UNITED STATES GOVERNMENT June 5, 2023
MEMORANDUM

To: Public Information
From: Plan Coordinator, OLP, Plans Section (GM 235D)

Subject: Public Information copy of plan

Control #	-	Control N-10213
Type	-	Initial Exploration Plan
Lease(s)	-	OCS-G 36263 Block - 956 Mississippi Canyon Area
Operator	-	BP Exploration & Production Inc.
Description	-	Subsea Wells 2A and 2B
Rig Type	-	Drillship

Attached is a copy of the subject plan.

It has been deemed submitted and is under review for approval.

Nicole Martinez
Plan Coordinator

BP Exploration & Production Inc.

Initial Exploration Plan
Mississippi Canyon Block 956
(OCS-G 36263)

"Keltics South"

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1	05/11/2023		Adalberto Garcia	Brenda Linster
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Rev	**Date**	**Document Status**	**Custodian/Owner**	**Authority**

AMENDMENT RECORD

Amendment Date	Revision Number	Amender Initials	Amendment
05/11/2023	1	AG	Updated referenced OSRP approval date in sub-sections 2.7.8, 8.1.1, and 8.1.4 as well as the Oil Spill Response Discussion Report (Appendix G).

TABLE OF CONTENTS

1 Plan Contents

1.1 Description of Activities

Under this Initial Exploration Plan for the Keltics South prospect, BP Exploration & Production Inc. (BP) proposes to drill and complete one well (and a twin for re-spud) with surface and bottom hole locations in Mississippi Canyon Block 956.

BP will not be utilizing pile-driving or installing pipelines in this plan.

OCS Plan Information Forms (Form BOEM-0137) are included in **Appendix A**.

1.2 Location

A map at a scale of 1-in = 2,000-feet on an 8.5-in X 11-in sheet of paper that depicts the surface locations and water depths of the proposed wells is included in **Appendix B**. A bathymetry plat is also included in **Appendix B**.

1.3 Safety and Pollution Prevention Features

Safety and pollution prevention features utilized during drilling operations will include the use of appropriately designed casing and cement programs; appropriate blowout preventers, diverters, and other associated well equipment, appropriate mud monitoring equipment and sufficient mud volumes for well control; and properly trained personnel as described in 30 CFR Part 250, Subparts C, D, E, F, G, O and S , 30 CFR Part 550, Subparts B and C, and as further described in Notices to Lessees (NTLs). Appropriate fire drills and abandon ship drills will be conducted, and navigational aids, lifesaving equipment, and all other shipboard safety equipment will be installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

1.4 Storage Tanks and Production Vessels

Information regarding the storage tanks and production vessels located on the drilling rig and support vessels that will store oil, as defined at 30 CFR 254.6 are provided in the tables below. Only those tanks with a capacity of 25 barrels or more are included.

1.4.1 Storage Tanks DP Drillship

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Tank Capacity (m3)	Number of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
#1P Fuel Oil	Drillship	4133	657.1	1	4133	38.57
#1S Fuel Oil	Drillship	4133	657.1	1	4133	38.57
#2P Fuel Oil	Drillship	9344	1485.5	1	9344	38.57
#2S Fuel Oil	Drillship	9344	1485.5	1	9344	38.57
#3P Fuel Oil	Drillship	9049	1438.6	1	9049	38.57
#3S Fuel Oil	Drillship	9036	1436.6	1	9036	38.57
#1S FO Settler Tank	Drillship	447	71	1	447	38.57
#2P FO Settler Tank	Drillship	447	71	1	447	38.57
#1 FO Service Tank ER1	Drillship	194	30.8	1	194	38.57
#2 FO Service Tank ER1	Drillship	194	30.8	1	194	38.57
#1 FO Service Tank ER2	Drillship	194	30.8	1	194	38.57
#2 FO Service Tank ER2	Drillship	194	30.8	1	194	38.57
#1 FO Service Tank ER3	Drillship	219	34.8	1	219	38.57
#1 FO Service Tank ER3	Drillship	217	34.5	1	217	38.57
Lube oil Storage	Drillship	465	74	1	465	25.72
Base oil P	Drillship	3603	572.8	1	3603	41.06
Base oil S	Drillship	3607	573.4	1	3607	41.06

1.4.2 Storage Tanks Support Vessels

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	No. of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil	Supply Boat (Typical 280feet)	450	16	7,200 bbls dependent on other cargo carried	31.14

1.5 Additional Measures

In addition to the safety, pollution prevention and early spill detection measures that may be required by applicable regulations, BP will rely on its Operating Management System (OMS) to help deliver safe and reliable operations. OMS is a system of interdependent activities that drive how BP will actually perform work and comply with internal and external standards and regulations. Within OMS, BP has also implemented a Safety Environmental Management System (SEMS) in accordance with 30 CFR 250 Subpart S, which provides a systematic way to identify risks, potential impacts, and compliance requirements that need to be managed. BP presented to the BOEMRE a report entitled *Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned*. This document assesses the capabilities that are now available to respond to oil spills in the GoM. Additionally, the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as revised on April 26, 2021, [i]will be implemented as applicable to the activities outlined in this document, specifically, with regards to any external hanging equipment that may present potential entanglement hazard for protected species.

2 General Information

2.1 Applications and Permits

The table below provides information on the filing or approval status of the individual and/or site-specific Federal, State and local application approvals or permits, which must be obtained to conduct the proposed activities.

Application / Permit	Issuing Agency	Status
General NPDES Permit	EPA	Existing
Application for Permit to Drill	BSEE – New Orleans District	Pending Submittal
Emergency Evacuation Plan	USCG	Pending Submittal

2.2 Drilling Fluids

A table providing information on the types (including chemical constituents) and amounts of the drilling fluids that are planned to be used to drill the proposed wells is included below:

Drilling Fluids per Well (145 days)

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be Used Per Well
Water based (seawater, freshwater, barite)	140,000 bbls
Oil based (diesel, mineral oil)	NA
Synthetic based (internal olefin, ester)	25,000 bbls

NOTE: Water based mud (WBM) calculations include the option to re-spud the well. WBM volume is twice the anticipated amount required to drill to the TD of the surface casing. This value includes WBM and seawater as needed. Estimated volume is 70,000 bbls without re-spud

2.3 New or Unusual Technology

In accordance with the definition of “new or unusual technology” set forth in 30 CFR § 550.200, exploration activities in Mississippi Canyon Block 956 will utilize the Managed Pressure Drilling (MPD) technology to mitigate non-productive events associated with pore pressure / fracture gradient (PPFG) uncertainty.

2.4 Bonding Information

The bonding requirements for the activities proposed in this Exploration Plan are satisfied by an area-wide bond, furnished and maintained according to 30 CFR Part 556, Subpart I, and NTL No. 2015-N04, and to the extent required under 30 CFR 556.901 and National NTL No. 2016-N01.

2.5 Oil Spill Financial Responsibility (OSFR)

BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP according to 30 CFR Part 553, and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

2.6 Deepwater Well Control

BP (Operator No. 02481) has the financial capability to drill a relief well and conduct other emergency well control operations.

2.7 Blowout Scenario

2.7.1 Blowout Scenario

The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted. Day 1 worst case discharge (WCD) at well location 'A' is 278,000 bopd, with the calculation support package for this rate attached as Appendix F in the Proprietary Information copies of this Exploration Plan. The maximum duration of the blowout is estimated at 70 days (see relief well timing below). The rate profile associated with the well blowout over this 70 day period (also included in Appendix F in the Proprietary Information copies of this Exploration Plan) results in a potential worst case spill volume estimated at 15.5 mmstbo.

2.7.2 The Potential for the Well to Bridge Over (verify or modify)

While bridging is possible due to generally low formation strengths in the Gulf of Mexico, no bridging was assumed in the 'worst case scenario'. The open hole intervals experienced on each well have multiple formations open simultaneously. The modeling of the failure point of the weakest interval includes many variables, and using no bridging yields a maximum flow potential.

2.7.3 The Likelihood for Surface Intervention to Stop the Blowout (Verify or modify)

The likelihood for above-mudline intervention to stop a blowout is dependent on the failure mechanism. Depending on the circumstances, BP may address a failure of the BOP stack by repairing the control system via ROVs, replacing the BOPs, or adding a BOP on top of the current BOP stack. Failure of the wellhead or casing would be more difficult and require clear access to the well below the failure point in order to run drill pipe and/or tools in the well.

In addition to BP's internal well containment and emergency response planning, BP has contracted resources to assist in the event of a blowout. Further, BP is a member of the Marine Well Containment Company ("MWCC"), currently has access to MWCC's Interim Containment Response System ("ICRS") and will have full access to MWCC's Expanded Containment Response System when it is available.

2.7.4 The Availability and Timing of a Rig to Drill a Relief Well

The table below lists the Mobile Offshore Drilling Units (MODU) that are capable of drilling a relief well. The estimated time to spud is 3 to 10 days, pending requirements to safely secure the current operations of the MODU, required material logistics, mobilization to location, and regulatory approvals. The possibility of drilling a relief well from a neighboring platform or land is not applicable to operations proposed in this Exploration Plan; there is existing infrastructure in the vicinity of Mississippi Canyon Block 956 but none that would impede drilling a relief well.

Parameters	West Auriga (Main Derrick)	Black Lion (Main Derrick)	Black Hornet (Main Derrick)
Proposed Utility in Response	Wellbore Capping / Relief Well	Wellbore Capping / Relief Well	Wellbore Capping / Relief Well
Current Location	GoM	GoM	GoM
Contract Expire Date	02/29/2024	09/09/2023	02/01/2025
Rated WD (ft)	10K	12K	12K
Rated TD (ft)	37.5K	40K	40K
Rated BOPs (psi)	15K	15K	15K
Derrick Capacity	2.5MM	4MM	4MM
Moor Type	DP	DP	DP
Relevant Drill Package Limitations	SHDH4 connector	SHDH4 connector	SHDH4 connector

The estimated time to drill a relief well is: 10 days to mobilize and spud, 25 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation--for a total of 70 days.

2.7.5 Measures that Would Enhance the Ability to Prevent a Blowout

Measures employed to prevent a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures include the following:

1. Volume measurements relative to the well will be monitored at all times during all operations.
2. Flow checks before leaving bottom, after pulling into shoe, and before BHA enters stack.
3. BP representative shall observe well conditions prior to each trip and after well kills or testing.
4. BP representative shall be the only person authorized to initiate opening the well as part or at the conclusion of well control measures.
5. On rig JSA/contingency plan before running any non-shearable tools or pipe through the BOP stack.
6. BP has a 24/7 monitoring center, Regional Collaboration Center (RCC) (formerly referred to as the 'Houston Monitoring Center (HMC)'), located at BP's Westlake Campus. Through continuous monitoring, onshore staff have the ability to communicate issues they observe on the well with the Wells Superintendent and Wells Engineer, as well as the rig. The rig team can then make corrective actions as necessary.

In addition to the additional measures listed above, BP has adopted the following performance standards:

1. BP will use and will require its contractors involved in drilling operations to use, subsea blowout preventers (BOPs) equipped with no fewer than two blind shear rams and a casing shear ram on all drilling rigs under contract to BP for deepwater service operating in dynamic position mode. With respect to moored drilling rigs under contract to BP for deepwater drilling service using subsea BOPs, the subsea BOP will be equipped with two shear rams, which will include at least one blind shear ram and either an additional blind shear ram or a casing shear ram.
2. Each time a subsea BOP from a moored or dynamically positioned drilling rig is brought to the surface and testing and maintenance on the BOP are conducted, BP will require that a third party verify that the testing and maintenance of the BOP were performed in accordance with manufacturer recommendations and API Std 53.

2.7.6 Measures that Would Reduce the Likelihood of a Blowout

Measures to reduce the likelihood of a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures:

1. Minimize any influx events to the wellbore by using the best pore pressure / fracture gradient predictions available, using down-hole tools when appropriate, such as PWD and/or LWD to monitor the wellbore and update pore pressure / fracture gradient predictions;
2. Management of Change process is in place for all procedure changes;
3. A Well Control Response Guide is in place; and
4. With the integration of the Regional Collaboration Center (RCC) (formerly referred to as the 'HMC'), BP has staff monitoring wells 24/7. Having a monitoring center away from the rig in a controlled environment gives BP the opportunity to evaluate data real time and communicate issues to the Wells Superintendent and Wells Engineer, as well as the rig.

2.7.7 Measures which Would Enhance the Ability to Conduct Early Intervention

Measures to enhance the ability to conduct early intervention in addition to the regulation and NTL requirements include:

1. Possible relief well locations have been identified and screened for general acceptability. In the event of a blow out or other event necessitating a relief well, data will be collected post-event to ensure that previously identified relief well locations are still valid, or to assist in determining alternate relief well locations if required;

2. Wellhead equipment and sufficient casing is identified and available for a relief well;
3. A rig(s) is identified and available for a relief well;
4. A Well Control Response Guide is in place; and
5. An Incident Management System (IMS) is in place.
    - The BP IMS is comprised of government-approved plans covering various scenarios; Incident Management Teams are trained annually in the Incident Command System, which is a part of the National Incident Management System; BP has access to response capability through various contractors and technical specialists; and to pre-designated facilities, where the teams can provide adequate oversight to the response.

2.7.8 Other Measures

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

3 Geological and Geophysical Information

3.1 Geological Description

A discussion of the geological objectives, including a brief description of the hydrocarbon trapping elements, is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

3.2 Structure Contour Maps

Current structure contour maps are included in **Appendix C** in the Proprietary Information copies of this EP.

3.3 Interpreted 2-D and/or 3D Seismic Lines

Migrated and annotated 3-D seismic lines with depth scale within 152 meters (500 feet) of the proposed surface locations are enclosed with the site clearance letters included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

3.4 Geological Structure Cross-Section Maps

Interpreted geological structure cross-section maps are included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

3.5 Shallow Hazards Report

An Autonomous Underwater Vehicle (AUV) site survey was conducted for BP by Fugro during February and March of 2020. The survey data was acquired across Mississippi Canyon (MC) Blocks 956 and 1000. The shallow hazards interpretation of the data was included in the 2022 Oceaneering International Inc. (OII) report noted below.

The OII geohazards report integrated the 2020 AUV site survey data with 3D seismic data to generate a regional shallow hazards report. The report is entitled "Archaeological and Geohazard Assessment – Keltic South Prospect, Blocks 956 and 1000, Mississippi Canyon Area Gulf of Mexico, OII Report No. 217609-OII-RPT-AAG-01."

3.6 Shallow Hazards Assessments (Site Clearance Letters)

Shallow hazards assessment (site clearance letters) that evaluate the seafloor and subsurface geologic and manmade features and conditions, for the proposed surface locations in Mississippi Canyon Block 956 are included in **Appendix C** of this Exploration Plan.

3.7 High Resolution Seismic Lines

Seismic sections through the proposed well locations are included in the shallow hazards assessments (site clearance letters) in **Appendix C** of this Exploration Plan.

3.8 Stratigraphic Column

A generalized biostratigraphic / lithostratigraphic column is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

3.9 Time vs. Depth Information

Time vs. Depth information is included in **Appendix C** in the Proprietary Information copies of this plan.

4 Hydrogen Sulfide (H_2S) Information

4.1 Concentration

Anticipated H_2S concentration is 0 ppm, based on offset well data in Mississippi Canyon Blocks 822. H2S is not expected to be encountered during the operations proposed herein.

4.2 Classification

Based on correlative information no H_2S is known to occur in the project area. BP requests BOEM confirm an "H_2S absent" classification.

4.3 H_2S Contingency Plan

No H_2S is documented in the offset wells in and around the project area, nor in nearby producing fields. Reservoirs have low temperature (< 100 C) and lack a sulfate source. Bottom-up model predicts no H_2S. Therefore, no H_2S contingency plans were needed.

4.4 Modeling Report

No H_2S is documented in the offset wells in and around the project area, nor in nearby producing fields. Reservoirs have low temperature (< 100 C) and are lack of sulfate source. Bottom-up model predicts no H_2S. Therefore, no further model reports were needed.

5 Biological, Physical, and Socioeconomic Information

5.1 Benthic Communities Report

The BOEM requires site-specific surveys and reviews for proposed bottom-disturbing actions in water depths greater than 300-m in order to judge the potential of the region for supporting high density deepwater benthic communities. NTL No. 2009–G40 formalized the process. BP has conformed to this requirement and has located wells to avoid potential sites for benthic communities during the activities described by this plan.

Mississippi Canyon Block 956 is located in water depths greater than 300-m; At these depths, the potential exists for deepwater benthic communities to be present. Site Clearance Surveys conducted for the proposed project confirm that high density benthic communities are not found in the area. These reports are contained in **Appendix C**.

5.2 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in water depths of approximately 6,826 ft. Therefore, requirements of NTL 2009-G39 for biologically sensitive underwater features and areas such as Topographic Features, Live Bottom (low-relief), Live Bottom (Pinnacle Trend) features, and other potentially sensitive biological features when conducting OCS operations in water depths less than 300-m (984-ft) in the Gulf of Mexico do not apply to this plan.

All proposed bottom-disturbing activities in this EP will occur outside of the nearest Topographic Features, "No Activity Zones", Live Bottom (low Relief), and Live Bottom (Pinnacle Trend) Stipulation Blocks described in NTL 2009-G39 and shown on BOEM December 2012 Map: "Biologically Sensitive Areas (< 300-m)".

5.3 Remotely Operated Vehicle (ROV) Monitoring Survey Plan

No longer applicable. NTL 2008-G06 "Remotely Operated Vehicle Surveys in Deepwater" has expired.

5.4 Threatened or Endangered Species, Critical Habitat and Marine Mammal Information

All marine mammals are protected under the Marine Mammal Protection Act (MMPA) and some are also protected under the Endangered Species Act (ESA).

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Mobula birostris*) are the only Endangered or Threatened species that could potentially occur within the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle. No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale.

The Rice's whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*Balaenoptera edeni brydei*) until recent DNA studies identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016, Rosel et al., 2021) and are therefore not likely to occur within the project area. The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area.

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 2000). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 200- and 1,000-meter (656 and 3,280 ft) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 3,000 m (9,843 ft). Generally, groups of sperm whales observed in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study (SWSS) consisted of mixed-sex groups comprising adult females with juveniles, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008).

Excluding the five Endangered or Threatened species that have been cited previously, there are 20 additional species of whales and dolphins (cetaceans) that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales, four species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin.

Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast. Adapted from: U.S. Fish and Wildlife Service (2020a) and NOAA Fisheries (2020) are listed below and taken from Table 7 of **Appendix I**.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Bryde's whale	*Balaenoptera edeni*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[1]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[2]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	None
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Panama City Crayfish	*Procambarus econfinae*	T	--	X	South-central Bay County, Florida
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus* subsp. *ammobates, allophrys, trissyllepsis,* and *peninsularis,* respectively	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

1 There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris),* which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

2The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles is designated as Threatened (76 Federal Register [FR] 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as *Sargassum spp.* habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

Five species of sea turtle are known to inhabit the waters of the Gulf of Mexico:

- leatherback sea turtle (*Dermochelys coriacea*)
- green sea turtle (*Chelonia mydas*)
- hawksbill sea turtle (*Eretmochelys imbricata*)
- Kemp's ridley sea turtle (*Lepidochelys kempii*)
- loggerhead sea turtle (*Caretta caretta*)

According to the project specific EIA (Appendix I), Five species of endangered or threatened sea turtles may be found near the lease area. Endangered species include the Loggerhead (*Caretta caretta),* leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle (*Chelonia mydas*) is listed as threatened (81 FR 20057). The DPS of loggerhead turtles (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as threatened, although other DPSs are endangered.

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 151 statute miles (243 km) north of the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles. Additional information can be found in the Environmental Impact Analysis attached as **Appendix I (Figure 3).**

Five species of fish are the other listed threatened or endangered fish species in the Gulf of Mexico.

- Smalltooth Sawfish (*Pristis pectinata*)
- Gulf Sturgeon (subspecies *Acipenser oxyrinchus desotoi*)
- Nassau Grouper (*Epinephelus striatus*)
- Giant manta ray (*Manta birostris*)
- Oceanic whitetip shark (*Carcharhinus longimanus*)

According to the EIA of Appendix I, the smalltooth sawfish (*Pristis pectinata*) is remote from the project area and highly unlikely to be affected.

The NMFS and United States Fish and Wildlife Service (USFWS) designated critical habitat for the Gulf sturgeon in fourteen geographic areas from Florida to Louisiana, encompassing spawning rivers and adjacent estuarine areas. Therefore, the Gulf Sturgeon is remote from the project area and highly unlikely to be affected.

Nassau groupers are found within the mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatan Peninsula, and the Caribbean, including the U.S. Virgin Island and Puerto Rico (NOAA, nd). There has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of Mexico at a water depth of 36 m (Foley et al., 2007). Three additional unconfirmed reports (i.e. lacking photographic evidence) of Nassau grouper have also been documented from mooring buoys and the coral cap region of the West Flower Garden flats (Foley et al., 2007).

Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude and now the species is only occasionally spotted in the GoM.

The giant manta ray is a highly migratory species that is thought to utilize the Flower Garden Banks serves as nursery habitat for aggregations of juvenile giant manta rays. Mature rays have also been observed in the Flower Garden Banks.

Two coastal species of birds that inhabit the GoM are protected under the ESA:

- Piping Plover (*Charadrius melodus*)
- Whooping Crane (*Grus americana*).

Critical overwintering habitat for the Piping plover has been designated in GoM, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida. Whooping crane critical habitat has been designated within the GoM region within the Aransas National Wildlife Refuge in Texas.

Four beach mice species occurring in the GoM are listed as endangered under the ESA and occupy critical habitats in the mature coastal dunes of Florida and Alabama:

- Alabama beach mouse (*Peromyscus polionotus ammobates*)
- Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*)
- St. Andrew beach mouse (*Peromyscus polionotus peninsularis*)
- Perdido Key Beach mouse (*Peromyscus polionotus trissyllepsis*)

The Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) is found only in saltgrass (*Distichlis spicata*) meadows in the Big Bend region of Florida; therefore, it is remote from the project area and highly unlikely to be affected.

There are currently seven species of corals listed as threatened under the ESA in the Gulf of Mexico:

- elkhorn coral (*Acropora palmata*)
- staghorn coral (*Acropora cervicornis*)
- lobed star coral (*Orbicella annularis)*
- mountainous star coral (*Orbicella faveolata)*
- boulder star coral (*Orbicella franksi)*
- pillar coral (*Dendrogyra cylindrus*)
- rough cactus coral (*Mycetophyllia ferox*)

The nearest critical habitat is for the elkhorn coral, staghorn coral and Dry Tortugas has been designated in the Florida Keys.

The Panama City crayfish is a semi-terrestrial crayfish that grows up to 2 inches (51 mm) in size and is found in south-central Bay County, Florida.

According to the project specific EIA: "There are no other endangered animals or plants in the Gulf of Mexico that are reasonably likely to be adversely affected by either routine or accidental events."

5.5 Archaeological Report

In 2021, BP commissioned Oceaneering International Inc. (OII) to generate an Archaeological Assessment based on the AUV site survey acquired for BP in 2020. Fugro USA Marine, Inc., (Fugro) collected high-resolution geophysical data during February and March 2020, in Blocks 956 and 1000, Mississippi Canyon Area as part of a larger BP survey campaign. All data were examined to locate potential submerged archaeological resources within the Area of Potential Effect in the AUV survey area. Based on this dataset, the Area of Potential Effect appears clear of submerged archaeological resources. If any wood, ceramics, textiles, or ferrous objects become exposed during bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

6 Waste and Discharge Information

6.1 Projected Generated Wastes

A table providing information on the projected solid and liquid wastes likely to be generated by the proposed activities is included in **Appendix D**.

6.2 Projected Ocean Discharges

A table providing information on the projected ocean discharges likely to be generated during the proposed activities is included in **Appendix D.**

7 Air Emissions Information

7.1 Screening Questions

Screening Questions for EP's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: $CT = 3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?	X	
Are your proposed exploration activities located east of 87.5° W longitude?		X
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours, from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

7.2 Emissions Worksheet

An emission workbook (BOEM Form 0138) showing Plan total emissions associated with the activities proposed in this Exploration Plan document is included in **Appendix E**. Total Plan emissions are summarized in the Table below. The proposed Total plan emissions are less than BOEM's emission exemption thresholds and as a result, no further review or controls are required.

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
BP Exploration & Production Inc.	Mississippi Canyon	MC956	OCS-G 36263	Not Applicable	2

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2023	31.81	19.19	18.62	0.46	762.16	21.91	0.00	119.54	0.22
2024	17.94	10.82	10.50	0.26	429.78	12.36	0.00	67.41	0.13
Allowable	2707.29			2707.29	2707.29	2707.29		63807.63	

7.3 Emission Reduction Measures

Emission Source	Reduction Control Method	Amount of NO_x Reduction (tons/year)*	Monitoring System
Black Hornet MODU engines	Actual Fuel Usage	763 tpy	MODU Fuel Usage Logs

NOTE: The amount of NOx reduction in tons/year are based on the highest emission year 2023.

7.4 Verification of Non-Default Emission Factors

The project BOEM 0138 Form emissions worksheet tabs (EMISSIONS1 through EMISSIONS2) include actual fuel usage rates for MODU Ocean Black Hornet. A history of Ocean Black Hornet's actual fuel usage is provided in Attachment 3.

7.5 Distance to Shore for Emission Exemption Thresholds (EET)

The distance to shore in statute miles is based on the same coordinate system used in the lease sale documents for the lease.

7.6 Non-Exempt Facilities

The calculated maximum projected emissions of the facility, with emissions reduction measures, is less than the respective EET calculated at 30 CFR § 550.303(d). The facility is therefore exempt from the requirements in 30 CFR § 550.303(e) through (i).

7.7 Hydrogen Sulfide

The requirements related to hydrogen sulfide (H_2S) are not repeated here as they are addressed in section 4 of the Plan.

7.8 Environmental Impact Analysis (EIA)

The requirements related to EIA are not repeated here as they are addressed in section 15 Appendix I of this Plan.

8 Oil Spill Information

8.1 Oil Spill Response Planning

8.1.1 Regional OSRP Information

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

Pursuant to 30 CFR 254.30(b), on July 12, 2022, BP submitted to BSEE a revision to the Oil Spill Response Plan referenced above. Revision changes are listed in the Record of Revision Form (Figure 2-1) of the revised OSRP.

BP has adopted additional performance standards:

a. Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled long-term blowout for the length of time required to drill a relief well;

b. Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;

c. Description of measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface, including methods to increase encounter rates;

d. Information regarding remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (e.g., X-band/infrared systems);

e. Information regarding the use of communication systems between response vessels and spotter personnel;

f. Shoreline protection strategy that is consistent with applicable area contingency plans; and

g. For operations using a subsea BOP or a surface BOP on a floating facility, a discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

8.1.2 Spill Response Sites

Primary Response Equipment Location	Preplanned Staging Location(s)
Tampa, FL; Pascagoula, MS; Houma, LA.; Leeville, LA; Morgan City, LA; Lake Charles, LA.; Venice, LA; Galveston, TX; Ingleside, TX.	Fourchon, LA.

8.1.3 OSRO Information

BP is a member of the Marine Spill Response Corporation (MSRC) and Clean Gulf Associates (CGA) and would utilize said Oil Spill Response Organization (OSRO) personnel and equipment in the event of an oil spill at Mississippi Canyon Area Block 956.

8.1.4 Worst-Case Scenario Determination

Category	Regional OSRP Approved Nov. 29, 2022	Keltics South EP
Type of Activity	Drilling >10 miles	Drilling > 10 miles
Facility Location	MC 778	MC 956
Facility Designation	Thunder Horse Well 778-15	MODU Well MC956 002 A
Distance to Nearest Shoreline	68-miles	81.3 statute miles
Volume storage tanks and flowline (total)	50,000-bbls	0-bbls
Volume Lease term pipelines	13,000-bbls	0-bbls
Volume Uncontrolled Blowout (Day 1)	360,000-bbls	278,000-bbls
Total Volume	423,000-bbls	278,000-bbls
Type of Oil(s) – (Crude Oil, Condensate, Diesel)	Crude	Crude
API Gravity(s)	32.0	32.6°

BP has determined that the worst-case scenario from the activities proposed in this EP do not supersede the worst-case scenario in BPXP's GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022. Pursuant to NTL No. 2008-G04, BP makes the following statement:

Since BP Exploration & Production Inc. has the capability to respond to the worst-case spill scenario included in its regional Oil Spill Response Plan approved on November 29, 2022, and since the worst-case scenario determined for our EP does not replace the worst-case scenario in our regional or sub-regional OSRP, BP certifies that it has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in our EP.

Wellbore data, geologic data, reservoir data, and fluid data used in modeling and making the WCD determination are provided in **Appendix F** in the Proprietary Information copies of this Exploration Plan.

8.2 Oil Spill Response Discussion

A detailed discussion of a response to an oil spill at Mississippi Canyon Area Block 956 is included in **Appendix G.** This Appendix addresses topics such as resource identification, release modeling, response technologies, and source containment / control.

9 Environmental Monitoring and Mitigation Measures

9.1 Monitoring Systems

In addition to rig control engineered systems, operational personnel have been instructed to check for pollution frequently during their tour of duty and, if pollution is spotted, to identify and shut-off the source and make immediate notifications as per instructions provided in Section 8 of BP's certified OSRP. In accordance with the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended on April 26, 2021 [*Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico*. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 26, 2021)], a person onboard the vessel(s) will visually monitor the moonpool(s) using a remote camera system. Logs will be kept for each shift documenting the observed presence/absence of marine animals in the moonpool(s). If a protected species is observed in the moonpool(s), required reporting to the appropriate agencies will be made and BP will comply with ensuing guidance.

Also, in accordance with the provisions of Title 30 CFR § 250.713(g) and NTL 2018-G01 "Ocean Current Monitoring" dated August 7, 2018, the MODU will be equipped with an Acoustic Doppler Current Profile (ADCP) current monitoring system onboard to allow continuous monitoring and gathering of ocean current data on a real-time basis in the upper 1000 meters.

9.2 Incidental Takes

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Monitoring activities are conducted by personnel on vessels to prevent accidental loss of materials overboard, and to report sightings of injured/dead protected species. Reporting of dead/injured protected species is addressed in Annex 2 of BP's "Incident Notification and Investigation Procedure - Attachment 1". Additionally, to mitigate against incidental takes, activities will be conducted in adherence to 2020 revisions of BSEE NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", as necessary. As required by BSEE NTL 2015-G03, BP submits an annual certification letter for its Marine Debris Awareness Training Process. The marine debris awareness training is required annually by the BSEE and is identified by "BP's Gulf of Mexico (GoM) Environmental Training Matrix" and "BP's GoM Health, Safety, and Environmental (HSE) Training Needs Assessment", both of which are located on BP's GoM HSE website.

Further mitigation measures can be found throughout the supporting EIA found in Appendix I.

9.3 Flower Garden Banks National Marine Sanctuary

All proposed activities will occur outside of the Protective Zones of the Flower Garden Banks National Marine Sanctuary boundaries.

10 Lease Stipulations

Oil and gas exploration activities on the OCS are sometimes subject to mitigations in the form of lease stipulations.

10.1 Lease Stipulation Information

Lease Stipulation for Protected Species

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, all activities will be conducted in adherence to 2020 revisions of NTL 2015-G03 "Marine Trash and Debris Awareness Training and Elimination"; BOEM NTL 2016-G01 "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" and BOEM NTL 2016-G02 "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program", as necessary. Mitigation to prevent takes varies based on the activity underway and it can include worker training on waste management and trash and debris containment procedures to avoid accidental loss overboard and its potential impact on protected species, and training on reporting of dead/injured protected species addressed in BP's Incident Notification and Investigation Procedure.

11 Related Facilities and Operations Information

11.1 Produced Liquid Hydrocarbons Transportation Vessels

There are no well tests proposed in this Exploration Plan.

12 Support Vessels and Aircraft Information

12.1 General

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Helicopter	760-gals	1	7 / week
Crew Boats	1,000-bbls	1	2 / week
Supply Boats	5,000-bbls	1	4 / week

12.2 Diesel Oil Supply Vessels

Size of Fuel Supply Vessel	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel will Take
240-feet to 312-feet	50,000-gallons (boat fuel) 150-K to 250-K gallons of transferable fuel (rig fuel)	Weekly / as needed	From the shorebase in Fourchon, LA, to Mississippi Canyon Area Block 956

12.3 Solid and Liquid Wastes Transportation & Disposal

A table providing information on the transportation of solid and liquid wastes and the onshore facilities used for disposal of solid and liquid wastes generated by the proposed activities is included in Table 2 found in **Appendix D**.

12.4 Vicinity Map

A vicinity map depicting the location of the proposed activities relative to the shoreline, the distance of the proposed activities from the shoreline, and the primary route(s) of the support vessels and aircraft when traveling between the onshore support facilities and the project areas is included in **Appendix B.** In accordance with Appendices A, B, C, and J of the NMFS 2020 Biological Opinion, as amended in 2021, transit routes will avoid the Rice's whale core distribution area. As outlined in the table below, vessels will transit from shorebases in Louisiana to the blocks where activities will occur under this plan.

13 Onshore Support Facilities Information

13.1 General

The onshore support base for the proposed operations will be in Fourchon, Louisiana. Mississippi Canyon Area Block 956 is located approximately 125.0 statute miles from the onshore support base located in Fourchon, Louisiana, as indicated on the vicinity map in **Appendix B.**

The following table provides information of the onshore facility that will be used to provide supply and service support for the activities proposed in this plan.

Name	Location	Existing / New / Modified
C-Port	Fourchon, LA	Existing
Heliport	Houma, LA	Existing

BP will primarily use the existing C-Port Fourchon Shorebase located in Fourchon, Terrebonne Parish, Louisiana to support general vessel operations. No expansion of these physical facilities is expected to result from the proposed activities. The C-Port Fourchon facility is located approximately 125 miles from the general activity area, provides a vehicle parking lot, office space, radio communication equipment, outside and warehouse storage space, crane, forklifts, water and fueling facilities, and boat dock space. The base is in operation 24 hours each day. Helicopters will be based out of Houma, Louisiana.

A small amount of vessel and helicopter traffic may originate from bases other than those described above in order to address changes in weather conditions. It is expected that this vessel traffic will originate from bases and locations that are in the near vicinity of the bases previously described.

13.2 Support Base Construction or Expansion

BP will utilize existing support bases for the proposed activities and will not require the construction or expansion of additional support bases.

13.3 Waste Disposal

Information about the onshore facilities used to store and dispose of solid and liquid wastes generated by proposed activities has been included in Table 2 found in **Appendix D**.

14 Coastal Zone Management Act (CZMA) Information

14.1 Consistency Certification

A Coastal Zone Management Act consistency certification, according to 15 CFR § 930.76(b) is included in **Appendix H**.

14.2 New or Unusual Technology

See Sections 2.7.5, 2.7.8, 8.1.1, and 8.1.3 within the EP for a discussion of voluntary performance standards and Oil Spill Response Organization (OSRO) participation. No new or unusual technology for spill prevention, control, or cleanup is proposed. The EP Section 2.7 Blowout Scenario describes prevention, control, and cleanup technologies that are currently available.

15 Environmental Impact Analysis (EIA)

Attached as **Appendix I** is an Environmental Impact Analysis (EIA) prepared for the proposed project by CSA Ocean Sciences Inc. 8502 Sw Kansas Ave, Stuart, FL 34997.

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, BOEM (or its predecessor, the Minerals Management Service) has conducted extensive environmental analyses examining the possible impacts produced by oil and gas exploration and production activities, which evaluated impacts from similar activities on the areas in the Gulf of Mexico covered by the present plan.

The EIA addresses potential impacts to environmental resources found in the deepwater Gulf of Mexico (GoM), coastal habitats, protected areas, and onshore. Based on the activity set of the project, these included:

- Drilling rig presence, physical disturbance to the seafloor, air emissions, effluent discharges, water intake, onshore waste disposal, marine debris, support vessel/helicopter traffic, and unintended releases to the marine environment.

The EIA outlines high level mitigation measures that will be in place to reduce associated potential impacts.

16 Administrative Information

16.1 Exempted Information Description

In accordance with 43 CFR Part 2, Appendix E, sections (4) and (9), the following information has been determined by the BOEM GOMR exempt from public disclosure:

- Geologic Objectives (BHL, TVD and MD) on Form BOEM-0137
- Production rates and life of reservoirs
- Proprietary New or Unusual Technology
- Geological and Geophysical Information (except for non-proprietary Shallow Hazard Assessment)
- Hydrogen Sulfide Correlative Well Information

This information is excluded from the “Public Information” copies of the submitted plan.

16.2 Bibliography

Any previously submitted EP, DPP, DOCD, study report, survey report, or any other material referenced in this EP are listed below:

Plan Control No	Lease	Block	Operator Name	Operator Number	Plan Type Code	Received Date	Final Action Code	Final Action Date

16.3 Other Reference Items

[i]*Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 24, 2021)*

Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned.

BP America Inc, (BP), 2022, Wellsite Clearance Letters, Proposed Well Location MC 956-2A, Block 956, Mississippi Canyon Area, Gulf of Mexico, OII Report No. 222212-OII-RPT-WSC-01

Archaeological and Geohazard Assessment – Keltic South Prospect, Blocks 956 and 1000, Mississippi Canyon Area Gulf of Mexico, OII Report No. 217609-OII-RPT-AAG-01

17 Appendixes

Appendix A:	Plan Information Forms – Form BOEM-0137
Appendix B:	Location Plat, Bathymetry Plat, and Vicinity Plat
Appendix C:	Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters), Stratigraphic Column, Hydrogen Sulfide Basis of Requested Classification, Time vs. Depth Information
Appendix D:	Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)
Appendix E:	Air Emissions Information – Form BOEM-0138
Appendix F:	WCD Modeling Report
Appendix G:	Oil Spill Response Discussion
Appendix H:	Coastal Zone Management Act (CZMA) Consistency Certification
Appendix I:	Environmental Impact Analysis (EIA)
Appendix J:	New Technology
Appendix K:	Fees Recovery

Appendix A: Plan Information Forms – Form BOEM-0137

U.S. Department of the Interior
Bureau of Ocean Energy Management

OMB Control Number: 1010-0151
OMB Approval Expires: 6/30/2021

OCS PLAN INFORMATION FORM – Public Information Copy

General Information

Type of OCS Plan:	X	Exploration Plan (EP)		Development Operations Coordination Document (DOCD)

Company Name: BP Exploration & Production Inc.	BOEM Operator Number: 02481
Address: 501 Westlake Park Blvd.	Contact Person: Adalberto Garcia
Houston, TX 77079	Phone Number: 281-995-2815
	E-Mail Address: Adalberto.Garcia@bp.com

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	$4,348.00	Receipt No.	76329959398

Project and Worst Case Discharge (WCD) Information

Leases: OCS-G 36263	Area: Mississippi Canyon	Blocks: 956	Project Name (If Applicable): Keltics South

Objective(s)	X	Oil		Gas		Sulphur		Salt	Onshore Support Base(s): Fourchon, LA

Platform / Well Name: MC956 002	Total Volume of WCD: 15.5 MMSTBO	API Gravity: 32.6˚

Distance to Closest Land (Miles): 81.3 Statute Miles	Volume from uncontrolled blowout: 278,000 STBO/day

Have you previously provided information to verify the calculations and assumptions for your WCD?		Yes	X	No
If so, provide the Control Number of the EP or DOCD with which this information was provided				
Do you propose to use new or unusual technology to conduct your activities?	X	Yes		No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

Description of Proposed Activities and Tentative Schedule (Mark all that apply)

Proposed Activity	Start Date	End Date	No. of Days
Drill and complete one well (and a twin for re-spud)	09/05/2023	03/06/2024	182

Description of Drilling Rig

	Jackup	X	Drillship
	Gorilla Jackup		Platform rig
	Semisubmersible		Submersible
	DP Semisubmersible		Other (Attach description)

Drilling Rig Name (If known):

Description of Structure

	Caisson		Tension leg platform
	Fixed platform		Compliant tower
	Spar		Guyed tower
	Floating production system		Other (Attach description)

Description of Lease Term Pipelines

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)

Form BOEM-0137 (June 2018 – Supersedes all previous editions of this form which may not be used.)

