing to construct and operate the world's largest plastics plant on 1,300 ac near Gregory, Texas (Exxon Mobil Corporation 2017). As of December 2018, an air permit from the TCEQ is pending, however site preparation is underway, and the plant is expected to operational by 2020 (Ramirez 2018). The project is expected to employ 6,000 workers at peak construction and generate $22 million in economic output. Operation of the facility will result in 600 permanent jobs with an estimated $50 million in economic output during the first 6 years of operation (Exxon Mobil Corporation 2017 and Ramirez 2018).

San Patricio County is one of three locations under consideration by Steel Dynamics Inc's planned manufacturing plant (Savage 2019). Operation of this facility would create about 600 permanent jobs with a median salary of $80,000. A location about 4 mi north of the Sinton area is under consideration given its proximity to transportation infrastructure and utilities. Steel Dynamics Inc. plans to start construction in 2020 and the plant would be operational by 2nd quarter of 2021.

16.2.8 Non-Jurisdictional Facilities

As described in in Section 3: Project Description, the Proposed Project will begin at a planned multi-use terminal south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines are the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.

16.3 Cumulative Impacts

Cumulative effects generally refer to impacts that are additive or synergistic in nature and result from the construction of multiple actions in the same vicinity and time frame. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time. In general, small-scale projects with minimal impacts of short duration do not significantly contribute to cumulative impacts. The detailed cumulative impacts analysis for each section is presented below:

16.3.1 Water Quality

Cumulative impacts to water quality of wetlands and waterbodies were assessed based on the Framework for Cumulative Impact Analysis. The Corpus Christi LNG Terminal, offshore oil and gas exploration, the three proposed offshore terminals, onshore gas and oil storage terminals, waterway improvement projects, marine traffic, and commercial and residential

development projects could contribute to cumulative impacts on water quality within the vicinity of the Bluewater SPM Project. Impacts on water quality could arise from increased turbidity and sedimentation and contamination, including release of hazardous materials into the water as well as marine trash and debris.

Construction activities associated with the Bluewater SPM Project will generally be concentrated about 14.7 nautical miles (nm; 17.0 mi) offshore at the proposed SPM buoy sites in water at depths ranging from 88.5 – 89.5 ft (27.0 – 27.3 meters [m]). Alternatively, construction of the proposed pipelines will be sequential along the entire length and will include a 17-month-long period of onshore construction. At the locations where the pipelines will be installed via the horizontal directional drill (HDD) method, construction will occur over up to 9 weeks at each location. Onshore construction activities that will impact water quality will be primarily associated with sedimentation from construction, and in the event of an inadvertent leak or spill of hazardous materials. Impacts on water quality associated with in-water construction will be associated with disturbance of the seabed, discharge of waters (for hydrostatic-testing), and inadvertent discharges.

The three proposed offshore terminals and activities associated with offshore oil and gas exploration and production, including the decommissioning of existing infrastructure, and associated marine traffic will also impact water quality in a similar manner as the Proposed Project. Assuming regulatory requirements are followed during exploration and production, BOEM predicts that discharges associated with these activities will rapidly dilute, thus the discharge areas will not overlap and therefore will not have an additive impact on water quality (BOEM 2017). Impacts on water quality associated with discharges from the three proposed offshore terminals are also expected to be negligible, and water quality is expected to rapidly return to pre-Project conditions, similar to those of the Bluewater SPM Project. However, given to the localized nature of such impacts relative to the proximity of these other activities to the Proposed Project, ranging from 0.0 to 208 mi (1.1 to 334 km) away, cumulative effects from these projects are not likely.

Other on- or nearshore projects, such as onshore gas and oil storage and terminals, waterway improvement projects, and commercial and residential development projects, will involve modification of surface water resources and placement of fill, and some will require significant dredging. The initial dredging as well as current/ future maintenance dredging associated with these projects will temporarily impact water quality by increasing turbidity, salinity and sedimentation. Additionally, projects that deepen existing water depths will exacerbate low dissolved oxygen and anoxic conditions that already exist in and around the navigation channels. If these projects were to occur concurrent with construction of the Bluewater SPM Project, cumulative impacts on water quality in the Project area could potentially cause major changes to water quality conditions in the particularly in the inshore area. However, these impacts would be short-term, and localized.

Also, construction equipment and support vessels associated with these projects could affect water quality from inadvertent spills, releases of hazardous materials, and discharge of ballast water. Generally, these impacts are expected to be localized and short-term. Once installed the pipeline trench will naturally backfill from tidal and current movement. Since the pipelines will be buried, they will not contribute to cumulative effects on water quality during operation.

Overall, the cumulative impacts of the Proposed Project when considered with other projects will be short-term (during construction) to permanent (within the footprint of the SPM buoys), and minor. Temporary, minor impacts on water quality in nearshore locations of Redfish Bay could occur if construction of the Proposed Project and the projects discussed above are concurrent. The Proposed Project and other projects will be required to comply with the Clean Water Act of 1977 (CWA) to minimize impacts on surface water quality. Therefore, while the Proposed Project will contribute to cumulative impacts on water quality along with other projects in the geographic range, this impact will be negligible.