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location							
Well or Structure Name/Number (If renaming well or structure, reference previous name): MC956-2A				Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.			
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?				X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 278,000	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	32.6˚

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 36263		OCS OCS
Area Name	Mississippi Canyon		
Block No.	956		
Blockline Departures (in feet)	N/S Departure: 6384.00 FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 4205.00 FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,199,635.00	X:	X: X: X:
	Y: 10,175,664.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 28° 02' 02.350"N NAD27	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 22' 00.324"W NAD27	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 6,826’	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A			

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): MC956-2B	Previously reviewed under an approved EP or DOCD?			Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.	
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?	X	Yes		No		

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 278,000	For structures, volume of all storage and pipelines (Bbls): N/A	API Gravity of fluid	32.6˚

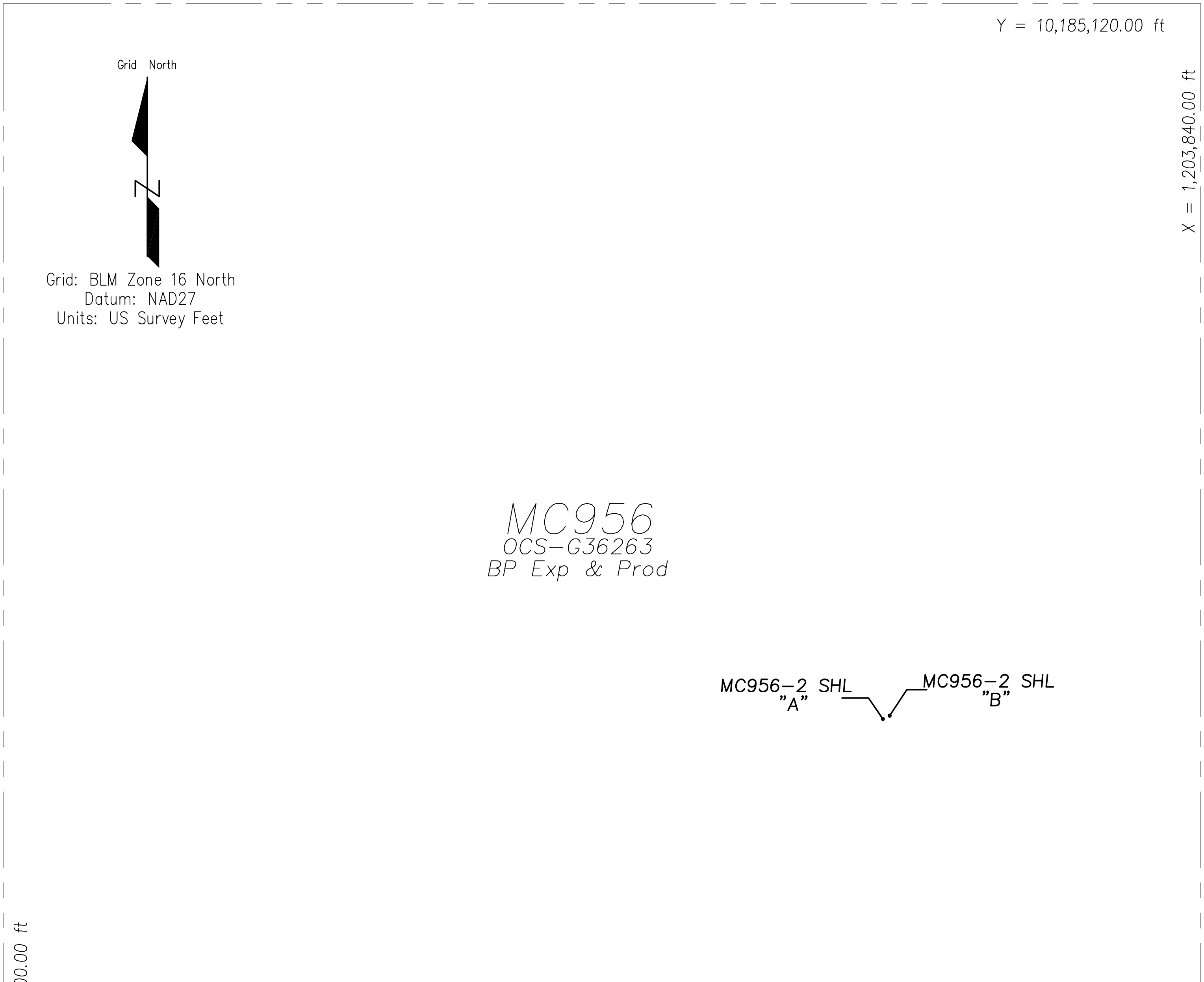
	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 36263		OCS OCS
Area Name	Mississippi Canyon		
Block No.	956		
Blockline Departures (in feet)	N/S Departure: 6427.00 FSL	N/S Departure:	N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 4115.00 FEL	E/W Departure:	E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,199,725.00	X:	X: X: X:
	Y: 10,175,707.00	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude: 28° 02' 02.786"N NAD27	Latitude:	Latitude Latitude Latitude
	Longitude: 88° 21' 59.325"W NAD27	Longitude:	Longitude Longitude Longitude

Water Depth (Feet): 6,826’	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A			

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

Appendix B: Location Plat, Bathymetry Plat, and Vicinity Plat



	Well MC956-2	UTM None 16 North NAD27 - US Survey Feet Northing(Y)	Easting(X)	MC BLK	Block Ties FEL	FSL	NAD27 Lat/Long Latitude	Longitude	NAD83 Lat/Long Latitude	Longitude	Depth MSL
SHL	A	10175664.00	1199635.00	956	4205.00	6384.00	28°02'02.350"N	88°22'00.324"W	28°02'03.280"N	88°22'00.298"W	6826'
SHL	B	10175707.00	1199725.00	956	4115.00	6427.00	28°02'02.786"N	88°21'59.325"W	28°02'03.716"N	88°21'59.299"W	6826'

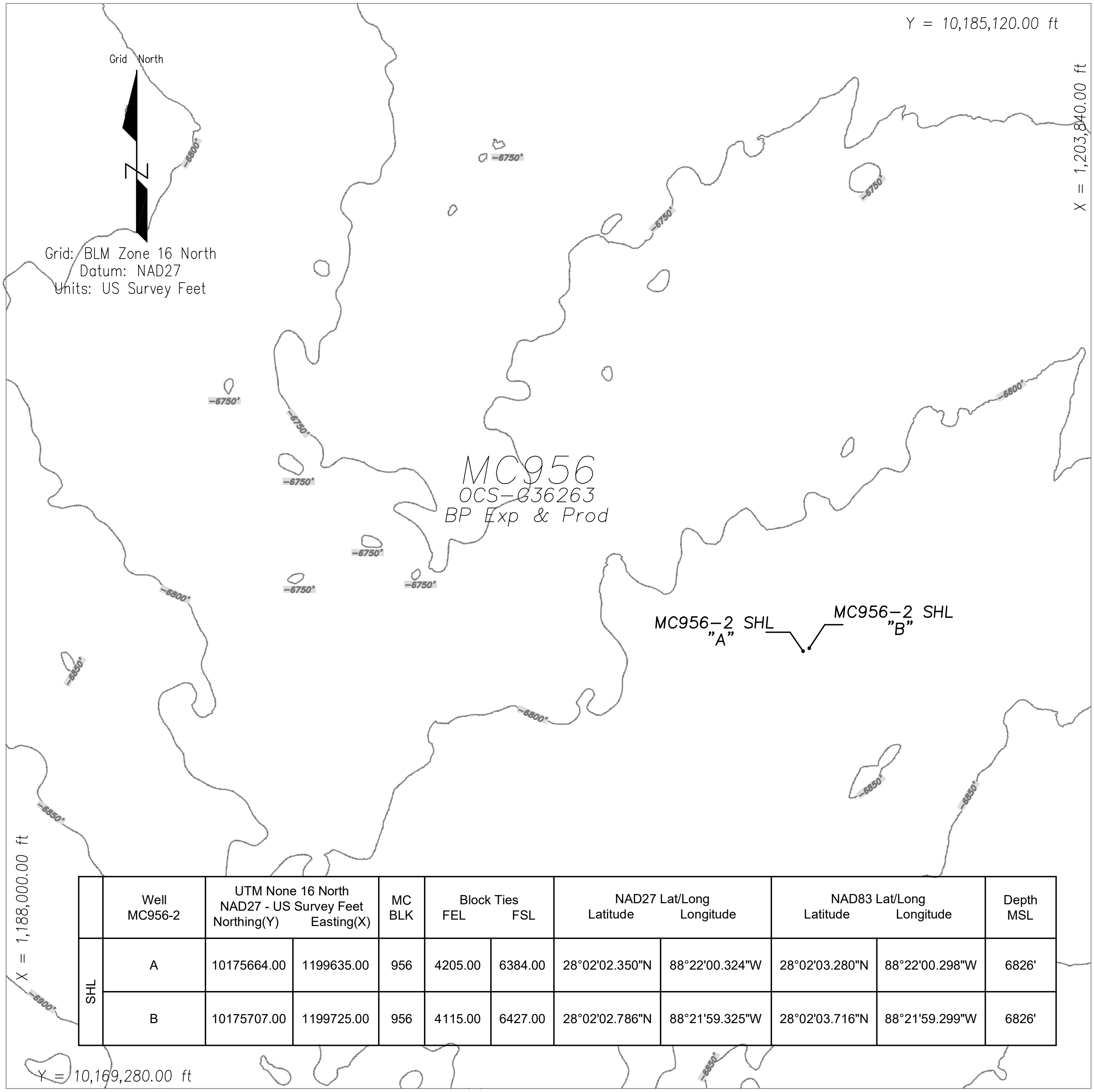
Notes:
1) All data hereon based on BLM Zone 16 North, NAD27, US Survey feet, unless otherwise noted;
2) All coordinate transformations by NADCON 2.0, or better equivalent software;

"Public Information"

bp

BP EXPLORATION AND PRODUCTION
Proposed Well EP Location OCS–G36263 MC956
Mississippi Canyon Area (OPD# NH16–10) Block 956 Offshore Federal
Plat prepared by: Kyle Beeson, Surveyor, bp America, Inc.

Scale 1" = 2000 ft
Date: 31 Oct 2022
BKB



	Well MC956-2	UTM None 16 North NAD27 - US Survey Feet Northing(Y)	Easting(X)	MC BLK	Block Ties FEL	FSL	NAD27 Lat/Long Latitude	Longitude	NAD83 Lat/Long Latitude	Longitude	Depth MSL
SHL	A	10175664.00	1199635.00	956	4205.00	6384.00	28°02'02.350"N	88°22'00.324"W	28°02'03.280"N	88°22'00.298"W	6826'
	B	10175707.00	1199725.00	956	4115.00	6427.00	28°02'02.786"N	88°21'59.325"W	28°02'03.716"N	88°21'59.299"W	6826'

Notes:
1) All data hereon based on BLM Zone 16 North, NAD27, US Survey feet, unless otherwise noted;
2) All coordinate transformations by NADCON 2.0,

"Bathymetry"

bp

BP EXPLORATION AND PRODUCTION

Proposed Well EP Location OCS-G36263 MC956

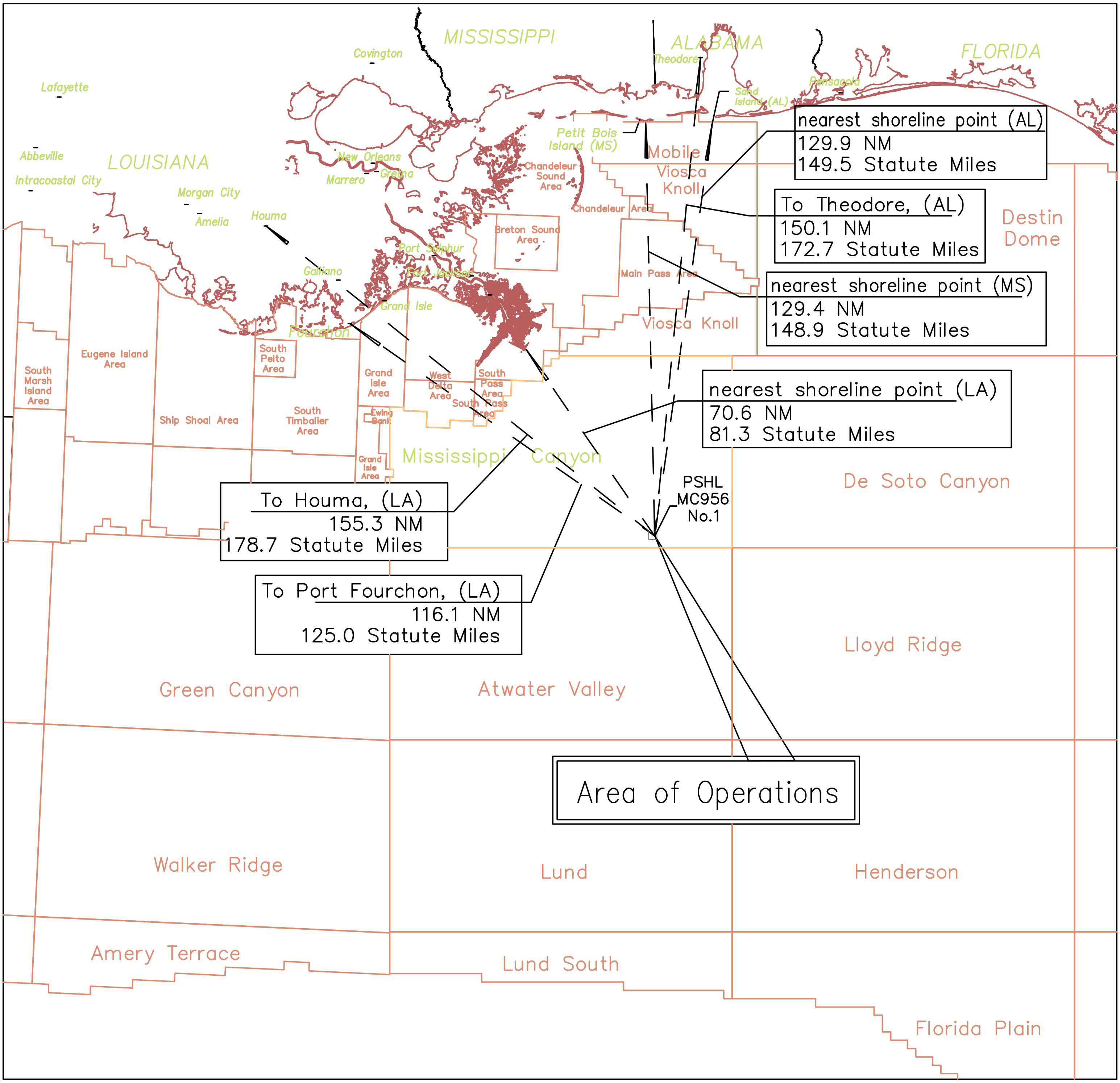
Mississippi Canyon Area (OPD# NH16-10) Block 956 Offshore Federal

Plat prepared by: Kyle Beeson, Surveyor, bp America, Inc.

Scale 1" = 2000 ft

Date: 06 Jan 2023

BKB



Note: Nearest Louisiana shoreline distance was computed from the Proposed Surface Location of the MC956 No.2 to the nearest shoreline feature as represented in the NOAA 1:24k Continuously Updated Shoreline Product (CUSP). This vector Database is a more current, detailed, and correct representation of the actual shoreline than the NOAA 1:80k Medium-Resolution Vector Shoreline Database, which was based on medium-scale charts compiled by NOAA in the 1980's and which no longer accurately reflects the actual shoreline position in many locations, especially along the Mississippi River Delta.

N
Grid North
W E
S

Grid: BLM Zone 16 North
Datum: NAD27
Units: US Survey Feet

"VICINITY CHART"

BP EXPLORATION AND PRODUCTION

Proposed Well EP Location OCS-G36263 MC956

Mississippi Canyon Area (OPD# NH16-10) Block 956 Offshore Federal

Plat prepared by: Kyle Beeson, Surveyor, BP America, Inc.

Scale 1" = 50 miles

Date: 25 August 2022

BKB

Appendix C: Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters) for Well Locations, Stratigraphic Column, H_2S Correlative Wells Information, Time vs. Depth Information

WELLSITE CLEARANCE REPORT
PROPOSED WELL MC956-2A

BLOCK 956, MISSISSIPPI CANYON
GULF OF MEXICO

Oceaneering Document Number:	222212-OII-RPT-WSC-01	Available Data	AUV & 3-D Seismic
Client Document Number:	N/A	Area	MC956
Client:	BP plc	Lease Number	OCS-G-36263

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	S. Haney	C. Baker	C. Baker	26 Oct 2022
0	Final Issue	S. Haney	C. Baker	C. Baker	03 Nov 2022

Signature Box

Stephen Haney
Geoscientist

BP plc
501 Westlake Park Blvd
Houston, TX 77029

November 03, 2022

Re: Top-Hole Drilling Hazards and Wellsite Clearance of Proposed Well MC956-2A, Mississippi Canyon

Attn: Christian Noll

Please find within this digital delivery, revision 0 of files pertaining to the above-mentioned project. These include:

- PDF files of the wellsite clearance report, accompanying maps and figures, and the Top-Hole Prognosis diagram.

Oceaneering appreciates this opportunity to be of service. Please feel free to contact me, or Chris Baker (CRBaker@oceaneering.com), if you need additional information or have any questions pertaining to the findings enclosed.

Stephen Haney
Geoscientist
Email: shaney@oceaneering.com

OII Project 222212

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ENCLOSURES

CD (DIGITAL FILES)

Report and Maps (PDF), AutoCAD (DWG) and associated files
BOEM and BSEE ASCII Files

1.0 INTRODUCTION

BP plc (BP) contracted Oceaneering International, Inc. (OII) to prepare a wellsite clearance letter for the proposed location of Well MC956-2A in Block 956, Mississippi Canyon Area of the Gulf of Mexico. The data used for this site clearance letter include high-resolution geophysical data collected by Fugro's Autonomous Underwater Vehicle (AUV) for BP in 2020, and an exploration-quality 3-D seismic data volume provided by BP. OII completed an archaeological and geohazard assessment report titled "Archaeological and Geohazard Assessment, Blocks 956 and 1000, Mississippi Canyon Area, Gulf of Mexico" in April 2022. This site clearance letter is based on findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius centered at the proposed well MC956-2A location. The depth limit of the investigation is approximately 6,500 feet below the seafloor or the top of salt depending which occurs first.

This assessment and all enclosures presented with this letter comply with the Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) guidelines provided in Notice to Lessees (NTL) No. 2022-G01 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeological Resource Surveys and Reports), and NTL No. 2009-G40 (Deepwater Benthic Communities). These NTLs are current due to the elimination of NTL expiration dates through NTL-2015-N02.

2.0 PROPOSED WELLSITE

The coordinates and block calls for the proposed well MC956-2A surface location are tabulated below:

Table 1: MC956-2A Proposed Well Location

WELL NAME	EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATTITUDE	CALLS FROM MC956	
MC956-2A	1,199,635	10,175,664	28°02'02.350" W	88°22'00.324" N	4,205.00' FEL	6,384.00' FSL

An additional potential respud location was provided by BP. The proposed surface location for the respud well is located below and also shown on the accompanying maps:

Table 2: MC956-2B Proposed Well Location

WELL NAME	EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATTITUDE	CALLS FROM MC956	
MC956-2B	1,199,725	10,175,707	28°02'02.786" W	88°21'59.325" N	4,115.00' FEL	6,427.00' FSL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 16 North (16N) with a central meridian at 87°00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00°00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed well MC956-2A surface location and the 2,000-foot radius circle centered at the surface hole location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map

(Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Seafloor and Subsurface Hazard Map (Sheet 5).

3.0 AVAILABLE DATA AND METHODOLOGY

3.1 AUV DATA

AUV data was collected in February and March of 2020 onboard the M/V *Fugro Brasilis* using the *Echo Surveyor IV* AUV and was provided to OII by BP. The data types provided include multibeam bathymetric mapping, high-resolution side scan sonar imagery, and subbottom profiles were collected at an altitude of 36 meters above the seafloor. The AUV remote-sensing instruments include a Kongsberg EM 2040 multibeam echosounder (200 kHz), an EdgeTech 2200 dual-frequency side scan sonar (105-410 kHz), and an EdgeTech 4200 full-spectrum subbottom profiler. Data acquisition and processing software are listed in *Table 3* and *Table 4* below.

Table 3. Data acquisition software

Equipment Type	Software
Navigation and Positioning	StarfixNG Version 2018.1 SP1 R8 Build 2
Multibeam Echo Sounder	Kongsberg Seafloor Information System (SIS) V4.3.2
Sub-Bottom Profiler System	KM SBP OPU 1.5.3
Tide and Water Level Measurements	Starfix Tides (Referenced to DTU13 Model)

Table 4. Data processing software

Equipment Type	Software
Navigation, Positioning and Auxiliary Sensors	NavLab, Starfix.VBAProc
Multibeam Echo Sounder (Bathymetric Data)	CARIS HIPS & SIPS 10.4.8
Multibeam Echo Sounder (Backscatter Data)	Fledermaus Geocoder FMGT - 7.8.9
Sub-Bottom Profiler System	Starfix.VBAProc, Chesapeake SonarWiz 7.04.07
Side-Scan Sonar	Starfix.VBAProc , Chesapeake SonarWiz 7.04.07

The 2020 AUV survey grid consisted of 32 north-south primary tracklines (Lines 3000–3032) and 19 East-West tie lines (Lines 3100–3118). Primary tracklines were spaced at 150-meter (~500-foot) intervals and the tie lines were spaced at 500-meter (1,800-foot) line spacing. The survey grid provided overlapping side scan sonar coverage and representative coverage for the multibeam and subbottom profiler systems.

3.2 3-D SEISMIC DATA

The 3-D seismic data used for this site clearance assessment were provided in SEG-Y format and loaded into IHS' Kingdom Suite 2D/3DPak for interpretation. The amplitude traces were processed at 10-foot sample rate and interpreted to one second below seafloor. The 3-D data volume inlines and crosslines run northwest to southeast and southwest to northeast, respectively. The inlines and crosslines are spaced at 25-meter (82.02-foot) intervals.

The 3-D seismic data are zero-phase and the seafloor reflector is represented by a strong, positive amplitude peak flanked by troughs with absolute amplitude values of less than one-half of the peak value.

The seismic data provided adequate screening of the regional seafloor and shallow geologic conditions and large-scale geohazards (faults, salt, high acoustic impedance, stratigraphic horizons, etc.). Figure 1 consists of a wavelet and an amplitude spectrum showing the frequency content versus the amplitudes of the data collected at the proposed wellsite.

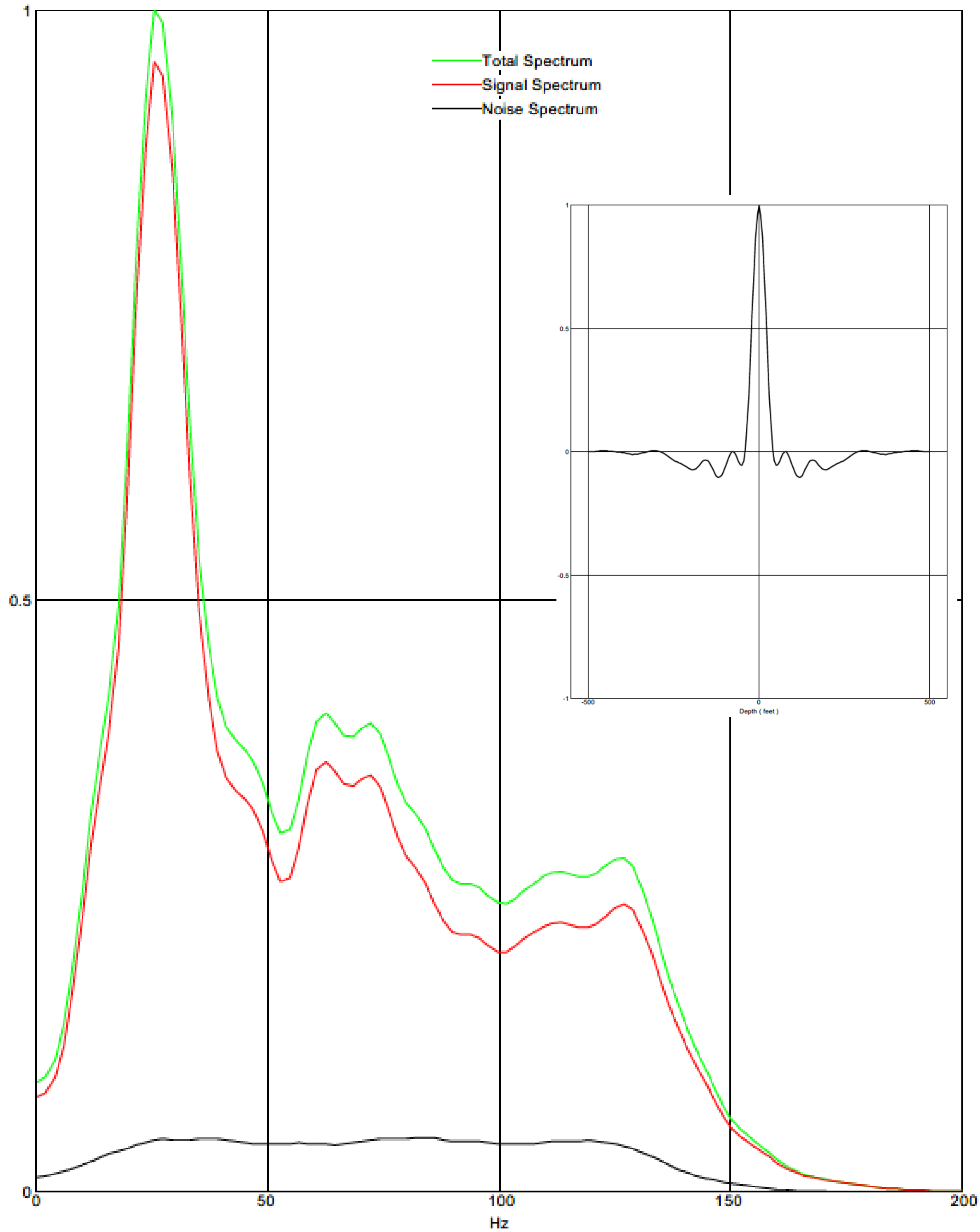


Figure 1. Extracted wavelet and power spectrum at Proposed Well MC956-2A.

4.0 SEAFLOOR CHARACTERISTISCS

The water depth at the proposed MC956-2A surface location is 6,826 feet below mean sea level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 6,788 feet MSL in the northwest to 6,854 feet MSL in the southeast (Sheet 1, Color Shaded Bathymetry Map). The seafloor texture at and around the proposed well is slightly undulating and slopes to the southwest at a gradient of 0.87° at the proposed well location (Sheet 2, Seafloor Gradient Map).

4.1 SEAFLOOR SEDIMENT AND HAZARDS

The low side scan sonar reflectivity indicates finely-textured seafloor sediments within the 2,000-foot radius (Figure 2; Sheet 3, Side Scan Sonar Mosaic Map). There are no surface faults, seafloor amplitude anomalies, or any other seafloor features that may have adverse effects drilling operations (Sheet 4, Seafloor Amplitude Map; Sheet 5, Seafloor and Subsurface Hazard Map).

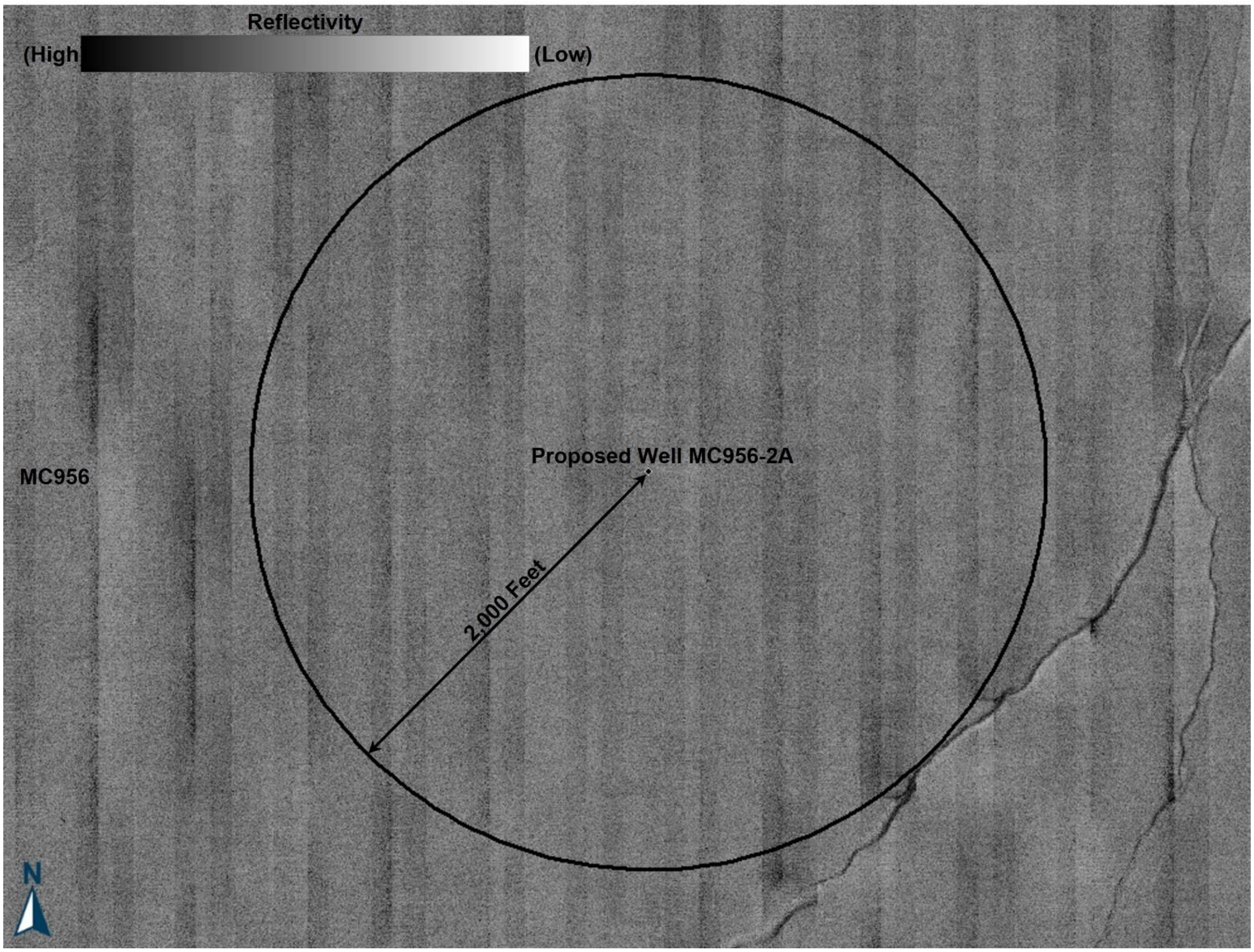


Figure 2. Sidescan sonar data showing low reflectivity within 2,000 ft of Proposed Well MC956-2A.

4.2 POTENTIAL DEEPWATER BENTHIC COMMUNITIES

The review of AUV and 3-D seismic data did not identify any potential high-density deepwater benthic communities within the 2,000-foot radius (Sheet 3, Side Scan Sonar Mosaic Map; Sheet 4, Seafloor Amplitude Map). Therefore, impact to deepwater benthic communities during drilling operations is considered negligible.

5.0 SUBSURFACE STRATIGRAPHY AND GEOHAZARDS

AUV chirp subbottom profiles in the study area have penetration depths up to 330 feet below the seafloor. The profiles are characterized as continuous, well-defined bottom echoes with stratified subsurface reflectors of varying amplitudes (Figure 3). One buried fault occurs approximately 1,770 feet north of the proposed wellsite and is located 190 feet below the seafloor.

3-D seismic data were used to assess subsurface geology deeper than the AUV penetration. Four stratigraphic units (Unit A to Unit D), each consisting of one or more distinctive sequences, were interpreted within the study area to approximately 6,500 feet below the seafloor or the top of salt, depending which occurs first (Figures 4 and 5 of Section 5.1).

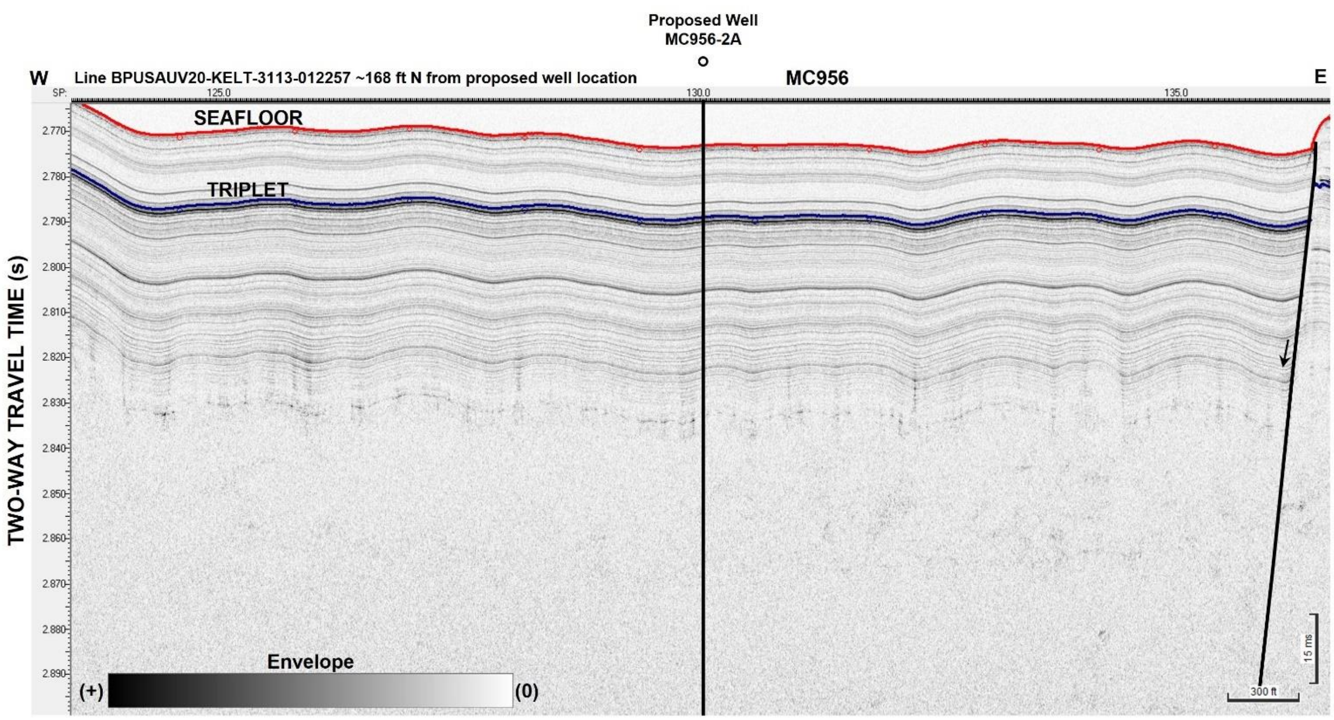


Figure 3. SBP Line BPUSAUV20-KELT-3113-012257 showing high resolution shallow stratigraphy at Proposed Well MC956-2A.

5.1 STRATIGRAPHY

Unit A (Seafloor to Horizon 1)

Unit A consists of two units. The upper unit is primarily observed in the subbottom profiler data and is composed of low- to moderate-amplitude, parallel, and continuous reflectors interpreted as hemipelagic clays interbedded with fine-grained turbidites (Figures 3–5). The base of the upper unit occurs at the interface at approximately 158 feet BML (6,984 ft MSL; Figure 9, Top Hole Prognosis). The lower unit consists of low- to moderate-amplitude, subparallel, and discontinuous reflectors interpreted to represent clay- and silt-dominated channel fill mass transport deposits. The lower unit is approximately 439 feet thick at the proposed well location with Horizon 1 marking the base. Unit A occurs from 0 to 597 feet BML (6,826 to 7,423 feet MSL) at the Proposed Well MC956-2A location (Figure 9).

Unit B (Horizon 1 to Horizon 2)
Unit B consists of low-amplitude, subparallel, and discontinuous reflectors interpreted to represent clay deposits with interbedded fine-grained turbidites (Figure 4 and Figure 5). Unit B occurs from 597 to 1,252 feet BML (7,423 to 8,078 feet MSL) and is 655 feet thick at the Proposed Well MC956-2A location (Figure 9).

A gas hydrate stability zone (GHSZ) base was calculated, based on Maekawa et al (1995), to occur at 1,880 feet BML (8,706 feet MSL) at the proposed well location. The calculated GHSZ base is calculated based on a constant geotherm and does not take into account geologic factors that may affect the geotherm. This calculated GHSZ base would occur within Unit C where there is evidence of shallow free gas in the form of amplitude anomalies. Additionally, the presence of the shallow salt would increase the geothermal gradient within the sediments at the proposed well location preventing the formation of gas hydrates at the calculated GHSZ base depth. With the presence of amplitude anomalies within Unit C and increased geothermal gradient due to shallow salt it is interpreted that gas hydrate stability would likely occur within Unit B at 1,169 feet BML (7,995 feet MSL; Figure 9).

Unit C (Horizon 2 to Horizon 3)
Unit C consists of low- to high-amplitude, subparallel, and discontinuous reflectors. The sediments in Unit C are interpreted as sand-dominated channel fill with interbedded mass transport deposits (Figure 4 and Figure 5). Unit C occurs between 1,252 to 2,051 feet BML (8,078 and 8,877 feet MSL) and is 799 feet thick at the proposed well location.

Unit D (Horizon 3 to Horizon 4)
Unit D consists of low- to moderate-amplitude, subparallel, and discontinuous reflectors and are interpreted to represent interbedded fine-grained mass transport deposits with coarse-grained turbidites (Figure 4 and Figure 5). Unit D occurs between 2,051 to 2,649 feet BML (8,877 to 9,475 feet MSL) and is 598 feet thick at the Proposed Well MC956-2A location (Figure 9).

Unit E (Horizon 4 to Top of Salt)
Unit E consists of low- to moderate-amplitude, subparallel, and discontinuous reflectors, interpreted as interbedded fine-grained mass transport deposits with coarse-grained turbidites (Figure 4 and Figure 5). The base of Unit E marks the salt/sediment interface at the proposed well location. The unit occurs between 2,649 to 3,220 feet BML (9,475 to 10,046 feet MSL) and is 571 feet thick at the proposed well location (Figure 9).

Several amplitude anomalies in Unit C occur in the 1,000-foot radius of the proposed wellbore. These anomalies are located more than 455 feet from the proposed wellbore. Minor amplitude anomalies occur with Unit E located more than 1,500 feet northeast of the proposed wellsite. There are no other amplitude anomalies interpreted within the other units within 2,000 feet of the proposed well location, and a proposed wellbore does not penetrate any interpreted amplitude anomalies. The proposed well penetrates a seafloor fault at a depth of 3,058 feet BML (9,770 feet MSL). No other faults, or any other subsurface features that may have adverse effects to the drilling operations are interpreted within 2,000 feet of the Proposed Well MC956-2A location.

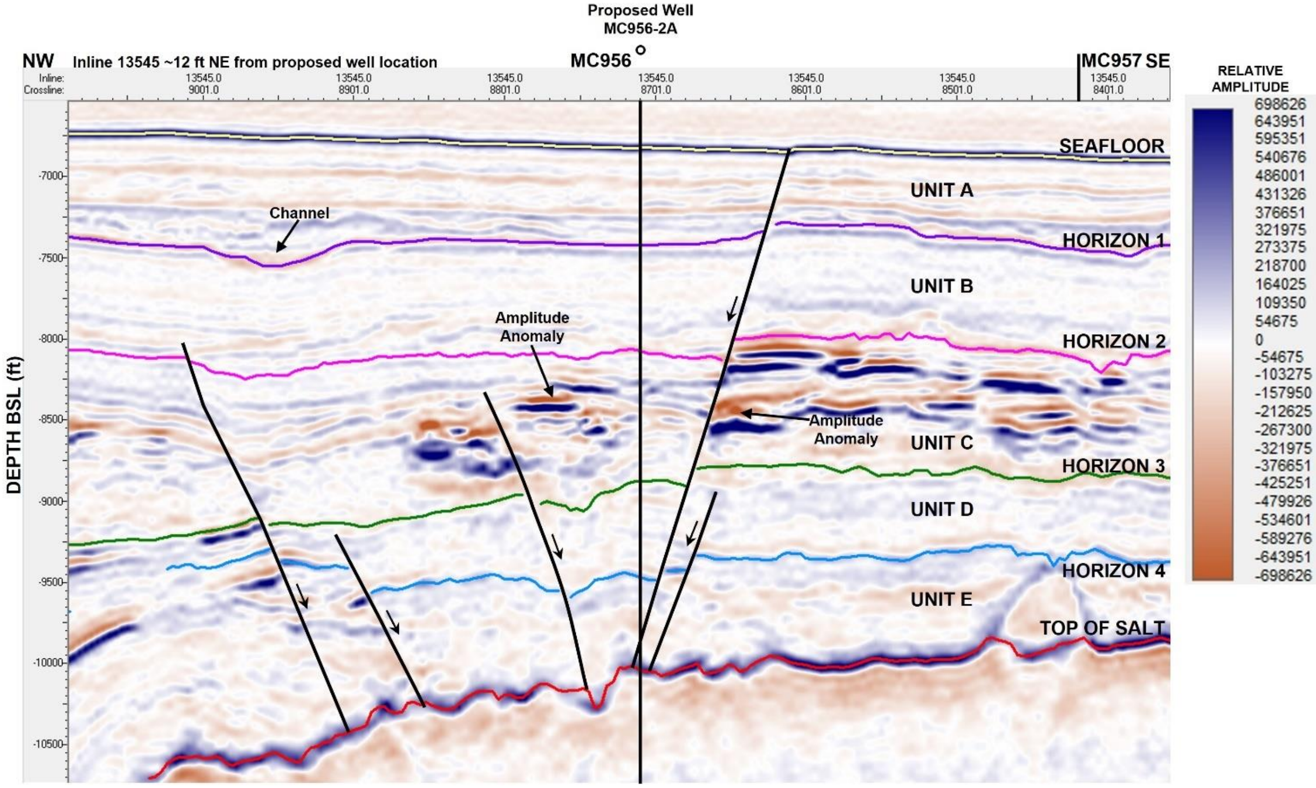


Figure 4. 3-D seismic Inline 13545 through Proposed Well MC956-2A.

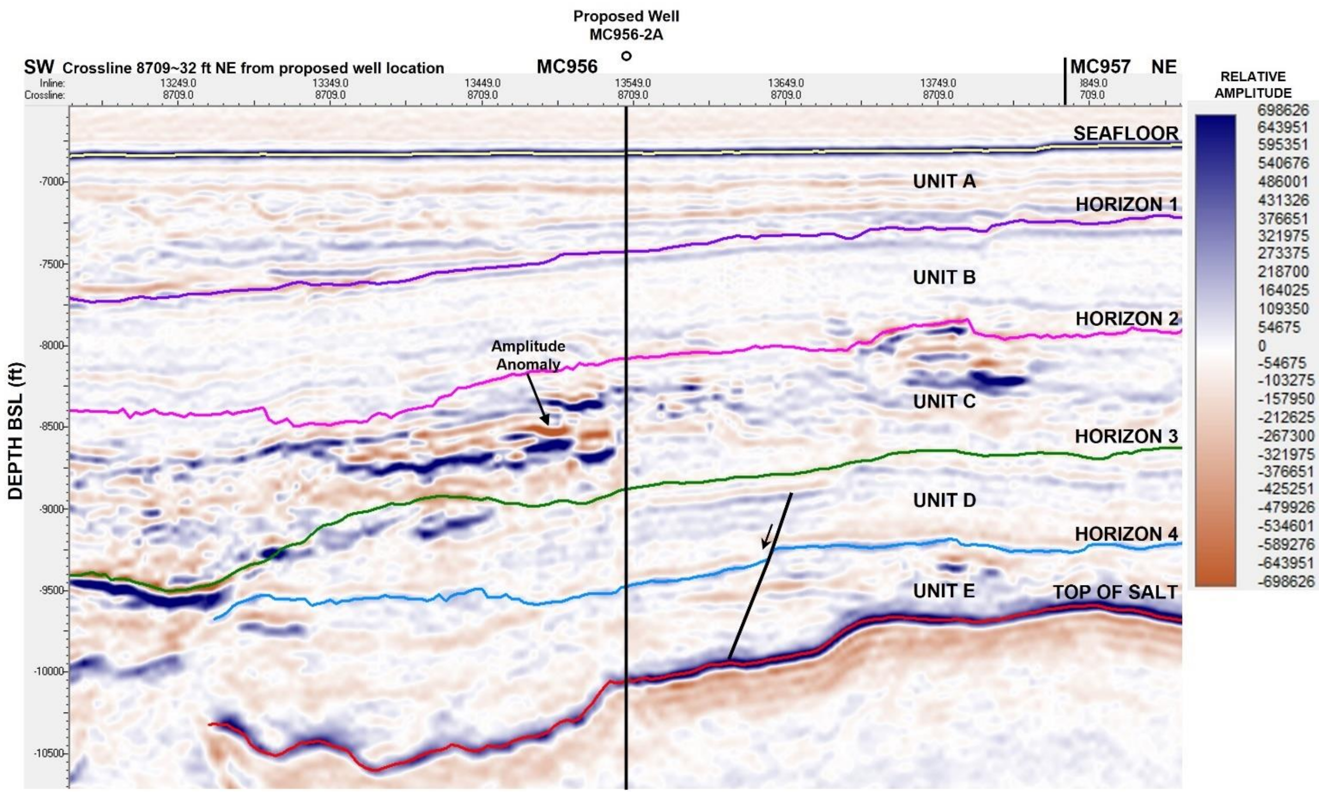


Figure 5. 3-D seismic Crossline 8709 through Proposed Well MC956-2A.

5.2 SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a sealing layer that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles.

Based on Ostermeier et al. (2002) several units have been mapped where there is an increased likelihood for SWF to occur within the northern Gulf of Mexico. The Proposed Well MC956-A lies within the mapped extents of Ostermeier's Blue Unit and is interpreted to correlate with sediments within in Unit A between the interface and Horizon 1. According to the BOEM the closest well that had SWF occur is in MC1002 approximately 7.1 miles to the southeast of the proposed well location. The reported depth at which this shallow water flow occurred is 1,002 feet BML and was a reported minor severity flow.

The assessment of seismic profiles suggests Unit A has a negligible to low potential for SWF. Units B has a negligible potential for SWF. The potential for shallow water flow in Units D and E is assessed as a low risk due to the interpreted coarse-grained sediments within the unit. The occurrence of interpreted sands and overlying clay dominated sediments, Unit C is interpreted to have a moderate potential of shallow water.

Negligible	No indication of shallow sandy formations and the interval does not correlate with any known shallow water flow units or events.
Low	Indication of shallow sandy formations however, the interval does not correlate to any known shallow water flow unit or event.
Moderate	Indications of rapidly-deposited shallow sandy formation(s) with overlying clay-rich sediments within a depth of burial significant for overpressured conditions. The interval does not correlate with any known shallow water flow units or events.
High	Indications of rapidly-deposited shallow sandy formation(s) with overlying clay-rich sediments within a depth of burial significant for overpressured conditions. The interval correlates to nearby wells where shallow water flow has occurred and/or are located within a known shallow water flow unit.

Figure 6. Geologic characteristics to determine potential for shallow water flow.

5.3 SHALLOW GAS

Anomalies of very high negative amplitude, commonly termed bright spots, are interpreted as potential regions of fluid saturation usually associated with porous sands. Seismic amplitude anomalies are mapped on a unit-by-unit basis to assess the potential risk of gas and are exhibited on the Hazard Map (Sheet 5).

The risk of gas refers to the risk of encountering shallow gas and is interpreted based on amplitude levels. Stratigraphic, structural settings, and velocity anomalies such as velocity pull-down may also be taken into account. The four risk levels of gas are presented as Figure 7.

At the proposed well location, Units A, B, D, and E have negligible potentials for shallow gas. Unit C has a moderate potential for shallow gas with amplitude anomalies within 1,000 feet of the proposed wellbore and some of the amplitude anomalies having a high amplitude with phase reversals (Figures 4 through 6). The proposed wellbore does not penetrate any interpreted amplitude anomalies indicative of shallow gas.

Negligible	No amplitude anomalies or other gas indicators present.
Low	Generally indicated by increased amplitude (2–3× background level) and phase reversal. This may also include diffuse areas of gas blanking.
Moderate	Generally indicated by high amplitude (3–4× background level) and phase reversal.
High	Generally indicated by the highest amplitudes (in excess of 4× background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be considered.

Figure 7. Geologic and seismic characteristics to determine potential for shallow gas.

5.4 GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross-cut the normal seismic stratigraphy, much like a bottom multiple.