16.3.2 Wetlands and Waters of the U.S.

Activities that could impact wetlands and Waters of the U.S. in the Project area include offshore oil and gas terminals and exploration and production; onshore gas and oil storage and terminals, waterway improvement projects, pipeline projects and industrial, commercial and residential developments. Although activities associated with land-based projects can impact wetlands and waters of the U.S. from discharges and runoff from adjacent facilities, it is anticipated that these

activities will be conducted in accordance with applicable permits, such that impacts are adequately minimized or mitigated for.

Offshore oil and gas terminal and exploration activities can include installation/removal of mooring platforms and laying of pipelines and associated anchoring activities, service vessel operations, supporting infrastructure discharges, and oil spills. Many platforms have discharges of drilling wastes, produced water, and other industrial wastewater streams that have adverse impacts on waters of the U.S. The USEPA regulates the discharge of these wastes through Nation Pollution Discharge Elimination System (NPDES) permits. Except in shallow waters, the effects of these discharges are generally localized near individual points of discharge (Neff 2005).

The primary cumulative effect from these activities will be the installation of platforms and other permanent structures, which will simultaneously remove soft-bottom habitat and provide hard structure for faunal communities. Further, in addition to improvements (i.e., widening and increased depth) of the CCSC, POCC is also proposing to conduct ecosystem restoration to protected endangered species, wetlands, oysters and seagrasses, which will result in beneficial impacts through creation of additional nursery habitat. These impacts are considered to have long-term beneficial impacts by creating additional habitat for aquatic species, but given the size of the Western Planning Area, the overall benefit of habitat creation from these projects is anticipated to be minor.

Waterway improvement projects are generally short-term and their effects (turbidity, salinity and sedimentation, with the potential for limited habitat loss for new construction) will typically be limited to the area where these activities take place. These projects are all over 19 mi (30.5 km) from the proposed Project, as a result, any cumulative effects of construction of the Project, when considered with these projects will be negligible.

Numerous pipeline projects are either under construction or are proposed in the vicinity of the proposed Project Pipelines. Generally pipeline projects have a minor impact to wetland and WOUS due to construction within wetland areas and habitat fragmentation due to maintained ROWs. Because the proposed project onshore pipeline is proposed to follow existing pipeline corridors and roadways where able, the cumulative impact to WOUS of the region is anticipated to minor to negligible. Most of the wetland impacts that occur from pipeline construction are temporary because preexisting contours and conditions are restored following construction of the pipeline through a wetland area. Additionally, all permanent impacts will be mitigated for according to USACE permit requirements, thus minimizing the total net loss of wetlands in the region. Inshore pipeline installation will utilize HDD installation to avoid wetlands and WOUS to the maximum extent practicable, resulting in no cumulative impact to WOUS due to the project.

There are currently 1,113 platforms and 6,554 mi (10,548 km) of pipeline in BOEM's Western Planning Area and the state waters of Texas (BOEM 2017). Between 561 and 1,788 additional production structures and between 3,049 and 6,930 mi (4,907 and 11,153 km) of new pipeline are projected to be installed in the Western Planning Area over the 70-year analysis period. Effects to waters of the U.S. from these structures are similar and typically localized. The contribution of the Proposed Project is considered negligible relative to the total number of platforms in the GOM. The potential for Project impacts to a resource or the environment are small when compared to other activities in the Western Planning Area.

Overall, the cumulative impacts of the Proposed Project on waters of the U.S. when considered with other projects will be short-term (during construction), temporary (during construction), to permanent (within the footprint of the SPM buoys and booster station). Temporary and minor impacts on wetlands and waters of the U.S. are anticipated estuarine, and scrub shrub wetlands. The Proposed Project and other projects will be required to comply with the CWA to minimize impacts on wetlands and Waters of the U.S. and Mitigation for unavoidable impacts. Therefore, while the Proposed Project will contribute to cumulative impacts to wetlands and Waters of the U.S. along with other projects in the geographic range, this impact will be temporary and permanent impacts would be negligible.

16.3.3 Aquatic Environment

Activities that could impact the aquatic environment in the Project area include offshore oil and gas terminals and exploration and production; waterway improvement projects, and marine traffic associated with the oil and gas industry, as well as recreation. Although activities associated with land-based projects can impact aquatic environments from discharges and runoff from coastal facilities, it is anticipated that these activities will be conducted in accordance with applicable permits, such that impacts are adequately minimized. Offshore oil and gas terminal and exploration activities can include installation/removal of mooring platforms and laying of pipelines and associated anchoring activities, service vessel operations, supporting infrastructure discharges, and oil spills. Many platforms have discharges of drilling wastes, produced water, and other industrial wastewater streams that have adverse impacts on water quality. The USEPA regulates the discharge of these wastes through NPDES permits. Except in shallow waters, the effects of these discharges are generally localized near individual points of discharge (Neff 2005).

The primary cumulative effect from these activities will be the installation of platforms and other permanent structures, which will simultaneously remove soft-bottom habitat and provide hard structure for faunal communities. Further, in addition to improvements (i.e., widening and increased depth) of the CCSC, POCC is also proposing to conduct ecosystem restoration to protected endangered species, wetlands, and seagrasses, which will result in beneficial impacts through creation of additional nursery habitat. These impacts are considered to have long-term beneficial impacts by creating additional habitat for aquatic species, but given the size of the Western Planning Area, the overall benefit of habitat creation from these projects is anticipated to be minor.