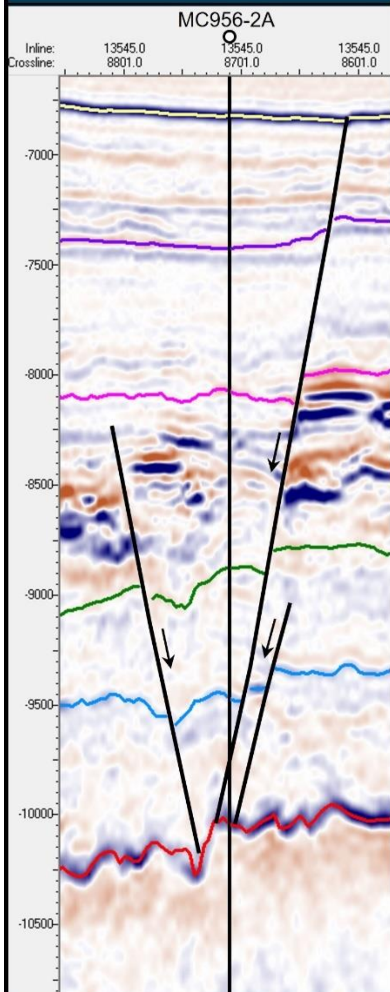
The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates, and benthic communities may all be found in close association.

There was no indication of gas hydrates, associated geologic features, or any obvious BSRs at the proposed wellsite. The presence of amplitude anomalies indicative of shallow gas and the shallow salt increasing the geothermal gradient an interpreted GHSZ base was used instead of a calculated GHSZ base. The interpreted GHSZ base is interpreted to occur above the amplitude anomalies indicative of shallow gas at a depth of 1,169 feet BML (7,995 feet MSL). From the seafloor to the interpreted depth of the GHSZ base the risk of encountering gas hydrates is low. Below the GHSZ base the risk of encountering gas hydrates is negligible (Figure 9).

Negligible	No bottom simulating reflector is identified within the area, and interval is below the base of gas hydrate stability zone.
Low	No bottom simulating reflector identified within the area, but the interval is above the base of gas hydrate stability zone.
Moderate	A bottom simulating reflector is identified within the surrounding study area but not at or near the proposed well location. The interval is above the base of gas hydrate stability zone.
High	A bottom simulating reflector is evident at or near the proposed well location and the interval is above the base of gas hydrate stability zone.

Figure 8. Geologic and seismic characteristics to determine potential for gas hydrates.

Proposed Well MC956-2A Location
MC956 (OCS-G-36263)
X: 1,119,635' Y: 10,175,664'
Lat: 88° 22' 00.32" N, Long: 28° 03' 02.35" W
Line: 13545 (offset 12' NE)



Unit	Horizon	Depth BML (ft)	Depth MSL (ft)	Interval Thickness (ft)	Lithology	Shallow Gas	SWF	Gas Hydrate
A	Seafloor	0	6,826	158	Hemipelagic clay drape with interbedded fine-grained turbidites	Negligible	Negligible	Low
	Interface	158	6,984	439	Clay- and silt-dominated channel fill mass transport deposits	Negligible	Low	Low
B	Horizon 1	597	7,423	655	Clay deposits with interbedded fine-grained turbidites	Negligible	Negligible	Low
	GHSZ Base	1,169	7,995			Negligible	Negligible	Negligible
C	Horizon 2	1,252	8,078	799	Sand-dominated channel fill with interbedded mass transport deposits	Moderate	Moderate	Negligible
D	Horizon 3	2,051	8,877	598	Interbedded fine-grained mass transport deposits and coarse-grained turbidites	Negligible	Low	Negligible
E	Horizon 4	2,649	9,475	571	Interbedded fine-grained mass transport deposits and coarse-grained turbidites	Negligible	Low	Negligible
	Fault	3,058	9,770			Negligible	Low	Negligible
	Top of Salt	3,220	10,046		Salt			

Hazard Potential: Negligible | Low | Moderate | High

OII Job #: 222212 Prepared By: SPH Revision 0

Figure 9. Top-Hole Prognosis for Proposed Well MC956-2A.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The water depth at the Proposed Well MC956-A surface location is 6,826 feet below mean sea level. The proposed wellsite is in area of slightly undulating seafloor with a gradient of 0.87° to the southwest. No significant seafloor features that could interfere with drilling activities occur within 2,000 feet of the proposed wellsite.

The low side scan sonar reflectivity and low to moderate 3D seafloor amplitude indicate finely-textured seafloor sediments within the 2,000-foot radius. There are no surface faults or any other seafloor features that may have adverse effects to the drilling operation within 2,000 feet of the proposed wellsite.

The review of AUV and 3D seismic data did not identify any potential high-density deepwater benthic communities within the 2,000-foot radius. Therefore, impact to deepwater benthic communities during drilling operation is considered negligible.

No infrastructure or sonar contacts occur within 2,000 feet of the proposed wellsite.

There are several amplitude anomalies within 2,000 feet of the proposed well bore within Units C and D with the closest amplitude anomaly 455 feet away of the proposed well location within Unit C. There are no other amplitude anomalies within the other units within 2,000 feet of Proposed Well MC956-A.

The proposed well will penetrate one seafloor fault at a depth of 3,058 feet BML. The proposed well will not penetrate any other faults or subsurface features that may have adverse effects to the drilling operations occur within 2,00 feet of the Proposed Well MC956-A location.

Units A, B, D and E have a negligible risk of gas and a low to negligible risk for shallow water flow. The sandy intervals and amplitude anomalies in Unit C exhibit a moderate risk of gas and shallow water flow. There was no indication of gas hydrates, associated geologic features, or any obvious BSRs at the proposed wellsite. The interpreted depth of the gas hydrate stability zone is at 1,169 feet BML.

7.0 REFERENCES

Bureau of Ocean Energy Management, and Bureau of Safety and Environmental Enforcement, 2008. "Notice to Lessees and Operators of Federal Oil, Gas, and Sulphur Leases and Pipeline Right-of-Way Holders in the Outer Continental Shelf, Gulf of Mexico OCS Region: Shallow Hazards Program ", U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico NTL No. 2022-G01.

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Appendix D: Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)

TABLE 1. WASTES YOU WILL GENERATE, TREAT AND DOWNHOLE DISPOSE OR DISCHARGE TO THE GOM

please specify if the amount reported is a total or per well amount

Keltic South MC956-02

Basis: Estimated 145 Drilling Days (95 planned + high side NPT) ; All wells slotted to be drilled using Black Hornet

			Projected ocean discharges		Projected Downhole Disposal
Type of Waste	**Composition**	**Projected Amount**	**Discharge Rate**	**Discharge Method**	**Answer yes or no**
Will drilling occur ? If yes, you should list muds and cuttings					
Water Based Fluid	Spent drilling fluid drilling riserless hole plus pad mud to fill the hole	70,000 bbl/well	20 days @ 3,500 bbl/day	Seafloor	No
Cuttings wetted with Water Based Fluid	Water base interval	2,537 bbl/well	20 days @ 127 bbl/day	Seafloor	No
Excess Cement Slurry	Excess mixed cement, including additives & waste from equipment wash down after a cement operation	150 bbl/well	18 cmt jobs @ 8.33 bbl/cmt job	Surface	No
Cuttings wetted with Synthetic Based Fluid	Drill cuttings, cement cuttings, & synthetic base mud retained on cuttings	5,491 bbl/well	45 days @ 122 bbl/day	Below Water Surface Line	No
Small Volume Drilling Fluid Discharges associated with Cuttings	Displaced interfaces, accumulated solids in sand traps, pit clean-out solids, & centrifuge discharges made while changing the mud weight	95 bbl/well	45 days @ 2 bbl/day	Surface	No
Will humans be there? If yes, expect conventional waste					
Domestic Waste / Gray Water	Food waste, drainage from dishwasher, shower, laundry, bath, & washbasin drains	30,102 bbl/well	145 days @ 208 bbl/day	Surface	No
Sanitary Waste	Treated human body waste discharged from toilets & urinals	4,010 bbl/well	145 days @ 28 bbl/day	Surface	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Deck washdown & rain water	0 bbl/well	145 days @ 201 bbl/day (avg)	Surface	No
Will you conduct well treatment, completion, or workover?					
Well Treatment Fluids	Stimulations fluids including acids, solvents & propping agents	bbl/well	145 events @ 0 bbl/event	Surface	No
Completion Fluids	Salt solutions, weighted brines, polymers & various additives	bbl/well	145 days @ 0 bbl/day	Surface	No
Workover Fluids - **If applicable**	Salt solutions, weighted brines, polymers, & other speciality additives	bbl/well	145 days @ 0 bbl/day	Surface	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization Unit Discharge	Wastewater associated with the process of creating freshwater from seawater	7,223,436 bbl/well	145 days @ 49817 bbl/day	Surface	No
Blowout Preventer Fluid	Fluid used to actuate the hydraulic equipment on the BOP	1,650 bbl/well	145 events @ 8.25 bbl/event	N/A	N/A
Uncontaminated Ballast Water	Uncontaminated seawater added or removed to maintain proper draft	960,031 bbl/well	145 days @ 6,621 bbl/day (avg)	Surface	No
Uncontaminated Bilge Water	Water that collects in the vessels bilge	11,006 bbl/well	145 days @ 76 bbl/day (avg)	Surface	N/A
Cement discharged at seafloor	Excess mixed cement slurry	1,920 bbl/well	8 event @ 240 bbl/day	Seafloor	No
Fire Water	Uncontaminated seawater/freshwater used for fire control	0 bbl/well	145 days @ 0 bbl/week	Surface	No
Cooling Water / Utility Water	Uncontaminated seawater	158,429,277 bbl/well	145 days @ 1,092,616 bbl/day	Surface	No
Sea Water / Fresh Water that has been Chemically Treated	Biocide, corrosion inhibitors, or other chemicals used to prevent corrosion or fouling of piping or equipment	50 bbl/well	1 event @ 50 bbl/event	Surface	No
Sub Sea Fluid Discharges	Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids	2 bbl/well	1 event @ 2 bbl/event	N/A	N/A
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced Water	Water brought up from hydrocarbon-bearing strata during extraction of oil & gas	11,006	145 days @ 4,037 bbl/day	N/A	N/A
Will you be covered by an individual or General NPDES permit ?		**GEG460000**			
NOTE: If you will not have a type of waste, enter NA in the row.		Red = Drlg Eng, **Yellow** = Completion Eng, **Blue** = Waste Specialist, **Green = Calculator Tool**			

PROVIDED BY Water SME:
Lerato Matlamela
PROVIDED BY DRILLING & COMPLETIONS ENGINEERS:
Levi Johnson
Last Revision: 9/20/2022

TABLE 2. WASTES YOU WILL TRANSPORT AND /OR DISPOSE OF ONSHORE

Pease specify whether the amount reported is a total or per well			Number of operational days:	145	Asset Name:	Black Hornet
Well Name: MC956-2	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal			
Type of Waste	Composition	Storage and Transport Method	Name/Location of Facility	Quantity	Units	Disposal Method
Will drilling occur ? If yes, fill in the muds and cuttings.						
Unused Synthetic-based drilling fluid	SBM from service - has not been downhole	Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA	3000	bbls/well	For Reclamation & re-use
Synthetic-based drilling mud solids and barite	SBM and barite from pit cleanout	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360 Fouchon, LA	348	bbls/well	Landfill/ Deepwell injection on land
Contaminated Synthetic base mud	SBM interface	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fourchon, LA	1620	bbls/well	Landfill/ Deepwell injection on land
Used Synthetic base mud - from downhole	SBM from downhole - sent in to vendor for reuse	Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA	6000	bbls/well	For Reclamation & re-use
Drilling mud contaminated absorbents	Absorbent pads contaminated with drilling muds	Barged in (Omega 2 yard boxes)	Omega Waste Management, Patterson, LA	2	tons/well	Recycle
Excess barite	Excess barite from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA	25	tons/well	Reuse / Landfill
Excess cement	Excess cement from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA	11.6	tons/well	Reuse / Landfill
Rig Drilling washwater	Cleaning out of mud tanks	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / RCS, Fourchon LA	2160.5	bbls/well	Landfill/ Deepwell injection on land
Contaminated Completion Fluids	Used Completion fluids	Barged in (15 or 25 barrel cutting boxes)	Ecoserv Fourchon LA	1000	bbls/well	Landfill/ Deepwell injection on land
Completion Fluids	Used Completion fluids	Liquid storage tanks on workboat	Ecoserv / MI Swaco Fourchon LA	3000	bbls/well	Landfill/ Deepwell injection on land
Will you produce hydrocarbons? If yes fill in for produced sand.						
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.						
Well Related Hazardous Waste	Rig lab titrations containing isopropanol alcohol, silver nitrate etc.	Barged in (5 gallon DOT containers)	Chemical Waste Management, Sulphur, LA	0.087	ton/well	Incineration / Landfill
Rig Maintenance Wastes (painting, blasting)	Paint thinner, paint chips, blast media, aerosol cans	Barged in (drums or totes)	River Birch Landfill, Avondale, LA and Chemical Waste Management, Sulphur, LA	43.5	ton/well	Incineration / Landfill
Rig Maintenance Wastes (non hazardous)	Oily rags, pads, oil filters etc.	Barged in (totes)	Omega Waste Management, Patterson, LA	20.3	ton/well	Reuse / Landfill
Rig Used oil	Lube oil, hydraulic oil, glycol	Barged in (drums)	Omega Waste Management, Patterson, LA	8.7	bbls/well	Recycle
Domestic waste	Municipal trash	Barged in (supersacks)	River Birch Landfill, Avondale, LA	3.625	ton/well	Incineration / Landfill
Scrap Metal	scrap piping, grating and other metals	Barged in (scrap baskets)	EMR, Houma, LA	33.35	ton/well	Recycle
Universal Waste	Batteries	Barged in (DOT drums)	Heritage - Rineco, Benton, AR	0.58	ton/well	Recycle
Universal Waste	Fluorescent light bulbs	Barged in (DOT drums)	Heritage - Rineco, Benton, AR	0.145	ton/well	Recycle
Misc. unused chemical	Pills, spacers, additives etc.	Barged in (totes)	River Birch Landfill, Avondale, LA	493	bbls/well	Recycle
Oily water	Washwater rig equipment	Transported in (15 barrel cuttings boxes)	Omega Waste Management, Patterson, LA	166.75	bbls/well	Recycle
Recyclyed materials	Plastic, paper, aluminum	Barged in (supersacks)	Tech Oil, New Iberia, LA	4.35	ton/well	Recycle

Provided by Waste SME - calculated based on total days of operations
Tana Eckols
Provided by Drilling & Completion Engineers

Appendix E: Air Emissions Information – Form BOEM-0138

OMB Control No. 1010-0151
OMB Approval Expires: 08/31/2023

COMPANY	BP Exploration & Production Inc.
AREA	Mississippi Canyon
BLOCK	MC956
LEASE	OCS-G 36263
FACILITY	Not Applicable
WELL	2
COMPANY CONTACT	Ramesh Gopal (Air Quality Review)/ Scherie Douglas & Adalberto Garcia (Plans)
TELEPHONE NO.	Ramesh Gopal (409-655-4418) / Scherie Douglas (832-315-7228) & Adalberto Garcia (281-995-2815)
REMARKS	Drill and complete one well and a twin for re-spud.

AIR EMISSIONS COMPUTATION FACTORS

Fuel Usage Conversion Factors	Natural Gas Turbines				Natural Gas Engines		Diesel Recip. Engine		Diesel Turbines			
	SCF/hp-hr	9.524			SCF/hp-hr	7.143	GAL/hp-hr	0.0514	GAL/hp-hr	0.0514		

Equipment/Emission Factors	**units**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**REF.**	**DATE**
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-1& 3.1-2a	4/00
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr		0.1293	0.1293	0.0020	6.5998	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr		0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr		0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0089	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3: WebFIRE (08/2018)	9/98 and 5/10
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-1& 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00
Vessels – Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels – Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels – Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.4400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NEI;TSP (units converted) refer to Diesel Boiler Reference	3/19
Vessels – Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3: WebFIRE (08/2018)	7/98 and 8/18
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017
Fugitives	lbs/hr/component						0.0005				API Study	12/93
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96
On-Ice – Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice – Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice – Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice – Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice – Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice – Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NEI;TSP refer to Diesel Recip. > 600 hp reference	3/19

Sulfur Content Source	**Value**	**Units**
Fuel Gas	3.38	ppm
Diesel Fuel	0.0015	% weight
Produced Gas (Flare)	3.38	ppm
Produced Oil (Liquid Flaring)	1	% weight

Density and Heat Value of Diesel Fuel		
Density	7.05	lbs/gal
Heat Value	19,300	Btu/lb

Natural Gas Flare Parameters	**Value**	**Units**
VOC Content of Flare Gas	0.6816	lb VOC/lb-mol gas
Natural Gas Flare Efficiency	98	%

Heat Value of Natural Gas		
Heat Value	1,050	MMBtu/MMscf

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Mississippi Canyon		MC956	OCS-G 36263	Not Applicable	2					Ramesh Gopal (Air Quality Revie		Ramesh Gopal (409-655-4418) / $		Drill and complete one well and a twin for re-spud.										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**13210** **34818**																				
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel		60354	3,104.97	34,818.00	24	117	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	27.93	16.85	16.35	0.41	669.21	19.24	0.00	104.96	0.20
Egen: Cummins 1900 kW	Vessels – Drilling Prime Engine, Auxiliary		2458	126.45	3,034.90	24	17	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.35	0.21	0.21	0.01	8.48	0.24	0.00	1.33	0.00
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary		2500	128.62	3,086.76	24	117	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	2.48	1.49	1.45	0.04	59.33	1.71	0.00	9.31	0.02
CONSTRUCTION / SUBSEA INSTALLATION (Substitution likely with similar vessels of same/lower hourpower)																									
Construction: C-Constructor																									
Main Engines: 6 x Cat 3512C + 2 x Schottel SCD3030	VESSELS -Construction/Installation - Diesel		21726	1,117.72	26,825.18	24	5	15.33	9.25	8.97	0.22	367.23	10.56	0.00	57.60	0.11	0.92	0.55	0.54	0.01	22.03	0.63	0.00	3.46	0.01
E-Gen: 1 x Cat C18, 425 kW	VESSELS – Prime Engine, Auxiliary		570	29.32	703.78	24	5	0.40	0.24	0.24	0.01	9.63	0.28	0.00	1.51	0.00	0.02	0.01	0.01	0.00	0.58	0.02	0.00	0.09	0.00
Small/Large Auxiliary Engines	VESSELS – Prime Engine, Auxiliary		2500	128.62	3,086.76	24	5	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.11	0.06	0.06	0.00	2.54	0.07	0.00	0.40	0.00
2023	**Facility Total Emissions**							**63.57**	**38.35**	**37.20**	**0.93**	**1,523.07**	**43.79**	**0.00**	**238.89**	**0.44**	**31.81**	**19.19**	**18.62**	**0.46**	**762.16**	**21.91**	**0.00**	**119.54**	**0.22**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**2,707.29**			**2,707.29**	**2,707.29**	**2,707.29**		**63,807.63**	
	81.3																								
Offshore Support Vessel - 312 ft Class	VESSELS>600hp diesel(crew)		7200	370.41	8889.87	24	117	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	7.13	4.30	4.17	0.10	170.87	4.91	0.00	26.80	0.05
Offshore Support Vessel - 312 ft Class	VESSELS>600hp diesel(supply)		7200	370.41	8889.87	24	80	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	4.88	2.94	2.85	0.07	116.83	3.36	0.00	18.32	0.03
Offshore Support Vessel - 312 ft Class	VESSELS>600hp diesel(tugs)		7200	370.41	8889.87	24	80	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	4.88	2.94	2.85	0.07	116.83	3.36	0.00	18.32	0.03
2023	**Non-Facility Total Emissions**							**15.24**	**9.19**	**8.92**	**0.22**	**365.10**	**10.50**	**0.00**	**57.26**	**0.11**	**16.88**	**10.19**	**9.88**	**0.25**	**404.53**	**11.63**	**0.00**	**63.45**	**0.12**

AIR EMISSIONS CALCULATIONS - 2ND YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
BP Exploration & Production Inc.	Mississippi Canyon		MC956	OCS-G 36263	Not Applicable	2					Ramesh Gopal (Air Quality Review		Ramesh Gopal (409-655-4418) / S		Drill and complete one well and a twin for re-spud.										
OPERATIONS	**EQUIPMENT**	**EQUIPMENT ID**	**RATING**	**MAX. FUEL**	**ACT. FUEL**	**RUN TIME**		**MAXIMUM POUNDS PER HOUR**									**ESTIMATED TONS**								
	Diesel Engines		**HP**	**GAL/HR**	**GAL/D**																				
	Nat. Gas Engines		**HP**	**SCF/HR**	**SCF/D**																				
	Burners		**MMBTU/HR**	**SCF/HR**	**SCF/D**	**HR/D**	**D/YR**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**	**TSP**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**Pb**	**CO**	**NH3**
DRILLING - Black Hornet (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	**Average Daily Fuel Usage** **Maximum Daily Fuel Usage**				**13210** **34818**																				
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel		60354	3,104.97	34,818	24	65	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	15.52	9.36	9.08	0.23	371.78	10.69	0.00	58.31	0.11
Egen: Cummins 1900 kW	Vessels – Drilling Prime Engine, Auxiliary		2458	126.45	3,035	2	10	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.02	0.01	0.01	0.00	0.42	0.01	0.00	0.07	0.00
Temporary Large/ Small Auxiliary Engines	Vessels – Drilling Prime Engine, Auxiliary		2500	128.62	3,087	24	65	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	1.38	0.83	0.81	0.02	32.96	0.95	0.00	5.17	0.01
CONSTRUCTION / SUBSEA INSTALLATION (Substitution likely with similar vessels of same/lower hourpower)																									
Construction: C-Constructor																									
Main Engines: 6 x Cat 3512C + 2 x Schottel SCD3030	VESSELS -Construction/Installation - Diesel		21726	1,117.72	26,825.18	24	5	15.33	9.25	8.97	0.22	367.23	10.56	0.00	57.60	0.11	0.92	0.55	0.54	0.01	22.03	0.63	0.00	3.46	0.01
E-Gen: 1 x Cat C18, 425 kW	VESSELS – Prime Engine, Auxiliary		570	29.32	703.78	2	5	0.40	0.24	0.24	0.01	9.63	0.28	0.00	1.51	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.00
Small/Large Auxiliary Engines	VESSELS – Prime Engine, Auxiliary		2500	128.62	3,086.76	24	5	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	0.11	0.06	0.06	0.00	2.54	0.07	0.00	0.40	0.00
2024	**Facility Total Emissions**							**63.57**	**38.35**	**37.20**	**0.93**	**1,523.07**	**43.79**	**0.00**	**238.89**	**0.44**	**17.94**	**10.82**	**10.50**	**0.26**	**429.78**	**12.36**	**0.00**	**67.41**	**0.13**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**2,707.29**			**2,707.29**	**2,707.29**	**2,707.29**		**63,807.63**	
	81.3																								
Offshore Support Vessel - 312 ft Class	VESSELS- Crew Diesel		7200	370.41	8889.87	24	65	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	3.96	2.39	2.32	0.06	94.93	2.73	0.00	14.89	0.03
Offshore Support Vessel - 312 ft Class	VESSELS - Supply Diesel		7200	370.41	8889.87	24	65	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	3.96	2.39	2.32	0.06	94.93	2.73	0.00	14.89	0.03
Offshore Support Vessel - 312 ft Class	VESSELS - Tugs Diesel		7200	370.41	8889.87	24	65	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	3.96	2.39	2.32	0.06	94.93	2.73	0.00	14.89	0.03
2024	**Non-Facility Total Emissions**							**15.24**	**9.19**	**8.92**	**0.22**	**365.10**	**10.50**	**0.00**	**57.26**	**0.11**	**11.89**	**7.17**	**6.96**	**0.17**	**284.78**	**8.19**	**0.00**	**44.67**	**0.08**

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
BP Exploration & Production Inc	Mississippi Canyon	MC956	OCS-G 36263	Not Applicable	2	

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2023	31.81	19.19	18.62	0.46	762.16	21.91	0.00	119.54	0.22
2024	17.94	10.82	10.50	0.26	429.78	12.36	0.00	67.41	0.13
Allowable	2707.29			2707.29	2707.29	2707.29		63807.63	

Ocean BlackHornet

GENERAL DESCRIPTION

Design……………………………...……………………........... Gusto P10,000 DW

Year Entered Service……………………………....………………… 2015

Classification.ABS, +A1, Drillship, Helidk, +AMS, +ACCU, +CDS, + DPS-3, SH-DLA, GP

Dimensions…..754 ft long x 118 ft wide x 59 ft deep

Draft…………………..……………………...... 36 ft operating / 29 ft transit

Displacement…………...………………..…..............…… 70,000T operating

Variable Deck...……..………...…………….….....……....… 22,045T operating

Transit Speed………………...………...……………..……….... up to 12.5 knots

Water Depths…………....……….…...... 12,000 ft designed / 10,000 ft outfitted

Drilling Depth…………………………………………………..…… 40,000 ft

DRILLING EQUIPMENT

Derrick	NOV Dual Bottleneck, 210 ft high with 80 ft x 60 ft base, combined hook load capacity of 4,000 kips
Drawworks	(Main): NOV / AHD 1250, six AC electric motors, 9,000hp total, 1,250T with sixteen 2 1/8” drilling lines
	(Aux): NOV / AHD 750, five AC electric motors, 5,750hp total, 750T with fourteen 1 ¾” drilling lines
Compensator	Active Heave Compensating Drawworks
Rotary Table	(Main): NOV RST 75 ½” hydraulic, 1,375T static
	(Aux): NOV RST 60 ½” hydraulic, 1,000T static
Top Drive	(Main): NOV TDX-1250, 1,250T with 7,500 psi
	(Aux): NOV TDS-8SA. 750T with 7,500 psi
Tubular handling	2 x NOV MPT ‘Hydraulic Roughneck’ for tubular range 3 ½” to 9 ¾” + 2 x NOV HR IV-ER
Mud Pumps	5 x NOV 14-P-220, 2,200hp, 7,500 psi

POWER EQUIPMENT

Main Power	6 x Himsen diesel engines rated 4,500kW, each driving 5,375 kVA AC generators
	2 x Himsen V-type diesel engines rated 9,000kW, each driving 10,875 kVA AC generators
Emergency Power	V-type Cummins diesel engine rated 1,900kW driving 1 x STX engine rated 1,550kW AC generator

STORAGE CAPACITIES

Liquid Mud…………………………………………….…………..… 15,204 bbls

Base Oil………………………………………….........................… 7,209 bbls

Brine………………..…………………………….…………….... 13,175 bbls

Drill Water…………………..……………………………………… 18,593 bbls

Potable Water…………………………….……………………….. 8,834 bbls

Bulk Storage…..............… 16,315 ft³ (barite + bentonite) + 15,891ft³ (cement)

Sack Storage……………………………..……...……..……… 6,000 sacks

CRANES

Knuckle-boom	1 x 100 ton + 2 x 85 ton knuckle-boom
AHC Subsea	165 ton Active Heave Compensation knuckle-boom

SUBSEA EQUIPMENT

Diverter	Vetco CSO 21¼” 500 psi diverter with 1 x 20” flow line + 2 x 16” overboard diverter lines
BOP Stacks (2)	Hydril 18 ¾” 15,000 psi seven-ram preventer
	2 x Hydril 18 ¾” 10,000 psi annular preventers
	APIS53 compliant
C&K Manifold	3 1/16”, 15,000 psi
Marine Riser	Vetco HMF Class H 21”, 75 ft long per joint
Tensioners	16 x 225 kips NOV wireline riser tensioners. Total capacity 3,600 kips with 50 ft of wire travel
Moonpool	73 ft x 42 ft

STATION KEEPING / PROPULSION SYSTEM

Thrusters	6 x Thrustmaster, 5,000kW azimuth thrusters with fixed pitch variable speed propellers
DP System	Kongsberg K-POS

OTHER INFORMATION

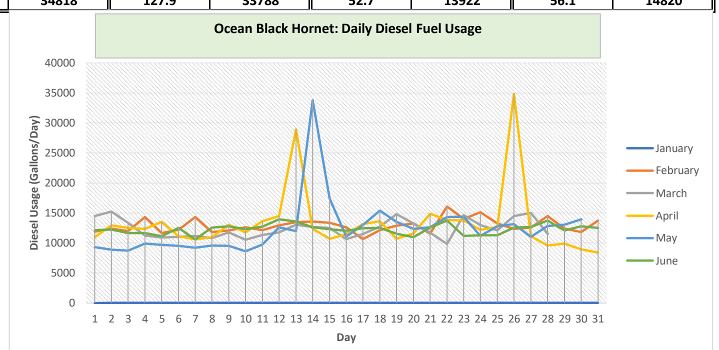
Dual Activity	Yes
Accommodation	210 people
Helideck	Sikorsky S-61 & S-92, CAP 437 compliant

DIAMOND OFFSHORE

OCEAN BLACK HORNET ACTUAL FUEL USAGE (JANUARY - JUNE 2019)

	January		February		March		April		May		June	
Day	(Cubic Meter)	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons
1	44.9	11861	54.6	14424	41.4	10937	35.1	9272	45.8	12099	47.7	12601
2	46.9	12390	57.7	15243	48.9	12918	33.5	8850	46.2	12205	43.5	11491
3	45.3	11967	50.5	13341	47.2	12469	32.9	8691	44.1	11650	39.1	10329
4	54	14265	42.3	11174	46.7	12337	37.3	9854	44	11624	39.1	10329
5	44	11624	41.1	10857	51.1	13499	36.6	9669	41.9	11069	41.4	10937
6	46.1	12178	41.5	10963	42	11095	36	9510	47.3	12495	41.2	10884
7	54.1	14292	42.1	11122	40	10567	34.8	9193	40.1	10593	50.6	13367
8	44.6	11782	40.7	10752	41.4	10937	36.2	9563	47.4	12522	46.8	12363
9	45.7	12073	44.5	11756	49.2	12997	36	9510	48.3	12760	41.7	11016
10	47.7	12601	39.8	10514	44.4	11729	32.5	8586	46.5	12284	46	12152
11	45.9	12125	42.8	11307	51.5	13605	36.7	9695	48.1	12707	40.8	10778
12	48.8	12892	44.4	11729	54.8	14477	47.6	12575	52.7	13922	41	10831
13	50.8	13420	49.3	13024	109.3	28874	45.3	11967	51.3	13552	43.3	11439
14	51.2	13526	47.8	12627	46.6	12310	127.9	33788	47.6	12575	46.1	12178
15	50.5	13341	47.2	12469	40.3	10646	65.8	17383	46.4	12258	41.7	11016
16	47.6	12575	40.1	10593	43.2	11412	41.7	11016	45.5	12020	50.3	13288
17	40.3	10646	43.4	11465	49.7	13129	49.1	12971	47.1	12443	54.6	14424
18	45.9	12125	48.1	12707	51.4	13578	58.2	15375	47.2	12469	45.9	12125
19	48.7	12865	56	14794	40.4	10673	51.1	13499	43.7	11544	52.5	13869
20	50.1	13235	50	13209	43.8	11571	46.7	12337	41.3	10910	53	14001
21	43.6	11518	44.2	11676	56.1	14820	47.7	12601	47.4	12522	49.9	13182
22	60.9	16088	37.3	9854	52.2	13790	54.1	14292	51.8	13684	56	14794
23	52.8	13948	55.3	14609	51.9	13711	54.2	14318	42.2	11148	55	14529
24	57.1	15084	49.1	12971	46	12152	42.2	11148	42.5	11227	44.5	11756
25	50.1	13235	45.6	12046	47.9	12654	48.3	12760	42.5	11227	51.3	13552
26	46.6	12310	54.6	14424	131.8	34818	49.6	13103	47.4	12522	55.7	14714
27	47.5	12548	56.8	15005	42	11095	41.5	10963	47.8	12627	56.1	14820
28	54.6	14424	43.4	11465	36.2	9563	48.5	12812	51.9	13711	48	12680
29	46.8	12363			37.3	9854	49.3	13024	45.7	12073	45.8	12099
30	44.6	11782			33.7	8903	52.6	13895	48.3	12760	48.8	12892
31	51.8	13684			31.7	8374			47.3	12495		
Total	**1509.5**	**398768**	**1310.2**	**346118**	**1550.1**	**409493**	**1409**	**372218**	**1437.3**	**379694**	**1417.4**	**374437**
Average	**49**	**12864**	**47**	**12362**	**51**	**13210**	**47**	**12408**	**47**	**12249**	**48**	**12482**
Maximum	**60.9**	**16088**	**57.7**	**15243**	**131.8**	**34818**	**127.9**	**33788**	**52.7**	**13922**	**56.1**	**14820**

Average Daily Fuel Usage Rate = 13210 gals/day
Maximum Daily Fuel Usage Rate = 34818 gals/day



C-INNOVATION

C-CONSTRUCTOR

OFFSHORE CONSTRUCTION / INTERVENTION VESSEL

- Main offshore crane
  150 MT @ 10.5 m
- 2 x Schilling Ultra Heavy-Duty
  Work Class ROVs
- DP2
- Helideck rated for S-92
- Accommodation for 99 POB

GENERAL DESCRIPTION

MAIN CHARACTERISTICS

Length overall	97 m (318 ft)
Length between p.p.	84.73 m (277.9 ft)
Breadth	20.1 m (66 ft)
Design draught	6.5 m (21.3 ft)
Transit speed	10 knots
Cargo deck, 5.86 MT/m^2	770.6 m^2 (8,305 ft^2)
Deck Cargo Capacity	3,149.7 MT (3,100 LT)
Accommodation	99 persons

SPECIAL FEATURES

Two Z-Drives, Schottel SCD 3030, ea. 3,000kW
Six main diesel generators , ea. 1,700 ekW, 1,800 rpm
Two bow thrusters, ea. 1,050 kW
One drop-down thruster, ea. 800 kW
Emergency generator, 425 kW, 1,800 RPM
Helicopter deck, rated for Sikorsky S-92
Passive roll reduction system, 1 tank
Integrated bridge

Partial back deck view of C-Constructor

CLASSIFICATION

ABS: ✠A1 (Hull), ✠A1 (OSV) Offshore Support Vessel, Supply – HNLS, ✠AMS, ✠ACCU, ✠DPS-2, HDC, HLC, FiFi 2, Heavy Lift Crane, POT, SPS, HELIDK, USCG Subchapter L (OSV) and I (Cargo), SOLAS, MARPOL
Flag: USA

TANK CAPACITIES

Fuel oil	5,799.6 bbl
Ballast/cargo fresh water	6,383.7 bbl
Ballast/salt water	20,343.1 bbl
Potable water	747 bbl
Dry bulk	1,544.2 bbl
Liquid Mud	20,674 bbl

MISSION EQUIPMENT

Main offshore AHC crane 150 MT@ 10.5m (Subsea lift), knuckle boom jib crane, operational depth 3,000 m

Two Ultra Heavy-Duty work class ROVs, 200HP, each with own dedicated LARS and workshop

Two fire pumps, ea. 3,810 m^3/hr
Four fire monitors, ea. 1,800 m^3/hr

CONTACT

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Appendix F: WCD Modeling Report - *Found in Proprietary Copy of EP*

Appendix G: Oil Spill Response Discussion -

SPILL RESPONSE DISCUSSION

1) <u>Worst Case Discharge Scenario</u>

Under this revised Exploration Plan for the Keltics South prospect, BP Exploration & Production Inc. (BP) proposes to drill and complete one well (and a twin for re-spud) with surface and bottom hole locations in Mississippi Canyon Block 956.

The uncontrolled blowout scenario is for a potential blowout of the MC 956 prospect at well location '002A' which BP calculates has the highest liquid hydrocarbons rate potential in the MC 956 area. The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted. Day 1 worst case discharge (WCD) is approximately 278,000 bopd, with the calculation support package for this rate attached as Appendix F in the Proprietary Information copy of the initial Exploration Plan. The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70 day period results in a potential worst case spill volume estimated at 15.5 mmbo.

2) <u>Facility Information:</u>

- Type of Operation: Drill and complete
- Facility Name: Keltics South
- Area and Block: Mississippi Canyon Block 956
- Latitude: 28˚ 02' 02.350" N
- Longitude: 088˚ 22' 00.324" W
- Distance to Shore: 70.6 nautical miles / 81.3 statute miles
- Water Depth: 6,826-ft
- API Gravity: 32.6°

3) <u>Worst Case Discharge Volume</u>

Description	**Barrels of Oil**
24 hour uncontrolled blowout	278,000 bbls

Oil spill response-related activities for wells to be drilled under BP's EP are governed by the BP Regional Oil Spill Response Plan (OSRP). The OSRP was filed on behalf of several BP companies, including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on 22 October 2021. The BP OSRP should meet the requirements contained in 30 CFR Part 254. BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." The OSRP details BP's plan for response to manage oil spills that may result from drilling and production operations. BP has designed its response program based on a regional capability of response to spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. BP's spill response program is intended to meet the response planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. It also includes information regarding BP's Incident Management Team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The OSRP describes personnel and equipment mobilization, the incident management team organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

BP will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment to contain and recover the Worst Case Discharge is shown in **Figure 4**, which outlines contracted equipment, personnel, materials and support vessels as well as temporary storage equipment to respond to the worst case discharge. The list estimates individual times needed for procurement, load out, travel time to the site, and deployment. **Figure 4** also indicates how operations would be supported.

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 37% or approximately 102,860 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 175,140 barrels remaining.

Natural Weathering Data: MC 956, Keltics South	**Barrels of Oil**
WCD Volume	278,000
Less 37% natural evaporation/dispersion	99,180
Remaining volume	175,140

4) Land Segment and Resource Identification

In compliance with NTL 2012-N06, BP has determined the land areas that could be potentially impacted by a potential oil spill using the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1** below. The BOEM OSRAM identifies the highest probability of impact to the shorelines of Plaquemines Parish, Louisiana. **Figure 2** contains a list of environmental sensitivities, areas of socio-economic concern, and protection priorities. **Figure 3** contains a list of shoreline types found.

Plaquemines Parish includes Barataria Bay, the Mississippi River Delta, Breton Sound and the affiliated islands and bays. This region includes sensitive habitat and serves as a migratory, breeding, feeding and nursery habitat for numerous species of wildlife. Beaches in this area vary in grain particle size and can be classified as fine sand, shell or perched shell beaches. Sandy and muddy tidal flats are also abundant.

FIGURE 1
TRAJECTORY BY LAND SEGMENT

Conditional probabilities of a spill in Mississippi Canyon Block 956 (MC 956) contacting shoreline segments have been projected utilizing BP's WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) (Ji et al., 2004) for the Central and Western Gulf of Mexico available on the BOEM website using 3, 10, and 30 day impact. The results are tabulated below.

Location	Shoreline Segment	County/Parish, State	Conditional Probability [1](%)		
			3 Day	10 Day	30 day
MC 956, Keltics South, Well 002A 81.3 statute miles OCS-G: G36263 Launch Area: C 59	C12	Jefferson, LA	--	--	1
	C13	Cameron, LA	--	--	1
	C14	Vermilion, LA	--	--	1
	C17	Terrebonne, LA	--	--	2
	C18	Lafourche, LA	--	1	2
	C20	**Plaquemines, LA**	--	**5**	**11**
	C21	St. Bernard, LA	--	--	2
	C29	Walton, FL	--	--	1
	C31	Bay, FL	--	--	1

[1] Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%).