Waterway improvement projects are generally short-term and their effects (turbidity and sedimentation, with the potential for limited habitat loss for new construction) will typically be limited to the area where these activities take place. These projects are all over 19 mi (30.5 km) from the proposed Project, as a result, any cumulative effects of construction of the Project, when considered with these projects will be negligible.

Ongoing marine traffic associated with recreational activities, onshore and offshore terminals, as well as offshore oil and gas exploration have the potential for inadvertent releases of petroleum products, which could result in impacts on the aquatic environment similar to those described above for the proposed Project. In the event of a spill, operators will be required to implement oil spill response procedures in accordance with applicable federal regulations to remove oil from the environment and mitigate impacts. Given the low probability of a spill associated with the proposed Project, and the implementation of federal regulations, the potential for cumulative impacts due to inadvertent releases of petroleum is unlikely and will be minor.

16.3.4 Commercial and Recreational Fisheries

Activities that could impact the aquatic environment in the Project area include offshore oil and gas terminals and exploration and production; waterway improvement projects, and marine traffic associated with the oil and gas industry, as well as recreation. The onshore projects, and activities associated with each, will not impact commercial or recreation fishing activities. Although discharges and runoff from coastal facilities could affect the fisheries themselves, it is anticipated that these activities will be conducted in accordance with applicable permits, such that impacts to the fisheries populations will not occur.

Cumulative impacts to the fisheries could be caused by projects located within the Western Planning Area of the GOM, as well as the adjacent state waters. These include the proposed offshore and onshore terminals, two desalination plants, channel improvement and maintenance projects, as well as minor coastal projects in and around Corpus Christi; oil and gas exploration activities; and recreational boating.

Currently two desalination projects are under consideration and both are expected to be located on Harbor Island in Port Aransas. Impacts on fisheries from these types of facilities are generally limited to the small area associated with water

discharge, or the outfall area. Based on the expected location of these facilities and associated outfalls, the Bluewater SPM Project is not expected to contribute to cumulative impacts on fisheries in proximity.

Channel maintenance and dredging activities, as well as the minor coastal improvement projects, have the potential to affect water and habitat quality in the immediate vicinity of the projects. These projects are generally temporary or short-term and their effects (low dissolved oxygen, turbidity and sedimentation, with the potential for limited habitat loss for new construction) will typically be limited to the area where dredging/construction takes place. As a result, the cumulative effects of construction of the Project, when considered with these projects will be negligible due to the use of HDDs within areas where dredging is proposed.

Offshore oil and gas terminals and exploration activities can include installation/removal of mooring platforms and laying of pipelines and associated anchoring activities, service vessel operations, supporting infrastructure discharges, and oil spills. The primary cumulative effect from these activities will be the installation of platforms and other permanent structures within designated fishing areas. The effect on both recreational and commercial fishing will be similar to that expected from placement of the proposed SPM buoy system and establishment of its safety zones. These activities will result in the potential loss/reduction of fishing areas, but also have the potential for a concurrent increase in fisheries productivity as a result of new structure (habitat) within the soft-bottom environments that are ubiquitous throughout the Western Planning Area. Further, in addition to improvements to the CCSC, the POCC is also proposing to conduct ecosystem restoration to protected endangered species, wetlands, and seagrasses, which will result in beneficial impacts on fisheries populations through creation of additional nursery habitat. These impacts are considered to have long-term beneficial impacts on the fisheries populations, but given the size of the Western Planning Area, the overall benefit of habitat creation from these projects is anticipated to be minor.

Oil and gas terminals and exploration activities in the Western Planning Area have the potential for inadvertent releases of product, which could result in impacts on the local fisheries. Since the Deepwater Horizon (DWH) oil spill, the federal government has reorganized the Minerals Management Service into BOEM (responsible for offshore energy leases) and the Bureau of Safety and Environmental Enforcement (responsible for safety and environmental enforcement relevant to offshore energy activity). The oil and gas industry has also developed standards to better prevent and respond to releases (American Petroleum Institute 2015). In the event of a spill, operators will be required to implement oil spill response procedures in accordance with applicable federal regulations to remove oil from the environment and mitigate impacts. Given the low probability of a spill associated with the proposed Project, and the implementation of federal regulations, the potential for cumulative impacts due to inadvertent releases of petroleum is unlikely and will be minor.

16.3.5 Wildlife and Protected Species

As described in the Introduction, cumulative impacts are the combined result of the impacts of an action that, when considered with the impacts of other actions, will result in resource impacts. The geographic and temporal scope of projects considered in this cumulative impact analysis, as well as a description of each past, present, or reasonably foreseeable future project considered, is provided in the Introduction.

Activities that could impact the marine environment in the Project area include offshore oil and gas terminals and exploration and production; the two desalination plants, waterway improvement projects, and marine traffic associated with the oil and gas industry, as well as recreation. Although activities associated with land-based projects can impact the marine environment, it is more than likely that these onshore projects will not result in additive negative impacts when combined with the Bluewater SPM Project.

There are currently 1,113 platforms and 6,554 mi (10,548 km) of pipeline in BOEM's Western Planning Area and the state waters of Texas (BOEM 2017). Between 561 and 1,788 additional production structures and between 3,049 and 6,930 mi (4,907 and 11,153 km) of new pipeline are projected to be installed in the Western Planning Area over the 70-year analysis period. Effects to the environment and biological resources from these structures are similar and typically localized. The contribution of the Proposed Project is considered negligible relative to the total number of platforms in the GOM. The

potential for Project impacts to a resource or the environment are small when compared to other activities in the Western Planning Area.