Figure 2 – Environmental Sensitivities

Plaquemines Parish, Louisiana

Sensitive Areas	Descriptions	Wildlife	Access	Contact
Delta National Wildlife Refuge	48,800 acres of marsh, shallow ponds, channels and bayous. Provides a winter sanctuary for migratory waterfowl such as snow geese and more than 18 species of ducks. Also the home of many other water birds and various wildlife species.	**RTE:** **Brown pelican, American alligator** **Others:** Waterfowl (winter), peregrine falcon, sea birds, shore birds, bass, bream, catfish, crappie, drum, garfish, redfish, speckled trout, flounder, nutria, mink, otter, muskrat, raccoon, white-tailed deer	By boat only.	Delta NWR Bayou Lacombe Centre 61389 Hwy 434 Lacombe, LA 70445 Phone: (985) 882-2000
Pass A Loutre Wildlife Management Area	66,000 acres characterized by river channels with attendant pass banks, natural bayous and man-made canals which are interspersed with intermediate and fresh marshes. Furbearers and alligators are fairly common in the marsh. Freshwater finfish flourish in the interior marsh ponds.	**RTE:** **Brown pelican, American alligator** **Others:** Waterfowl (winter), peregrine falcon, sea birds, shore birds, bass, bream, catfish, crappie, drum, warmouth fish, garfish, redfish, speckled trout, flounder, nutria, mink, otter, muskrat, raccoon, white-tailed deer	By boat only, however, the tributaries along the Mississippi River provide excellent traveling passages. The nearest public launches are in Venice.	Pass A Loutre WMA Hammond Field Office 42371 Phyllis Ann Drive Hammond, LA 70403 Phone (985) 543-4777
Breton National Wildlife Refuge	Breton Island and the adjoining Chandeleur Islands. Breton Island is made up of 2 adjacent islands with a combined length of about 3 miles and a width of less than 1 mile. The Chandeleur Islands have a length of approximately 20 miles and a width of less than 1 mile. The islands are low with sandy beaches on the Gulf side and saltwater marshes on the Chandeleur Sound side. Shoals along the sound side provide wintering habitat for about 20,000 redhead ducks. Nesting colonies of thousands of birds are found on the islands in the summer. Dominant vegetation is black mangrove, groundsel bush and wax murtle. Shallow bay waters around the islands support beds of varying grasses.	**RTE:** **Brown pelican, least tern, piping plover** **Others:** Redhead ducks and other waterfowl (winter), wading birds, shorebirds and seabirds (including laughing gulls, sandwich terns and black skimmers), finfish	By boat only. Motorized land vehicles are prohibited.	Breton NWR c/o Southeast Louisiana Refuges 61389 Highway 434 Lacombe, LA 70445 Phone : (985) 882-2000

Areas of Socio-Economic Concern in Plaquemines Parish:

- Commercial fishing routes
    - South Pass
    - Tiger Pass
    - Barataria Waterway

- Surface Raw Water Intake
    - Belle Chasse Water District
    - Dalcour waterworks District
    - Pointe a la Hache W S
    - Port Sulphur water District

- Public Water Intake
    - Dalcour Water Intake
    - Belle Chase Water Intake
    - Boothville Water Intake
    - Empire Water Intake

- Industrial Water Intake
    - International Matex Terminal Site
    - United Bulk Terminal
    - Freeport Nickle Plant
    - Tennessee Gas Pipeline
    - Freeport Dock
    - Harvest States Grain Elevator

- Diversions
    - West Point La Hache Fresh Water Diversion
    - Ostrica Locks
    - Bayou Lamoque

- Shipping Safety Fairways
    - Grand Bayou Pass
    - Empire to the Gulf
    - South Pass, South Pass to Sea
    - Southwest Pass to Sea
    - Mississippi River-Gulf Outlet

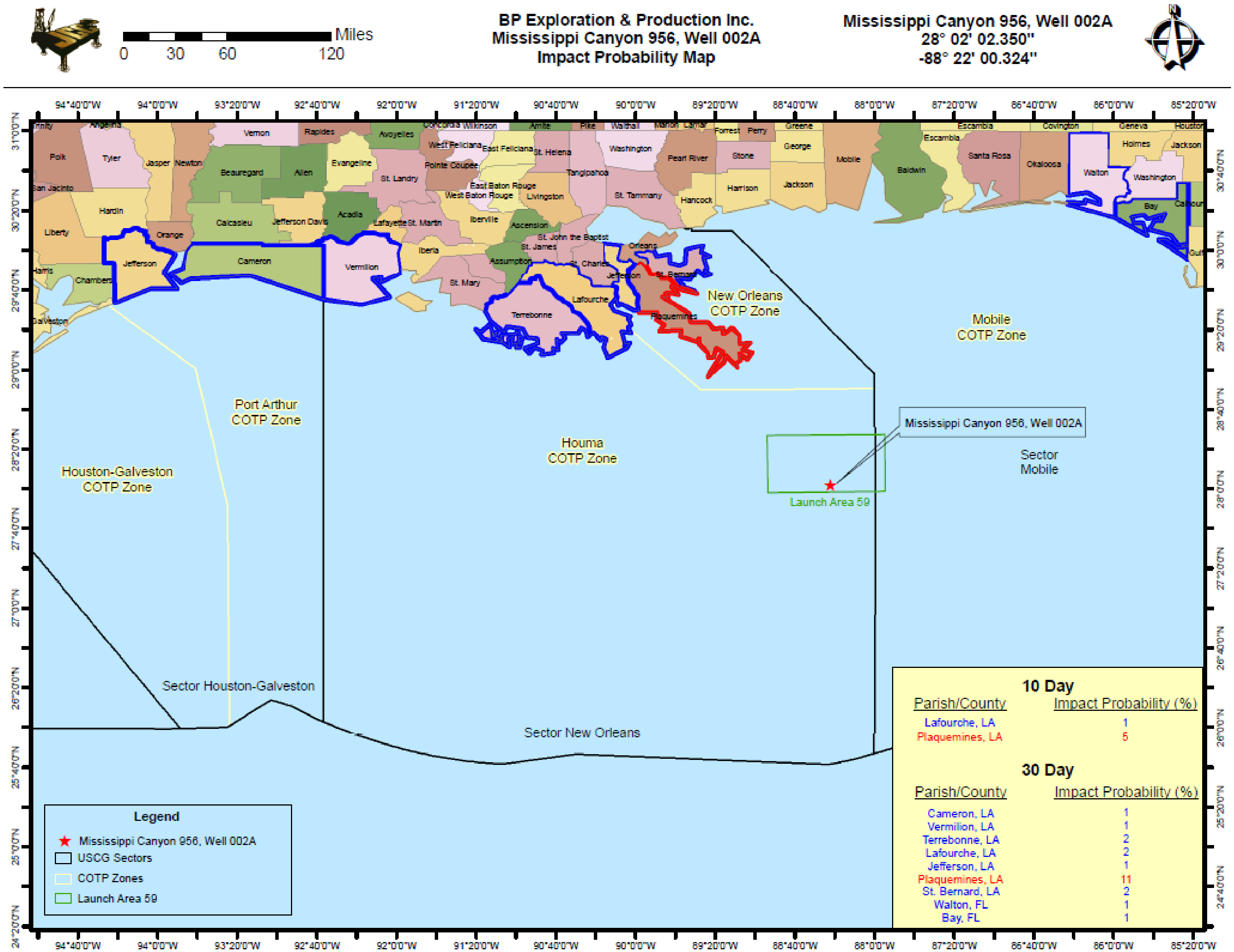
- Coastal Maintained Channels
    - Southwest Pass Channel
    - South Pass Channel
    - Baptiste Collette Bayou

Protection Priorities for Plaquemines Parish:

- Delta National Wildlife Refuge
- Pass-A-Loutre Wildlife Management Area
- Other coastal marshes

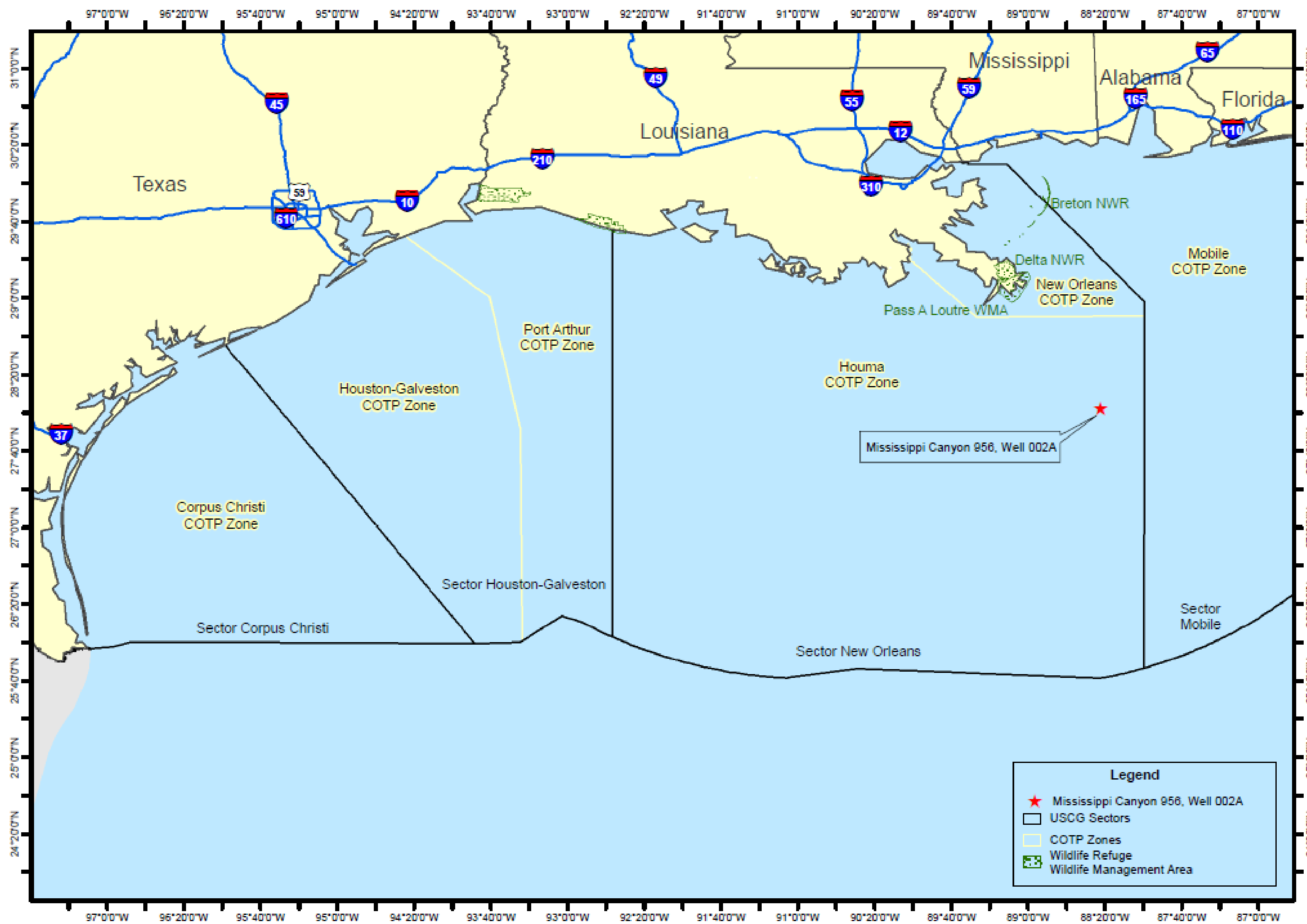
Figure 3
Plaquemines Parish – Shorelines

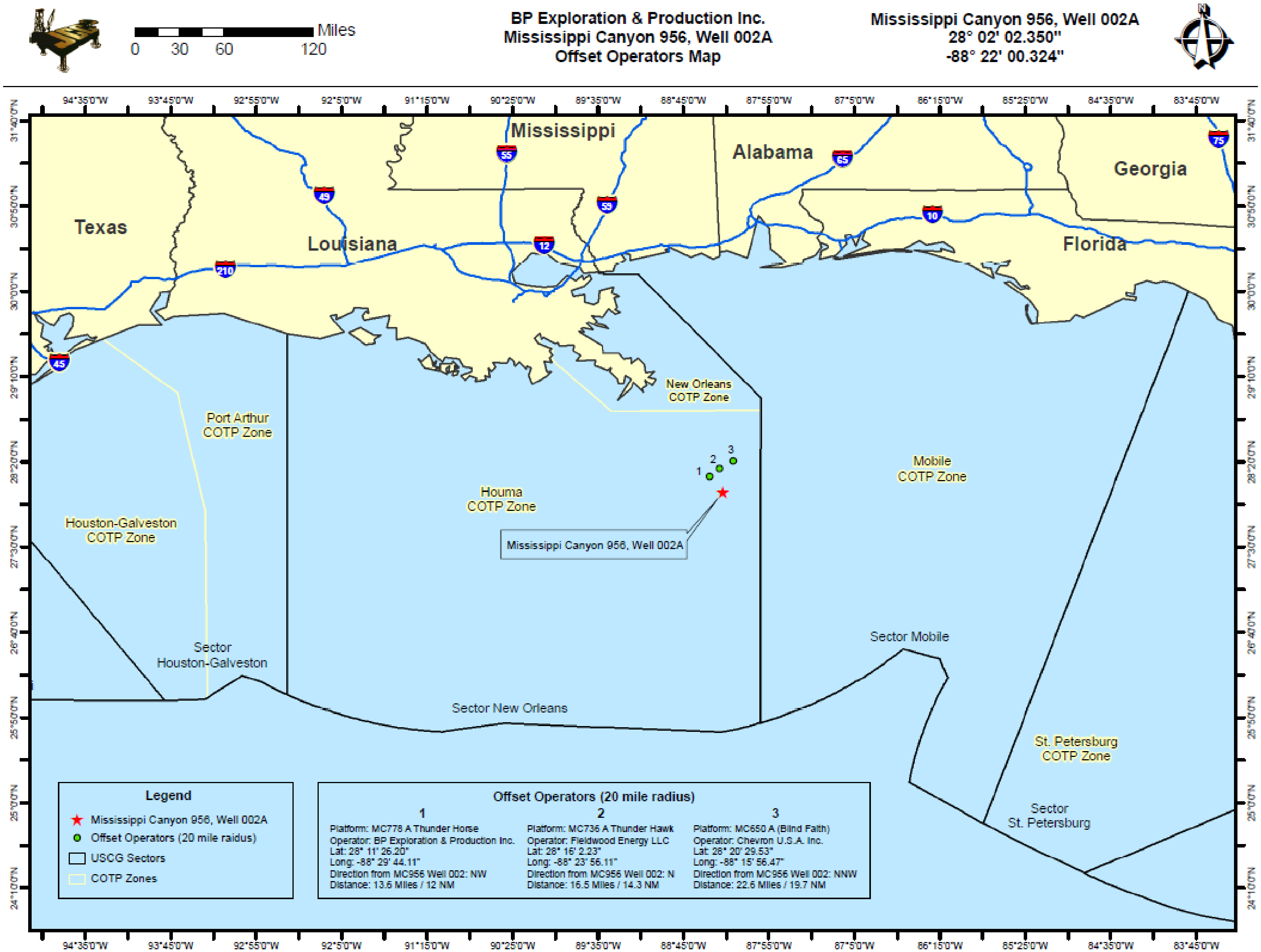
Shoreline Type	Description
Fine Sand Beaches	Beaches with low slopes and a grain-size of 0.625 to 0.200 mm. Low percentage of shells and hash. Major fine sand beaches on the delta plain are found at Southwest Pass, Pelican Island and Chandeleur Island.
Perched Shell Beaches	Shoreline type where a thin shell beach overlies a fresh or salt marsh with an eroded marsh platform outcropping in the surf zone. Organic debris is common to this shoreline type. Where the marsh platform outcrops on the shoreline, it can become re-vegetated by marsh grass.
Shell Beaches	Shoreline types comprised of almost entirely of shell. Shell material may be in the form of shell hash or whole shells. Shell beaches form extremely steep beach faces. Major shell beaches on the delta plain are found at Point Au Fer and Shell Island.
Muddy Tidal Flats	Shoreline types comprised of broad intertidal areas consisting of mud and minor amounts of shell hash. The grain-size is smaller than 0.0625 mm. Muddy tidal flats are typically found in association with prograding river mouths. Major muddy tidal flats on the delta plain are found at the Mississippi and Atchafalaya River mouths.
Sandy Tidal Flats	Shoreline types comprised of broad intertidal areas consisting of fine and coarse grain sand and minor amounts of shell hash. Mean grain size is between 0.0625 and 0.4 mm. Typically found in association with barrier island and tidal inlet systems. This type of flat is submerged during each tidal cycle and at low tide may be 100-200 m wide. Slight changes in water levels can produce significant shoreline changes. Low water levels can expose extensive tidal flat areas to oiling. Major sandy tidal flats on the delta plain are found at Barataria Bay and the Mississippi River mouth.


BP Exploration & Production Inc.
Mississippi Canyon 956, Well 002A
Impact Probability Map
Mississippi Canyon 956, Well 002A
28° 02' 02.350"
-88° 22' 00.324"
Miles
0 30 60 120
Houston-Galveston COTP Zone
Port Arthur COTP Zone
Houma COTP Zone
New Orleans COTP Zone
Mobile COTP Zone
Sector Mobile
Sector Houston-Galveston
Sector New Orleans
Mississippi Canyon 956, Well 002A
Launch Area 59
Legend
Mississippi Canyon 956, Well 002A
USCG Sectors
COTP Zones
Launch Area 59
10 Day
Parish/County | Impact Probability (%)
Lafourche, LA | 1
Plaquemines, LA | 5
30 Day
Parish/County | Impact Probability (%)
Cameron, LA | 1
Vermilion, LA | 1
Terrebonne, LA | 2
Lafourche, LA | 2
Jefferson, LA | 1
Plaquemines, LA | 11
St. Bernard, LA | 2
Walton, FL | 1
Bay, FL | 1

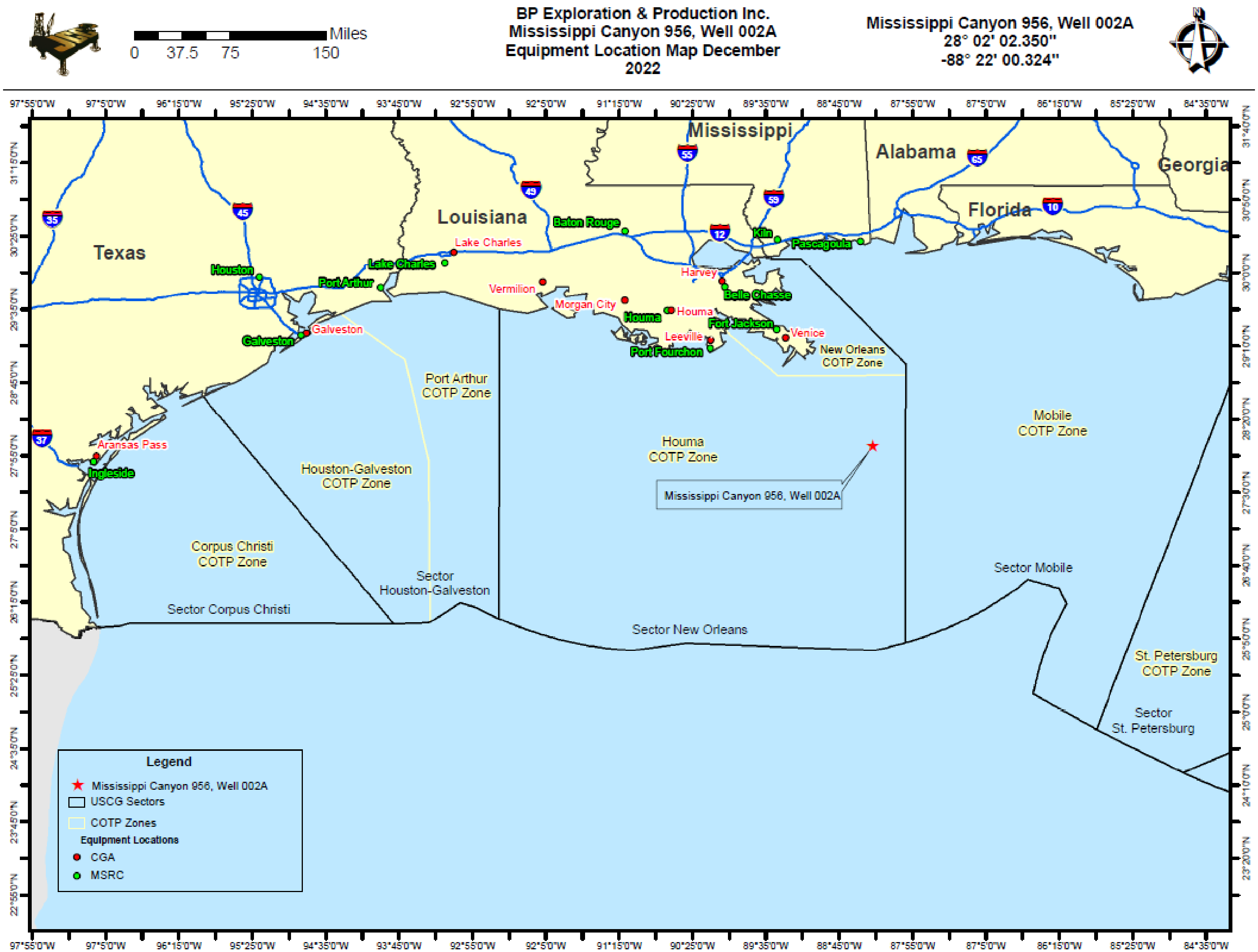
BP Exploration & Production Inc.
Mississippi Canyon 956, Well 002A
Wildlife Refuge/Wildlife Management Areas Map
December 2022

Mississippi Canyon 956, Well 002A
28° 02' 02.350"
-88° 22' 00.324"





Miles
0 30 60 120
BP Exploration & Production Inc.
Mississippi Canyon 956, Well 002A
Offset Operators Map
Mississippi Canyon 956, Well 002A
28° 02' 02.350"
-88° 22' 00.324"
Mississippi
Alabama
Georgia
Texas
Louisiana
Florida
New Orleans COTP Zone
Port Arthur COTP Zone
Houma COTP Zone
Mobile COTP Zone
Houston-Galveston COTP Zone
Mississippi Canyon 956, Well 002A
Sector Houston-Galveston
Sector Mobile
Sector New Orleans
St. Petersburg COTP Zone
Sector St. Petersburg
Legend
Mississippi Canyon 956, Well 002A
Offset Operators (20 mile raidus)
USCG Sectors
COTP Zones
Offset Operators (20 mile radius)
1
Platform: MC778 A Thunder Horse
Operator: BP Exploration & Production Inc.
Lat: 28° 11' 26.20"
Long: -88° 29' 44.11"
Direction from MC956 Well 002: NW
Distance: 13.6 Miles / 12 NM
2
Platform: MC736 A Thunder Hawk
Operator: Fieldwood Energy LLC
Lat: 28° 16' 2.23"
Long: -88° 23' 56.11"
Direction from MC956 Well 002: N
Distance: 16.5 Miles / 14.3 NM
3
Platform: MC650 A (Blind Faith)
Operator: Chevron U.S.A. Inc.
Lat: 28° 20' 29.53"
Long: -88° 15' 56.47"
Direction from MC956 Well 002: NNW
Distance: 22.6 Miles / 19.7 NM



BP Exploration & Production Inc.
Mississippi Canyon 956, Well 002A
Equipment Location Map December 2022
Miles
0 37.5 75 150
Mississippi Canyon 956, Well 002A
28° 02' 02.350"
-88° 22' 00.324"
Mississippi
Alabama
Georgia
Louisiana
Florida
Texas
Baton Rouge
Lake Charles
Houston
Port Arthur
Vermilion
Morgan City
Harvey
Kiln
Pascagoula
Belle Chasse
Houma
Fort Jackson
Venice
Leeville
Port Fourchon
Galveston
Aransas Pass
Ingleside
New Orleans COTP Zone
Port Arthur COTP Zone
Houma COTP Zone
Mobile COTP Zone
Houston-Galveston COTP Zone
Corpus Christi COTP Zone
Sector Houston-Galveston
Sector Corpus Christi
Sector New Orleans
Sector Mobile
St. Petersburg COTP Zone
Sector St. Petersburg
Mississippi Canyon 956, Well 002A
Legend
Mississippi Canyon 956, Well 002A
USCG Sectors
COTP Zones
Equipment Locations
CGA
MSRC

5) <u>General Considerations for all Oil Spill Recovery Operations</u>

BP will use all appropriate measures possible to safely and efficiently recover oil spilled from its well. These include but are not limited to:

- Conducting detailed safety analyses on response operations and preparing/disseminating resulting safety plans to all response personnel.
- Use of tactics described in the most current *MSRC Gulf Area Tactics Guide Book* and *CGA Equipment Guide Book and Tactic Manual* and any other appropriate tactics developed during the event.
- Configuring surface recovery systems to achieve maximum throughput and recovery efficiency rates:
    - Maximization of the use of advanced and adverse weather recovery systems to increase oil to recovery system encounter rates.
    - Use of vessels with the largest possible onboard recovered oil storage to minimize off-load times.
    - Use of appropriate vessels to deploy ocean boom to form the widest practical width to maximize oil to recovery system encounter rate.
    - Use of appropriate recovery systems to maximize recovery rate in all operable environmental conditions.
- Deployment of CGA and MSRC spill response equipment to recover and store oil while minimizing rig/derig and transit time, maximizing onboard storage and on-station time.
- Obtaining approval for decanting of oil to maximize storage capacity.
- Use of most efficient, high volume pumps for oil recovery and decanting, offloading and lightering.
- Use of advanced technology (such as thermal infrared and multi-spectral cameras) to detect oil on the water's surface and classify it as recoverable or non-recoverable. This will allow more efficient use of on-water recovery task forces, maximize recovery rates and expand operational windows. This advanced technology is effective in both day and night time surveillance activities depending upon atmospheric conditions.
- Early consideration of advanced oil removal methods (e.g. dispersant application and in-situ burning) and coordination/consultation with the USCG and appropriate Regional Response Team for obtaining permission to proceed as necessary.
- Providing effective communication systems to allow for the command and control of deployed resources to ensure safety, reduce response times, and collect information necessary to develop a comprehensive, timely, and accurate Common Operating Picture (COP).

6) Location Specific Worst Case Discharge Response

BP's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If the conditions are favorable for dispersant application and/or in-situ burning, once the proper approvals have been obtained and the proper planning is in place, dispersant application and/or in-situ burning of oil may be employed. Slick containment boom will be immediately called out and on scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 1,189,841 barrels. Temporary storage associated with skimming equipment equals 410,796 barrels. If additional storage is needed, various storage barges with a total capacity of 1,008,000 million+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be conducted, and operations deemed safe prior to the commencement of any containment/skimming operations.**

If the spill went unabated, shoreline impact in Cameron and/or Plaquemines Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection will include the use of CGA and MSRC near shore and shallow water skimmers with a total derated skimming capacity of 291,303 barrels. Temporary storage associated with skimming equipment equals 10,537 barrels. If additional storage is needed, various storage barges with a total capacity of 363,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. Contracts with AMPOL and MSRC will ensure access to 98,750 feet of 18" shoreline protection boom. **Figure 4** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies will be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), federal and state agencies that oversee and manage some of the resources that may be at risk, and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. BP's IMT has access to the applicable ACP(s) and GRP(s) Shoreline protection strategies that depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in the Tactics discussion below. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances.

Based on the anticipated worst case discharge scenario, BP can estimate onsite arrival of contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within approximately 72 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC) and expected travel time to spill site).

7) Response Strategies

BP will take action to provide a safe, coordinated response to contain and recover spilled oil in a timely manner. Response actions will be designed to provide protection strategies meant to recover oil and protect the responders, the public, wildlife and environmentally sensitive areas. Safety will take precedence over all other considerations during these operations.

Coordination of response assets will be supervised by the designation of a SIMOPS group as necessary for close quarter vessel response activities. Most often, this group will be used during source control events that require a significant number of large vessels operating independently to complete a common objective, in close coordination and support of each other. This group must also monitor the subsurface activities of each vessel (ROV, dispersant application, well control support, etc.).

In addition, these activities will be monitored by the IMT and UC via a structured COP established to track resource and slick movement in real time.

Offshore Response

Surveillance

- Aerial Observation:
  - Deployment of surveillance aircraft as soon as possible
  - Trained observer to provide on-site status reports
  - Aerial photography and visual confirmation
- Command and control platform at the site if needed
- Remote Sensing:
  - Use of thermal infrared and multi-spectral sensing systems or other technology to detect oil and classify it as recoverable or non-recoverable to enhance on-water recovery capability
  - Surveillance platforms should be appropriate for weather and atmospheric conditions to provide the greatest altitude (e.g. aircraft, aerostats or ship mounted)
  - Continued surveillance of oil movement by remote sensing systems
- Continuous monitoring of vessel assets using vessel monitoring systems

Dispersant application

- Place aerial dispersant providers on standby.
- Depending on the scenario, a Modular Subsea Dispersant Application Unit (MSDAU) may be ordered and installed at or adjacent to the spill site.
- Conduct analysis to determine appropriateness of dispersant application (refer to Section 18 of approved Oil Spill Response Plan).
- Obtain regulatory approval for use of surface and subsea dispersants.
- Caution will be taken to ensure safety of wildlife and avoid spraying over marine mammals, marine turtles, and flocks of birds.
- Conduct initial dispersant test to ensure effectiveness of dispersants.
- Confirm dispersant availability for current and long range operations.
- Coordinate deployment of a Special Monitoring of Applied Response Technologies (SMART) team as required.
- Coordinate movement of dispersants, aircraft, and support equipment and personnel.
- Initiate orders for additional dispersant stocks required for expected operations.

Dispersant monitoring

- BP will follow and comply with regulatory requirements in 40 CFR 300.913.

Containment boom

- Call out OSRO boom equipment early and expedite deployment.
- Ensure boom handling and mooring equipment is deployed with boom.
- Provide continuous reports to vessels to expedite their arrival at sites and provide for most effective containment.
- Use support vessels to deploy and maintain boom.

Dedicated offshore skimming systems

- Determine if weather conditions allow for skimming operations.
- Deployed to the highest concentration of oil.
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations.
- Deploy OSRO's mechanical recovery equipment such as OSRVs, OSRBs, and VOSS.
- Vessels should be organized into task forces or groups with consideration for effective communication and control.
- The use of alternative spill surveillance technologies could be used to guide skimming vessels during night time operations.
- FOSC/SOSC approval will be requested prior to decanting operations.

Storage Vessels

- Establish availability of contracted assets (Appendix E of BP GoM OSRP).
- Early call out (to allow for tug boat acquisition and deployment speeds).
- Phase mobilization to allow storage vessels to arrive with skimming systems.
- Position as closely as possible to skimming assets to minimize offloading time.

In-situ Burn Assets

- Determine appropriateness of in-situ burning in coordination with the FOSC and affected SOSC.
- Conduct analysis to determine appropriateness of in-situ burn application (refer to Section 19 of approved Oil Spill Response Plan).
- Obtain regulatory approval to conduct in-situ burn operations.
- Determine availability of fire boom and selected ignition systems.
- Determine assets to perform on-water operations.
- Build operations into safety plan.
- Initiate orders for additional fire boom stocks required for expected operations.
- Conduct initial test burn to ensure effectiveness.
- Conduct operations in accordance with an approved plan.

Adverse Weather Operations:

During adverse weather conditions, such as seas being greater three (3) feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. Safety will be the overriding factor and operations will cease at the order of the UC or vessel captain. In an emergency, ”stop work” may be directed by any crew member.

Near Shore Response Actions

Timing

- Put near shore assets on standby and deploy in accordance with planning based on the actual situation, real time trajectories and oil budgets.
- Support vessel identification and induction training in advance of spill nearing shoreline if possible.
- Outfitting of support vessels for specific missions.
- Deployment of assets based on actual movement of oil.

Considerations

- Water depth, vessel draft
- Shoreline gradient
- State of the oil
- Use of support vessels
- Distance of surf zone from shoreline

Surveillance

- Trained observer to direct skimming operations
- Continuous surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continuous monitoring of vessel assets

Dispersant Use

- Generally will not be approved within 3 miles of shore or with less than 10 meters of water depth
- Approval would be at Regional Response Team level (Region 6) on a case by case basis

Shoreline Protection Operations

Response Planning Considerations

- Review appropriate Area Contingency Plan(s).
- Locate and review appropriate Geographic Response and Site Specific Plans.
- Refer to associated Environmentally Sensitive Area Maps.
- Ensure capability of continuous analysis of trajectories run periodically during response.
- Order personnel and equipment.
- Perform aerial surveillance of oil movement.
- Perform Pre-impact beach cleaning and debris removal.
- Adhere to Shoreline Cleanup Assessment Team (SCAT) Plans.
- Determine requirements and availability of boom types, sizes and lengths.
- Consider need for in-situ burning in near shore areas.
- Assess current wildlife situation, especially status of migratory birds, threatened and endangered species
- Check for critical habitat in the area.
- Check for archeological sites and arrange assistance for the appropriate state agency when planning operations may impact these areas.

Placement of boom

- Position boom in accordance with the information gained from references listed above and based on the actual situation.
- Determine areas of natural collection and develop booming strategies accordingly.
- Assess timing of boom placement based on the most current trajectory analysis and the availability of each type of boom needed. Determine an overall booming priority and conduct booming operations accordingly. Consider:
    - Trajectories.
    - Weather forecast.
    - Oil impact forecast.
    - Verified spill movement.
    - Boom, manpower and vessel (shallow draft) availability.
    - Near shore boom and support material, (stakes, anchors, line).

Beach Preparation Considerations and Actions

- Review SCAT reports and recommendations.
- Monitor tide tables and weather to determine extent of high tides.
- Pre-clean beaches by moving waste/organic matter above high tide lines to minimize waste.
- Determine if it is considered a sensitive area or a critical habitat (i.e turtle nesting grounds).
- Determine logistical requirements of waste removal and disposal.
- Stage equipment and housing of response personnel as close to job site as possible to maximize on-site work time.
- Tend to boom, repair, replace and secure as needed (use of local assets may be advantageous).
- Maintain constant awareness of weather and oil movement for resource re-deployment as necessary.
- Consider earthen berms and shoreline protection boom to protect sensitive inland areas.
- Requisition earth moving equipment.
- Plan for efficient and safe use of personnel, ensuring:
    1. Assessment of remediation requirements, i.e., replacement of sands, rip rap, etc.
    2. Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan (NCP) Product Schedule for list of possible agents).
    3. Discussion with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
        - Access to areas.

- Possible response measures and impact of property and ongoing operations.
- Determination of any specific safety concerns.
- Any special requirements or prohibitions.
- Area security requirements.
- Handling of waste.
- Remediation expectations.
- Vehicle traffic control.
- Domestic animal safety concerns.
- Wildlife or exotic game concerns/issues.

Inland and Coastal Marsh Protection and Response Considerations and Actions

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by Unified Command only after discussions with local Stakeholder, as identified above.
  - In-situ burn may be considered when marshes have been impacted.
- Passive clean-up of marshes should be considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
  - Use of appropriate vessels.
  - Use of temporary walkways or roadways.
- Discuss and gain approval prior to cutting or moving vessels through vegetation.
- Discuss use of vessels that may disturb wildlife, i.e, airboats.
- Ensure safe movement of vessels through narrow cuts and blind curves.
- Consider the possibility that no response in a marsh may be best.
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
  - Planning for stockage of high use items for expeditious replacement.
  - Use of shallow water craft.
  - Use of communication systems appropriate ensure command and control of assets.
  - Use of appropriate boom in areas that can offer effective protection.
  - Planning of waste collection and removal to maximize cleanup efficiency.
- Consideration of on-site remediation of contaminated soils to minimize replacement operations and impact on the area.

8) Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system is placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds.

Boom	3 foot seas, 20 knot winds
Dispersants	Winds more than 25 knots Visibility less than 3 nautical miles Ceiling less than 1,000 feet.
FRU	8 foot seas
HOSS Barge/OSRB	8 foot seas
Koseq Arms	8 foot seas
OSRV	4 foot seas

9) Environmental Conditions in the GOM

Louisiana is situated between the easterly and westerly wind belts, and therefore experiences westerly winds during the winter and easterly winds in the summer. Average wind speed is generally 14-15 mph along the coast. Wave heights average 4 and 5 feet. However, during hurricane season, Louisiana has recorded wave heights ranging from 40 to 50 feet high and winds reaching speeds of 100 mph. Because much of southern Louisiana lies below sea level, flooding is prominent.

Surface water temperature ranges between 70 and 80 ˚ F during the summer months. During the winter, the average temperature will range from 50 and 60 ˚ F.

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November. About 97% of all tropical activity occurs within this window. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor (Saffir-Simpson Scale categories 1 and 2) hurricane days, and 96% of the major (Saffir-Simpson categories 3, 4 and 5) hurricane days occurring then. Maximum activity is in early to mid-September. Once in a few years there may be a hurricane occurring "out of season" - primarily in May or December. Globally, September is the most active month and May is the least active month.

WCD Scenario– BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS (81.3 statute miles from shore)
175,140 bbls of crude oil (Volume considering natural weathering, based on 24-hour estimate)
API Gravity 32.6°

FIGURE 4 – Equipment Response Time to MC 956 002A

Surveillance Aircraft

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Aero Commander	NA	2	Houma	2	2	0.6	4.6

Dispersant Aircraft

Name/Type	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Basler 67T	2000	2	Houma, LA	2	2	0.6	4.6
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
MSRC							
Boeing 737-500	4,125	4	Moses Lake, WA	3	0	6	9

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
95' FRV	22885	249	NA	6	Leeville, LA	2	0	2	5	1	10
95' FRV	22885	249	NA	6	Venice, LA	2	0	3	5	1	11
95' FRV	22885	249	NA	6	Vermilion, LA	2	0	3	5.5	1	11.5
95' FRV	22885	249	NA	6	Galveston, TX	2	0	2	14	1	19
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville, LA	8	0	4	18	2	32
HOSS Barge	76285	4000	3 Tugs	8	Harvey, LA	6	0	12	16	2	36

Offshore Response, cont'd.

Offshore Equipment Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
MSRC											
Florida Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Miami, FL	2	0	2	48	1	53
Gulf Coast Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Lake Charles, LA	2	0	4	16	1	23
Louisiana Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Fort Jackson, LA	2	0	4.5	13	1	20.5
Mississippi Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Pascagoula, MS	2	0	2	17	1	22
Southern Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Ingleside, TX	2	0	1	40	1	44
S.T. Benz Responder LFF 100 Brush + OSRV *2,640' 67" Curtain Pressure Boom*	18086	4000	NA	10	Grand Isle, LA	2	0	1	10	1	14
Texas Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Galveston, TX	2	0	1	30	1	34
MSRC 360 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	36000	3 Tugs + 1-2 Support Vessels	9	Tampa, FL	2.5	0	2	45	1	50.5
MSRC 402 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40300	3 Tugs + 1-2 Support Vessels	9	Pascagoula, MS	2.5	0	3	22	1	28.5
MSRC 403 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40300	3 Tugs + 1-2 Support Vessels	9	Ingleside, TX	2.5	0	2	52	1	57.5
MSRC 452 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40000	3 Tugs + 1-2 Support Vessels	9	Fort Jackson, LA	2.5	0	6	20	1	29.5
MSRC 570 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	56900	3 Tugs + 1-2 Support Vessels	9	Galveston, TX	2.5	0	2	34	1	39.5

Offshore Response, cont'd.

Recovered Oil Storage Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	29	0	6	18	1	54
CTCo 2608	NA	23000	1 Tug	6	Amelia	29	0	6	18	1	54
CTCo 2609	NA	23000	1 Tug	6	Amelia	29	0	6	18	1	54
CTCo 5001	NA	47000	1 Tug	6	Amelia	29	0	6	18	1	54

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	100000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	110000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	130000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	140000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	150000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	160000+	1 Tug	6	Venice, LA	37	0	4	18	1	60

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass, TX	2	6	17	10	1	36
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston, TX	2	6	12	10	1	31
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Vermilion, LA	2	6	5.5	10	1	24.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles, LA	2	6	7	10	1	26
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville, LA	2	6	2	10	1	21
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice, LA	2	6	5	10	1	24
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston, TX	4	12	12	10	2	40
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey, LA	4	12	3	10	2	31
Koseq Skimming Arms (10) Lamor brush	228850	60000	10 OSV	60	Galveston, TX	24	24	12	10	2	72
Koseq Skimming Arms (6) Lamor brush	108978	36000	6 OSV	36	Galveston, TX	24	24	12	10	2	72
Koseq Skimming Arms (2) Lamor brush	45770	12000	2 OSV	12	Harvey, LA	24	24	3	10	2	63
Koseq Skimming Arms (4) MariFlex 150 HF	72652	24000	4 OSV	24	Harvey, LA	24	24	3	10	2	63

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Ingleside	1	1	16.5	10	1	29.5
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Ingleside	1	1	16.5	10	1	29.5
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Ingleside	1	1	16.5	10	1	29.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Ingleside	1	1	7	10	1	20
Walosep 4 Skimmer (1)	3017	500	1 Utility	5	Ingleside	1	1	16.5	10	1	29.5
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Galveston	1	1	12	10	1	25
GT-185 Skimmer w Adaptor (2)	2742	1000	2 Utility	10	Galveston	1	1	12	10	1	25
Walosep 4 Skimmer (1)	3017	500	1 Utility	5	Galveston	1	1	12	10	1	25
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Galveston	1	1	12	10	1	25
Stress I Skimmer (1)	15840	500	1 Utility	5	Galveston	1	1	12	10	1	25
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Port Arthur	1	1	8.5	10	1	21.5
Desmi Skimmer (1)	3017	500	1 Utility	5	Lake Charles	1	1	7	10	1	20
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Lake Charles	1	1	7	10	1	20
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Lake Charles	1	1	7	10	1	20
Stress I Skimmer (2)	31680	1000	2 Utility	10	Lake Charles	1	1	7	10	1	20
LFF 100 Brush Skimmer (1) 1,320' 67" Curtain Pressure Boom	18086	1000	1 PSV	9	Lake Charles	1	1	7	10	1	20
LFF 100 Brush Skimmer (1) 1,320' 67" Curtain Pressure Boom	18086	1000	1 PSV	9	Lake Charles	1	1	7	10	1	20
LFF 100 Brush Skimmer (1) 1,320' 67" Curtain Pressure Boom	18086	1000	1 PSV	9	Lake Charles	1	1	7	10	1	20
Transrec 350 Skimmer (1) 1,320' 67" Curtain Pressure Boom	10567	1000	1 PSV	9	Lake Charles	1	1	7	10	1	20
Transrec 350 Skimmer (1) 1,320' 67" Curtain Pressure Boom	10567	1000	1 PSV	9	Lake Charles	1	1	7	10	1	20

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Baton Rouge	1	1	4	10	1	17
Stress I Skimmer (1)	15840	500	1 Utility	5	Grand Isle	1	1	1	10	1	14
LFF 100 Brush Skimmer (1) 1,320' 67" Curtain Pressure Boom	10567	1000	1 PSV	9	Houma	1	1	2	10	1	15
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Foilex 200 Skimmer (1)	1989	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Belle Chasse	1	1	3	10	1	16
Desmi Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	1	5	10	1	18
Stress I Skimmer (1)	15840	500	1 Utility	5	Fort Jackson	1	1	5	10	1	18
Crucial Disk 88/30 Skimmer (1) 1,320' 67" Curtain Pressure Boom	11122	1000	1 PSV	9	Fort Jackson	1	1	5	10	1	18
Crucial Disk 88/30 Skimmer (1) 1,320' 67" Curtain Pressure Boom	11122	1000	1 PSV	9	Fort Jackson	1	1	5	10	1	18
GT-185 Skimmer (1)	1371	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Pascagoula	1	1	6	10	1	19
Stress I Skimmer (1)	15840	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Stress II Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	10	1	19
Stress I Skimmer (1)	15840	500	1 Utility	5	Tampa	1	1	21.5	10	1	34.5
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Tampa	1	1	21.5	10	1	34.5
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Tampa	1	1	21.5	10	1	34.5
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Miami	1	1	27.5	10	1	40.5
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Miami	1	1	27.5	10	1	40.5
Desmi Skimmer (1)	3017	500	1 Utility	5	Miami	1	1	27.5	10	1	40.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Miami	1	1	27.5	10	1	40.5

** Utility Boats, Crew Boats, Supply Boats, or Fishing Vessels*

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	3	10	6	43
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	80*	160	Houston	1	2	11	10	1	25
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	12	10	6	33
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	11	10	6	32
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	7	10	6	28

Nearshore Response for Plaquemines Parish

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
46’ FRV	15257	65	NA	4	Aransas Pass	2	0	2	21	1	26
46’ FRV	15257	65	NA	4	Morgan City	2	0	2	2.5	1	7.5
46’ FRV	15257	65	NA	4	Lake Charles	2	0	2	7	1	12
46’ FRV	15257	65	NA	4	Venice	2	0	2	3.5	1	8.5
MSRC											
MSRC Lightning 2 LORI Brush Pack	5000	50	NA	3	Tampa	2	0	1	24	1	28
MSRC Quick Strike 2 LORI Brush Pack	5000	50	NA	3	Lake Charles	2	0	1	8	1	12
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2604	NA	20000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	37	0	4	18	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	37	0	4	18	1	60

Staging Area: Fourchon

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	12	2	1	19
SWS Egmopol	1810	100	NA	3	Leeville	2	2	2	2	1	8
SWS Marco	3588	20	NA	3	Lake Charles	2	2	7	2	1	14
SWS Marco	3588	34	NA	3	Leeville	2	2	2	2	1	8
SWS Marco	3588	34	NA	3	Venice	2	2	5	2	1	12
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	7	2	2	27
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	11.5	2	2	31.5
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	3	2	2	23
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	3	2	1	10
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	3	2	1	10
MSRC											
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Ingleside	1	1	2	17	1	22
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Galveston	1	1	12	2	1	17
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Belle Chasse	1	1	3	2	1	8
30 ft. Kvichak Marco I Skimmer	3588	24	NA	2	Pascagoula	1	1	6	2	1	11
AardVac Skimmer (1)	3840	500	1 Utility	5	Lake Charles	1	1	7	2	1	12
AardVac Skimmer (1)	3840	500	1 Utility	5	Pascagoula	1	1	6	2	1	11
AardVac Skimmer (2)	7680	1000	2 Utility	10	Miami	1	1	27.5	2	1	32.5
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Galveston	1	1	12	2	1	17
Queensboro Skimmer (5)	4525	2500	5 Pushboat	20	Lake Charles	1	1	7	2	1	12
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Belle Chasse	1	1	3	2	1	8
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Pascagoula	1	1	6	2	1	11
WP 1 Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	2	1	11
WP 1 Skimmer (1)	3017	500	1 Utility	5	Tampa	1	1	21.5	2	1	26.5
WP 1 Skimmer (1)	3017	500	1 Utility	5	Miami	1	1	27.5	2	1	32.5

Staging Area: Fourchon

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Fourchon	Travel to Deployment Site	Hrs to Deploy	Total Hrs
MSRC									
50’ 18” Boom	1 Crew	2	Port Arthur, TX	1	1	10	2	3	17
150’ 18” Boom	1 Crew	2	Galveston, TX	1	1	13	2	3	20
50’ 18” Boom	1 Crew	2	Ingleside, TX	1	1	18	2	3	25
9,700’ 18” Boom	5 Crew	10	Lake Charles, LA	1	1	8	2	3	15
100’ 18” Boom	1 Crew	2	Belle Chasse, LA	1	1	2	2	3	9
6,950’ 18” Boom	4 Crew	8	Pascagoula, MS	1	1	5	2	3	12
50’ 18” Boom	1 Crew	2	Tampa, FL	1	1	21	2	3	28
2,950’ 18” Boom	3 Crew	6	Miami, FL	1	1	27	2	3	34
AMPOL									
34,050’ 18” Boom	13 Crew	26	New Iberia, LA	2	2	4.1	2	12	22.1
16,000’ 18” Boom	7 Crew	14	Chalmette, LA	2	2	3	2	6	15
900’ 18” Boom	1 Crew	2	Morgan City, LA	2	2	3	2	2	11
11,800’ 18” Boom	5 Crew	10	Gonzales, LA	2	2	5	2	2	13
16,000’ 18” Boom	7 Crew	14	Port Arthur, TX	2	2	9	2	6	21

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	3	1	2	10
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	3	1	2	10
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	12	1	2	19
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	16.5	1	2	23.5
Bird Scare Guns (48)	NA	NA	NA	2	Lake Charles	2	2	7	1	2	14
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	2	1	2	9

Response Asset Totals	Total (bbls)
Offshore EDRC	1,189,841
Offshore Recovered Oil Storage	1,418,796+
Nearshore / Shallow Water EDRC	291,303
Nearshore / Shallow Water Recovered Oil Storage	373,537+

References

Ji, Zhen-Gang, Walter R. Johnson, Charles F. Marshall, and Eileen M. Lear. 2004. Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities. OCS Report 2004-026, Herndon, VA: U.S. Dept. of the Interior, Minerals Management Service, Environmental Division.

Appendix H: Coastal Zone Management Act (CZMA) Consistency Certification –

Coastal Zone Management Consistency Certification
State of Louisiana

Initial Exploration Plan
Type of OCS Plan

Mississippi Canyon Block 956
Area and Block

OCS-G 36263
Lease Number

The proposed activities described in detail in this OCS Plan comply with Louisiana's approved Coastal Management Program and will be conducted in a manner consistent with such Program.