Activities associated with the waterway improvement project activities identified in Table 16-2, have the potential to affect water quality, which could result in minor impacts to fish and other marine taxa. These impacts will be additive to the Bluewater SPM Project's activities if the actions are concurrent with installation of proposed pipelines, and during anchoring and other bottom disturbing activities during construction of the SPM buoy systems. Generally, impacts from these types of projects will be short-term, and their effects (turbidity and sedimentation) will be localized, and limited to the area where active construction takes place. Most of the other projects with known construction schedules that could be concurrent with the Bluewater SPM Project are all over 12 mi (19.3) from the Proposed Project, therefore any cumulative effects of construction of the Project, when considered with these projects will be negligible.

Currently there are no identified in-water projects within the immediate vicinity of the Project that are in operation; however, three offshore terminal projects are currently under review by MARAD. The TGTP, SPOT, and COLT projects will be 26, 100, and 88 mi (41.8, 160.9, and 141.7 km), respectively, from the Bluewater SPM Project. Additionally, ongoing regional activities within the Western Planning Area, like the rest of the GOM, is heavily used by recreational and commercial fishing vessels and contains known popular fishing areas. Recreational and state-regulated commercial fishing activities occurring in the Project area can result in bycatch of various fish and invertebrate species. In addition, fishing vessels and other recreation boat traffic could impact managed species through vessel collisions and subsequent spills, or through increased vessel noise.

Pile-driving will be the greatest source of noise associated with the Project; however, given the temporary nature of pile-driving impacts, Project construction is not expected to contribute to a significant cumulative impact on noise with other activities in the GOM. As described in Sections 13 and 14 (Meteorology, Air Quality, and Noise; and Navigation and Navigation Safety, respectively), given the level of existing commercial vessel traffic in the GOM, the contribution of the Project to cumulative vessel traffic consistent with existing uses of the waterways transited by these vessels. Therefore, associated noise impacts will be negligible.

Ongoing marine traffic associated with recreational activities and offshore oil and gas terminals and exploration have the potential for inadvertent releases of petroleum products, which could result in impacts on the marine biological communities similar to those described above for the Project. In the event of a spill, operators will be required to implement oil spill response procedures in accordance with applicable federal regulations to remove oil from the environment and mitigate impacts. Given the low probability of a spill associated with the Proposed Project, and the implementation of federal regulations, the potential for cumulative impacts due to inadvertent releases of petroleum is unlikely. However, the Project could contribute to a minor to major cumulative impact if multiple spills were to occur in a short time frame, and the worst-case scenario spill associated with Project operations could result in significant impacts as described in Section 8.2.4.

It has been determined that the Proposed Action will have no effect on multiple species, as identified in Section 8. Given the temporary, minor effects of Project implementation of techniques with consideration of protected species, and given that other projects will also be subject to the Endangered Species Act of 1973 (ESA), it is expected that the cumulative impacts of the Bluewater SPM Project on protected species, combined with the multiple projects listed above, will also be minimal and temporary in nature. Temporary disturbance of Redfish Bay and the GOM waters along San Jose Island will be associated with on and inshore installation of the pipelines. Even if the proposed Project is built at the same time as other projects identified in Table 16-2, cumulative impacts on the marine environment is not expected as activities associated with the other projects will be sufficiently removed from the Project area. Once installation is complete, the Offshore and Inshore Pipelines will be buried and as such will not contribute to cumulative impacts.

Vegetation and wildlife habitat in the vicinity of the proposed Onshore Pipeline facilities have been affected by industrialized development associated with oil and gas infrastructure. In addition, while most of the future projects

identified in in Table 16-2 within the defined geographic scope for wildlife (the Hydrologic Unit Code [HUC] 12 watershed) have unknown construction schedules, concurrent construction and operation of these projects with the Onshore Pipelines will result in cumulative impacts on wildlife. Construction and operation of the Onshore Pipeline facilities will temporarily impact vegetation within work areas, which will be allowed to revert to pre-construction condition after construction is completed. As discussed above, vegetation maintenance during operations will result in impact wildlife habitat, however these activities will be intermittent. Given the location of the Onshore Pipelines and other projects within the HUC-12 watershed in areas characterized by industrialized development, impacts on wildlife are expected to be less than projects in areas where there is less development. Wildlife inhabiting developed areas typically includes human commensal species or individuals that have otherwise become acclimated to human activity. Further as most projects considered are anticipated to implement BMPs to ensure restoration of temporarily impacted wildlife habitat and minimize noise and lighting, and are also required to adhere to the ESA, we have determined that cumulative impacts on wildlife will be minor.

The operation and decommissioning of the Project will have much lower impacts than those described above for construction; therefore, will not be cumulatively significant.

16.3.6 Cultural Resources

As the construction and operation of the DWP, along with the construction of any of the number of other industrial scale projects within the vicinity of the DWP have the potential to impact cultural resources through ground disturbance and impacts to the viewshed of cultural resources, the DWP has the potential to contribute to cumulative impacts to cultural resources in the vicinity of the Project. However, based on the relative location of the projects to the proposed Project, no common cultural resources will be impacted.

The proposed Project will not permanently impact historic properties listed on or considered eligible for listing on the NRHP. Therefore, any potential incremental increase in cumulative impacts on cultural resources from the other projects in consideration with the Project will be negligible.