BP Exploration & Production Inc.
Lessee or Operator

Certifying Official

01/17/2023
Date:

Evaluation of Consistency with the Enforceable Policies of the Louisiana Coastal Resource Program

1 Background

BP Exploration & Production Inc. (bp) is submitting an Initial Exploration Plan (EP) to the Bureau of Ocean Energy Management (BOEM). The EP covers the drilling and completion of one well with surface hole location in Mississippi Canyon (MC) Block 956 (MC 956). The EP also includes an alternate contingency re-spud surface locations for the proposed wellsite. This document evaluates bp's EP for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Louisiana, and evaluates the consistency of bp's EP with the enforceable policies of the Louisiana Coastal Resource Program (LCRP). The analysis, compliant with the Coastal Zone Management Act, is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the Environmental Impact Analysis (EIA). The EIA provides an environmental impacts analysis for the drilling activities based on the location in MC 956 and is included in EP Appendix I. The EIA was prepared in accordance with applicable regulations, including 30 CFR 550.212(o) and 550.227 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL BOEM 2015-N02, and BOEM 2015-N01.

The proposed activities will be conducted in accordance with BOEM, Bureau of Safety and Environmental Enforcement, and U.S. Environmental Protection Agency regulations, applicable NTLs, conditions in the approved permits, and lease stipulations. Required federal permits will be obtained, and activities are expected to be conducted in compliance with such regulations, NTLs, conditions, and stipulations.

The proposed activities will occur in Federal Outer Continental Shelf (OCS) waters, approximately 77 statute miles (124 km) from the nearest Louisiana shoreline (**Figure 1**). A dynamically positioned drilling vessel is anticipated to be on site for up to 140 days for drilling and completion activities.

All land-based support activities, including transport to and from the site, will be from Louisiana. No new expansion of facilities or personnel for shorebases is anticipated to result from this exploration project. No significant impacts on the State of Louisiana are expected from routine activities as described in bp's EP.

Spill response-related activities for the proposed activities under bp's EP are governed by the bp Regional Oil Spill Response Plan (ROSRP) was filed on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481). The ROSRP was confirmed in compliance and approved by the Bureau of Safety and Environmental Enforcement on 22 October 2021. bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in the EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

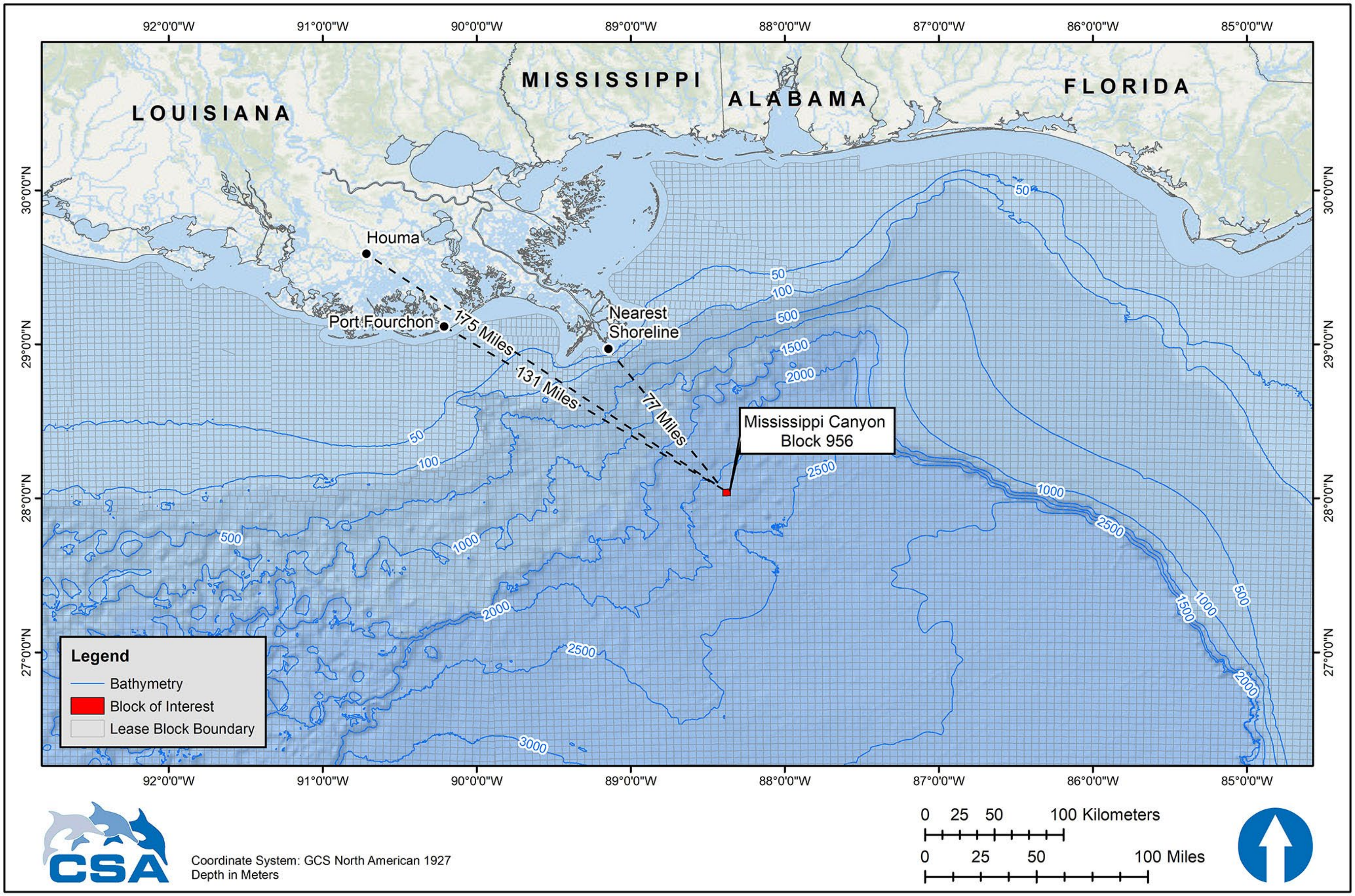


Figure 1. Location of Mississippi Canyon Block 956 relative to the Louisiana shoreline and offshore bathymetric contours.

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in MC 956, projected using information in the 30-day Oil Spill Risk Analysis model for the Gulf of Mexico (see Ji et al., 2004), indicates there is up to an 11% conditional probability of a spill contacting the Louisiana shoreline (Plaquemines Parish) within 30 days of a spill. Using Launch Point 59 (as indicated in Ji et al., 2004), the model predicts potential shoreline contact within 30 days of a spill ranging from Cameron Parish, Louisiana to Bay County, Florida.

BOEM (2017) presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons from five launch points across the Gulf of Mexico. Seasonally, the highest probability of shoreline contact (based on a shoreline segment [county/parish] basis) within 60 days of a spill were estimated to be:

- 10% in winter (January–March), Matagorda County, Texas;
- 13% in spring (April–June), Terrebonne Parish, Louisiana;
- 5% in summer (July–September), Kenedy and Brazoria counties, Texas; and
- 5% in autumn (October – December), Matagorda County, Texas.

The sum of the conditional probabilities of contact across all state shoreline segments (counties or parishes) values equals the overall seasonal conditional probability value of contact for any statewide shoreline presented in Section A.9.2 of the EIA for the 60-day OSRA. For Louisiana, the model predicts a 52% conditional probability of contact in spring, a 12% conditional probability of contact in summer, and winter, and a 4% conditional probability of contact in autumn within 60 days of a spill.

2 Louisiana Coastal Resource Program Guidelines

Pursuant to the Louisiana State and Local Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 et seq.), the Office of Coastal Management of the Louisiana Department of Natural Resources has created guidelines to implement the LCRP (LAC 43:I.Chapter 7). The guidelines are organized as a set of performance standards that are used to evaluate the impacts of a proposed action on coastal resources. All guidelines applicable to bp's proposed project in MC 956 are summarized in the following sections.

§701. Guidelines Applicable to All Uses

A. *The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.*

The guidelines have been read in their entirety in preparation of this consistency analysis for the MC 956 project, and bp expects to comply with all applicable guidelines.

B. *Conformance with applicable water and air quality laws, standards, and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.*

Addressed in EP Sections 6 and 7 and Appendix I.

C. *The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.*

The guidelines have been read in their entirety, and all applicable guidelines are summarized and addressed herein.

F. *Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines:*

1. *type, nature, and location of use;*
2. *elevation, soil, and water conditions and flood and storm hazard characteristics of site;*
3. *techniques and materials used in construction, operation, and maintenance of use;*
4. *existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity; and impacts on them;*
5. *availability of feasible alternative sites or methods of implementing the use;*
6. *designation of the area for certain uses as part of a local program;*
7. *economic need for use and extent of impacts of use on economy of locality;*
8. *extent of resulting public and private benefits;*
9. *extent of coastal water dependency of the use;*
10. *existence of necessary infrastructure to support the use and public costs resulting from use;*
11. *extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited;*
12. *proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands;*
13. *the extent to which regional, state, and national interests are served including the national interest in resources and the siting of facilities in the coastal zone as identified in the coastal resources program;*
14. *proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs;*
15. *likelihood of; and extent of impacts of; resulting secondary impacts and cumulative impacts;*
16. *proximity to and extent of impacts on public lands or works, or historic, recreational, or cultural resources;*
17. *extent of impacts on navigation, fishing, public access, and recreational opportunities;*
18. *extent of compatibility with natural and cultural setting; and*
19. *extent of long-term benefits or adverse impacts.*

Addressed in EP Sections 1, 5, and 9, and Appendix I.

G. *It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses, and activities shall be planned, sited, designed, constructed, operated, and maintained to avoid to the maximum extent practicable significant:*

1. *reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow;*
2. *adverse economic impacts on the locality of the use and affected governmental bodies;*
3. *detrimental discharges of inorganic nutrient compounds into coastal waters;*
4. *alterations in the natural concentration of oxygen in coastal waters;*
5. *destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features;*
6. *adverse disruption of existing social patterns;*
7. *alterations of the natural temperature regime of coastal waters;*
8. *detrimental changes in existing salinity regimes;*
9. *detrimental changes in littoral and sediment transport processes;*
10. *adverse effects of cumulative impacts;*
11. *detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging;*
12. *reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest;*
13. *discharges of pathogens or toxic substances into coastal waters;*
14. *adverse alteration or destruction of archaeological, historical, or other cultural resources;*
15. *fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas;*
16. *adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands;*
17. *adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern;*
18. *adverse disruptions of coastal wildlife and fishery migratory patterns;*
19. *land loss, erosion, and subsidence;*
20. *increases in the potential for flood, hurricane, and other storm damage, or increases in the likelihood that damage will occur from such hazards; and*
21. *reduction in the long-term biological productivity of the coastal ecosystem.*

   Addressed in EP Sections 5 and 6, and Appendix I.

I. *Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.*

Addressed in EP Sections 1 and 2.

§703. Guidelines for Levees

Not applicable.

§705. Guidelines for Linear Facilities

Not applicable.

§707. Guidelines for Dredged Spoil Deposition

Not applicable.

§709. Guidelines for Shoreline Modification

Not applicable.

§711. Guidelines for Surface Alterations

Not applicable. Surface alterations to shorebases are not required for this project.

§713. Guidelines for Hydrologic and Sediment Transport Modifications

Not applicable.

§715. Guidelines for Disposal of Wastes

A. *The location and operation of waste storage, treatment, and disposal facilities shall be avoided in wetlands to the maximum extent practicable, and best practical techniques shall be used to minimize adverse impacts which may result from such use.*

Addressed in EP Sections 6 and 13, and Appendices D and I.

B. *The generation, transportation, treatment, storage, and disposal of hazardous wastes shall be pursuant to the substantive requirements of the Department of Environmental Quality adopted pursuant to the provisions of R.S. 30:217, et seq.; as amended and approved pursuant to the Resource Conservation and Recovery Act of 1976 P.L. 94-580, as amended, and of the Office of Conservation for injection below surface.*

Addressed in EP Sections 6 and 13, and Appendices D and I.

C. *Waste facilities located in wetlands shall be designed and built to withstand all expectable adverse conditions without releasing pollutants.*

Not applicable.

D. *Waste facilities shall be designed and constructed using best practical techniques to prevent leaching, control leachate production, and prevent the movement of leachate away from the facility.*

Not applicable.

E. *The use of overland flow systems for nontoxic, biodegradable wastes, and the use of sump lagoons and reservoirs utilizing aquatic vegetation to remove pollutants and nutrients shall be encouraged.*

Not applicable.

F. *All waste disposal sites shall be marked and, to the maximum extent practicable, all components of waste shall be identified.*

Not applicable.

G. *Waste facilities in wetlands with identifiable pollution problems that are not feasible and practical to correct shall be closed and either removed or sealed and shall be properly revegetated using the best practical techniques.*

Not applicable.

H. *Waste shall be disposed of only at approved disposal sites.*

Addressed in EP Sections 6 and 13, and Appendices D and I.

I. *Radioactive wastes shall not be temporarily or permanently disposed of in the coastal zone.*

Radioactive wastes may be generated during the completion phase of the project and are addressed in EP Sections 6 and 13, and Appendix D.

§717. Guidelines for Uses that Result in the Alteration of Waters Draining into Coastal Waters

Not applicable.

§719. Guidelines for Oil, Gas, and Other Mineral Activities

A. *Geophysical surveying shall utilize the best practical techniques to minimize disturbance or damage to wetlands, fish and wildlife, and other coastal resources.*

Not applicable; all geophysical survey work related to this project was conducted on the OCS in MC 956, approximately 77 statute miles (124 km) from the nearest Louisiana shoreline. Geological and geophysical information is provided in EP Section 3.

B. *To the maximum extent practicable, the number of mineral exploration and production sites in wetland areas requiring floatation access shall be held to the minimum number, consistent with good recovery and conservation practices and the need for energy development, by directional drilling, multiple use of existing access canals, and other practical techniques.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in MC 956, approximately 77 statute miles (124 km) from the nearest Louisiana shoreline.

C. *Exploration, production, and refining activities shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Mineral operations in wildlife preserves and management areas shall be conducted in strict accordance with the requirements of the wildlife management body.*

Addressed in EP Sections 1, 5, and 9, and Appendix I. No activities will be conducted in wildlife preserves or management areas. All drilling activities related to this project will be conducted on the OCS in MC 956. Shore-based support will originate from Louisiana. The nearest Louisiana shoreline is approximately 77 statute miles (124 km) from the project area.

During a large-scale incident, a few of Louisiana's Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas that could potentially be affected by oiling within 30 days of a large spill (per the 30-day Oil Spill Risk Analysis presented by Ji et al., 2004). Potentially affected areas, along with the natural resources found in each area, are provided in **Table 1**.

D. *Mineral exploration and production facilities shall be to the maximum extent practicable designed, constructed, and maintained in such a manner to maintain natural water flow regimes, avoid blocking surface drainage, and avoid erosion.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in MC 956, approximately 77 statute miles (124 km) from the nearest Louisiana shoreline.

E. *Access routes to mineral exploration, production, and refining sites shall be designed and aligned so as to avoid adverse impacts on critical wildlife and vegetation areas to the maximum extent practicable.*

Addressed in EP Sections 12 and 13, and Appendix I.

F. *Drilling and production sites shall be prepared, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment.*

Addressed in EP Sections 1, 2, 8, and 9.

Table 1. Louisiana Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas and natural resources within the geographic range of potential shoreline oil contact within 30 days of a large discharge event based on Oil Spill Risk Analysis Launch Point 59 (as referenced from Ji et al., 2004).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Cameron Parish	
Lacassine National Wildlife Refuge (NWR)	Established in 1937, Lacassine NWR is approximately 35,000 acres of freshwater marsh. Approximately half of the acreage of the NWR is natural freshwater marsh and open water. Notable wildlife includes nesting colonies of wading and water birds, alligators, eagles, falcons, and Louisiana black bears as well as wintering populations of several species of ducks. The NWR is known for vast numbers of pintails congregating each winter. The NWR is available for a multitude of recreational opportunities, including fishing, hunting, boating, and hiking (U.S. Fish and Wildlife Service [USFWS], n.d. - 1.
Peveto Woods Bird and Wildlife Sanctuary	A bird sanctuary owned by the Baton Rouge Audubon Society; this sanctuary is a 40-acre tract of coastal land in Cameron Parish. During the spring and fall migrations, the sanctuary is home to numerous species of songbirds. It is estimated that nearly 2 million birds seek refuge in the sanctuary each year before and after their trans-Gulf migrations. The sanctuary is also used by numerous species of butterflies, including the migratory Monarch butterfly (Baton Rouge Audubon Society, 2022).
Rockefeller Wildlife Refuge and Game Preserve	Rockefeller Wildlife Refuge, located in eastern Cameron and western Vermilion Parishes, is owned, and maintained by the State of Louisiana. The refuge is a flat, treeless area with highly organic soils that are capable of producing immense quantities of waterfowl foods in the form of annual emergent and submerged aquatics. When deeded to the state, the refuge encompassed approximately 86,000 acres, but beach erosion has taken a heavy toll, and the most recent surveys indicate only 76,042 acres remain. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge 6 miles (10 km) from the Gulf of Mexico. Common resident animals include Mottled Ducks, nutria, muskrat, rails, raccoon, mink, otter, opossum, white-tailed deer, and alligators. An abundant fisheries population provides recreational opportunities to fishermen seeking shrimp, redfish, speckled trout, black drum, and largemouth bass, among others (Louisiana Department of Wildlife and Fisheries, n.d. – a).
Sabine NWR	Sabine NWR includes 124,511 acres of fresh, intermediate, and brackish marshes that provide habitat for waterfowl and other birds. Designated as an Internationally Important Bird Area, the refuge is known to provide habitat for more than 300 species of birds, 26 species of mammals, 41 species of reptiles and amphibians, 132 species of fish, and 68 species of marine invertebrates. Common bird species include Mottled Ducks, Great Egrets, Neotropic Cormorants, Snowy Egrets, and various species of wading birds and shorebirds. American alligators are known to be very common in the refuge as well (USFWS, n.d. - b).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Vermilion Parish	
Paul J. Rainey Wildlife Refuge and Game Preserve	Paul J. Rainey Wildlife Refuge and Game Preserve is a privately owned 26,000-acre coastal wetland in Vermilion Parish owned by the National Audubon Society. Formerly open to gas drilling, hydrocarbon exploration ended in 1999. Notable faunae include deer, muskrats, otters, geese, and numerous other species of birds. No hunting or fishing is currently allowed in the Preserve (National Audubon Society, n.d.).
Rockefeller Wildlife Refuge and Game Preserve	See description under Cameron Parish.
State Wildlife Refuge	State Wildlife Refuge is a 13,000-acre tract owned by the State of Louisiana. Located on the southwest shore of Vermilion Bay, the focus of the refuge is on natural resource conservation. The refuge is an important waterfowl wintering area and serves as habitat for numerous species of shorebirds, wading birds, alligators, shrimp, fish, and crabs. Mammals such as raccoons, muskrats, nutria, mink, and deer are common as well (Louisiana Department of Wildlife and Fisheries, n.d. – b).
Terrebonne Parish	
Isle Dernieres Barrier Islands Refuge	This refuge is made up of three barrier islands offshore of Terrebonne Parish: Wine Island, Whiskey Island, and Raccoon Island, for a total of approximately 630 acres. The primary management goal of the refuge is to provide and protect habitat for nesting waterbirds. Raccoon Island is one of the most important waterbird nesting sites on the Gulf coast (Louisiana Department of Wildlife and Fisheries, n.d. – c).
Mandalay NWR	Mandalay NWR was established in 1996 as 4,419 acres of freshwater marsh and cypress-tupelo swamp. Access to the refuge is by boat only. Popular activities in the refuge include wildlife observation, boating, fishing, and hunting. The refuge proves important habitat for wintering waterfowl of the Mississippi flyway. Other notable wildlife includes ducks, white tailed deer, alligators, and numerous bird species, including herons, egrets, and eagles (USFWS, n.d. - c).
Point-aux-Chenes Wildlife Management Area (WMA)	Point-aux-Chenes WMA is a 35,000-acre marshland owned and operated by the Louisiana Department of Wildlife and Fisheries. Access to the WMA typically is limited to boats as there are no roads through the marshland. Notable game species present in the WMA include waterfowl, deer, rabbit, squirrels, rails, gallinules, and snipe. Both saltwater and freshwater fishing in the WMA is considered excellent due to the nearby Timbalier and Terrebonne Bay watersheds. Annual lotteries are held by the Louisiana Department of Wildlife and Fisheries for a waterfowl hunt exclusively for physically challenged hunters and a deer hunt for youth (Louisiana Department of Wildlife and Fisheries, n.d. - d).
Lafourche Parish	
Wisner WMA	Owned by the Edward Wisner Donation Advisory Committee, the WMA is approximately 21,000 acres of bayous and canals. The WMA is open seasonally for small game and waterfowl hunting.
Point-aux-Chenes WMA	See description under Terrebonne Parish.

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Jefferson Parish	
Grand Isle State Park	Grand Isle State Park is a beach ridge that serves as a breakwater between the Gulf of Mexico and channels that connect to tributaries of the Mississippi River. The park is a well-known location for excellent fishing, birding, crabbing, hiking, and boating, including a departure point for deep sea fishing in the Gulf of Mexico (Louisiana Office of Tourism, 2022). Grand Isle State Park was heavily damaged by Hurricane Ida in August 2021 and as of August 2022, remains closed to the public.
Plaquemines Parish	
Delta NWR	The Delta NWR was established in 1935 and covers 49,000 acres formed by the deposition of sediment from the Mississippi River. Its lush vegetation is the food source for a multitude of fish, waterfowl, and animals. The Delta NWR is the winter home for hundreds of thousands of snow geese, coots, and ducks. Endangered and threatened species in the NWR include the Piping Plover and the American alligator, which was de-listed as an endangered species in 1987 but remains listed as threatened due to similarity in appearance to the endangered American crocodile. The Delta NWR supports a wide variety of non-listed wildlife species. Tens of thousands of wintering waterfowl utilize the food resources found in the Delta NWR. Large numbers of other bird species can be found in the NWR, with numbers peaking during the spring and fall migrations. Large numbers of wading birds nest on the refuge, and thousands of shorebirds can be found on tidal mudflats and deltaic splays. Numerous furbearers and game mammals are year-round residents, and the marshes and waterways provide year-round and seasonal habitat for a diversity of fish and shellfish species (USFWS, n.d. - d).
Pass-a-Loutre WMA	The Pass-a-Loutre WMA is located in southern Plaquemines Parish at the mouth of the Mississippi River, approximately 10 miles (16 km) south of Venice and is accessible only by boat. The area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals interspersed with intermediate and fresh marshes. The area is owned by the Louisiana Department of Wildlife and Fisheries and encompasses approximately 115,000 acres. The area is home to numerous species of shorebirds and other waterfowl. Alligators and small mammals are abundant. The inland waters provide habitat for fish, shrimp, and crabs (Louisiana Department of Wildlife and Fisheries, n.d. - e).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Breton NWR	Established in 1904, the Breton NWR is the second oldest NWR in the United States. Historically, the Breton NWR has been the site of a lighthouse station (destroyed by Hurricane Katrina), a quarantine station, a small fishing village, and an oil production facility. The Chandeleur Islands (where Breton NWR is located) are designated as critical habitat (as defined by NMFS) for the Endangered Piping Plover, which is a common visitor to the refuge during fall, winter, and spring. The Western Gulf Coast population of Brown Pelicans was de-listed under the Endangered Species Act in 2009. The Brown Pelican is a year-round resident of southeast Louisiana, and the Breton NWR serves as important breeding grounds for these birds. The Breton NWR also provides habitat for colonies of nesting wading birds and seabirds as well as wintering shorebirds and waterfowl. Twenty-three species of seabirds and shorebirds frequently use the refuge, and 13 species nest on the various islands. The most abundant nesters are Brown Pelicans, Laughing Gulls, Royal Gulls, and Caspian and Sandwich Terns. Waterfowl winter near the refuge islands and use the adjacent shallows, marshes, and sounds for feeding and for protection during inclement weather. Redheads and Lesser Scaup account for the majority of waterfowl on the refuge. Other wildlife species found in the NWR include nutria, raccoons, and several species of sea turtles (USFWS, n.d. - e).
St. Bernard Parish	
Biloxi WMA	Biloxi WMA is a brackish and saline marsh encompassing more than 35,000 acres. Due to the large number of bays and bayous, the WMA is home to numerous species of fish, crabs, waterfowl, and furbearers. Popular activities in the WMA include hunting, trapping, fishing, boating, and birding. Game species present in the WMA include rabbits, rails, gallinules, snipe, ducks, geese, and deer (Louisiana Department of Wildlife and Fisheries, n.d.-f).
Breton NWR	See description under Plaquemines Parish.

G. *All drilling activities, supplies, and equipment shall be kept on barges, on drilling rigs, within ring levees, or on the well site.*

Addressed in EP Section 1.

H. *Drilling ring levees shall to the maximum extent practicable be replaced with small production levees or removed entirely.*

Not applicable; no drilling ring levees will be used during the proposed activities.

I. *All drilling, and production equipment, structures, and storage facilities shall be designed and constructed utilizing best practical techniques to withstand all expectable adverse conditions without releasing pollutants.*

Addressed in EP Sections 1 and Appendix I.

J. *Mineral exploration, production, and refining facilities shall be designed and constructed using best practical techniques to minimize adverse environmental impacts.*

Addressed in EP Sections 1 and 2, and Appendix I.

K. *Effective environmental protection and emergency or contingency plans shall be developed and complied with for all mineral operations.*

Addressed in EP Sections 1, 2, 3, and 8, and Appendices G and I.

L. *The use of dispersants, emulsifiers, and other similar chemical agents on oil spills is prohibited without the prior approval of the Coast Guard or Environmental Protection Agency on-scene coordinator, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan.*

Addressed in EP Appendix I.

M. *Mineral exploration and production sites shall be cleared, revegetated, detoxified, and otherwise restored as near as practicable to their original condition upon termination of operations to the maximum extent practicable.*

Addressed in EP Section 1 and Appendix I.

N. *The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.*

Addressed in EP Section 1.

3 Consistency Certification

The analysis indicates that bp's EP for MC 956 is consistent with the enforceable policies of the LCRP according to the guidelines provided by the LCRP. Routine operations will have limited environmental impacts in the immediate vicinity of the drilling activities. Land-based support activities will originate from Louisiana.

In the event of an accidental spill, bp will implement the measures of its ROSRP, which details plans and procedures for containment, recovery, and removal of an oil spill. This project is expected to conform to existing regulatory requirements. The EP describes the project and related activities, and the EIA analyzes potential environmental impacts from an unplanned release. The intent and requirements of enforceable Louisiana Statutes have been considered and discussed as well as other information requirements of Louisiana. A Coastal Zone Management Act consistency certification according to 16 U.S.C. 1456(c)(3)(B) and 15 CFR 930.76(c) for Louisiana is provided on the cover page.

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Coastal Zone Management Consistency Certification
State of Mississippi

Initial Exploration Plan
Type of OCS Plan

Mississippi Canyon Block 956
Area and Blocks

OCS-G 36263
Lease Number

The proposed activities described in detail in this OCS Plan comply with Mississippi's approved Coastal Management Program and will be conducted in a manner consistent with such Program.

BP Exploration & Production Inc.
Lessee or Operator

[signature]
Certifying Official

01/17/2023
Date:

Evaluation of Consistency with Mississippi Goals

1.0 Project Description

BP Exploration & Production Inc. (bp) is submitting an Initial Exploration Plan (EP) for Mississippi Canyon Block 956 (MC 956). The EP covers the drilling and completion of one well with surface and bottom hole locations in MC 956. Drilling is estimated to require up to 140 days. The project is located approximately 77 statute miles (124 km) to the nearest shoreline (Louisiana) and approximately 147 statute miles (237 km) from the nearest Mississippi shoreline (**Figure 1**).

This document evaluates bp's EP for any reasonably foreseeable coastal effects on the land, water uses, and natural resources of the coastal zone of Mississippi, pursuant to the enforceable policies of the Mississippi Coastal Program (MCP). The analysis, compliant with the Coastal Zone Management Act (CZMA) of 1972, is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the Environmental Impact Analysis (EIA), which addresses the proposed wells based on the surface hole locations and is included in EP Appendix I. The EIA was prepared in accordance with applicable regulations, including 30 CFR 550.212(o) and 550.227 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL 2015-N02.

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in MC 956, projected using information in the 30-day Oil Spill Risk Analysis model for the Gulf of Mexico (see Ji et al., 2004), indicates there is <0.5% conditional probability of a spill contacting any Mississippi shoreline within 30 days of a spill.

BOEM (2017) presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons from five launch points across the Gulf of Mexico. Seasonally, the highest probability of shoreline contact (based on a shoreline segment [county/parish] basis) within 60 days of a spill were estimated to be:

- 10% in winter (January–March), Matagorda County, Texas;
- 13% in spring (April–June), Terrebonne Parish, Louisiana;
- 5% in summer (July–September), Kenedy and Brazoria counties, Texas; and
- 5% in autumn (October – December), Matagorda County, Texas.

The sum of the conditional probabilities of contact across all state shoreline segments (counties or parishes) values equals the overall seasonal conditional probability value of contact for any statewide shoreline presented in Section A.9.2 of the EIA for the 60-day OSRA. For Mississippi, the model predicts a 1% conditional probability of contact in spring and summer, and <0.5% conditional probability of contact in autumn and winter within 60 days of a spill.

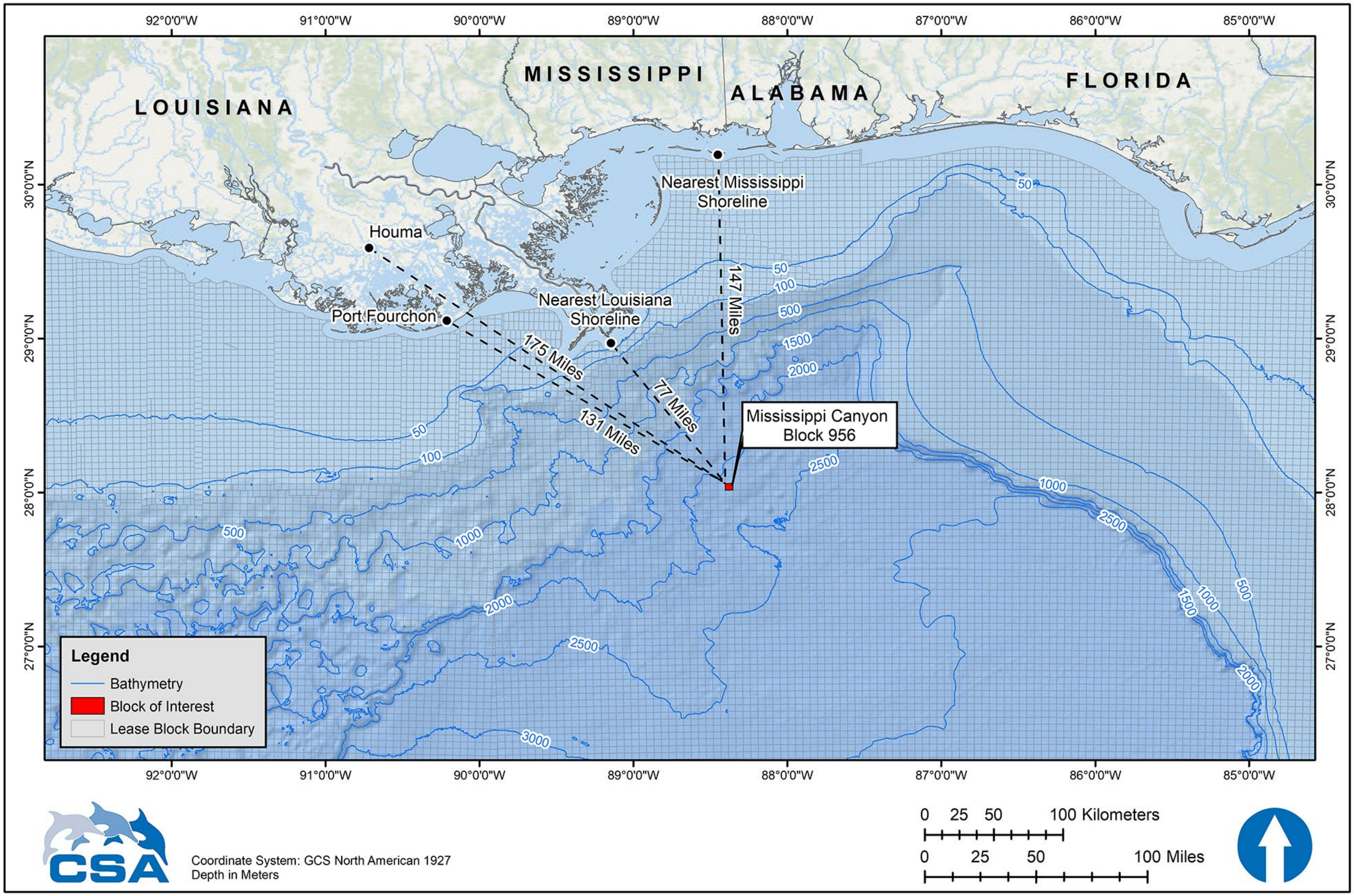

Figure 1. Location of Mississippi Canyon Block 956 relative to the Louisiana and Mississippi shorelines and offshore bathymetric contours.

2.0 Mississippi Coastal Program Goals

As authorized by the CZMA, the State of Mississippi developed a Coastal Management Program to allow for the review of proposed federal license and permit activities affecting any coastal use or resources in or outside of the Mississippi coastal zone. The Outer Continental Shelf (OCS)-related oil and gas exploratory and development activities having potential impact on the Mississippi Coastal Zone are based on the location of the proposed facilities, access to those sites, best practical techniques for drilling locations, drilling equipment guidelines for the prevention of adverse environmental effects, effective environmental protection, emergency plans, and contingency plans.

The MCP has established guidelines and procedures as outlined by the goals listed in MS Code § 57-15-6 (2020). The goals identified by the State of Mississippi in recognition of the CZMA of 1972 are provided in **Section 2.0**. The following analysis evaluates the consistency of bp's EP with each of the Mississippi Coastal Program goals.

Goal 1: To provide for reasonable industrial expansion in the coastal area and to ensure the efficient utilization of waterfront industrial sites so that suitable sites are conserved for water-dependent industry.

The activities proposed in the EP will have no effects on utilization of coastal waterfront sites in Mississippi. The activities proposed in the EP will be conducted in federal OCS waters, approximately 147 miles (237 km) from the Mississippi coast. The project will use existing shorebases in Louisiana, and there will be no onshore activities or facilities in the Mississippi coastal zone. Therefore, the EP is consistent with the goal of conserving Mississippi coastal areas for water-dependent industrial sites.

Goal 2: To conserve resources of the coastal area for this and succeeding generations in accordance with the public policies expressed in Sections 39-7-3, 49-15-1, 49-17-3, 49-27-3 and 51-3-1, Mississippi Code of 1972.

No effects on Mississippi's coastal area are expected. The proposed activities will be conducted in federal OCS waters, approximately 147 miles (237 km) from the Mississippi coast. The project will use existing shorebases in Louisiana, and there will be no onshore activities or facilities in the Mississippi coastal zone. Therefore, as discussed in EP Appendix I (EIA), there will be no impacts to Mississippi's coastal area under normal operations. In the event of a spill, bp will implement the plans and procedures of its Regional Oil Spill Response Plan (ROSRP) as summarized in EP Section 8 (Oil Spill Information), which describes specific response actions for potential spill events and addresses plans and procedures for containment, recovery, and removal of an oil spill. Therefore, the plan is consistent with the preservation of Mississippi's coastal areas.

Goal 3: To consider the national interest involved in planning for and in the siting of facilities in the coastal area.

The activities proposed in the EP will have no effects on the planning or siting of facilities in the Mississippi coastal area. The activities proposed in the EP will be conducted in federal OCS waters, approximately 147 miles (237 km) from the Mississippi coast. The project will use existing shorebases in Louisiana, and there will be no onshore activities or facilities in the Mississippi coastal zone. Therefore, the EP is consistent with the goal of consideration of national interests in planning of siting of facilities in the Mississippi coastal area.

Goal 4: To encourage the preservation of natural scenic qualities in the coastal areas.

The plan is not expected to affect natural scenic qualities in the Mississippi coastal zone. The proposed activities will be conducted in federal OCS waters, approximately 147 miles (237 km) from the Mississippi coast. The project will use existing shorebases in Louisiana, and there will be no onshore activities or facilities in the Mississippi coastal zone. Therefore, as discussed in EP Appendix I (EIA), no impacts to Mississippi's coastal habitats are expected under normal operations. In the event of a spill, bp will implement the plans and procedures of its ROSRP as summarized in EP Section 8 (Oil Spill Information), which describes specific response actions for potential spill events and addresses plans and procedures for containment, recovery, and removal of an oil spill. Therefore, the plan is consistent with the preservation of Mississippi's coastal zone and its natural scenic qualities.

Goal 5: To assist local governments in the provision of public facilities services in a manner consistent with the coastal program.

As the proposed activities are located approximately 147 miles (237 km) from the Mississippi coast and will use existing shorebases in Louisiana, the plan will have no effects on local governments or public facilities services in Mississippi. The plan is consistent with the State's goal.

Goal 6: To ensure the effective, coordinated implementation of public policy in the coastal area of Mississippi comprised of Hancock, Harrison and Jackson Counties.

The activities in the proposed EP are not expected to affect public policy in Mississippi. The proposed activities will be conducted in federal OCS waters, approximately 147 miles (237 km) from the Mississippi coast. The project will use existing shorebases in Louisiana, and there will be no onshore activities or facilities in the Mississippi coastal zone. The plan is consistent with the State's goal.

3.0 Consistency Certification

The analysis indicates that bp's EP for block MC 956 is consistent with the goals provided by the MCP. Routine operations will have limited environmental impacts in the immediate vicinity of the wellsite and are not anticipated to impact coastal areas of Mississippi. All land-based support activities, including transport to and from the site, will be from Louisiana.

In the event of an accidental spill, bp will implement the measures of its revised ROSRP, which details plans and procedures for containment, recovery, and removal of an oil spill. This project is expected to conform to existing regulatory requirements. The EP thoroughly describes the project and related activities, and the EIA analyzes potential environmental impacts. The intent and requirements of all enforceable Mississippi statutes have been considered and discussed as well as other information requirements of Mississippi. A CZMA consistency certification according to 16 U.S.C. 1456(c)(3)(B) and 15 CFR 930.76(c) for Mississippi is provided on the cover page.

Appendix I: Environmental Impact Analysis (EIA) –

Environmental Impact Analysis

for an

INITIAL EXPLORATION PLAN
for
Mississippi Canyon Block 956 (OCS-G-36263)
Offshore Louisiana and Mississippi

November 2022

Prepared for:

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Table of Contents

Table of Contents (Continued)

List of Tables

List of Figures

Acronyms and Abbreviations

§	section
µPa	micropascal
ac	acre
ADIOS2	Automated Data Inquiry for Oil Spills 2
bbl	barrel
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	blowout preventer
BOPD	barrels of oil per day
bp	bp Exploration & Production Inc.
BSEE	Bureau of Safety and Environmental Enforcement
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CFR	Code of Federal Regulations
dB	decibel
DP	dynamically positioned
DPS	distinct population segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIA	Environmental Impact Analysis
EIS	Environmental Impact Statement
EP	Exploration Plan
ESA	Endangered Species Act
FAD	fish aggregating device
FR	*Federal Register*
GPS	global positioning system
GMFMC	Gulf of Mexico Fishery Management Council
H_2S	hydrogen sulfide
ha	hectare
HAPC	Habitat Area of Particular Concern
Hz	hertz
IPF	impact-producing factor
IMT	Incident Management Team
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Mississippi Canyon
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NAAQS	National Ambient Air Quality Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRDA	Natural Resource Damage Assessment
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analysis
PAH	polycyclic aromatic hydrocarbons
PK	zero-to-peak sound pressure level
PM	particulate matter
PSD	Prevention of Significant Deterioration
re	referenced to
ROSRP	Regional Oil Spill Response Plan
SBM	synthetic-based drilling muds
SEL_{24h}	sound exposure level over 24 hours
SEMS	Safety and Environmental Management system
SO_x	sulfur oxides
SPL	root-mean-square sound pressure level
SWSS	Sperm Whale Seismic Study
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WCD	worst case discharge

Introduction

BP Exploration & Production Inc. (bp) is submitting an Initial Exploration Plan (EP) for Mississippi Canyon (MC) Block 956 (MC 956), Gulf of Mexico, Outer Continental Shelf (OCS)-G 36263. Under this EP, bp proposes to drill and complete one well with a surface hole location in MC 956. The Environmental Impact Analysis (EIA) provides information on potential impacts to environmental, archaeological, and socioeconomic resources that could be affected by bp's proposed activities in the project area under this EP.

MC 956 is located within the Central Gulf of Mexico OCS Planning Area, approximately 77 statute miles (124 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 131 statute miles (211 km) from the regional onshore support base (Port Fourchon, Louisiana), and 175 statute miles (282 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the proposed primary wellsite location is approximately 2,081 m (6,826 ft). A dynamically positioned (DP) drillship is anticipated to be on site for approximately 90 to 140 days for well drilling and completion activities.

The EIA for this EP was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) § 550.212(o) and § 550.227. The EIA is a project- and site-specific analysis of the potential environmental impacts of bp's planned activities. The EIA complies with guidance provided in existing Notices to Lessees and Operators (NTLs) issued by BOEM and its predecessors, Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NTLs 2008-G04 (extended by 2015-N02) and 2015-N01. Potential impacts have been analyzed at a broader level in the 2017-2022 Programmatic Environmental Impact Statement (EIS) for the OCS Oil and Gas Leasing Program (BOEM, 2016a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017). The most recent multisale EIS contains updated environmental baseline information in light of the Macondo (*Deepwater Horizon*) incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017). The NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico assesses impacts and requires additional mitigation measures for protected species (NMFS, 2020a). The analyses and relevant information from those documents are incorporated in this EIA by reference.

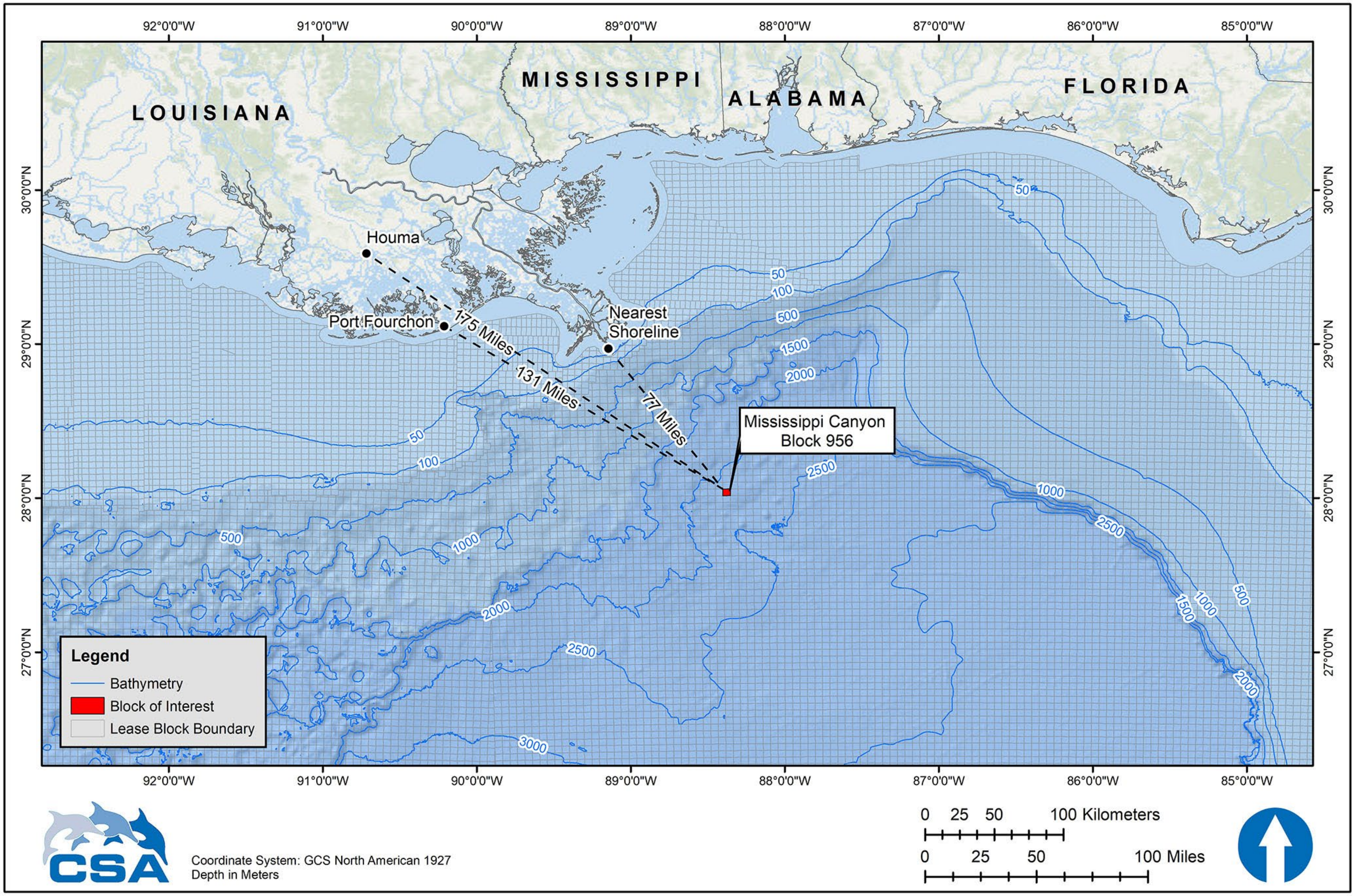

Figure 1. Location of Mississippi Canyon Block 956 relative to the Louisiana shoreline and offshore bathymetric contours.