16.3.7 Socioeconomics

Of the projects identified in the cumulative impact analysis, those with the greatest potential to contribute to cumulative impacts on socioeconomic factors such as population, housing, employment, and tourism are the Corpus Christi LNG Terminal, the Axis Midstream Terminal, the Industrial Recycling and Production Facility, the Fractionation Facility, the two Desalination Plants, the Plastics Plant, Steel Mill, the multiple pipeline projects, and offshore oil and gas terminals and exploration and production.

The counties in the Project area will likely see a temporary increase in population and demand for housing associated with non-local workers relocating to the area, with an expected concentration in Aransas Pass and Corpus Christi, during the construction of the Project as well as any concurrently constructed projects. Local communities will benefit from increased spending by construction crews at restaurants, hotels, and retailers.

Construction-related impacts from the Bluewater SPM Project on employment and tax revenues will generally be temporary and minor; the other projects identified above will likely have economic impacts during construction, most notably construction of the Corpus Christi LNG Terminal, the Fractionation Facility, and the two EPIC pipeline projects, which are currently underway. As discussed in this section, project details for the Axis Midstream Terminal, the Industrial Recycling and Production Facility, the two Desalination Plants, and the Plastics Plant are unknown, however these projects are typical of ongoing development in the Project area and will contribute to economic impacts during construction but to a smaller degree.

As discussed previously, the proposed Project will have negligible socioeconomic impacts during operation and therefore is likely to have a negligible contribution to cumulative impacts on population, employment, and local services. However,

based on the results of the cash flow modeling, the construction and operation of the Proposed Project would result in a positive impact to and support the continued growth of both U.S. and local economies.

16.3.8 Geological Resources

Onshore ground disturbance will be in an area that poses a limited potential for erosion and landslide hazards but will have direct impacts on near-surface geology and soils during construction (within construction workspaces). Installation of the pipelines by the HDD method will avoid any beach erosion areas. Most other nearby projects are sufficiently far enough away from the Project such that they will not contribute to cumulative impacts on geological resources in the Project area. Erosion control and restoration techniques and requirements will be determined prior to construction based on requirements within the USACE permit and other applicable agency recommendations.

The offshore portion of the proposed Project will disturb shallow sediment in the immediate vicinity associated with installation of the pipeline. Minor temporary displacement of sediment will occur during laying and jetting of the pipelines and during HDD activities. The resulting temporary displacement of sediment from these activities would be similar to that resulting from installation of pipeline, platforms, and other similar structures associated with oil and gas activity in the Western Planning Area.

While activities necessary in offshore oil and gas exploration and production, including the decommissioning of existing infrastructure, carry the potential for impacting local geological resources, activities present in the OCS Western Planning Area have not demonstrated any adverse cumulative impact on geologic resources, with the potential exception of regular resource reserve reduction.

Overall the proposed Project will not adversely affect geological resources; therefore, it will not contribute to any potentially adverse cumulative impacts on the geologic resources in the Western Planning Area.

16.3.9 Coastal Zone Use, Recreation and Aesthetics

Of the reasonably foreseeable projects identified, 14 of them could have effects on marine and land use, recreation, and aesthetics that could have a cumulative impact when combined with the effects of the Bluewater SPM Project. Potential cumulative impacts to land and marine use, recreation, and aesthetics are addressed below.

BOEM prepares Five-Year OCS Oil and Gas Leasing Programs to facilitate leasing of portions of theOCS for exploration and drilling, including in the Central and Western Planning Areas of the GOM. The BOEM Oil and Gas Leasing Program, 2012–2017, authorized lease bidding on 64.5 million ac in the Central Planning Area and 28.6 million ac in the Western Planning Area (BOEM 2012). The most recent draft of the BOEM Oil and Gas Leasing Program, 2017–2022, proposes to offer all unleased blocks within the same boundaries during the upcoming five-year cycle (BOEM 2017). These lease programs confer long-term benefits on the oil and gas industry both by permitting long-term leases on productive operations and continuously arranging bidding opportunities on unleased blocks. The Proposed Project would have a negative effect on oil and gas uses by presentingan encumbrance to industry vessels that could otherwise access the safety zones to explore or drill from the surface of the water above the OCS. However, the Project's impact would be negligible considering that the OCS lease blocks adjacent would still be available for leasing and could be accessed by horizontal drilling or other technology. The beneficial impact of the BOEM Five-Year OCS Oil and Gas Leasing Programs would outweigh the impact of the Project, so that the cumulative effect on use by the oil and gas industry would be long-term and beneficial.

The Preliminary Environmental Impact Statement (PEIS) for the BOEM 2012-2017 OCS Oil and Gas Leasing Program predicted it would lead to installation of 2,400 to 7,500 mi of subsea pipeline in the GOM (BOEM 2012). Based on the BOEM 2017–2022 Five- Year Leasing Program, there has been no interest in the OCS lease blocks traversed by or immediately adjacent to the proposed offshore facilities. One active lease was identified within the Project's protraction area (Area Block G20605); however, is not intersected by the Proposed Project. With the exception of TGTP, the other concurrent projects are not expected to install any additional offshore pipelines or submerged infrastructure, or create impacts that would obstruct installation of the Offshore Pipelines or other submerged infrastructure. Similar to the

Proposed Project, none of the OCS lease blocks traversed by or immediately adjacent to the TGTP are active. Bluewater Texas Terminal, LLC (BWTT) proposes to install a combined length of approximately 143,820 ft of Offshore Pipelines and establish a 1,100-m radius safety zone around each of the SPMs. Given the limited subsea infrastructure the Project would install, and the small restricted area of the Project safety zones, the Project's contribution to cumulative impacts on the ability to install or maintain offshore pipelines and other submerged infrastructure in the GOM would be negligible.