Oil spill response-related activities for the well to be drilled under this EP are governed by the bp Regional Oil Spill Response Plan (ROSRP), as filed by BP America Inc. (Operator No. 21372) under cover letter dated 8 October 2021. The ROSRP was filed on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481). The ROSRP was confirmed in compliance and approved by the Bureau of Safety and Environmental Enforcement (BSEE) on 22 October 2021. The bp ROSRP should meet the requirements contained in 30 CFR Part 254 and as operator, bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." The bp ROSRP details the plan for response to manage oil spills that may result from drilling and production operations with a designed response program based on regional capabilities to address spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. The program, as detailed in bp's ROSRP is intended to meet requirements of the relevant coastal states and applicable federal oil spill planning regulations. It also includes information regarding bp's incident management team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The ROSRP describes personnel and equipment mobilization, the IMT organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

The EIA is organized into **Sections A** through **I** corresponding to the information required by NTLs 2008-G04 and 2015-N01. The main impact-related discussions are in **Section A** (Impact-Producing Factors) and **Section C** (Impact Analysis). **Table 1** lists and summarizes the NTLs applicable to the EIA.

Table 1. Notices to Lessees and Operators (NTLs) applicable to the Environmental Impact Analysis (EIA).

NTL	Title	Summary
BOEM-2020-G01	Air Quality Information Requirements for Exploration Plans, Development Operations Coordination Documents, and Development and Production Plans in the Gulf of Mexico Region	Cancels and supersedes the air emission information portion of NTL 2008-G04, Information Requirement for Exploration Plans and Development Operations Coordination Documents, effective date May 5, 2008.
BOEM-2016-G01 or Appendix C (NMFS, 2020a)	Vessel Strike Avoidance and Injured/Dead Protected Species Reporting	Recommends protected species identification training; recommends that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel movement to avoid colliding with protected species; and requires operators to report sightings of any injured or dead protected species. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.

Table 1. (Continued).

NTL	Title	Summary
BOEM-2016-G02 or Appendix A (NMFS, 2020a)	Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program	Summarizes seismic survey mitigation measures, updates regulatory citations, and provides clarification on how the measures identified in the NTL will be used by BOEM, BSEE, and operators in order to comply with the Endangered Species Act and the Marine Mammals Protection Act. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
BSEE-2015-G03 or Appendix B (NMFS 2020a)	Marine Trash and Debris Awareness and Elimination	Instructs operators to exercise caution in the handling and disposal of small items and packaging materials; requires the posting of instructional placards at prominent locations on offshore vessels and structures; and mandates a yearly marine trash and debris awareness training and certification process.
BOEM 2015-N02	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BOEM website.
BOEM 2015-N01	Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios	Provides guidance regarding information required in WCD descriptions and blowout scenarios.
BOEM 2014-G04	Military Warning and Water Test Areas	Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico.
BSEE 2014-N01	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BSEE website.
BSEE-2012-N06	Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans	Provides clarification, guidance, and information for preparation of regional Oil Spill Response Plans. Recommends description of response strategy for worst-case discharge scenarios to ensure capability to respond to oil spills is both efficient and effective.

Table 1. (Continued).

NTL	Title	Summary
2010-N10	Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources	Informs operators using subsea blowout preventers (BOPs) or surface BOPs on floating facilities that applications for well permits must include a statement signed by an authorized company official stating that the operator will conduct all activities in compliance with all applicable regulations, including the increased safety measures regulations (75 *Federal Register* [FR] 63346). Informs operators that the Bureau of Ocean Energy Management will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to respond promptly to a blowout or other loss of well control.
2009-G40	Deepwater Benthic Communities	Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 300 m (984 ft). Prescribes separation distances of 610 m (2,000 ft) from each mud and cuttings discharge location and 76 m (250 ft) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	Provides guidance for avoiding and protecting biologically sensitive features and areas (i.e., topographic features, pinnacles, low relief live bottom areas, and other potentially sensitive biological features) when conducting OCS operations in water depths less than 300 m (984 ft) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.
2008-N05	Guidelines for Oil Spill Financial Responsibility (OSFR) for Covered Facilities	Provides clarification and guidance to operators/lessees on policies for submitting required OSFR documents to the Gulf of Mexico OCS Region as required under 30 CFR Part 253.
2005-G07	Archaeological Resource Surveys and Reports	Provides guidance on regulations regarding archaeological discoveries, specifies requirements for archaeological resource surveys and reports, and outlines options for protecting archaeological resources. Reissued in June 2020 to comply with Executive Order 13891 of 9 October 2019 and to rescind NTL 2011-JOINT-G01.

A. Impact-Producing Factors

Based on the description of bp's proposed activities, a series of impact-producing factors (IPFs) have been identified as presented in **Table 2**. **Table 2** provides a matrix of environmental resources that may be affected in the left column and sources of impacts (i.e., IPFs) associated with the proposed project across the top. **Table 2**, adapted from Form BOEM-0142, has been developed *a priori* to focus the impact analysis on those environmental resources that may be impacted as a result of one or more IPFs. The tabular matrix indicates which of the routine activities and accidental events could affect specific resources. An "X" indicates that an IPF could reasonably be expected to affect a certain resource, and a dash (--) indicates no impact or negligible impact (**Table 2**). Where there may be an effect, an impact analysis by resource is provided in **Section C**. Potential IPFs for the proposed activities are listed below and briefly discussed in the following sections:

- Drilling rig presence (including noise and lights);
- Physical disturbance to the seafloor;
- Air pollutant emissions;
- Effluent discharges;
- Water intake;
- Onshore waste disposal;
- Marine debris;
- Support vessel and helicopter traffic (includes vessel collisions with resources and marine noise); and
- Accidents.

A.1 Drilling Rig Presence, Marine Noise, and Lights

The well proposed in this EP will be drilled using a DP drillship. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the drilling rig is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring may not best suited or feasible. Consequently, there will be no anchoring of the drilling rig in MC 956 during this project. The selected drilling rig is expected to be on site for an estimated 90 to 140 days. The drilling rig will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

Potential impacts to marine resources from the drilling rig include the physical presence of the drilling rig in the ocean, entanglement and entrapment from moon pools and equipment in the water, working and safety lighting on the rig, and underwater noise produced during operations.

During the physical presence of the drilling rig and associated drilling-associated activities there may occasion where equipment may be suspended in the water column. Entanglement and entrapment of protected species can occur from equipment with slack or looping lines and cables in the water. Marine mammals and sea turtles can become entangled in vessel lines in the water with loops or sufficient looping to trap the animals if they come into contact with them. Entanglement and entrapment can be minimized with proper maintenance of equipment lines in the water by encasing flexible lines, removing excess lines, and keeping lines taught to remove slack and line loops.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources.

Environmental Resources	Impact-Producing Factors									
	Drilling Rig Presence (incl. noise & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Physical/Chemical Environment										
Air quality	--	--	--**X**	--	--	--	--	--	**X**(6)	**X**(6)
Water quality	--	--	--	**X**	--	--	--	--	**X**(6)	**X**(6)
Seafloor Habitats and Biota										
Soft bottom benthic communities	--	**X**	--	**X**	--	--	--	--	--	**X**(6)
High-density deepwater benthic communities	--	--(4)	--	--(4)	--	--	--	--	--	**X**(6)
Designated topographic features	--	--(1)	--	--(1)	--	--	--	--	--	--
Pinnacle trend area live bottoms	--	--(2)	--	--(2)	--	--	--	--	--	--
Eastern Gulf live bottoms	--	--(3)	--	--(3)	--	--	--	--	--	--
Threatened, Endangered, and Protected Species and Critical Habitat										
Sperm whale (Endangered)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
Rice's whale (Endangered)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
West Indian manatee (Threatened)	--	--	--	--	--	--	--	**X**(8)	--	**X**(6,8)
Non-endangered marine mammals (protected)	**X**	--	--	--	--	--	--	**X**	**X**(6)	**X**(6)
Sea turtles (Endangered/Threatened)	**X**(8)	--	--	--	--	--	--	**X**(8)	**X**(6,8)	**X**(6,8)
Piping Plover (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Whooping Crane (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Oceanic whitetip shark (Threatened)	**X**	--	--	--	--	--	--	--	--	**X(6)**
Giant manta ray (Threatened)	**X**	--	--	--	--	--	--	--	--	**X** (6)
Gulf sturgeon (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Nassau grouper (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Smalltooth sawfish (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Beach mice (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Florida salt marsh vole (Endangered)	--	--	--	--	--	--	--	--	--	**X**(6)
Panama City Crayfish (Threatened)	--	--	--	--	--	--	--	--	--	**X**(6)
Threatened coral	--	--	--	--	--	--	--	--	--	**X**(6)
Coastal and Marine Birds										
Marine birds	**X**	--	--	--	--	--	--	**X**	**X**(6)	**X**(6)
Coastal Birds	--	--	--	--	--	--	--	**X**	--	**X**(6)
Fisheries Resources										
Pelagic communities and ichthyoplankton	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Essential Fish Habitat	**X**	--	--	**X**	**X**	--	--	--	**X**(6)	**X**(6)
Archaeological Resources										
Shipwreck sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)
Prehistoric archaeological sites	--	--(7)	--	--	--	--	--	--	--	**X**(6)

Table 2. (Continued).

Environmental Resources	Impact-Producing Factors									
	Drilling Rig Presence (incl. noise & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Coastal Habitats and Protected Areas										
Coastal habitats and protected areas	--	--	--	--	--	--	--	**X**	--	**X**(6)
Socioeconomic and Other Resources										
Recreational and commercial fishing	**X**	--	--	--	--	--	--	--	**X**(6)	**X**(6)
Public health and safety	--	--	--	--	--	--	--	--	--	**X**(5,6)
Employment and infrastructure	--	--	--	--	--	--	--	--	--	**X**(6)
Recreation and tourism	--	--	--	--	--	--	--	--	--	**X**(6)
Land use	--	--	--	--	--	--	--	--	--	**X**(6)
Other marine uses	--	--	--	--	--	--	--	--	--	**X**(6)

*Numbers refer to table footnotes.

X = potential impact; dash (--) = no impact or negligible impact.

Table 2 Footnotes and Applicability to this Program:

Footnotes are numbered to correspond to entries in ***Table 2****; applicability to each case is noted by a bullet point following the footnote.*

(1) *Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well, rig site, or any anchors will be on the seafloor within the following:*
   (a) *4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;*
   (b) *1,000-m, 1-mile, or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an Outer Continental Shelf (OCS) lease;*
   (c) *Essential Fish Habitat (EFH) criteria of 152 m (500 ft) from any no-activity zone; or*
   (d) *Proximity of any submarine bank (152 m [500-ft] buffer zone) with relief greater than 2 m (7 ft) that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
      - None of these conditions (a through d) are applicable. The project area is not within or near any marine sanctuary, topographic feature, submarine bank, or no-activity zone.

(2) *Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.*
   - The Live Bottom (Pinnacle Trend) Stipulation is not applicable to the project area.

(3) *Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.*
   - The Live Bottom (Low-Relief) Stipulation is not applicable to the project area.

(4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
   - No impacts on high-density deepwater benthic communities are anticipated. There are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 610 m (2,000 ft) of the proposed wellsite locations (Oceaneering, 2022a).

(5) *Exploration or production activities where Hydrogen Sulfide (H_2S) concentrations greater than 500 ppm might be encountered.*
   - The lease block is classified as H_2S absent.

(6) *All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.*
   - Accidental hydrocarbon spills could affect the resources marked (X) in the matrix, and impacts are analyzed in **Section C**.

(7) *All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or prehistoric site that no impact would occur, the EIA can note that in a sentence or two.*
   - No impacts to archaeological resources are expected. MC 956 is on the list of high-probability blocks for shipwrecks (BOEM, 2011), but the project area is well beyond the 60-meter depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. The archaeological and geohazard assessment (Oceaneering, 2022b), reported that no archaeologically significant sonar contacts were identified in the survey area.

(8) *All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.*
   - IPFs that may affect marine mammals, sea turtles, or their critical habitats include drilling rig presence, support vessel and helicopter traffic, and accidents. See **Section C**.

(9) *Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.*
   - Not applicable.

The physical presence of the drilling rig in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. DP drillships and semisubmersible drilling rigs maintain exterior lighting for working at night and for navigational and aviation safety in accordance with applicable federal safety regulations. This artificial lighting may also attract and directly or indirectly impact natural resources. Drilling operations produce underwater sounds that may impact certain marine resources. Sources of drilling-related sounds include, for example, riser rotation, DP thrusters, remotely operated vehicle (ROV) operations, and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning. Of the aforementioned sources, only DP thruster activity is expected to produce sound at levels which could result in potential impacts on marine life.

The drilling rig operations and equipment can be expected to produce noise associated with propulsion machinery that transmits directly to the water during station keeping, drilling, and maintenance operations. Additional sound and vibration are transmitted through the hull to the water from auxiliary machinery, such as generators, pumps, and compressors onboard the drilling rig (Richardson et al., 1995). The noise levels produced by DP vessels for station-keeping are largely dependent on the level of thruster activity required to keep position and, therefore, vary based on local ocean currents, vessel thruster specifications, and operational requirements. Representative source levels for vessels in DP mode range from 184 to 190 decibels (dB) referenced to (re) 1 micropascal (µPa) m with a primary frequency below 600 Hz (Blackwell and Greene Jr., 2003; McKenna et al., 2012; Kyhn et al., 2014). Zykov (2016) characterized a noisier drillship thruster with a source level, expressed as root-mean-square sound pressure level (SPL), of 190 to 195 dB re 1 µPa m. The source level for the thrusters used by Zykov (2016) were estimated for power output close to the nominal value (the maximum sustainable) for all thrusters; it is highly unlikely that all the thrusters of all vessels will be operated at such conditions for a prolonged period of time.

Drilling operations produce noise that includes strong tonal components at low frequencies. When drilling, the drill string represents a long vertical sound source (McCauley, 1998). Source levels associated with drilling activities have a maximum broadband (10 Hz to 10 kHz) energy of approximately 190 dB re 1 µPa m (Hildebrand, 2005). Based on available data, source levels generated from drillships during drilling and in the absence of thrusters can be expected to range between 154 and 176 dB re 1 µPa m (Nedwell et al., 2001). The use of thrusters, whether drilling or not, can elevate sound source levels from a drillship or semisubmersible to approximately 188 dB re 1 µPa m (Nedwell and Howell, 2004).

Positioning of the drilling rig requires the use of a vessel-mounted transducer and a series of transceivers placed on the seafloor. The transducer employs a high frequency acoustic signal (i.e., main energy between 21 and 31 kHz) throughout the operation. While the acoustic signal emitted by the transducer is similar to that emitted by a commercial echosounder, its source level will vary depending upon water depth (i.e., higher source levels required in deeper water). Source levels for the vessel-mounted transceiver, expressed as SPL, are estimated to be >200 dB re 1 µPa m, with the energy focused towards the seafloor (Equinor, 2019). The directionality and frequency of the source results in minimal propagation outside the main beam of the pulse.

The response of marine mammals, sea turtles, and fishes to a perceived marine sound depends on a range of factors, including 1) SPL, frequency, duration, and novelty of the sound; 2) the physical and behavioral state of the animal at the time of perception; and 3) the ambient acoustic features of the environment (Hildebrand, 2009). Additionally, the sound detection capabilities of a particular species or group of species can make them more or less susceptible to potential impacts from sound sources (BOEM, 2014b).

A.2 Physical Disturbance to the Seafloor

In water depths of 600 m (1,969 ft) or greater, DP drilling rigs disturb only a very small area of the seafloor around the wellbore where the bottom template and blowout preventer (BOP) are located. Depending on the specific well configuration, the total disturbed area is estimated to be 0.25 hectares (ha) (0.62 acres [ac]) per well (BOEM, 2012a).

A.3 Air Pollutant Emissions

The air pollutant emissions are calculated in accordance with BOEM requirements for screening air impacts and summarized in the Air Quality Emissions Report in EP Section 7 and EP **Appendix E**. The primary air pollutants typically associated with OCS activities are suspended particulate matter ($PM_{2.5}$ and PM_{10}), sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015), as well as ammonia (NH_3) and lead (Pb) per NTL 2020-G01. These emissions occur mainly from combustion diesel and aviation fuel, also known as Jet-A.

The Air Quality Emissions Report demonstrates that the projected emissions are below exemption levels set by the applicable regulations in 30 CFR § 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

A.4 Effluent Discharges

Effluent discharges are summarized in EP Section 6.2 and EP Appendix D. All offshore discharges are expected to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit issued by the U.S. Environmental Protection Agency (USEPA) Region 6 and any applicable U.S. Coast Guard (USCG) regulations such as International Sewage Pollution Prevention Certificates and maintenance logs/records for marine sanitation devices.

Water-based drilling muds and cuttings are expected to be released at the seafloor during the initial well-drilling intervals before the marine riser that enables the return of drilling muds and cuttings to the surface is installed and set. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Blowout prevention fluids also are expected to be discharged during the setting of the BOP, diverter systems testing after drilling fluids displacement, and at regular testing intervals at NPDES allowable de minimis levels. Drill Cuttings generated during synthetic-based drilling mud (SBM) operations will be collected on the rig in dry cuttings boxes. SBM will either be reused by the vendor on the rig or transported via bulk tank containers to Port Fourchon, Louisiana, for recycling and/or disposal at an approved facility. Drill cuttings wetted with some residual SBMs will be discharged at the surface in accordance with the Base Fluids Retained on Cuttings (RoC %) percentage as listed in NPDES permit conditions averaged over all well sections.

Dry Cuttings are sent ashore in cutting boxes for disposal at approved facilities. Well treatment fluids, well completion fluids, well workover fluids, residual drilling fluids adhered to marine risers and minor drips/splatters around mud and solids control equipment also are expected to be contained, handled or discharged in accordance with the specified conditions, terms, or limitations in the NPDES permit.

Drilling fluids or cuttings will not be discharged when they fail the static sheen test defined in Appendix 1 of 40 CFR 435, Subpart A.

Other marine vessel effluent discharges are expected from the DP drillship station keeping operations and are expected to be discharged in accordance with the conditions in the NPDES permit or USGC – MARPOL 73/78 Annex IV & V regulations. These marine operations effluents include miscellaneous discharges that are untreated, effluents that are treated before discharge, and substances removed during wastewater control. Miscellaneous discharges will consist of uncontaminated seawater/freshwater, such as uncontaminated ballast /bilge water, fire water, cooling water, potable water, graywater from dishwater, shower, laundry, bath, and washbasin drains, off-specification potable water and desalination unit discharge. Chemically treated effluents include seawater/freshwater to which treatment chemicals such as biocides or corrosion inhibitors have been added, sewage processed through a marine sanitation device, and deck drainage effluents passed through the drillship oil-water separator, Removed Substances and include, but are not limited to, solids, sewage sludges, filter backwash, and other pollutants removed from wastewater removed in the course of treatment or wastewater control shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

Waste streams will not be discharged that contain free oil as evidenced by the monitoring method specified for that particular stream, e.g., deck drainage or miscellaneous discharges will not be discharged when they would cause a film or sheen upon or discoloration of the surface of the receiving water.

Under certain circumstances, the drilling rig may relocate to a safe zone which is not located within the leased area to avoid severe weather, loop currents, or to conduct routine maintenance while idled from drilling activities. During these limited times of safe zone harboring, incidental vessel discharges may occur. These discharges are expected to be within the limits represented in the waste and water discharge table estimates submitted as part of this EP.

A.5 Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. It is expected that the drilling rig ultimately selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations.

Where applicable, the drilling rig operator takes responsibility for obtaining necessary NPDES permit coverage for its cooling water intake structure and associated permit compliance.

A.6 Onshore Waste Disposal

A list of the solid and liquid wastes generated during this project to be disposed of onshore are tabulated in EP Section 6.1. Wastes generated during the proposed project are expected to be properly stored and segregated on the drilling rig. Wastes are to be packaged in appropriate non-hazardous or hazardous waste containers for transportation to shore for disposal in an appropriately permitted facility. All other wastes generated by bp, and its contractors are managed by their respective waste management procedures. Compliance with established bp waste management practices and procedures is expected to result in either no or negligible impacts.

A.7 Marine Debris

All activities of bp and its contractors relating to solid waste handling, transportation, and disposal will intend to comply with all applicable regulations, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, USCG, BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (i.e., trash and debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR § 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR § 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material. The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Additionally, the debris awareness training, instruction, and placards required by the Protected Species Lease Stipulation should minimize the amount of debris that is accidentally lost overboard by offshore personnel (NMFS [2020a] Appendix B). In compliance with NTL BSEE-2015-G03, bp and its contractors intend to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of informational placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. Compliance with these requirements is expected to result in minimal and only accidental loss of solid waste. Consequently, there will be either no or negligible impacts from this factor.

A.8 Support Vessel and Helicopter Traffic

A.8.1 Physical Presence

IPFs associated with support vessel and helicopter traffic include their physical presence and operational noise. The existing shorebase facilities at Port Fourchon, Louisiana, will be used by bp for support vessel activities. Support helicopters are expected to be based at heliport facilities in Houma, Louisiana. No terminal expansion or construction is planned at either location.

NMFS (2020a) has found that support vessel traffic has the potential to disturb protected species (e.g., marine mammals, sea turtles, fishes) and creates a risk of vessel collisions. The probability of a vessel collision depends on the number, size, and speed of vessels as well as the distribution, abundance, and behavior of the species (Conn and Silber, 2013; Hazel et al., 2007; Jensen and Silber, 2004; Laist et al., 2001; Vanderlaan and Taggart, 2007; NMFS, 2020a). To reduce the potential for vessel collisions, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking protected species and requires operators to report sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. The project will be supported by onshore crew boats and supply vessels making an estimated two to four round trips per week. The boats typically move to the project area via the most direct route from the shorebase.

A helicopter will make approximately seven round trips per week between the drilling rig and the heliport. The helicopter will be used to transport personnel and small supplies and will normally take the most direct route of travel between the shorebase and the project area when air traffic and weather conditions permit. Offshore support helicopters typically maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over-populated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (NMFS, 2020a).

Table 3 summarizes the estimated fuel capacity and trip frequency of the support vessels and aircraft.

Table 3. Support vessel and aircraft fuel capacity and trip frequency or duration in Mississippi Canyon Block 956 during the proposed exploratory drilling project.

Vessel/Aircraft Type	Maximum Fuel Tank Storage Capacity	Estimated Trip Frequency or Duration
Helicopter	760 gal	7 flights per week
Crew boats	1,000 bbl	2 trips per week
Supply Boats	5,000 bbl	4 trips per week

gal = gallons; bbl = barrel.

A.8.2 Operational Noise

Offshore support vessels associated with the proposed project will contribute to the overall acoustic environment by transmitting noise through both air and water. The support vessels will use conventional diesel-powered screw propulsion. Vessel noise is a combination of narrow band (tonal) and broadband noise (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012). Tones typically dominate up to approximately 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include engine noise, flow noise from water dragging along the hull, and bubbles breaking in the vessel's wake (Richardson et al., 1995). The intensity of noise from support vessels is roughly related to ship size, weight, and speed.

Broadband source levels for smaller boats (a category that include supply and other service vessels) are in the range of 150 to 180 dB re 1 µPa m (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012).

Penetration of aircraft noise below the sea surface is greatest directly below the aircraft. Aircraft noise produced at angles greater than 13 degrees from vertical is mostly reflected from the sea surface and does not propagate into the water (Richardson et al., 1995). The duration of underwater noise from passing aircraft is much shorter in water than air; for example, a helicopter passing at an altitude of 152 m (500 ft) that is audible in air for 4 minutes may be detectable under water for only 38 seconds at 3 m (10 ft) depth and for 11 seconds at 18 m (59 ft) depth (Richardson et al., 1995).

Dominant tones for helicopters are generally below 500 Hz with source levels ranging from approximately 149 to 151 dB re 1 µPa m (for a Bell 212 helicopter) (Richardson et al., 1995). However, underwater noise levels received from passing aircraft depend on the aircraft's altitude, the aspect (direction and angle) of the aircraft relative to the receiver, receiver depth, water depth, and seafloor type (Richardson et al., 1995). The received level diminishes with increasing receiver depth when an aircraft is directly overhead, but may be stronger at mid-water than at shallow depths when an aircraft is not directly overhead (Richardson et al., 1995). Because of the relatively high expected airspeeds during transits and these physical variables, aircraft-related noise (including both airborne and underwater noise) is expected to be very brief in duration.

A.9 Accidents

The accidents addressed in the EIA focuses on the following two potential types:

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- a large oil spill, up to and including the WCD for this EP, which is an oil spill resulting from an uncontrolled blowout.

The following subsections summarize assumptions about the sizes and fates of these spills as well as bp's spill response plans. Impacts from these accidents are analyzed in **Section C**.

Recent EISs (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017) analyzed three types of accidents relevant to drilling operations that could lead to potential impacts to the marine environment: loss of well control, vessel collision, and chemical and drilling fluid spills. These types of accidents, along with dropped objects and an H_2S release, are discussed briefly below.

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, and/or water. Loss of well control includes incidents from the very minor up to the most serious well control incidents, while blowouts are considered to be a subset of more serious incidents with greater risk of oil spill or human injury (BOEM, 2016a; 2017). Loss of well control may result in the release of drilling fluid and/or loss of oil. Not all loss of well control events result in blowouts (BOEM, 2012a). In addition to the potential release of gas, condensate, oil, sand, and/or water, the loss of well control can also resuspend and disperse bottom sediments (BOEM, 2012a; 2017). BOEM (2016a) noted that most OCS blowouts have resulted in the release of gas.

The robust system bp has in place to prevent loss of well control includes measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early blowout intervention as described in the NTL 2015-N01 package submitted with this EP, as required by BOEM (as discussed in **Section A.9.1**). The potential for a loss of well control event will be minimized by adhering to the requirements of applicable regulations and NTL 2010-N10, which specifies additional safety measures for OCS activities.

Vessel Collisions. BSEE data show that there were 188 OCS-related collisions between 2007 and 2020 (BSEE, 2020). Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. Approximately 10% of vessel collisions with platforms in the OCS resulted in diesel spills, and during several collision incidents, fires resulted from hydrocarbon releases. To date, the largest diesel spill associated with a collision occurred in 1979 when an anchor-handling boat collided with a drilling platform in the Main Pass Lease Area, spilling 1,500 barrels (bbl). Diesel fuel is the product most frequently spilled, but oil, natural gas, corrosion inhibitor, hydraulic fluid, and lube oil have also been released as the result of vessel collisions. Human error accounted for approximately half of all reported vessel collisions from 2006 to 2009. As summarized by BOEM (2017), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. bp and its contractors intend to comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard the DP drilling rig could potentially pose a risk to existing live subsea pipelines or other infrastructure. If a dropped pipe or other subsea equipment landed on existing seafloor infrastructure, loss of integrity of seafloor pipelines, umbilicals, etc. could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. bp and its contractors intend to comply with all BOEM and BSEE safety requirement to minimize the potential for objects dropped overboard.

Chemical Spills. Chemicals are stored and used for pipeline hydrostatic testing, leak and pressure testing of subsea equipment and during drilling and in well completion operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017b) with completion, workover, and treatment fluids comprising the largest releases. Any potential leak due to pressure testing failure will be limited to a single line leak and would be limited to less than 1bbl. Potentially spilled fluids include Transaqua HT, MEG 50/50, or methanol. Between 2007 and 2014, an average of two chemical spills <50 bbl in volume and three chemical spills >50 bbl in volume occurred each year (BOEM, 2017).

Drilling Fluid Spills. There is the potential for drilling fluids, specifically SBMs, to be spilled due to an accidental riser disconnect (BOEM, 2017). SBMs are relatively nontoxic to the marine environment and have the potential to biodegrade (BOEM, 2014a). The majority of SBM releases are <50 bbl in size, but accidental riser disconnects may result in the release of medium (238 to 2,380 bbl) to large (>2,381 bbl) quantities of drilling fluids. In the event of an SBM spill, there could be short-term localized impacts on water quality and the potential for localized benthic impacts due to SBM deposition on the seafloor. Benthic impacts would be similar to those described in **Section C.2.1**. The potential for riser disconnect and subsequent SBM spills will be minimized by adhering to the requirements of applicable regulations.

H_2S Release. MC 956 is classified as H_2S absent. Based on the H_2S absent classification, no further discussion on H_2S impacts is warranted.

A.9.1 Small Fuel Spill

Spill Size. According to the analysis by BOEM (2017b), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 2017). The median size for spills ≤1 bbl is 0.024 bbl, and the median volume for spills of 1 to 10 bbl is 3 bbl (Anderson et al., 2012). For the EIA, a small diesel fuel spill of 3 bbl is used. Operational experience suggests that the most likely cause of such a spill would be a rupture of the fuel transfer hose resulting in a loss of contents (3 bbl of fuel) (BOEM, 2012a).

Spill Fate. The fate of a small fuel spill in the project area would depend on meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response activities. However, given the open ocean location of the project area and response actions, it is expected that impacts from a small spill would be minimal (BOEM, 2016a).

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high amounts of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel fuel is readily and completely degraded by naturally occurring microbes (National Oceanic and Atmospheric Administration [NOAA], 2006).

Sheens from small fuel spills are expected to persist for relatively short periods of time, ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl), and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a).

For purposes of the EIA, the fate of a small diesel fuel spill of 3 bbl was estimated using WebGNOME, a publicly available oil spill trajectory and fate model developed by NOAA (NOAA, 2022). This model uses the physical properties of oils in its database to predict the rate of evaporation and dispersion over time as well as changes in the density, viscosity, and water content of the product spilled. It is estimated that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it during this 24-hour period would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

The WebGNOME results, coupled with spill trajectory information discussed below for a large spill, indicate that a small fuel spill would not impact coastal or shoreline resources. The project area is 77 statute miles (124 km) from the nearest shoreline (Plaquemines Parish, Louisiana). Slicks from small fuel spills are expected to persist for relatively short periods of time ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl) and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a). Because of the distance from shore of these potential spills on the OCS and their lack of persistence, it is unlikely that a spill would make landfall prior to dissipation (BOEM, 2012a).

Spill Response. In the unlikely event the shipboard procedures fail to prevent a fuel spill, response equipment and trained personnel would be activated so that any spill effects would be localized and would result only in short-term environmental consequences. A discussion of bp's response efforts if a spill were to occur during operational activities is provided in EP Appendix G.

Weathering. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby influence its harmful effects on marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a, International Tanker Owners Pollution Federation Limited, 2018).

Weathering decreases the concentration of diesel fuel and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from the slick on the water surface. Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of diesel fuel on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Diesel fuel spill response-related activities for facilities included in this EP are governed by bp's ROSRP, which meets the requirements contained in 30 CFR Part 254.

A.9.2 Large Oil Spill (Worst Case Discharge)

Under this EP, bp proposes to drill one well in MC 956. The uncontrolled blowout scenario is for a potential blowout of the well which bp calculates has the highest liquid hydrocarbons rate potential in the MC 956 area.

Spill Size. Day 1 WCD is estimated to be 278,000 barrels of oil per day (BOPD). The maximum duration of a blowout is estimated at 70 days based on the time required to drill a relief well. The rate profile associated with the well blowout over this 70-day period results in a potential worst-case spill volume estimated of 15.5 million bbl of oil.

Spill Probability. Statistics from offshore drilling in the U.S. Gulf of Mexico provide a reasonable basis for evaluating oil spill risk during exploratory drilling. Historically, blowouts are rare events, and most do not result in oil spills. A 2010 analysis using the SINTEF[1] database estimates a blowout frequency of 0.0017 per exploratory well for non-North Sea locations (International Association of Oil & Gas Producers, 2010). BOEM has updated spill frequencies to include the *Deepwater Horizon* incident and found that spill rates (bbl spilled per bbl produced) for OCS platform spills were unchanged for spills >1,000 bbl when compared with previously published data (Anderson et al., 2012). According to the BSEE analysis conducted for the Final Drilling Safety Rule issued in 2010, the baseline risk of a catastrophic blowout is estimated to be once every 26 years (75 *Federal Register* [FR] 63365).

[1] Stiftelsen for industriell og teknisk forskning (Foundation for Scientific and Industrial Research, Norwegian Institute of Technology).

bp is expected to comply with NTL 2010-N10 and the drilling safety regulations in 30 CFR Part 250, Subparts D and G, which specify additional safety measures for OCS activities.

Spill Trajectory. The fate of a large oil spill in the project area would depend on meteorological and oceanographic conditions at the time of and during the spill. The Oil Spill Risk Analysis (OSRA) model is a computer simulation of oil spill transport that uses realistic data for winds and currents to predict spill trajectory. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments in the Gulf of Mexico.

The results for Launch Area 59 (where MC 956 is located) are presented in **Table 4**. The model predicts a <0.5% chance of contact with any shoreline within 3 days of the spill. Within 10 days, the model predicts a 1% conditional probability of shoreline contact in Lafourche Parish, Louisiana and a 5% conditional probability of shoreline contact in Plaquemines Parish, Louisiana. Shoreline contact is predicted within 30 days for shorelines ranging from Cameron Parish, Louisiana to Bay County, Florida, to Plaquemines Parish, Louisiana. The conditional probability of shoreline contact is low (1% to 11%) for all shorelines with predicted contact within 30 days, with the highest probability of contact (11%) in Plaquemines Parish, Louisiana.

Table 4. Conditional probabilities of a spill in Mississippi Canyon Block 956 (MC 956) contacting shoreline segments based on the 30-day Oil Spill Risk Analysis (OSRA) (From: Ji et al., 2004). Values are conditional probabilities that a hypothetical spill in MC 956 (represented by OSRA Launch Area 59) could contact shoreline segments (as referenced from Ji et al., 2004) within 3, 10, or 30 days.

Shoreline Segment	County or Parish and State	Conditional Probability of Contact[a] (%)		
		3 Days	10 Days	30 Days
C13	Cameron Parish, Louisiana	--	--	1
C14	Vermilion Parish, Louisiana	--	--	1
C17	Terrebonne Parish, Louisiana	--	--	2
C18	Lafourche Parish, Louisiana	--	1	2
C19	Jefferson Parish, Louisiana	--	--	1
C20	Plaquemines Parish, Louisiana	--	5	11
C21	St. Bernard Parish, Louisiana	--	--	2
C29	Walton County, Florida	--	--	1
C30	Bay County, Florida	--	--	1

[1] Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%). Values are conditional probabilities that a hypothetical spill in the project area (represented by OSRA Launch Area 59) could contact shoreline segments within 3, 10, or 30 days.

The original OSRA modeling runs reported by Ji et al. (2004) did not evaluate the fate of a spill over time periods exceeding 30 days, nor did they estimate the fate of a release that continues over a period of weeks or months. As noted by Ji et al. (2004), the OSRA model does not consider the chemical composition or biological weathering of oil spills, the spreading and splitting of oil spills, or spill response activities. The model does not specify a particular spill size but has been used by BOEM to evaluate contact probabilities for spills greater than 1,000 bbl.

OSRA is a preliminary risk assessment model. In the event of an actual oil spill, real-time monitoring and trajectory modeling would be conducted using current and wind data available from the rigs and permanent production structures in the area. Satellite and aerial monitoring of the plume and real-time deterministic trajectory modeling using wind and current data would continue on a daily basis to help position equipment and human resources throughout the duration of any major spill or uncontrolled release.

Weathering. In the event of a diesel fuel spill, it is expected that weathering and evaporation will occur quickly. The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. NOAA has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

Weathering decreases the concentration of oil and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from a slick on the water surface. For example, the light, paraffinic crude oil spilled during the *Deepwater Horizon* incident lost approximately 55 wt. % to evaporation during the first 3 to 5 days while floating on the sea surface (Daling et al., 2014). Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of oil on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics from the oil. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface (Prince, 2014).

Spill Response. All proposed activities and facilities in this EP will be covered by the Gulf of Mexico ROSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated 8 October 2021 on behalf of several companies listed in the plan including bp (Operator No. 02481) and approved by BSEE on 22 October 2021.

The bp ROSRP includes information about enhanced measures for responding to a spill in open water, near shore spill response, and shoreline spill response based on lessons learned from the *Deepwater Horizon* oil spill. In compliance with the requirements of 30 CFR Part 254 and related NTLs, bp's ROSRP includes the following:

- Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled, long-term blowout, for the length of time required to drill a relief well;
- Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;
- A description of the measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface. The description will include methods to increase encounter rates, the use of vessel tracking, and the use of remote sensing technologies;
- Information on remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (such as X-band/infrared systems);
- Information pertaining to the use of vessel tracking systems and communication systems between response vessels and spotter personnel;
- A shoreline protection strategy that is consistent with applicable area contingency plans; and
- For operations using a subsea BOP or a surface BOP on a floating facility, a discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

As a member of the Marine Spill Response Corporation, Clean Gulf Associates, and a client of the National Response Corporation, bp would utilize oil spill response organization personnel and equipment in the event of an oil spill in the Gulf of Mexico. Primary response equipment for the activation of bp's ROSRP is located in Houma, Louisiana; Lake Charles, Louisiana; Galveston, Texas; Pensacola, Florida; Mobile, Alabama; Pascagoula, Mississippi; Ft. Jackson, Louisiana; Venice, Louisiana; and Corpus Christi, Texas. The preplanned staging area for this EP is Port Fourchon, Louisiana.

See EP Appendix G for a detailed description of bp's ROSRP and site-specific response for an oil spill associated with this project.

B. Affected Environment

The project area is in the central Gulf of Mexico, approximately 77 statute miles (124 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 131 statute miles (211 km) from the onshore support base at Port Fourchon, Louisiana, and 175 statute miles (282 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed wellsite is approximately 2,081 m (6,826 ft) (**Figure 2**).

The seafloor in the vicinity of the proposed wellsite is generally smooth. Autonomous underwater vehicle side scan sonar and backscatter data indicate the seafloor in the vicinity of the proposed wellsite is composed of fine-textured sediments. There are no surface faults, seafloor amplitude anomalies, or other features than could adversely affect drilling operations (Oceaneering, 2022a).

A detailed description of the regional affected environment, including meteorology, oceanography, geology, air and water quality, benthic communities, threatened and endangered species, biologically sensitive resources, archaeological resources, socioeconomic conditions, and other marine uses is provided in recent EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017). These regional descriptions, applicable to MC 956, remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

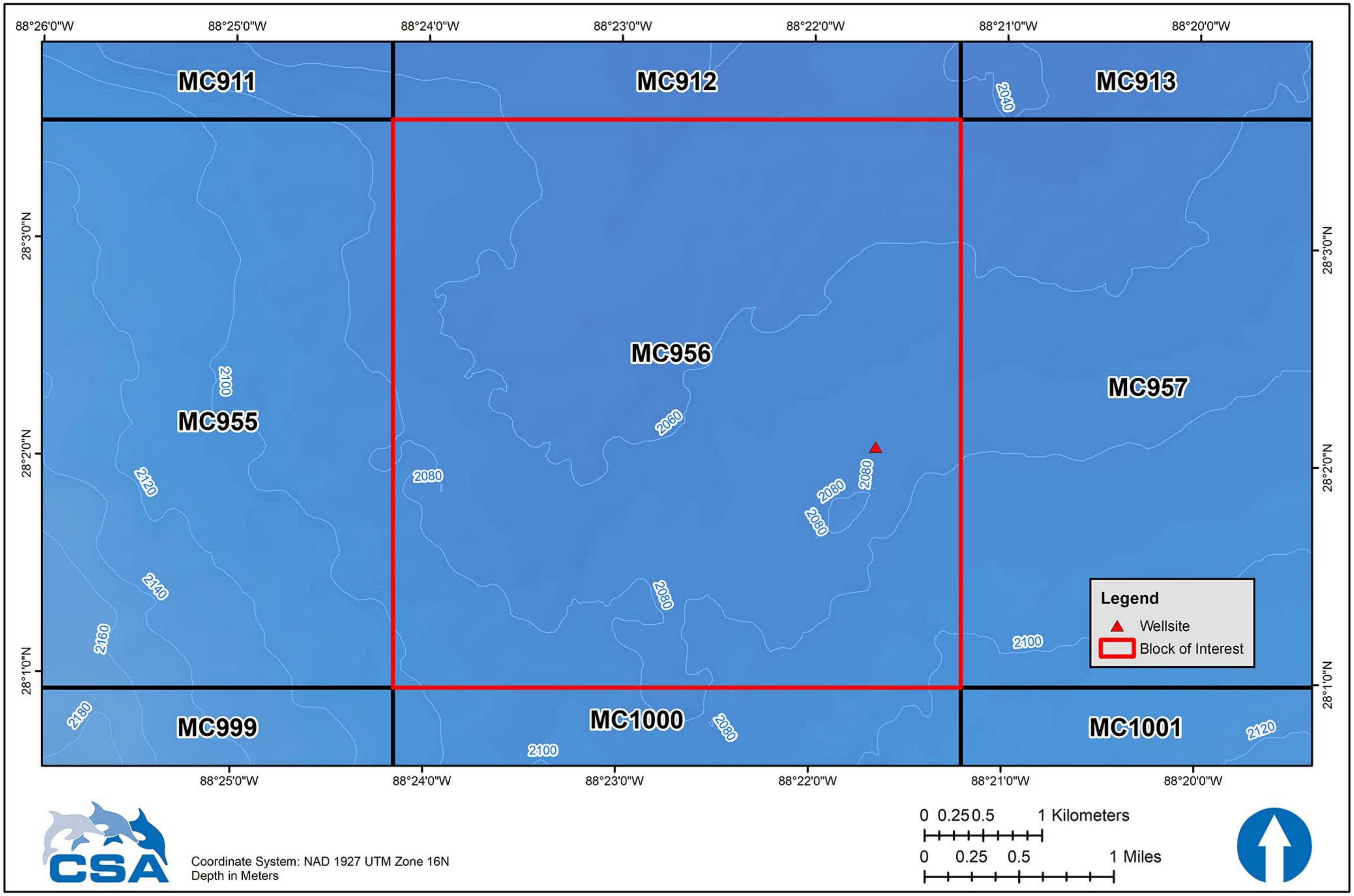

Figure 2. Bathymetric map of the project area showing the proposed wellsite surface hole location in Mississippi Canyon Block 956.

C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents. Impacts have been analyzed extensively in lease sale EISs for the Central and Western Gulf of Mexico Planning Areas (BOEM, 2013; 2014a; 2015; 2016a,b; 2017) and this information in these documents is incorporated by reference. This section is organized by the environmental resources identified in **Table 2** and addresses each IPF potentially affecting the resource.

C.1 Physical/Chemical Environment

C.1.1 Air Quality

There are no site-specific air quality data for the project area due to the distance from shore. Because of the distance from shore-based pollution sources and the minimally dispersed sources offshore, air quality at the wellsite is expected to be good. The attainment status, (i.e., meeting air quality standards set by the USEPA) of federal OCS waters is unclassified because there is no provision in the Clean Air Act for classification of areas outside state waters (BOEM, 2012a).

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of October 2022, Mississippi, Alabama, and Florida Panhandle coastal counties, in proximity to the project area, are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2022). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard. One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone (2015 Standard).