According to the NOAA Marine Cadastre, no federal OCS sand and gravel borrow areas under BOEM's purview occur within the vicinity of the Project, with the nearest federal OCS sand and gravel borrow located past Houston, over 230 mi northeast of the Project. Sand leases and resources within state waters are not available through this data layer. The concurrent projects listed in Section 16.2 are not expected to result in negative cumulative impacts on the collection of non-energy mineral resources on the OCS.

During construction of the Project, multiple marine traffic movements are expected to occur during the 18-month construction period, once operational the Project anticipates 16 very large crude carrier (VLCC) visits per month in addition to maintenance vessel visits when necessary. As shown in Figure 12-7 (see Section 12: Coastal Zone Use, Recreation, and Aesthetics) the Proposed Project will not impede any of the shipping lanes in the vicinity of the Project. The closest shipping lane to the SPM buoy systems is the Brazos Santiago Pass (about 0.9 mi east).

When combined with expected vessel service associated with construction of the other projects, and in combination with other projects for which the number of deliveries is not publicly known, concurrent construction of these projects will increase the number of vessels transiting the shipping/fairways lands in the Western Planning Area. While this change in vessel traffic may be noticeable for some users of the waterways in the Project vicinity, impacts on these users from vessel traffic associated with construction will be consistent with existing use of the waterway.

During operations, up to 16 VLCCs will call on the SPM buoys per month. If all of the projects identified above achieve in-service, then by 2022, an additional 1,720 vessels per year will be transiting the shipping/fairways lands in the Western Planning Area. Additionally, a portion of the vessel traffic in the GOM associated with oil and gas exploration and production (an increase between 860 and 10,820 vessels) could occur within the Western Planning Area. Collectively operation of these projects will increase traffic in the Western Planning Area, however, the increase in transits will be spread geographically from the Port of Brownsville to Port Arthur and throughout the GOM.

While VLCC transits to the SPM buoys will be subject to a moving security zone during transit, as are LNG vessels in transit to the Corpus Christi LNG Terminal, cumulative impacts on vessel traffic in the Project vicinity are not likely to experience significant delays or be precluded from use of the shipping/fairways lands in the Western Planning Area. Further, safe navigation practices as established though the 1972 Convention on the International Regulations for Preventing Collisions at Sea will mitigate potential impacts from the increased vessel traffic. Any other project for which LNG vessels calls will occur, will be subject to this regulation.

Overall the Proposed Project's contribution to cumulative impacts on marine transportation would be long- term and negligible, as the VLCCs and service vessels calling on the SPM buoys will result in a nominal increase in the current vessel traffic transiting the area.

The concurrent projects listed are not expected to result in negative cumulative impacts on military uses offshore. The Project would have a negligible impact on military uses, and the BOEM OCS Five-Year OCS Oil and Gas Leasing Program provides special instruction for coordination between OCS lessees and the armed forces to prevent and mitigate any conflicts of use.

The Proposed Project will not impact ocean dredged materials sites, coastal zone habitats or coral reefs during construction or operation. Recreation activities such as fishing, diving, and boating, will not be allowed within a safety zone around construction vessels based on the established safety zone, resulting in temporarily impacts associated with displacement of these activities. Operation of the Project will result in a small restricted area associated with the

approximately 1,100-m radius operational safety zones around the SPM buoys. Based on the level of activity at the proposed SPM buoy site, the Project's impact on water- based recreation will be permanent but minor.

Several cumulative effects on commercial fishing could be associated with development of offshore projects. These include a decrease in the amount of unrestricted water, a localized increase in vessel traffic, and alteration of natural viewsheds. Given the size of offshore projects relative to the GOM, these impacts are considered minor but long-term.

Ongoing oil and gas exploration and production associated with BOEM leasing program will impact commercial fishing by restricting portions of the Western Planning Area that contribute to commercial fishing landings (BOEM 2017). However, since the current program is regionwide, allowing for leases of blocks within all of BOEM's planning areas[1], the amount of future development and specific locations within the Western Planning Area are not able to be predicted. Impacts from these activities may be partially offset by positive impacts on fish populations and habitat as oil and gas structures serve as artificial structures that attract fish and/or provide alternative habitat (see Section 7: Commercial and Recreational Fisheries).

The other projects identified are not expected to create significant impacts on commercial fishing, with the exception of potential indirect effects from additional vessel traffic. The cumulative impact is not expected to be more than minor, and the Proposed Project's incremental contribution to negative impacts on commercial fishing will be negligible.

Commercial fishing will not be allowed within a safety zone around construction vessels based on the established safety zone, resulting in temporarily impacts associated with displacement of these activities. Operation of the Project will result in a small restricted area associated with the 1,100-m radius operational safety zones around the SPM buoy systems. Based on the level of activity at the proposed SPM buoy sites, and the finding fishery resource population-levels will not be impacted (see Section 7: Commercial and Recreational Fisheries), the Project's impact on commercial fishing will be permanent but negligible.