Winds in the region are driven by the anticyclonic (clockwise) atmospheric circulation around the Bermuda High, a semi-permanent, subtropical area of high pressure in the North Atlantic Ocean off the East Coast of North America that migrates east and west with varying central pressure (BOEM, 2017). The Gulf of Mexico is located to the southwest of this circulation center, resulting in a prevailing southeasterly to southerly flow, which is conducive to transporting emissions toward shore. However, circulation is also affected by tropical cyclones (hurricanes) during summer and fall and by extratropical cyclones (cold fronts) during winter.

As noted earlier, based on calculations made pursuant to applicable regulations and guidance in NTL BOEM-2020-G01, emissions from drilling activities are not expected to be significant. Therefore, the only potential effects to air quality would be from air pollutant emissions associated with routine operations and accidental spills (a small fuel spill or a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions result primarily from the drilling operations and service vessels. These emissions occur mainly from combustion or burning of diesel and Jet-A aircraft fuel. The combustion of fuels occurs primarily in generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended PM, SOx, NOx, VOCs, CO, NH_3, and Pb. As noted by BOEM (2017b), emissions from routine activities are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, anticipated emission rates, anticipated heights of emission sources, and the distance to shore of the proposed activities. However, support vessel and helicopter traffic entering or departing coastal facilities will release air pollutants in these areas during the project period. The incremental contribution to cumulative impacts from activities described in bp's EP is minimal and is not expected to cause or contribute to a violation of NAAQS.

Greenhouse gas emissions may contribute to climate change, with important effects on temperature, rainfall, frequency of severe weather, ocean acidification, and sea level rise (Intergovernmental Panel on Climate Change, 2014). Greenhouse gas emissions from this proposed project represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2016a). Carbon dioxide (CO_2) and methane (CH_4) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a; 2017), estimated CO_2 emissions from OCS oil and gas sources are 0.4% of the U.S. total. Because of the distance from shore, routine operations in the project area are not expected to have any impact on air quality conditions along the coast, including nonattainment areas.

As noted in the lease sale EIS (BOEM, 2017), emissions of air pollutants from routine activities in the Central Gulf of Mexico Planning Area are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission rates, and the distance of these emissions from the coastline. The Air Quality Emissions Report indicates that the projected project emissions are below exemption levels set by the applicable regulations in 30 CFR § 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration (PSD) Class I air quality area. BOEM is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from proposed projects may affect the Breton Class I area. The project area is approximately 113 statute miles [2] (182 km) from the Breton Wilderness Area. bp and its contractors intend to comply with all BOEM requirements regarding air emissions.

There are three Class I air quality areas on the west coast of Florida: St Mark's Wildlife Refuge in Wakulla County, Chassahowitzka Wilderness Area in Hernando County, and Everglades National Park in Monroe, Miami-Dade, and Collier counties. The project area is approximately 270 miles (435 km) from the closest Florida Class I air quality area (Saint Mark's Wildlife Refuge Class I Air Quality Area). bp expects to comply with emissions requirements as directed by BOEM.

Impacts of a Small Fuel Spill

Potential impacts of a small spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a; 2015; 2016b; 2017). The probability of a small spill would be minimized by bp's preventative measures during routine operations, including fuel transfer.

[2] Distance calculated based on the nearest point of Mississippi Canyon Block 956.

In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential impacts. EP Appendix G includes a detailed discussion of the spill response measures that would be employed.

The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig. A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The webGNOME model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Because of the offshore location of the proposed small fuel spill, coastal air quality would not be affected because the spill would be expected to be degraded by weathering processes and dissipate prior to making landfall or reaching coastal waters (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a; 2015; 2016b; 2017). A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of VOCs released. Additional air quality impacts could occur if response measures included *in situ* burning of floating oil. Burning would generate a plume of black smoke and result in emissions of NO_x, SO_x, CO, and PM as well as greenhouse gases. However, *in situ* burning would occur only after authorization from the USCG Federal On-Scene Coordinator. This approval would also be based upon consultation with the regional response team, including the USEPA.

Because of the project area's location (77 statute miles [124 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality. However, depending on the spill trajectory and the effectiveness of spill response measures, coastal air quality could be affected if oil on the sea surface approaches or contacts the coast.

C.1.2 Water Quality

There are no site-specific baseline water quality data for the project area. Deepwater areas in the northern Gulf of Mexico are relatively similar with respect to patterns of water column temperature, salinity, and oxygen (BOEM, 2017). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 610 m (2,000 ft) of the proposed wellsite (Oceaneering, 2022a).

The only IPFs that may affect water quality are effluent discharges associated with routine operations and two types of accidents (a small fuel spill and a large oil spill) as discussed below.

Impacts of Effluent Discharges

Discharges of treated cuttings with some limited amount of residual SBM may produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point for water-based drilling muds and cuttings (Neff, 1987). SBMs will be collected on the rig and either reused by the vendor or transported to Port Fourchon, Louisiana, for recycling and disposal at an approved facility. Cuttings wetted with SBMs and SBM discharges associated with weekly safety diverter valve testing on the drillship are expected to be treated to reduce SBM levels at or below NPDES requirements and discharged overboard at the drillsite in accordance with all NPDES permit limitations and requirements. After discharge, SBMs retained on cuttings would be expected to adhere tightly to the cuttings particles and, consequently, would not produce substantial turbidity in the water column (Neff et al., 2000). No persistent impacts on water quality in the project area are expected from drill cutting discharges.

Water-based drilling muds and cuttings will be released at the seafloor during the initial well intervals before the marine riser, which allows returns to the surface, is set. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. The seafloor discharges of WBM and associated drill cuttings will result in seafloor disturbances that will produce locally turbid conditions in the water column near the seafloor. The turbidity plume will be carried away from the well by near-bottom currents and, based on current speed(s), may be detectable within tens to hundreds of meters of the wellbore. As suspended WBM and resuspended sediments settle to the seafloor, the water clarity will return to background conditions within minutes to a few hours after drilling of these well intervals ceases (Neff, 1987). Discharges of WBM and cuttings are likely to have little or no impact on water quality due to the low toxicity and rapid dispersion of these discharges (National Research Council, 1983; Neff, 1987; Hinwood et al., 1994).

Treated sanitary and domestic wastes, including those from support vessels, may have a transient effect on water quality in the immediate vicinity of the discharge at the sea surface. Treated sanitary and domestic wastes may have elevated levels of nutrients, organic matter, and chlorine but should dilute rapidly to undetectable levels within tens to hundreds of meters from the source. All NPDES permit limitations and requirements as well as USCG regulations (as applicable) are expected to be met during proposed activities; therefore, little or no impact on water quality from the overboard releases of treated sanitary and domestic wastes is anticipated.

Deck drainage includes all effluents resulting from rain, deck washings, and runoff from curbs, gutters, and drains (including drip pans) in work areas. Rainwater that falls on uncontaminated areas of the drilling rig will flow overboard without treatment. However, rainwater that falls on the drilling rig deck and other areas such as chemical storage areas and places where equipment is exposed (such as drip or containment pans) will be collected, and oil and water will be separated to meet NPDES permit requirements. Based on expected adherence to permit limits and applicable regulations, little or no impact on water quality from deck drainage is anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine; BOP water-based hydraulic fluids; and uncontaminated cooling water, firewater, ballast water, bilge water, and other discharges of seawater and freshwater to which treatment chemicals have been added are expected to dilute rapidly and have little or no impact on offshore water quality.

Support vessels will discharge treated sanitary and domestic wastes. These are not expected to have a significant impact on water quality in the vicinity of the discharges. Support vessel discharges are expected be in accordance with USCG and MARPOL 73/78 regulations and, as applicable, the NPDES Vessel General Permit, and therefore are not expected to cause significant impacts on water quality.

Impacts of a Small Fuel Spill

Potential impacts of a small spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017). The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig. The probability of a small spill would be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to potentially help mitigate and reduce the impacts. EP Appendix G provides details on spill response measures in addition to the summary information provided in the EIA.

The water-soluble fractions of diesel are dominated by two- and three-ringed PAHs, which are moderately volatile (National Research Council, 2003a). The molecular weight of diesel fuel constituents is light to intermediate and can be readily degraded by physiochemical weathering processes (e.g., evaporation, dissolution, dispersion, and photochemical oxidation) and biological processes (microbial degradation). Diesel fuel is much lighter than water (specific gravity is between 0.83 and 0.88, compared to 1.03 for seawater). When spilled on water, diesel fuel spreads very quickly to a thin film of rainbow and silver sheens, except for marine diesel, which may form a thicker film of dull or dark colors. However, because diesel fuel has a very low viscosity, it is readily dispersed into the water column when winds reach 5 to 7 knots or with breaking waves (NOAA, 2017a). It is possible for the diesel fuel that is dispersed by wave action to form droplets that are small enough be kept in suspension and moved by the currents.

Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high levels of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

The extent and persistence of water quality impacts from a small diesel fuel spill would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. It is estimated that more than 90% of a small diesel spill would evaporate or disperse within 24 hours (NOAA, 2022) (see **Section A.9.1**). The sea surface area covered with a very thin layer of diesel fuel would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. In addition to removal by evaporation, constituents of diesel fuel are readily and completely degraded by naturally occurring microbes (NOAA, 2006; 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017). Most of the spilled oil would be expected to form a slick at the surface, although information from the *Deepwater Horizon* incident indicates that submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010; Hazen et al., 2010; NOAA, 2011a,b,c). Dispersants would be applied only after approval from the Federal On-Scene Coordinator with collaboration from the USEPA and Regional Response Team Region 6.

The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of released hydrocarbons. Weathering processes that affect spilled oil on the sea include adsorption (sedimentation), biodegradation, dispersion, dissolution, emulsification, evaporation, and photo oxidation. Most crude oil blends will emulsify quickly when spilled, creating a stable mousse that presents a more persistent cleanup and removal challenge (NOAA, 2017b).

Hazen et al. (2010) studied the impacts and fate of oil released in the deepwater environment after the 2010 *Deepwater Horizon* incident. Initial studies suggested that the potential exists for rapid intrinsic bioremediation (bacterial degradation) of subsea dispersed oil in the water column by deep-sea indigenous microbial activity without significant oxygen depletion (Hazen et al., 2010), although other studies showed that oil bioremediation caused oxygen drawdown in deep waters (Kessler et al., 2011; Dubinsky et al., 2013). Additional studies investigated the effects of deepwater dissolved hydrocarbon gases (e.g., methane, propane, and ethane) and the microbial response to a deepwater oil spill suggest dissolved hydrocarbon gases may promote rapid hydrocarbon respiration by low-diversity bacterial blooms, thus priming indigenous bacterial populations for rapid hydrocarbon degradation of subsea oil (Kessler et al., 2011; Du and Kessler, 2012; Valentine et al., 2014). A 2017 study identified water temperature, taxonomic composition of initial bacterial community, and dissolved nutrient levels as factors that may regulate oil degradation rates by deep-sea indigenous microbes (Liu et al., 2017).

Due to the project area being located approximately 77 statute miles (124 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011), especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments of Plaquemines Parish, Louisiana, is the coastal area with the most potential for water quality to be affected (5% conditional probability within 10 days and 11% conditional probability within 30 days of a spill). Other Louisiana or Florida shorelines may also be affected within 30 days.

C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed wellsite is approximately 2,081 m (6,826 ft). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The site clearance letter did not note the presence of hard bottom communities or potential seepage locations within 610 m (2,000 ft) of the proposed wellsite location (Oceaneering, 2022a). The IPFs with potential impacts listed in **Table 2** are discussed below.

C.2.1 Soft Bottom Benthic Communities

There are no site-specific benthic community data from the project area. However, data from the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Wei, 2006; Rowe and Kennicutt, 2009; Wei et al., 2010; Carvalho et al., 2013; Spies et al., 2016) can be used to describe typical baseline benthic communities in the area. **Table 5** summarizes data collected at two stations in water depths similar to those in the proposed drilling area.

Table 5. Baseline benthic community data from stations near the project area in similar depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Adapted from: Wei, 2006; Rowe and Kennicutt, 2009).

Station	Water Depth (m)	Abundance		
		Meiofauna (individuals m^{-2})	Macroinfauna (individuals m^{-2})	Megafauna (individuals ha^{-1})
MT4	1,401	246,058	3,262	1,548
MT5	2,267	128,964	1,763	1,111

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006). m = meter, ha = hectare.

Densities of meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) at stations in the vicinity of the project area ranged from approximately 129,000 to 246,000 individuals m^{-2} (**Table 5**) (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant meiofaunal groups, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on an extrapolation equation presented by Wei (2006), macroinfaunal density in the water depth of the project area are expected to be approximately 1,455 individuals m^{-2}.

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Carvalho et al. (2013) found polychaete abundance to be higher in the central region of the northern Gulf of Mexico when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The project area is in Zone 3E, which encompasses the west flank of the lower Mississippi Fan, the lower Mississippi Canyon, the lower DeSoto Canyon, the lower West Florida Terrace, the deep Mississippi Fan, and the base of the Sigsbee Escarpment. The most abundant species in this zone were the polychaetes *Paraonella monilaris* and *Tharyx marioni*; the bivalve *Heterodonta* spp.; and the isopod *Macrostylis* sp.

The megafaunal density at stations in the vicinity of the project area ranged from 1,111 to 1,548 individuals ha^{-1}. Common megafauna included motile taxa such as decapod crustaceans, holothurian echinoderms, and demersal fishes as well as sessile taxa such as sponges and octocorals (Rowe and Kennicutt, 2009).

Bacteria also are an important component in terms of biomass and cycling of organic carbon (Cruz-Kaegi, 1998). For example, in deep sea sediments, Main et al. (2015) observed that microbial oxygen consumption rates increased and bacterial biomass decreased with hydrocarbon contamination. Bacterial biomass at the depth range of the project area typically is about 1 to 2 g C m^{-2} in the top 15 cm of sediments (Rowe and Kennicutt, 2009).

IPFs that potentially may affect benthic communities are physical disturbance to the seafloor, effluent discharges (drilling muds and cuttings), and potential effects from large oil spill resulting from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel is expected to float and dissipate on the sea surface.

Impacts of Physical Disturbance to the Seafloor

In water depths such as those in the project area, DP drilling rigs disturb the seafloor only around the wellbore (surface hole location) where the bottom template and BOP are located. Depending upon the specific well configuration, this area of disturbance is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The areal extent of these impacts from the DP drilling rig are expected to be small compared to the project area itself, and these types of soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected be spatially localized and temporally short term. Therefore, these disturbances will not likely have a significant impact on soft bottom benthic communities in the region.

Impacts of Effluent Discharges

Drilling mud and cuttings are the only effluents that could be present in vicinity of the wellsite that are likely to affect local soft bottom benthic communities. During initial well drilling interval(s) before the marine riser is set, cuttings and water-based mud will be released at the seafloor. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Cement slurry components typically include cement mix and some of the same chemicals used in water-based drilling muds (Boehm et al., 2001; Fink, 2016). The main impacts will be burial and smothering of benthic organisms within several meters to tens of meters around the wellbore where cuttings and water-based muds physically contact the seafloor. Soft bottom sediments disturbed by cuttings, drilling muds, and cement slurry will eventually be recolonized through larval settlement and migration from adjacent areas. Because some deep-sea biota grow and reproduce slowly, recovery may require several years for the affected area within meters to tens of meters of the wellbore.

Discharges of treated SBM cuttings from the rig may affect benthic communities, primarily within several hundred meters of the wellsite. The fate and effects of SBM cuttings have been reviewed by Neff et al. (2000), and monitoring studies have been conducted in the Gulf of Mexico by Continental Shelf Associates (2004; 2006). In general, treated cuttings with adhering SBMs tend to clump together and form piles close to the drillsite. Areas of SBM cuttings deposition may develop elevated organic carbon concentrations and anoxic conditions (Continental Shelf Associates, 2006). Where SBM cuttings accumulate in concentrations of approximately 1,000 mg kg^{-1} or higher, benthic infaunal communities may be adversely affected due to both the toxicity of the base fluid and organic enrichment (with resulting anoxia) (Neff et al., 2000). Infauna numbers may increase and diversity may decrease as opportunistic species that tolerate low oxygen and high H_2S levels predominate (Continental Shelf Associates, 2006). As the base synthetic fluid is decomposed by microbes, the area will gradually return to pre-drilling conditions. Disturbed sediments will be recolonized through larval settlement and migration from adjacent areas.

The areal extent of impacts from drilling discharges will be small. Assuming a typical effect radius of 500 m (1,640 ft), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. Impacts from drilling discharges are expected to have no significant impact on these ubiquitous soft bottom benthic communities in the region. It is expected that the rig will move to safe zones for short periods of time to perform maintenance on critical equipment. All discharges during these times are expected to meet NPDES permit requirements.

Impacts of a Large Oil Spill

The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the wellsite. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300 m (984 ft) radius. While coarse sediments (sands) would probably settle at a rapid rate within 400 m (1,312 ft) from the blowout site, fine sediments (silts and clays) could be resuspended for more than 30 days and dispersed over a wider area. Based on previous studies, surface sediments at the project area are assumed to largely be silt and clay (Rowe and Kennicutt, 2009).

While impacts from a large oil spill are anticipated to be confined to the immediate vicinity of the wellhead, depending on the specific circumstances of the incident, additional benthic community impacts could extend beyond the immediate vicinity of the wellhead (BOEM, 2017). During the *Deepwater Horizon* incident, subsurface oil plumes were reported in water depths of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010).

C.2.2 High-Density Deepwater Benthic Communities

As defined by NTL 2009-G40, high-density deepwater benthic communities are features or areas that could support high-density chemosynthetic communities or high-density hard bottom communities, including deepwater coral-dominated communities. Chemosynthetic communities were discovered in the central Gulf of Mexico in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of Mexico (Brooke and Schroeder, 2007; CSA International, 2007; Brooks et al., 2012). In the Gulf of Mexico, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

Monitoring programs on the Gulf of Mexico continental slope have shown that benthic impacts from drilling discharges typically are concentrated within approximately 500 m (1,640 ft) of the wellsite, although detectable deposits may extend beyond this distance (Continental Shelf Associates, 2004; Neff et al., 2005; Continental Shelf Associates, 2006). In water depths such as those encountered in the project area, DP drilling vessels disturb the seafloor only around the wellbore where the bottom template and BOP are located. Depending on the specific well configuration, this area is approximately 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The site clearance letter did not identify any features that could support high-density deepwater benthic communities within 610 m (2,000 ft) of the proposed wellsite (Oceaneering, 2022a).

The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current of the proposed wellsite.

Impacts of a Large Oil Spill

A large oil spill caused by a seafloor blowout could cause direct impacts (i.e., caused by the physical impacts of a blowout) on benthic communities within approximately 300 m (984 ft) of the wellhead (BOEM, 2012a; 2013). However, based on the site clearance letter for the proposed wellsite (Oceaneering, 2022a), there are no seafloor features that could support high-density deepwater benthic communities within 610 m (2,000 ft). Therefore, this type of impact is not expected.

Additional benthic community impacts could extend beyond the immediate vicinity of the wellhead, depending on the specific circumstances (BOEM, 2017). During the *Deepwater Horizon* spill, subsurface plumes were reported at a water depth of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). Oil plumes that contact sensitive benthic communities before degrading could potentially impact the resource (BOEM, 2017). Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants, and such approval would be obtained from the Federal On-Scene Coordinator upon consultation with the regional response team, including USEPA, prior to the use of dispersants.

The biological effects and fate of the oil remaining in the Gulf of Mexico from the *Deepwater Horizon* incident are still being studied, but numerous papers have been published discussing the nature of subsea oil plumes (e.g., Ramseur, 2011; Reddy et al., 2012; Valentine et al., 2014). Hazen et al. (2010) reported changes in plume hydrocarbon composition with distance from the source. Incubation experiments with environmental isolates demonstrated faster than expected hydrocarbon biodegradation rates at 5°C (41°F). Based on these results, Hazen et al. (2010) suggested the potential exists for intrinsic bioremediation of the oil plume in the deepwater column without substantial oxygen drawdown.

Potential impacts of oil on high-density deepwater benthic communities are discussed in recent EISs (BOEM, 2012a; 2015; 2016b; 2017). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals in the vicinity of the spill site. Impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; reduction or loss of one or more commercial and recreational fishery habitats; or changes in sediment characteristics (BOEM, 2012a; 2017).

C.2.3 Designated Topographic Features

The MC 956 lease block is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 77 statute miles (124 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

Due to the distance from the project area, it is unlikely that designated topographic features could be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf edge.

C.2.4 Pinnacle Trend Area Live Bottoms

The project area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest Pinnacle Stipulation Block is located approximately 79 statute miles (127 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to pinnacle trend area live bottoms due to the distance from the project area.

Due to the distance from the project area, it is unlikely that pinnacle trend live bottom areas would be affected by an accidental spill. A small fuel spill would float on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf edge.

C.2.5 Eastern Gulf Live Bottoms

The project area is not covered by the Live Bottom (Low-Relief) Stipulation, which applies to seagrass communities and low-relief hard bottom reef within the Eastern Gulf of Mexico Planning Area leases in water depths of 100 m (328 ft) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 97 statute miles (156 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to eastern Gulf live bottom areas due to the distance from the project area.

Because of the distance from the project area, it is unlikely that Eastern Gulf live bottom areas would be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf.

C.3 Threatened, Endangered, and Protected Species and Critical Habitat

This section discusses species listed as Endangered or Threatened under the Endangered Species Act (ESA). In addition, it includes all marine mammal species in the region,all of which are protected under the Marine Mammal Protection Act (MMPA).

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in **Table 6**. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The NMFS has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee, and sea turtles while on their nesting beaches.

Table 6. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast. Adapted from: U.S. Fish and Wildlife Service (2020) and National and Oceanic Atmospheric Administration Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice's whale[1]	*Balaenoptera ricei*	E	X	--	None
Sperm whale	*Physeter macrocephalus*	E	X	--	None
West Indian manatee	*Trichechus manatus*[2]	T	--	X	Florida (Peninsular)
Sea Turtles					
Loggerhead turtle	*Caretta caretta*	T,E[3]	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); *Sargassum* habitat including most of the central & western Gulf of Mexico.
Green turtle	*Chelonia mydas*	T	X	X	None
Leatherback turtle	*Dermochelys coriacea*	E	X	X	None
Hawksbill turtle	*Eretmochelys imbricata*	E	X	X	None
Kemp's ridley turtle	*Lepidochelys kempii*	E	X	X	None
Birds					
Piping Plover	*Charadrius melodus*	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	*Grus americana*	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)

Table 6. (Continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	*Epinephelus striatus*	T	--	X	None
Smalltooth sawfish	*Pristis pectinata*	E	--	X	Southwest Florida
Invertebrates					
Elkhorn coral	*Acropora palmata*	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	*Acropora cervicornis*	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	*Dendrogyra cylindrus*	T	--	X	None
Rough cactus coral	*Mycetophyllia ferox*	T	--	X	None
Lobed star coral	*Orbicella annularis*	T	--	X	None
Mountainous star coral	*Orbicella faveolata*	T	--	X	None
Boulder star coral	*Orbicella franksi*	T	--	X	None
Panama City crayfish	*Procambarus econfinae*	T[4]	--	X	South-central Bay County, Florida[4]
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus subsp. Ammobates, allophrys, trissyllepsis, and peninsularis, respectively*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

1 In 2021, National Marine Fisheries Service recognized that what had previously been accepted as a subspecies of the Bryde's whale is actually a separate species. The reclassification is formerly recognized under 86 FR 47022 effective date 22 October 2021 as the Rice's whale (Balaenoptera ricei).

2 There are two subspecies of West Indian manatee: the Florida manatee (T. m. latirostris), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (T. m. manatus), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

3 The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles is designated as Threatened (76 Federal Register [FR] 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as Sargassum spp. habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

4 The Threatened status and critical habitat designation for the Panama City crayfish are effective 4 February 2022.

Coastal Endangered or Threatened species that may occur along the U.S. Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Panama City crayfish (*Procambarus econfinae*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinata*), and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole) as indicated in **Table 6** and discussed in individual sections. Two other coastal bird species (Bald Eagle [*Haliaeetus leucocephalus*] and Brown Pelican [*Pelecanus occidentalis*]) are no longer federally listed as Endangered or Threatened; these are discussed in **Section C.4.2**.

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Mobula birostris*) are the only Endangered or Threatened species that could potentially occur within the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.5**). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale.

Four Endangered mysticetes (blue whale, fin whale, North Atlantic right whale, and sei whale) have been reported in the Gulf of Mexico, and are considered rare or extralimital (Würsig et al., 2017). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2022) nor in the most recent BOEM multisale EIS (BOEM, 2017); therefore, they are not considered further in the EIA.

The Rice's whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*Balaenoptera edeni brydei*) until a DNA study identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf of Mexico. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016, Rosel et al., 2021) and are therefore not likely to occur within the project area. The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicronis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). These corals are shallow water, zooxanthellate species (containing symbiotic photosynthetic zooxanthellae which contribute to their nutritional needs) and so are not present in the deepwater project area (see **Section C.3.16**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are likely to be adversely affected by either routine or accidental events. The IPFs with potential impacts listed in **Table 2** are discussed below.

C.3.1 Sperm Whale (Endangered)

The Endangered marine mammal likely to be present at or near the project area is the sperm whale. Resident populations of sperm whales occur within the Gulf of Mexico; a species description is presented in the recovery plan for this species (NMFS, 2010b). Gulf of Mexico sperm whales are classified as an Endangered species and a "strategic stock" (defined as a stock that may have unsustainable human-caused impacts) by NOAA Fisheries (Waring et al., 2016).

A “strategic stock” is defined by the MMPA as a marine mammal stock that meets the following criteria:

- The level of direct human-caused mortality exceeds the potential biological removal level;
- Based on the best available scientific information, is in decline and is likely to be listed as a Threatened species under the ESA within the foreseeable future; or
- Is listed as a Threatened or Endangered species under the ESA or is designated as depleted under the MMPA.

Current threats to sperm whale populations are defined as “any factor that could represent an impediment to recovery.” Current threats to sperm whale populations worldwide include fisheries interactions, anthropogenic marine noise, vessel interactions, contaminants and pollutants, disease, injury from marine debris, research, predation and natural mortality, direct harvest, competition for resources, loss of prey base due to climate change and ecosystem change, and cable laying. In the Gulf of Mexico, the impacts from many of these threats are identified as either low or unknown (BOEM, 2012a).

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 2000). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 200- and 1,000-meter (656 and 3,280 ft) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 3,000 m (9,843 ft). Generally, groups of sperm whales observed in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study (SWSS) consisted of mixed-sex groups comprising adult females with juveniles, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008).

A review of PSO sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012). In these mitigation surveys, sperm whales were the most common large cetacean encountered. Tagging and observation data from the SWSS also showed that sperm whales’ transit through the vicinity of the project area. Movements of satellite-tracked individuals suggest that this area of the continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include drilling rig presence, underwater noise, and lights; support vessel and helicopter marine noise; support vessel collisions; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sperm whales due to rapid dilution, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these marine mammals. Compliance with NTL BSEE-2015-G03 is intended to minimize the potential for marine debris-related impacts on sperm whales.

Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sperm whales. NMFS (2020a) estimates that no more than three sperm whales will be non-lethally taken, with one sperm whale lethally taken through the ingestion of marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on sperm whales and is not discussed further (See **Table 2**).

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Noise from routine drilling activities (see **Section A.1**) has the potential to disturb individuals or groups of sperm whales or mask the sounds they would normally produce or hear. Behavioral responses to noise by marine mammals vary widely and overall, are short-term and include, temporary displacement or cessation of feeding, resting, or social interactions (NMFS, 2009a; Gomez et al., 2016). Additionally, behavioral changes resulting from auditory masking sounds may induce an animal to produce more calls, longer calls, or shift the frequency of the calls. For example, masking caused by vessel noise was found to result in a reduced number of whale calls in the Gulf of Mexico (Azzara et al., 2013).

NMFS (2018a) lists sperm whales in the same functional hearing group (i.e., mid frequency cetaceans) as most dolphins and other toothed whales (i.e., odontocetes), with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, DP vessel-related noise is likely to be audible to sperm whales. Frequencies <150 Hz produced by the drilling operations may be audible but are not likely to be perceived with any significance by mid-frequency cetaceans. The sperm whale may possess better low frequency hearing than some of the other odontocetes, although not as low as many baleen whale species whose vocalizations between 30 Hz and 5 kHz (Wartzok and Ketten, 1999). Generally, most of the vocalizations produced by sperm whales occur at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with source levels up to 236 dB re1 µPa m (Møhl et al., 2003).

It is expected that, due to the relatively stationary nature of the proposed drilling operations, sperm whales would move away from the proposed operations area, and noise levels that could cause auditory injury would be avoided. Noise associated with proposed vessel operations may cause behavioral disturbances to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic noise, in general, have been limited to short term behavioral responses, which included the temporary cessation of feeding, resting, or social interactions (NMFS, 2015a). Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its ability to avoid noise sources.

NMFS (2018a) presents criteria that are used to determine physiological (i.e., injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in *FR* 70(7): 1871-1875 (NMFS and NOAA, 2005). Behavioral disturbance thresholds for marine mammals and are applied equally across all functional hearing groups. Received SPL of 120 dB re 1 µPa from a non-impulsive source is considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, in the case of behavioral responses, exposure to above-threshold noise levels alone do not indicate a behavioral response and, more importantly, do not equate to biologically important responses (Southall et al., 2016; Ellison et al., 2012).

For mid-frequency cetaceans exposed to non-impulsive sources, acoustic injury such as permanent threshold shifts are estimated to occur when the mammal has received a sound exposure level over 24 hours (SEL_{24h}) of 198 dB re 1 µPa^2 s. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL_{24h} of 178 dB re 1 µPa^2 s. Due to transient nature of sperm whales and the stationary nature of installation activities, it is not expected that any sperm whales will remain in proximity to the source for a full 24-hour period to receive an SEL_{24h} necessary for the onset of auditory threshold shifts.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine noise sources. Drilling-related marine noise associated with this project may contribute to increases in the marine sound environment within the region, but it is not expected to be at amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activity may cause behavioral effects, primarily avoidance or temporary displacement from the project area, but are not expected to be biologically significant for the population. Drilling rig lighting and presence are not expected to impact sperm whales (NMFS, 2007; BOEM, 2016a; 2017). DP drilling rig lighting and rig presence are not identified as IPFs for sperm whales (NMFS, 2007, 2020b; BOEM, 2017).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sperm whales, and there is also a risk of vessel collisions, which are identified as a threat in the recovery plan for this species (NMFS, 2010b). To reduce the potential for vessel collisions, BOEM issued BOEM-2016-G01. This NTL recommends that vessel operators and crews receive protected species identification training. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. In addition, when sperm whales are sighted, vessel operators and crews are required to maintain a distance of 100 m (328 ft) or greater whenever possible (NTL BOEM 2016-G01 and NMFS, 2020a).

Vessel operators are required to reduce vessel speed to 10 knots or less, as safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel (NTL BOEM-2016-G01). When sperm whales are sighted while a vessel is underway, the vessel should take action (e.g., attempt to remain parallel to the whale’s course, avoid excessive speed or abrupt changes in direction until the whale has left the area) as necessary to avoid violating the relevant separation distance. However, if the sperm whale is sighted within this distance, the vessel should reduce speed and shift the engine to neutral and not re-engage until the whale is outside of the separation area. This does not apply to any vessel towing gear (NMFS [2020a] Appendix C). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sperm whales. However, this mitigation is effective only during daylight hours and during periods of adequate visibility.

NMFS (2020a) analyzed the potential for vessel collisions and harassment of sperm whales in its Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. NMFS concluded that the observed avoidance of passing vessels by sperm whales is an advantageous response to avoid a potential threat and is not expected to result in any significant effect on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the level of the population. With the implementation of the NMFS vessel collision protocols listed in Appendix C of NMFS (2020a) in addition to the NTL BOEM-2016-G01, NMFS concluded that the likelihood of collisions between vessels and sperm whales would be reduced during daylight hours. During nighttime and during periods of poor visibility, it is assumed that vessel noise and sperm whale avoidance of moving vessels would reduce the chance of vessel collisions with this species. It is, however, likely that a collision between a sperm whale and a moving support vessel would result in severe injury or mortality of the stricken animal. The current Potential Biological Removal (PBR) level for the Gulf of Mexico stock of sperm whales is 2.0 (Hayes et al., 2021). The PBR level is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level.

Helicopter traffic also has the potential to disturb sperm whales. Smultea et al. (2008) documented responses of sperm whales offshore Hawaii to fixed wing aircraft flying at an altitude of 245 m (800 ft). A reaction to the initial pass of the aircraft was observed during 3 (12%) of 24 sightings. All three responses consisted of a hasty dive and occurred at less than 360 m (1,180 ft) lateral distance from the aircraft. Additional reactions were seen when aircraft circled certain whales to make further observations. Based on other studies of cetacean responses to sound, the authors concluded that the observed reactions to brief overflights by the aircraft were short-term and limited to behavioral disturbances.

While flying offshore in the Gulf of Mexico, support helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animals. Although whales may respond to helicopters (Smultea et al., 2008), NMFS (2020a) concluded that this altitude would minimize the potential for disturbing sperm whales. Therefore, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the Marine Mammal Commission (MMC) (2011) with discussions germane to the Gulf of Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this EP, there are no unique site-specific issues with respect to spill impacts on these animals that were not analyzed in the previous documents.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and marine noise of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of sperm whales, no significant impacts would be expected.

The probability of a fuel spill will be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill is expected to be brief and therefore potential for impacts to be minimal.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this EP, there are no unique site-specific issues with respect to spill impacts on sperm whales.

Impacts of oil spills on sperm whales can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine noise, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and marine noise of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2020). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals, including displacement from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sperm whales and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with or disturbing these animals. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. Based on the current PBR level for the Gulf of Mexico stock of sperm whales (2.0), mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level.

C.3.2 Rice's Whale (Endangered)

A recent study by Rosel et al. (2021), identified the genetically distinct northern Gulf of Mexico Bryde's whale stock as a new species of baleen whale named the Rice's whale through DNA analysis. The reclassification was approved by NMFS under 86 *FR* 47022 and was effective 22 October 2021. The Rice's whale is the only year-round resident baleen whale in the northern Gulf of Mexico. The Rice's whale is sighted most frequently in the waters over DeSoto Canyon between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (**Figure 3**; Rosel et al., 2016; Hayes et al., 2021). Most sightings have been made in the DeSoto Canyon region and off western Florida, although there have been some in the west-central portion of the northeastern Gulf of Mexico. Based on the available data, it is possible, but unlikely, that Rice's whales could occur in the project area.

In 2014, a petition was submitted to designate the northern Gulf of Mexico population as a DPS and list it as Endangered under the ESA (Natural Resources Defense Council, 2014). This petition received a 90-day positive finding by NMFS in 2015 and a proposed rule to list was published in 2016 (Hayes et al., 2019). On 15 April 2019, NMFS issued a final rule to list the Gulf of Mexico DPS of Bryde's whale as Endangered under the ESA. NMFS final rule on the reclassification (86 *FR* 47022) does not affect the ESA standing; thus, the Rice's whale is listed as an Endangered species.

Although it is unlikely that the Rice's whales would occur in the project area, IPFs that could affect the Rice's whales, if present, include drilling rig presence, marine noise, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on Rice's whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility and low abundance of Rice's whales in the Gulf of Mexico.

Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on Rice's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Rice's whale (Bryde's whales at the time of publication) from marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on Rice's whales and is not further discussed (See **Table 2**).

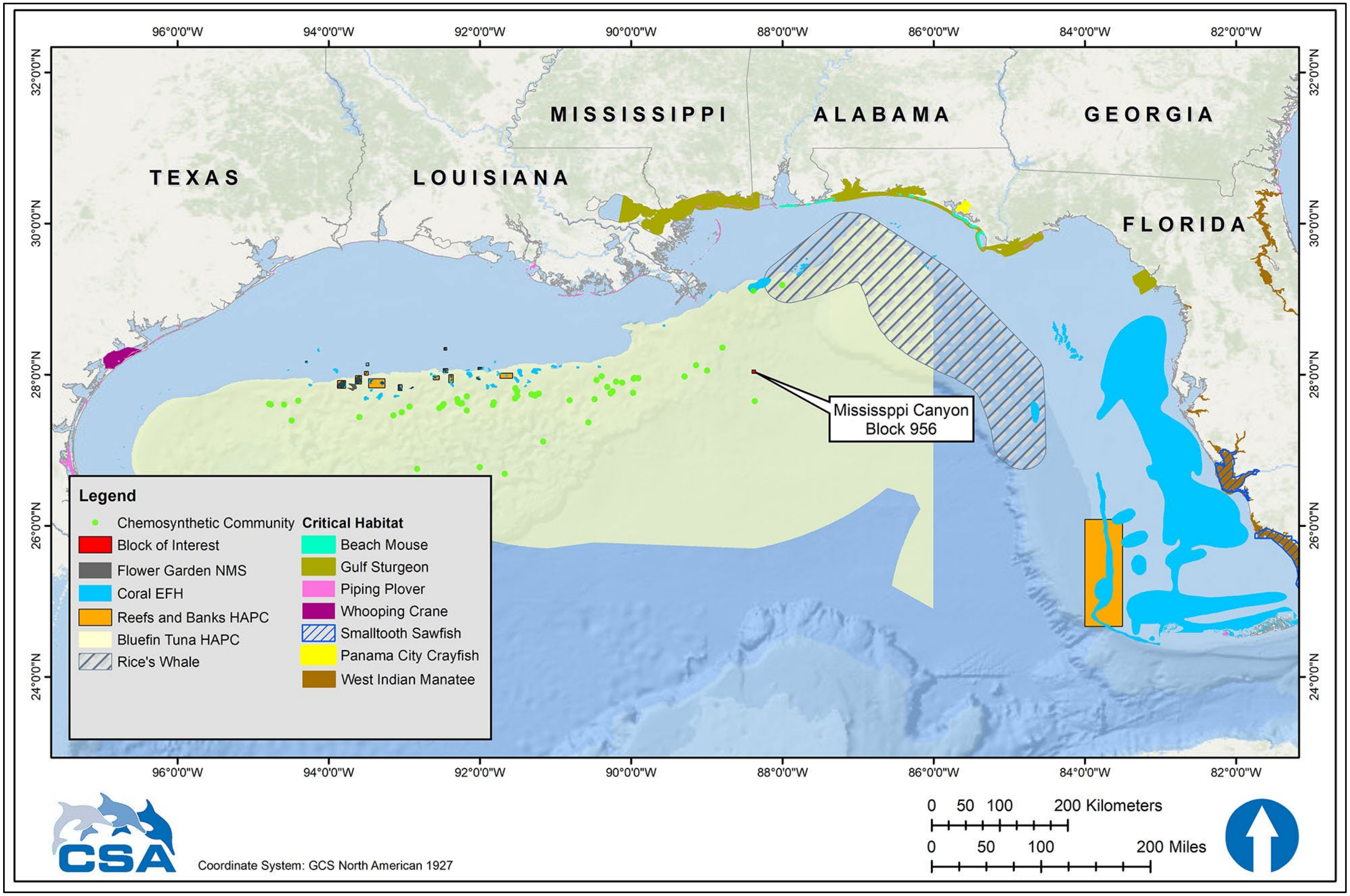

Figure 3. Location of selected environmental features in relation to the project area. EFH = Essential Fish Habitat; HAPC = Habitat Area of Particular Concern; NMS = National Marine Sanctuary.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

NMFS (2018a) lists Rice's whales in the functional hearing group of low frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 35 kHz. Noise produced by the drilling rig and drilling-associated vessels may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Noise associated with drilling and installation activities is relatively low in intensity relative to impulsive sources such as airgun noise, and an individual animal's sound exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) source levels ranging from approximately 180 to 190 dB re 1 µPa m (Hildebrand, 2005). Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans, such as the Rice's whale.

It is expected that, due to the relatively stationary nature of the drilling operations, Rice's whales would move away from the proposed operations area, and noise levels that could cause auditory injury would be avoided. Noise associated with proposed vessel operations may cause behavioral disturbance effects to individual Rice's whales. NMFS (2018a) presents criteria that are used to determine physiological (i.e., acoustic injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in 70 *FR* 1871. Received SPL of 120 dB re 1 µPa from non-impulsive sources are considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, exposure to SPL of 120 dB re 1 µPa does not alone equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur that, more importantly, may not result in biologically significant responses (Southall et al., 2016; Ellison et al., 2012).

Although it is unlikely that the Rice's whales would occur in the project area, IPFs that could affect the Rice's whales, if present, include drilling rig presence, marine noise, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on Rice's whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility and low abundance of Rice's whales in the Gulf of Mexico.

Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on Rice's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Rice's whale (Bryde's whales at the time of publication) from marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on Rice's whales and is not further discussed (See **Table 2**).

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transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) source levels ranging from approximately 180 to 190 dB re 1 µPa m (Hildebrand, 2005). Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans, such as the Rice's whale.

It is expected that, due to the relatively stationary nature of the drilling operations, Rice's whales would move away from the proposed operations area, and noise levels that could cause auditory injury would be avoided. Noise associated with proposed vessel operations may cause behavioral disturbance effects to individual Rice's whales. NMFS (2018a) presents criteria that are used to determine physiological (i.e., acoustic injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in 70 *FR* 1871. Received SPL of 120 dB re 1 µPa from non-impulsive sources are considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, exposure to SPL of 120 dB re 1 µPa does not alone equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur that, more importantly, may not result in biologically significant responses (Southall et al., 2016; Ellison et al., 2012).

For low-frequency cetaceans, specifically the Rice's whale, permanent and temporary threshold shift onset is estimated to occur at SEL_{24h} of 199 dB re 1 μPa^2 s and 179 re 1 μPa^2 s, repectively. Sounds generated by drilling operations, located within a deep-water, open ocean environment, will be generally non-impulsive, with some variability in sound level and frequency, and are not expected to reach permanent or temporary threshold shift values. This analysis assumes that the continuous nature of sounds produced by the drilling rig will provide individual whales with cues relative to the direction and relative distance of the sound source, and the fixed position of the drilling rig will allow for active avoidance of potential physical impacts. Drilling-related noise associated with this project may contribute to increases in the ambient noise environment of the region but are not expected to cause noise-related impacts to Rice's whales. Drilling rig lighting and presence are not expected to impact Rice's whales (BOEM, 2017).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Rice's whales and create the potential for vessel collisions. To reduce the potential for vessel collisions, BOEM has issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid colliding with protected species and requires operators to report sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. When whales are sighted, vessel operators and crews are required to maintain a distance of 500 m (1,640 ft) or greater whenever possible (NTL BOEM-2016-G01; NMFS, 2020a). Vessel operators are required to reduce vessel speed to 10 knots or less, as safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel (NTL BOEM-2016-G01). When a Rice's whale is sighted while a vessel is underway, the vessel should take action (e.g., attempt to remain parallel to the whale's course, avoid excessive speed or abrupt changes in direction until the whale has left the area) as necessary to avoid violating the relevant separation distance. However, if the whale is sighted within this distance, the vessel should reduce speed and shift the engine to neutral and not re-engage until the whale is outside of the separation area. This does not apply to any vessel towing gear (NMFS [2020a] Appendix C).

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing Rice's whales. The current PBR level for the Gulf of Mexico stock of Rice's whale is 0.1 (Hayes et al., 2021). Mortality of a single Rice's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Rice's whales. However, it is very unlikely that Rice's whale occurs within the project area, including the transit corridor for support vessels; consequently, the probability of a vessel collision with this species is extremely low.

Helicopter traffic also has the potential to disturb Rice's whales and based on studies of cetacean responses to noise, the observed responses to brief overflights by aircraft were short-term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 213 m (700 ft) during transit to and from the offshore working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2016a; 2017; NMFS, 2020a). Due to the brief potential for disturbance the low density of Rice's whales in the Gulf of Mexico, no significant impacts are expected.

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by NMFS (2020a) and BOEM (2012a; 2015; 2016b; 2017). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and reduce the potential for impacts on Rice's whales. Given the open ocean location of the project area and the brief duration of a small spill, any impacts are expected to be minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that more than 90% would evaporate or disperse naturally within 24 hours (NOAA, 2022). The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions at the time of a spill.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, as well as the mobility of Rice's whales and the unlikelihood of occurrence in the project area, no significant impacts are expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b; 2017), NMFS (2020a), Geraci and St. Aubin (1990), and the MMC (2011). Potential impacts of a large oil spill on Rice's whales could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, sound, and dispersants) (MMC, 2011). Direct physical and physiological effects could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2019). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb Rice's whales and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 and NMFS (2020a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. In the event of oil from a large spill contacting Rice's whales, it is expected that impacts resulting in the injury or death of individual Rice's whales would be significant based on the current PBR level for the Gulf of Mexico subspecies and stock (0.1). Mortality of a single Rice's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Rice's whales. The core distribution area for Rice's whales is within the eastern Gulf of Mexico OCS Planning Area; therefore, it is very unlikely that Rice's whales would occur within the project area. Consequently, the probability of spilled oil from a project-related well blowout reaching Rice's whales is extremely low.