Several cumulative effects on recreational boating could be associated with development of offshore projects. These include a decrease in the amount of unrestricted water, a localized increase in vessel traffic, and alteration of natural viewsheds. Given the size of offshore projects relative to the GOM, these impacts are considered minor but long-term.

Structures and restricted areas associated with the proposed offshore terminals and BOEM's Leasing Program will also impact recreational boating during construction, operation, exploration, drilling, and long-term production. BOEM estimates that between 561 and 1,788 additional production structures and between 3,049 and 6,930 mi (4,907 and 11,153 km) of new pipeline are projected to be installed in the Western Planning Area over the analysis period (BOEM 2017). Further, between 740 and 1,892 structures maybe removed during this period. In aggregate, these activities will result in an increase in the number of platforms in the Western Planning Area, however these structures are likely to be located in deepwater locations farther offshore, thereby minimizing impacts on recreational boating. Similarly, the three proposed offshore terminals will be sufficiently removed from the Bluewater SPM Project such that impacts on recreational boating are not expected to be significant.

The other projects identified in Table 16-2 are not expected to create significant impacts on recreational boating, with the exception of potential indirect effects from additional vessel traffic. The cumulative impact is not expected to be more than minor, and the Proposed Project's incremental contribution to negative impacts on recreational boating will be negligible.

[1] A large portion of the Eastern Planning Area is not included in the proposed lease program as it is subject to Congressional moratorium.

The Proposed Project would have permanent but negligible impacts on water-based recreation, primarily associated with the small 1,100-m radius operational safety zones around the respective SPM buoy systems.

Cumulative effects on recreational fishing will be similar to those discussed above for recreational boating, including a decrease in the area available for recreation activities and increased vessel traffic, but also including potential cumulative impacts on fishery resource population-levels.

Ongoing oil and gas terminals exploration and production associated with the BOEM leasing program will impact recreational fishing by restricting portions of the Western Planning Area that provide recreational fishing opportunities (BOEM 2017). As discussed above, the regionwide nature of the program does not allow predictions of the amount of future development or identification of specific locations within the Western Planning Area. However, recreational fishing in the vicinity of the Project is predominately from shore which aids in minimizing impacts on recreational fishing. Also, impacts from oil and gas terminals and exploration and production may be partially offset by positive impacts on fish populations and habitat as oil and gas structures serve as artificial structures that attract fish and/or provide alternative habitat (see Section 7: Commercial and Recreational Fisheries).

Recreational fishing will not be allowed within a safety area surrounding the construction vessels based on the established safety zone, resulting in temporarily impacts associated with displacement of these activities. Operation of the Project will result in a small restricted area associated with the 1,100-m radius operational safety zones around the SPM buoy systems. Based on the level of activity at the proposed SPM buoy sites, and the finding fishery resource population-levels will not be impacted (see Section 7: Commercial and Recreational Fisheries), the Project's impact on recreational fishing will be permanent but negligible.

In addition to the Onshore Pipelines, Onshore facilities to support construction activities, including fabrication sites would be utilized. Temporary disturbance of nearby onshore recreational fishing areas will be associated with onshore and nearshore installation of the pipelines. Even if the Proposed Project is built at the same time as other projects in Aransas, Nueces, and San Patricio Counties, cumulative impacts on recreational fishing occur onshore and within nearshore waters would be temporary and considered minor given the abundance of comparable recreational fishing opportunities in the Project area. Once installation is complete, the Offshore and Inshore Pipelines will be buried and as such will not impede recreational fishing activities.

There are no offshore terminals in operation in BOEM's Western Planning Area. Currently the only offshore terminal in operation within the GOM is the Louisiana Offshore Oil Port, which is located in BOEM's Central Planning Area (BOEM 2017). Since this port is outside the geographic range of the Proposed Project, it is excluded from our cumulative impact analysis. The shared use of the GOM for industrial and recreational activity historically has been permitted in the region for approximately 65 years. It is unlikely that the additional installation of the Project would cause a significant visual impact that is inconsistent with the typical views in the GOM. Overall, the cumulative effect of the concurrent projects on the viewshed in the region of the Gulf shared by the Project would be negligible.

As discussed above, the geographic scope for visual resources associated with the Onshore Components of the Project is generally a 0.25-mi radius. The two Desalination Plants and the Plastics Plant have the potential to contribute to cumulative impacts on visual resources.

The coastal bend of Texas, namely Aransas, Nueces, and San Patricio Counties, has changed considerably over the last 50 years with industrialized development associated with oil and gas infrastructure and the establishment of multiple Port authorities, as well as recently completed projects listed in Table 16-2. Construction of the Onshore Pipelines would add incrementally to this impact, but the overall contribution would be negligible given that the pipeline would be buried. Alternatively, construction and operation of the desalination and plastics plants would result in a permanent change in the viewshed. The onshore facilities for the Bluewater SPM Project would contribute incrementally to the cumulative impact on aesthetics in the Project area, but to a lesser degree than the Desalination or Plastic Plants.

16.3.10 Meteorology, Air Quality and Noise

16.3.10.1 Ambient Noise

Of the projects identified, the Project, offshore oil and gas exploration, waterway improvement projects, marine traffic, the Corpus Christi LNG Terminal, Plastics Plant, and the two Desalination Plants could contribute to cumulative impacts on noise within the western GOM and in the vicinity of Onshore Project Components.

The primary sources of noise during construction of the proposed Project will be associated with internal combustion engines powering construction equipment required for onshore and offshore installation (including the pipelines, Harbor Island Booster Station, and SPM buoys). The construction period associated with onshore and underwater construction of the pipelines is expected to last a short time at any one location; the longest timeframes will occur where the pipelines will be installed via HDD (up to 9 weeks at one location). As discussed in Section 1.3.2.1, installation of the Harbor Island Booster Station will primarily occur during the day; however, pipeline installation may occur up to 24 hours per day. Construction activity at the SPM buoy systems sites will last about 16-weeks, and will also result in short-term, minor airborne and underwater noise level increases in the immediate vicinity of the SPM buoy systems.

Operation of the Harbor Island Booster Station will result in a localized increase in noise levels; however, sound from operations is not expected to result in a noticeable sound level impact at NSAs. Operation of the buried pipelines is not expected to impact ambient airborne sound levels. Operational noise at the SPM buoy systems sites will be associated with the operation of engines and pumps, and intermittent noise of approaching and docked vessels, and support vessels. Overall noise impacts from the Project will be short-term and limited to the pipeline construction period for land-based receptors and long-term on the airborne and underwater sound environment in the immediate vicinity of the Harbor Island Booster Station and SPM buoys.

Based on the limited onshore noise contribution from the Project and the localized nature of offshore noise, cumulative noise effects will only occur where another project is in close proximity to the proposed Project. The Corpus Christi LNG Terminal, Plastics Plant, and the two Desalination Plants will be at varying distances, as reported in Table 16-2, with the greatest potential to contribute to cumulative impacts for those projects that will be within 0.5 mi of active construction activities of the Bluewater SPM Project. Based on distance and the known construction schedules of the other projects, construction of the pipelines is not likely to contribute to cumulative impacts on noise. Given the expected attenuation of noise from operation of the Harbor Island Booster Station and SPM buoys, as well as the distance between these facilities and NSAs, operation of the Project facilities will not contribute to cumulative noise impacts. However, vessel activity during construction and operation of the Project will contribute to cumulative sound levels. As described in Section 14: Navigation and Navigation Safety, given the level of existing commercial vessel traffic in the GOM, the contribution of the Project to cumulative vessel traffic consistent with existing uses of the waterways transited by these vessels. Therefore, associated noise impacts will be negligible.

16.3.10.2 Air Quality

Of the projects identified, activities that may impact air quality within the vicinity of the proposed project possibly include other offshore platform emission sources. It is assumed that representative background concentrations for the region may account for the impacts from other offshore sources in the absence of additional information. Emissions from these sources could overlap with air quality impacts from operation of the Project. A dispersion modeling analysis will be performed including direct, indirect, and cumulative impacts, as needed, and determined if the air quality impacts remain in compliance with all applicable air quality standards. Note that if air quality impacts from emissions sources with indirect impacts (including the crude tanker, support vessels, etc.) are greater than the USEPA's significant impact level (SIL), BWTT will use past guidance from the BOEM and TCEQ, and add a representative background ambient monitored concentration of the pollutant exceeding the SIL and compare to the National Ambient Air Quality Standards (NAAQS) to determine the cumulative impacts from the Project. Air quality impacts from construction and decommissioning of the proposed Project

will be short-term, minor, and not adverse. Air quality impacts from operation of the proposed Project will be long-term, and minor

16.3.11 Navigation, Safety, and Security

During construction of the proposed Project, an increase in marine traffic movements are expected to occur during the construction period due to construction vessels and supply barges accessing the project location. When combined with expected vessel service associated with construction of the other projects, as identified in the Framework for Cumulative Impact Analysis, and in combination with other projects for which the number of deliveries is not publicly known, concurrent construction of these projects will increase the number of vessels transiting the shipping channels and fairways in the Western Planning Area. This increase in vessel traffic would potentially cause an increased risk of vessel collision.

The DWP expects, at a maximum, 16 ships per month or 192 ships per year plus supply boats. More than 5,000 ships per year arrive at Aransas Pass, thus an additional maximum of 192 is thought to be only a negligible or minor impact. Additionally, a portion of the vessel traffic in the GOM associated with oil and gas exploration and production (an increase between 860 and 10,820 vessels) could occur within the Western Planning Area. Collectively operation of these projects will increase traffic in the Western Planning Area, however, the increase in transits will be spread geographically from the Port of Brownsville to Port Arthur and throughout the GOM.

While the vessel transits to the SPM buoy will be subject to a moving security zone during transit, as are liquefied natural gas, LNG vessels in transit to the Corpus Christi LNG Terminal, cumulative impacts on vessel traffic in the Project vicinity are not likely to experience significant delays or be precluded from use of the shipping/fairways lands in the Western Planning Area. Further, safe navigation practices as established though the 1972 Convention on the International Regulations for Preventing Collisions at Sea will mitigate potential impacts from the increased vessel traffic. Any other project for which LNG vessels calls will occur, will be subject to this regulation.

Overall the proposed Project's contribution to cumulative impacts on marine transportation would be long-term but negligible, as the VLCCs and service vessels calling on the SPM buoy will result in a nominal increase in the current vessel traffic transiting the area. Additionally, the proposed Project and other DWP project along the Texas coast could reduce the volume of product being exported through lightering and reverse lightering, thereby reducing the overall vessel traffic inshore.

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