C.3.3 West Indian Manatee (Threatened)

Most of the Gulf of Mexico manatee population is located in peninsular Florida, but manatees have been seen as far west as Texas during the summer (USFWS, 2001a). A species description is presented in the West Indian manatee recovery plan (USFWS, 2001a). Critical habitat of the West Indian manatee has been designated in southwest Florida.

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson, 2003). Manatees are typically found in coastal and riverine habitats, but have been seen on rare occasions in deepwater areas, during colder months when they seek refuge from colder coastal waters (USFWS, 2001a; Fertl et al., 2005; Pabody et al., 2009). There have been three verified reports of Florida manatee sightings by PSOs on the OCS during seismic mitigation surveys in mean water depths of over 600 m (1,969 ft) (Barkaszi and Kelly, 2019).

IPFs that potentially may affect manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect manatees, as the project area is approximately 77 statute miles (124 km) from the nearest shoreline (Louisiana).

As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with BSEE-NTL 2015-G03 is intended to minimize the potential for marine debris-related impacts on manatees.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel collisions, which are identified as a threat in the recovery plan for this species (USFWS, 2001a). Manatees are expected to be limited to shelf and coastal waters, and impacts are expected to be limited to transits of these vessels and helicopters through these waters. To reduce the potential for vessel collisions, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessel operators and that vessels slow down or stop their vessel to avoid colliding with protected species. NTL 2016-G01 was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. Vessel collision avoidance measures described in NMFS (2020a) for the marine mammal species managed by that agency may also provide some additional indirect protections to manatees. If a manatee is sighted, vessels associated with the operation should operate at "no wake/idle speed within that area, follow routes in deep water whenever possible, and attempt to maintain a distance of 50 m if practical. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling).

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing manatees during daylight hours. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). In the event of a vessel collision during support vessel transits, the mortality of a single manatee would constitute an adverse but insignificant impact to the subspecies.

Helicopter traffic has the potential to disturb manatees and Rathbun (1988) reported that manatees were disturbed more by low-flying 20 to 160 m (66 to 525 ft) helicopters than by fixed-wing aircraft. Helicopters used in support operations maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) overpopulated areas and sensitive habitats such as wildlife refuges and park properties. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2017; NMFS, 2020a). This helicopter traffic mitigation measure will minimize the potential for disturbing manatees and results in no expected impacts.

Impacts of a Large Oil Spill

The potential for significant impacts to manatees from a large oil spill would be most likely associated with coastal oiling in areas of manatee habitats. The OSRA results summarized in **Table 4** predict that nearshore waters and embayments of Plaquemines Parish, Louisiana is the coastal area with the most potential for water quality to be affected (5% conditional probability within 10 days and 11% conditional probability within 30 days of a spill). Other Louisiana or Florida shorelines may also be affected within 30 days.

In the event that manatees were exposed to oil, effects could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine noise, and dispersants) (MMC, 2011). Direct physical and physiological effects can include asphyxiation, acute poisoning, lowering of tolerance to other stress, nutritional stress, and inflammation from infection (BOEM, 2017). Indirect impacts include stress from the activities and sound of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 and NMFS (2020a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). It is not anticipated that groups of manatees would occur in coastal waters of the north central Gulf of Mexico; therefore, in the event of mortality of individual manatees from a large oil spill would constitute an adverse but insignificant impact to the subspecies.

C.3.4 Non-Endangered Marine Mammals (Protected)

Excluding the three Endangered or Threatened species that have been cited previously, there are 20 additional species of whales and dolphins (cetaceans) that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales, four species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin, spinner dolphin, and bottlenose dolphin. A brief summary is presented below, and additional information on these groups is presented by BOEM (2017).

Dwarf and pygmy sperm whales. At sea, it is difficult to differentiate dwarf sperm whales (*Kogia sima*) from pygmy sperm whales (*Kogia breviceps*), and sightings are often grouped together as *Kogia* spp. Both species have a worldwide distribution in temperate to tropical waters. In the Gulf of Mexico, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991; Mullin, 2007; Waring et al., 2016). Either species could occur in the project area.

Beaked whales. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), Gervais' beaked whale (*Mesoplodon europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records as well as passive acoustic monitoring in the Gulf of Mexico (Hildebrand et al., 2015) suggest that Gervais' beaked whale and Cuvier's beaked whale are the most common species in the region. The Sowerby's beaked whale is considered extralimital, with one documented stranding reported in the Gulf of Mexico by Bonde and O'Shea (1989). There are a number of extralimital strandings and sightings reported beyond the recognized range of Sowerby's beaked whale (e.g., Canary Islands, Mediterranean Sea), including from the eastern Gulf of Mexico (Pitman and Brownell, 2020). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000) and three sightings in the Gulf of Mexico (Hayes et al., 2021).

Due to the difficulties of at sea identification, beaked whales in the Gulf of Mexico are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of Mexico, they are broadly distributed in water depths greater than 1,000 m (3,281 ft) over lower slope and abyssal landscapes (Davis et al., 2000; HIdebrand et al., 2015). Any of these species could occur in the project area (Hayes et al., 2021).

Delphinids. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin (*Stenella clymene*), false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin (*Stenella attenuata*), pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin (*Stenella longirostris*), and striped dolphin (*Stenella coeruleoalba*). Any of these species could occur in the project area (Hayes et al., 2021).

The bottlenose dolphin (*Tursiops truncatus*) is a common inhabitant of the northern Gulf of Mexico, particularly within continental shelf waters. There are two ecotypes of bottlenose dolphins, a coastal form and an offshore form, which are genetically isolated from each other (Waring et al., 2016). The offshore form of the bottlenose dolphin may occur within the project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated into 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2021).

IPFs that potentially may affect non-endangered marine mammals include drilling rig presence, marine noise, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on marine mammals due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of marine mammals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on marine mammals.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

The presence of the drilling rig presents an attraction to pelagic food sources that may attract cetaceans. Some odontocetes have shown increased feeding activity around lighted platforms at night (Todd et al., 2009). Therefore, prey congregation could pose an attraction to protected species that exposes them to higher levels or longer durations of noise that might otherwise be avoided. Drilling and support vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017).

If the vessel is equipped with a moon pool, a trained crew member or company representative must monitor the moon pool area for marine mammals during operations. If a marine mammal is detected in the moon pool, immediate reporting to NMFS, BOEM, and BSEE is required (NMFS, 2020a).

Noise from routine drilling and well completion operations has the potential to disturb marine mammals. As discussed in **Section A.1**, noise impacts would be expected at greater distances when DP thrusters are in use than with vessel and drilling noise alone and are dependent on variables relating to sea state conditions, thruster type and usage. Three functional hearing groups are represented in the 20 non-endangered cetaceans found in the Gulf of Mexico. Eighteen of the 20 odontocete species are considered to be in the mid-frequency functional hearing group and two species (*Kogia* spp.) are in the high frequency functional hearing group, (NMFS, 2018a). Thruster and drilling noise will affect each group differently depending on the frequency bandwidths produced by operations. Generally, noise produced by drilling rigs on DP is dominated by frequencies below 10 kHz. Thus, drilling rig DP noise sources are out of the audible range for the high frequency group.

For mid frequency cetaceans exposed to a non-impulsive source (like drilling operations), permanent threshold shifts are estimated to occur when the mammal has received an SEL of 198 dB re 1 μPa^2 s over a 24-hour period. Simlarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1 μPa^2 s over a 24-hour period. Due to the transient nature of marine mammals and the stationary nature of the proposed activites, it is not expected that any marine mammals will remain within the ensonified area for a full 24-hour period to receive SEL necessary for the onset of auditory threshold shifts.

NMFS (2018a) presents criteria used to determine physiological (i.e., injury) thresholds for marine mammals but the behavioral disturbance thresholds were not updated in this most recent acoustic guidance; these behavioral disturbance thresholds are established and published by NMFS in 70 *FR* 1871. Received SPL of 120 dB re 1 µPa from a non-impulsive, continuous source is considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, in the case of behavioral responses, received levels alone do not indicate a behavioral response and, more importantly, do not equate to biologically important responses (Southall et al., 2016; Ellison et al., 2012).

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar sources. Marine mammal species in the northern Gulf of Mexico have been exposed to noise from anthropogenic sources for a long period of time and over large geographic areas and likely do not represent a naïve population with regard to sound (National Research Council, 2003b). Due to the limited scope, timing, and geographic extent of installation activities, this project would represent a small, temporary contribution to the overall soundscape, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Drilling rig and support vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017).

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb marine mammals, and there is also a risk of vessel collisions. Data concerning the frequency of vessel collisions are presented by BOEM (2012a). To reduce the potential for vessel collisions, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessels slow down or stop to avoid colliding with protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel operators and crews are required to attempt to maintain a distance of 100 m (328 ft) or greater when toothed whales are sighted and 50 m (164 ft) when small cetaceans are sighted (NMFS, 2020a). When cetaceans are sighted while a vessel is underway, vessels must attempt to remain parallel to the animal's course and avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Vessel operators are required to reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. These mitigation measures are only effective during daylight hours, or in sea and weather conditions where cetaceans are sighted. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all "other aquatic protected species" including sea turtles, with an exception made for those animals that approach the vessel. Vessel speeds must also be reduced to 10 kn or less when mother/calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel. Although vessel strike avoidance measures described in NMFS (2020a) are only applicable to ESA-listed species, complying with them may provide additional indirect protections to non-listed species as well.

When aquatic protected species are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array, site clearance trawling). Use of these measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing marine mammals, and therefore no significant impacts are expected.

The current PBR level for several non-endangered cetacean species in the Gulf of Mexico are less than 3 individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser's dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2021). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at a population level to the local (Gulf of Mexico) stocks of these species.

Helicopter traffic has the potential to disturb marine mammals (Würsig et al., 1998) but relatively high-altitude flying is conducted to minimize the potential for disturbances. While flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2012a; 2016a). Maintaining these altitudes during helicopter operations will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017; NMFS, 2020a).

Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b). Oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to lessen the potential for impacts on marine mammals. EP Appendix G provides detail on spill response measures, and those measures are summarized in the EIA. Given the open ocean location of the project area, the limited duration of a small spill, and response efforts, it is expected that any impacts would be brief and minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce the concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft (MMC, 2011). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. A small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (**Section A.9.1**). Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of marine mammals, no significant impacts would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017). For this EP, there are no unique site-specific issues. Impacts of oil spills on marine mammals can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine noise, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey. Complications of the above may lead to dysfunction of immune and reproductive systems (De Guise et al., 2017), physiological stress, declining physical condition, and death. Indirect impacts could include stress from the activities and sound of response vessels and aircraft. Behavioral responses can include displacement of animals from prime habitat (McDonald et al., 2017), disruption of social structure, change in prey availability and foraging distribution or patterns, change in reproductive behavior/productivity, and change in movement patterns or migration (MMC, 2011).

In the event of a large spill, response activities that may impact marine mammals include increased vessel traffic and remediation activities (e.g., use of dispersants, controlled burns, skimmers, boom, etc.) (BOEM, 2017). The increased level of vessel and aircraft activity associated with spill response could disturb marine mammals, potentially resulting in behavioral changes. The large number of response vessels could result in vessel collisions, entanglement or other injury, or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with or disturbing these animals, and therefore no significant impacts are expected.

This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. The application of dispersants greatly reduces exposure risks to marine mammals as the dispersants would remove oil from the surface thereby reducing the risk of contact and rendering it less likely to adhere to skin, baleen plates, or other body surfaces (BOEM, 2017). Based on the current PBR level for several non-endangered cetacean species in the Gulf of Mexico that are less than 3 individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser's dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2021), mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at the population level to the local (Gulf of Mexico) stocks of these species.

C.3.5 Sea Turtles (Endangered/Threatened)

Five species of Endangered or Threatened sea turtles may be found near the project area. Endangered species include the leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle (*Chelonia mydas*) is listed as Threatened (81 *FR* 20057). The DPS of loggerhead turtles (*Caretta caretta*) that occurs in the Gulf of Mexico is listed as Threatened.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 4**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 *FR* 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 2014a). The USFWS designation (79 *FR* 39756) includes nesting beaches in Jackson County, Mississippi; Baldwin County, Alabama; and Bay, Gulf, and Franklin Counties in the Florida Panhandle as well as several counties in southwest Florida and the Florida Keys (and other areas along the Atlantic coast). The NMFS designation (79 *FR* 39856) includes nearshore reproductive habitat within 0.99 miles (1.6 km) seaward of the mean high-water line along these same nesting beaches. NMFS also designated a large area of shelf and oceanic waters, termed *Sargassum* habitat, in the Gulf of Mexico (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown algae (Class Phaeophyceae) that takes on a planktonic, often pelagic existence after being removed from reefs during rough weather. Rafts of *Sargassum* serve as important foraging and developmental habitat for numerous fishes, and young sea turtles, including loggerhead turtles. NMFS designated three other categories of critical habitat; of these, two (migratory habitat and overwintering habitat) are along the Atlantic coast and the third (breeding habitat) is found in the Florida Keys and along the Florida east coast (NMFS, 2014a).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 146 statute miles (235 km) north of the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 4**).

Leatherbacks are the species most likely to be present near the project area, as they are the most pelagic of the sea turtles and feed on populations of gelatinous plankton, such as jellyfish and salps in all water depths. Loggerhead, green, hawksbill, and Kemp's ridley turtles are typically inner-shelf and nearshore species but may be found transiting in oceanic waters during seasonal migrations. Loggerheads are more likely to occur or be attracted to offshore structures than the other species. Hatchlings or juveniles of any of the sea turtle species may be present in deepwater areas, including the project area, where they may be associated with *Sargassum* rafts and other flotsam. All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats.

Sea turtle nesting in the northern Gulf of Mexico can be summarized by species as follows:

- Loggerhead turtles – Loggerhead turtles nest in significant numbers along the Florida Panhandle (Florida Fish and Wildlife Conservation Commission, nd-a) and, to a lesser extent, from Texas through Alabama (NMFS and USFWS, 2008);
- Green and leatherback turtles – Green and leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, nd-b; nd-c);
- Kemp's ridley turtles – The critically endangered Kemp's ridley turtle nests almost exclusively on a 16-mile (26-km) stretch of coastline near Rancho Nuevo in the Mexican state of Tamaulipas (NMFS et al., 2011). A much smaller population nests in Padre Island National Seashore, Texas, mostly as a result of reintroduction efforts (NMFS et al., 2011). A total of 284 Kemp's ridley turtle nests were counted on Texas beaches for the 2022 nesting season. A total of 262 Kemp's ridley turtle nests were counted on Texas beaches during the 2020 nesting season. This was an increase from 2019 (190 nests), but similar to 2018 (250 nests) (Turtle Island Restoration Network, 2022). Padre Island National Seashore along the coast of Willacy, Kenedy, and Kleberg Counties in southern Texas, is the most important nesting location for this species in the United States; and
- Hawksbill turtles – Hawksbill turtles typically do not nest anywhere near the project area, with most nesting in the region located in the Caribbean Sea and on the beaches of the Yucatán Peninsula (USFWS, 2016a).

IPFs that could potentially affect sea turtles include drilling rig presence, marine noise, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Though NMFS (2020a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G013 (See Table 1) and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sea turtles. NMFS (2020a) estimated a small proportion of individual sea turtles would be adversely affected from exposure to marine debris. Therefore, marine debris is likely to have negligible impacts on sea turtles and is not further discussed in this EIA (See **Table 2**).

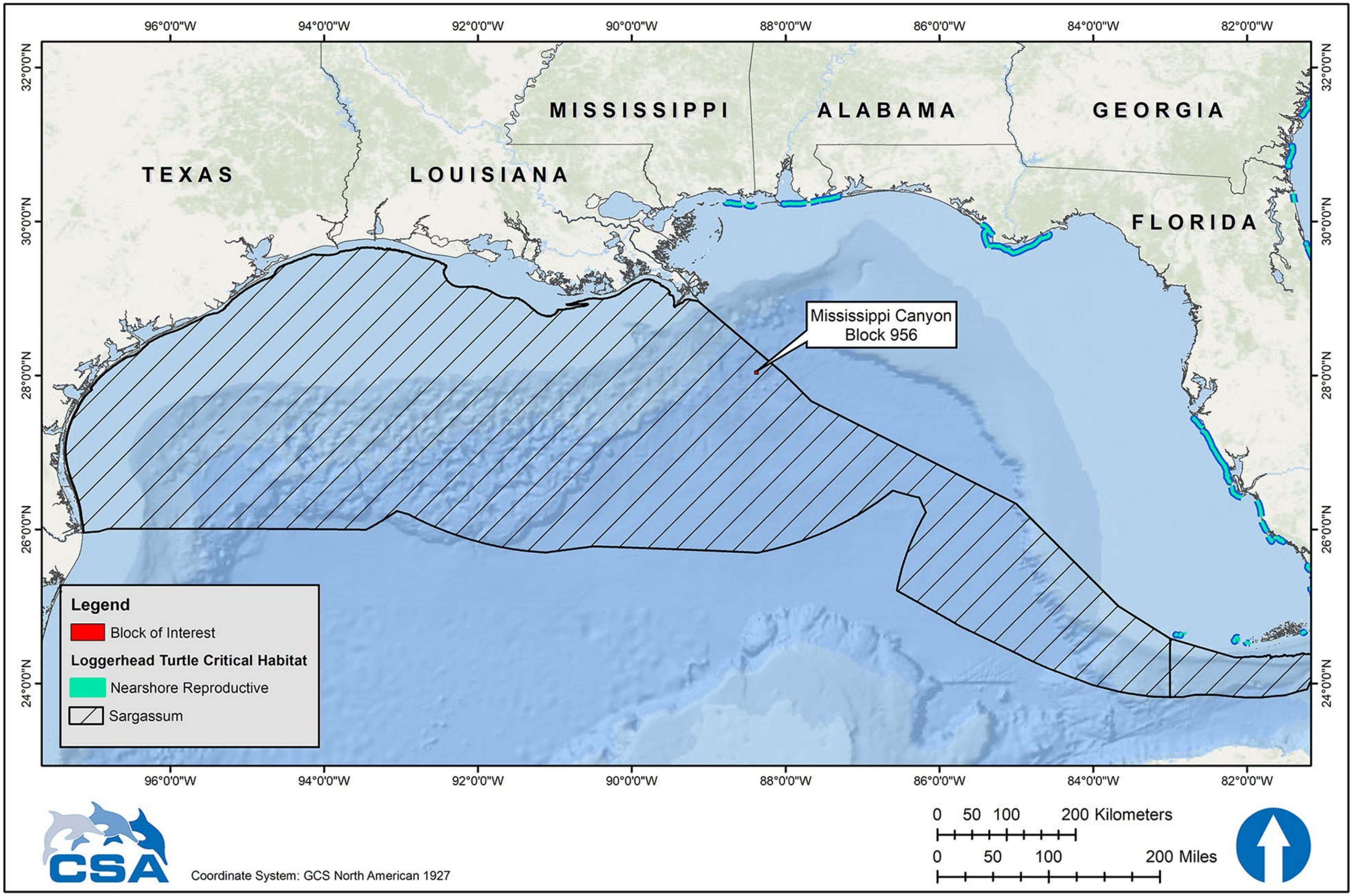

Figure 4. Location of loggerhead turtle designated *Sargassum* critical habitat and nearshore reproductive critical habitat in relation to the project area.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Samuel et al., 2005, Popper et al., 2014). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. Sea turtles can hear low to mid-frequency sounds and they appear to hear best between 200 and 750 Hz; they do not respond well to sounds above 2,000 Hz, although primary hearing frequency ranges vary per species and life stage (Ketten and Bartol, 2005; Dow Piniak et al., 2012a,b; Martin et al., 2012; Piniak et al., 2016).

The currently accepted hearing and response estimates for sea turtles are based on work conducted by the U.S. Navy (Finneran et al., 2017). These are applied in the NMFS Biological Opinion (NMFS, 2020a) which uses a zero-to-peak sound pressure level (PK) permanent threshold shift (i.e., acoustic injury) threshold of 232 dB re 1 µPa, and an SEL_{24h} threshold of 204 dB re 1 μPa^2 s. Behavioral thresholds for sea turtles are also based on work by the U.S. Navy (Blackstock et al., 2018) which recommends an SPL threshold of 175 dB re 1 µPa. Based on transmission loss calculations (see Urick, 1983), open water propagation of noise produced by typical sources with DP thrusters in use during drilling, are not expected to produce SPL greater than 175 dB re 1 µPa beyond a few meters from the source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefener et al., 1990; Gitschlag et al., 1997; Colman et al., 2020) and thus may be more susceptible to impacts from sounds produced during routine drilling activities. Any impacts would likely be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Because of the limited scope and short duration of drilling activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Tuxbury and Salmon, 2005; Berry et al., 2013; Simões et al., 2017). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant.

NMFS (2020a) stated sea turtles have the potential to be entangled or entrapped in moon pools, and though many sea turtles could exit the moon pool under their own volition, sublethal effects could occur. If the vessel is equipped with a moon pool, a trained crew member or company representative will monitor the moon pool area for sea turtles during operations. If a sea turtle is detected in the moon pool, it will be immediately reported to agencies including NMFS, BOEM, and BSEE per NMFS (2020a); compliance with ensuing agency guidance is expected. Resuscitation of any trapped sea turtles is expected to occur in compliance with NMFS (2020a) Appendix J. Based on the moon pool entrapment cases of sea turtles reported and successful rescues and releases that have occurred, NMFS (2020a) estimated approximately about one sea turtle will be sub lethally entrapped in moon pools every year. Therefore, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sea turtles, and there is also a risk of vessel collisions. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel collisions, BOEM issued NTL BOEM-2016-G01, which addresses 1) protected species identification training; 2) vessel operators and crews' observational vigilance and protected species collision avoidance; and 3) reporting of sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. When sea turtles are sighted, vessel operators and crews must, to the maximum extent possible, attempt to maintain a distance of 50 m (164 ft) or greater whenever possible (NMFS [2020a] Appendix C). When sea turtles are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sea turtles. Therefore, no significant impacts are expected.

Noise generated from support helicopter traffic has the potential to disturb sea turtles but relatively high-altitude flying is conducted to minimize the potential for disturbances. While flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. This altitude is intended to minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2007; BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2020a) and BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on sea turtles.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to minimize potential impacts on sea turtles. EP Appendix G provides details on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and the potential for impacts to occur would be minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircrafts (NMFS, 2020b). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, no significant impacts to sea turtles from direct or indirect exposure would be expected.

Loggerhead Critical Habitat – Nesting Beaches. A small fuel spill in the project area would be unlikely to affect sea turtle nesting beaches due to the distance from the nearest shoreline. Loggerhead turtle nesting beaches and nearshore reproductive habitat designated as critical habitat are located in Mississippi, Alabama, and the Florida Panhandle, at least 146 statute miles (235 km) from the project area. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to natural dispersion and degradation.

Loggerhead Critical Habitat – *Sargassum*. The project area is within the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 4**). A small diesel fuel spill would likely affect *Sargassum* and juvenile turtles in this habitat. If juvenile sea turtles come into contact with or ingest diesel fuel, impacts could include death, injury, or other sublethal effects. However, effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to 5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico. However, if juvenile sea turtles are present in the area impacted, significant impacts to the regional population could occur.

Impacts of a Large Oil Spill

Impacts of oil spills on sea turtles can include direct impacts from oil exposure as well as indirect impacts due to response activities (e.g., vessel traffic, marine noise, and dispersant use). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes and smoke (e.g., from *in situ* burning of oil); ingestion of oil (and dispersants) directly or via contaminated food; and stress from the activities and marine noise of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing food availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (NOAA, 2010; NMFS, 2020b). In the unlikely event of a spill, implementation of bp's ROSRP is expected to minimize the potential for these types of impacts on sea turtles. EP Appendix G provides further details on spill response measures.

Studies of oil effects on loggerhead turtles in a controlled setting (NOAA, 2010, Lutcavage et al., 1995) suggest that sea turtles show no avoidance behavior when they encounter an oil slick, and any sea turtle in an affected area would be expected to be exposed. Sea turtles' diving behaviors also put them at risk. Sea turtles rapidly inhale a large volume of air before diving and continually resurface over time, which may result in repeated exposure to volatile vapors and oiling (NMFS, 2007).

Loggerhead Critical Habitat – Nesting Beaches. If spilled oil reaches sea turtle nesting beaches, nesting sea turtles and egg development could be affected (NMFS, 2020a). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

The OSRA results summarized in **Table 4** predict that nearshore waters and embayments of Plaquemines Parish, Louisiana is the coastal area with the most potential for water quality to be affected (5% conditional probability within 10 days and 11% conditional probability within 30 days of a spill). Other Louisiana or Florida shorelines may also be affected within 30 days.

Loggerhead Critical Habitat – *Sargassum*. The project area is within the loggerhead turtle critical habitat designated as *Sargassum* habitat, which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 4**) (NMFS, 2014a). Because of the large area covered by the designated *Sargassum* critical habitat for loggerhead turtles, a large spill could result in a substantial part of the *Sargassum* critical habitat in the northern Gulf of Mexico being oiled. The 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014a). It is extremely unlikely that the entire *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to floating *Sargassum* and its associated communities (BOEM, 2017). *Sargassum* also has the potential to sink during a large spill, thus temporarily removing the habitat and possibly being an additional pathway of exposure to the benthic environment (Powers et al., 2013). Lower levels of oiling may cause sub-lethal affects, including a reduction in growth, productivity, and recruitment of organisms associated with the *Sargassum.* The *Sargassum* algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b). *Sargassum* has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of Mexico to the western Atlantic. A large spill could affect a large portion of the annual crop of the algae; however, because of its ubiquitous distribution and seasonal cycle, recovery of the *Sargassum* community would be expected to occur within one to two years (BOEM, 2017).

Impacts to sea turtles from a large oil spill and associated cleanup activities would depend on spill extent, duration, and season (relative to turtle nesting season); the amount of oil reaching the shore; the importance of specific beaches to sea turtle nesting; and the level of cleanup vessel and beach crew activity required. In the event of oil from a large spill, it is expected that impacts resulting in the injury or death of individual sea turtles would be adverse but not likely significant at the population level. In the event that spilled oil reached nesting beaches during nesting period(s), the level of mortality (and impact) would increase.

C.3.6 Piping Plover (Threatened)

The Piping Plover is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico coasts. This Threatened species experienced declines in population as a result of hunting, habitat loss and modification, predation, and disease (USFWS, 2003). However, as a result of intensive conservation and management, populations of Piping Plover appear to have been increasing since 1991 throughout its range (Bird Life International, 2020). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 3**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening.

A large oil spill is the only IPF that potentially may affect Piping Plovers. There are no IPFs associated with routine project activities that could affect these birds. A small fuel spill in the project area would be unlikely to affect Piping Plovers because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Noise from helicopters would be unlikely to significantly affect piping plover populations, because it is assumed that helicopters will maintain an altitude of 305 m (1,000 ft) over unpopulated areas or across coastlines.

Impacts of a Large Oil Spill

The project area is approximately 79 statute miles (127 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 3**). The 30-day OSRA modeling (**Table 4**) predicts that Piping Plover critical habitat in Louisiana and Florida could be contacted within 3 days of a spill (1% to 11% conditional probability).

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017). Piping Plovers congregate and feed along tidally-exposed banks and shorelines, following the tidal boundary and foraging at the water's edge. It is possible that some deaths of Piping Plovers could occur, especially if spills occur during winter months when plovers are most common along the coastal Gulf or if spills contacted critical habitat. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. Extensive bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

However, a large spill that contacts shorelines would not necessarily substantially impact Piping Plovers. In the aftermath of the *Deepwater Horizon* incident, Gibson et al. (2017) completed thorough surveys of coastal Piping Plover habitat in coastal Louisiana, Mississippi, and Alabama and found that only 0.89% of all observed Piping Plovers were visibly oiled, leaving the authors to conclude that the *Deepwater Horizon* incident did not substantially affect Piping Plover populations.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane is a large omnivorous wading bird listed as an Endangered species. Three wild populations live in North America (National Wildlife Federation, 2016). One population overwinters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching an estimated population of 543 at Aransas NWR during the 2021 to 2022 winter (USFWS, 2022), an increase of an estimated 506 individuals counted in the 2019 to 2020 winter survey. Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (USFWS, 2007). About 9,000 ha (22,240 ac) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species.

A large oil spill is the only IPF that potentially may affect Whooping Cranes. A small fuel spill in the project area would also be unlikely to affect Whooping Cranes, due to the distance of the project area from Aransas NWR. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior natural dispersion and degradation.

Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 491 statute miles (790 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill.

In the event of oil exposure, Whooping Cranes could physically oil themselves while foraging in oiled areas or secondarily contaminate themselves through ingestion of contaminated shellfish, frogs, and fishes. It is possible that some Whooping Crane deaths could occur, especially if a spill occurred during winter months when Whooping Cranes are most common along the Texas coast and if the spill contacts their critical habitat in Aransas NWR. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. In the event of a spill, bp would work with the applicable state and federal agencies to prevent impacts on Whooping Cranes. Extensive bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

C.3.8 Oceanic Whitetip Shark (Threatened)

The oceanic whitetip shark was listed as Threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 *FR* 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and historically were one of the most widespread and abundant species of shark (Rigby et al., 2019). However, based on reported oceanic whitetip shark catches in several major long-line fisheries, the global population appears to have suffered substantial declines (Camhi et al., 2008) and the species is now only occasionally reported in the Gulf of Mexico (Rigby et al., 2019).

Oceanic whitetip shark management is complicated due to it being globally distributed, highly migratory, and overlapping in areas of high fishing pressure; thus, leaving assessment of population trends on fishery dependent catch-and-effort data rather than scientific surveys (Young and Carlson, 2020). A comparison of historical shark catch rates in the Gulf of Mexico by Baum and Myers (2004) noted that most recent papers dismissed the oceanic whitetip shark as rare or absent in the Gulf of Mexico. NMFS (2018b) noted that there has been an 88% decline in abundance of the species in the Gulf of Mexico since the mid-1990s due to commercial fishing pressure.

IPFs that could affect the oceanic whitetip shark include drilling rig presence, noise, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area, a small diesel fuel spill would be unlikely to affect oceanic whitetip sharks due to rapid natural dispersion of diesel fuel and the low density of oceanic whitetip sharks potentially present in the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (**Table 2**).

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Offshore drilling activities produce a broad array of noise at frequencies and intensities that may be detected by sharks including the Threatened oceanic whitetip shark. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013) which includes sensitivities for individual species to SPLs between approximately 134 to 148 dB re 1 µPa in nurse sharks (*Ginglymostoma cirratum*) at frequencies between 100 and

1,000 Hz (Casper and Mann, 2006). These frequencies overlap with noise associated with drilling activities (source levels of 195 dB re 1 µPa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, no population level impacts on oceanic whitetip sharks are expected.

Impacts of a Large Oil Spill

Information regarding the direct effects of oil on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large oil spill, oceanic whitetip sharks could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Because oceanic whitetip sharks may be found in surface waters, they could be more likely to be impacted by floating oil than other species which only reside at depth.

It is possible that a large oil spill could affect individual oceanic whitetip sharks and result in injuries or deaths. However, due to the low density of oceanic whitetip sharks thought to exist in the Gulf of Mexico, it is unlikely that a large spill would result in population level effects.

C.3.9 Giant Manta Ray (Threatened)

The giant manta ray is a Threatened elasmobranch species that is a slow-growing, migratory, planktivorous species than inhabits tropical, subtropical, and temperate bodies of water worldwide (NOAA, 2018). The giant manta ray became listed as Threatened under the ESA in 2018.

Commercial fishing is the primary threat to giant manta rays (NOAA, 2018). The species is targeted and caught as bycatch in several global fisheries throughout its range. Although protected in U.S. waters, protection of populations is difficult as they are highly migratory with sparsely distributed and fragmented populations throughout the world. Some estimated regional population sizes are small (between 100 to 1,500 individuals) (Marshall et al., 2018; NOAA, 2018). Stewart et al. (2018) recently reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. Approximately 100 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Belter et al., 2020). Genetic and photographic evidence in the Flower Garden Banks over 25 years of monitoring showed that 95% of identified giant manta ray male individuals were smaller than mature size (Stewart et al., 2018).

IPFs that may impact giant manta rays include drilling rig presence, marine noise, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area a small diesel fuel spill would be unlikely to affect giant manta rays due to rapid natural dispersion of diesel fuel and the low density of giant manta rays potentially present in the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (See **Table 2**).

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Offshore drilling activities produce a broad array of noise at frequencies and intensities that may be detected by elasmobranchs including the Threatened giant manta ray. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013). Studies indicate sensitivities to SPLs between approximately 139 and 153 dB re 1 µPa in yellow stingray (*Urobatis jamaicensis*) and SPLs between approximately 120 and 145 dB re 1 µPa in little skate (*Erinacea raja*) at frequencies from 100 to 1,000 Hz (Casper et al., 2003; Casper and Mann, 2006). These frequencies overlap with noise associated with drilling activities (source levels of 195 dB re 1 µPa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, no population level impacts on giant manta rays are expected.

Impacts of a Large Oil Spill

A large oil spill in the project area could reach coral reefs at the Flower Garden Banks which is the only known location of giant manta ray aggregations in the Gulf of Mexico, although individuals may occur anywhere in the Gulf. In the unlikely event of a large oil spill impacting areas with giant manta rays, individual rays could be affected by direct ingestion of oil which could cover their gill filaments or gill rakers, or by ingestion of oiled plankton. Giant manta rays typically feed in shallow waters of less than 10 m (33 ft) depth (NOAA, 2018). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which most typically reside at depth.

In the event of a large oil spill, due to the distance between the project area and the Flower Garden Banks, it is unlikely that oil would impact the threatened giant manta ray nursery habitat. It is possible that a large oil spill could contact individual giant manta rays, but due to the low density of individuals thought to occur in the Gulf of Mexico, there would not likely be any population-level impacts.

C.3.10 Gulf Sturgeon (Threatened)

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is a Threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). Sturgeon are anadromous fish that migrate from the ocean upstream into coastal rivers to spawn in freshwater.

The historic range of the species extended from the Mississippi River to Charlotte Harbor, Florida (Wakeford, 2001). This range has contracted to encompass major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida. Populations have been depleted or even extirpated throughout this range by fishing, shoreline development, dam construction, water quality changes, and other factors (Barkuloo, 1988; Wakeford, 2001). These declines prompted the listing of the Gulf sturgeon as a Threatened species in 1991. The best-known populations occur in the Apalachicola and Suwannee Rivers in Florida (Carr, 1996; Sulak and Clugston, 1998), the Choctawhatchee River in Alabama (Fox et al., 2000), and the Pearl River in Mississippi/Louisiana (Morrow et al., 1998). Rudd et al. (2014) reconfirmed the spatial distribution and movement patterns of Gulf Sturgeon by surgically implanting acoustic telemetry tags. Critical habitat in the Gulf extends from Lake Borgne, Louisiana (St. Bernard Parish), to Suwannee Sound, Florida (Levy County) (NMFS, 2014a) (**Figure 3**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large oil spill is the only IPF that potentially may affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect these fish. A small fuel spill in the project area would be unlikely to affect Gulf sturgeon because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Vessel collisions to Gulf sturgeon would be unlikely based on the location of the support vessel base and that NMFS (2020a) estimated one non-lethal Gulf sturgeon collision in the 50 years of proposed action.

Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2007) and BOEM (2012a; 2017). For this EP, there are no unique site-specific issues with respect to this species.

The project area is approximately 146 statute miles (235 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a 2% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days of a spill.

In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, subadult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable from approximately October through April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2020a).

C.3.11 Nassau Grouper (Threatened)

The Nassau grouper is a Threatened, long-lived reef fish typically associated with hard bottom structures such as natural and artificial reefs, rocks, and underwater ledges (NOAA, nd). Once one of the most common reef fish species in the coastal waters of the United States and Caribbean (Sadovy, 1997), the Nassau grouper been subject to overfishing and is considered extinct in much of its historical range. Observations of current spawning aggregations compared with historical landings data suggest that the Nassau grouper population is substantially smaller than its historical size (NOAA, nd). The Nassau Grouper was listed as Threatened under the ESA in 2016 (81 *FR* 42268).

Nassau groupers are found mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatán Peninsula, and the Caribbean, including the U.S. Virgin Island and Puerto Rico (NOAA, nd). There has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of Mexico at a water depth of 36 m (118 ft) (Foley et al., 2007). Three additional unconfirmed reports (i.e. lacking photographic evidence) of Nassau grouper have also been documented from mooring buoys and the coral cap region of the West Flower Garden flats (Foley et al., 2007).

There are no IPFs associated with routine project activities that could affect Nassau grouper. A small fuel spill would not affect Nassau grouper because the fuel would float and dissipate on the sea surface and would not be expected to reach the Flower Garden Banks or Florida Keys. A large hydrocarbon spill is the only relevant IPF.

Impacts of a Large Oil Spill

A spill would be unlikely to contact the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 315 statute miles [507 km]), and the difference in water depth between the project area (2,081 m [6,826 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons contact Nassau grouper habitat, hydrocarbon droplets or contaminated sediment particles could come into contact with Nassau grouper present on the reefs. Individual fish could be affected by direct ingestion of hydrocarbons which could cover their gill filaments or gill rakers, result in ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills.

C.3.12 Smalltooth Sawfish (Endangered)

The smalltooth sawfish, named due to their flat, saw-like rostrum, is an elasmobranch ray which lives in shallow coastal tropical seas and estuaries where they feed on fish and invertebrates such as shrimp and crabs (NOAA Fisheries, nd). Once found along most of the northern Gulf of Mexico coast from Texas to Florida, their current range in Gulf of Mexico is restricted to areas primarily in southwest Florida (Brame et al., 2019) where several areas of critical habitat have been designated (**Figure 3**). A species description is presented in the recovery plan for this species (NMFS, 2009b).

Listed as Endangered under the ESA in 2003, population numbers have drastically declined over the past century primarily due to accidental bycatch (Seitz and Poulakis, 2006). Although there are no reliable estimates for smalltooth sawfish population numbers throughout its range (NMFS, 2018c), data from 1989 to 2004 indicated a slight increasing trend in population numbers in Everglades National Park during that time period (Carlson et al., 2007). More recent data resulted in a similar conclusion, with indications that populations were stable or slightly increasing in southwest Florida (Carlson and Osborne, 2012).

There are no IPFs associated with routine project activities that could affect smalltooth sawfish. A small fuel spill would not affect smalltooth sawfish because the fuel would float and dissipate on the sea surface and would not be expected to reach smalltooth sawfish habitat in coastal areas (see **Section A.9.1**). A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

The project area is approximately 385 miles (620 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 30-day OSRA modeling (**Table 3**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 30 days of a spill (<0.5% conditional probability).

Information regarding the direct effects of oil on elasmobranchs, including the smalltooth sawfish are largely unknown. A recent study by Cave and Kajiura (2018) reported that when exposed to crude oil, the Atlantic stingray (*Hypanus sabinus*) experienced impaired olfactory function which could lead to decreased fitness. In the event of oil reaching smalltooth sawfish habitats, the smalltooth sawfish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the shallow, coastal habitats preferred by smalltooth sawfish, individuals in areas subject to coastal oiling could be more likely to be impacted than other species that reside at depth.

C.3.13 Beach Mice (Endangered)

Four subspecies of Endangered beach mouse occur on the barrier islands of Alabama and the Florida Panhandle: the Alabama (*Peromyscus polionotus ammobates*), Choctawhatchee (*P. p. allophrys*), Perdido Key (*P. p. trissyllepsis*), and St. Andrew beach mouse (*P. p. peninsularis*). Critical habitat has been designated for all four subspecies and is shown combined in **Figure 3**. One additional subspecies of *Peromyscus* beach mouse inhabiting dunes on the western Florida Panhandle, the Santa Rosa beach mouse (*P. p. leucocephalus*), is not listed under the ESA. A large oil spill is the only IPF that potentially may affect beach mice. There are no IPFs associated with routine project activities that could affect these animals due to the distance from shore and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect beach mice because a small fuel spill would not be expected to reach beach mice habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on Endangered beach mice are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to these species that were not analyzed in these documents.

Beach mouse critical habitat in Baldwin County, Alabama, is approximately 150 statute miles (241 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% conditional probability of contacting any coastal areas containing beach mouse critical habitat within 30 days.

In the event of oil contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. However, any such impacts are unlikely due to the distance from shore and response actions that would occur in the event of a spill.

C.3.14 Florida Salt Marsh Vole (Endangered)

The Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*) is a small, dark brown or black rodent found only in saltgrass (*Distichlis spicata*) meadows in the Big Bend region of Florida that was listed as Endangered under the ESA in 1991. Only two populations of Florida salt marsh vole are known to exist: one near Cedar Key in Levy County, Florida and one in the Lower Suwanee National Wildlife Refuge in Dixie County, Florida (Florida Fish and Wildlife Conservation Commission, nd-e). No critical habitat has been established for the Florida salt marsh vole in part due to concerns over illegal trapping or trespassing if the location of the populations were publicly disclosed (USFWS, 2001b).

A large oil spill is the only IPF that potentially may affect the Florida salt marsh vole. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Florida salt marsh vole because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Florida salt marsh vole habitat in Levy and Dixie counties, Florida is approximately 312 miles (502 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing Florida salt marsh vole habitat within 30 days.

In the event of oil contacting beaches containing these animals, Florida salt marsh voles could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Florida salt marsh voles from a large oil spill are expected to be significant. Due to the extremely low population numbers, extensive oiling of Florida salt marsh vole habitat could result in the extinction of the species. However, any such impacts are unlikely due to the distance from the project area to Florida salt marsh vole habitat and response actions that would occur in the event of a spill.

C.3.15 Panama City Crayfish (Threatened)

The USFWS issued a Final Rule designating the Panama City crayfish as Threatened under the ESA on 5 January 2022 (effective 4 February 2022). The Panama City crayfish is a semi-terrestrial crayfish that grows up to 2 inches (51 mm) in size and is found in south-central Bay County, Florida. Medium to dark brown in color, the crayfish prefers areas dominated by herbaceous vegetation and shallow or fluctuating water levels (Keppner and Keppner, 2004). Historically prevalent in shallow freshwater bodies in pine and prairie communities, urban development has largely replaced these habitats. The Panama City crayfish is now generally found in wet or semi-wet swales, ditches, slash pine plantations, undeveloped utility rights-of-way, and remnant wetlands (Florida Fish and Wildlife Conservation Commission, 2016).

A large oil spill is the only IPF that potentially may affect the Panama City crayfish. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Panama City crayfish because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Panama City crayfish critical habitat in Bay County, Florida is approximately 214 miles (344 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing Panama City crayfish critical habitat within 30 days.

Effects of oiling on the Panama City crayfish are largely unknown. In general, crayfishes use chemoreception to orient themselves in their environmental, to find food, and to avoid predators (Bergman and Moore, 2005). Exposure to hydrocarbons has been shown to damage receptor cells that crayfish use for chemoreception, thus decreasing their fitness (Tierney et al., 2010).

Indirect impacts of oiling of Panama City crayfish habitat could include reduction of food supply, destruction of habitat, and fouling of burrows. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Panama City crayfish from a large oil spill are expected to be significant. Due to the low population numbers and restricted range, extensive oiling of Panama City crayfish habitat could be significant at the species level. However, any such impacts are unlikely due to the distance from the project area to Panama City crayfish habitat and response actions that would occur in the event of a spill.

C.3.16 Threatened Coral Species

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral, staghorn coral, lobed star coral, mountainous star coral, boulder star coral, pillar coral, and rough cactus coral. Elkhorn coral, lobed star coral, mountainous star coral, and boulder star coral have been reported from the coral cap region of the Flower Garden Banks (NOAA, 2014), but are unlikely to be present with a widespread distribution in the northern Gulf of Mexico because they typically inhabit coral reefs in shallow, clear tropical, or subtropical waters. Staghorn coral, pillar coral, and rough cactus coral are only known from the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, nd-d). Other Caribbean coral species evaluated by NMFS in 2014 (79 *FR* 53852) either do not meet the criteria for ESA listing or are not known from the Flower Garden Banks, Florida Keys, or Dry Tortugas. Critical habitat has been designated for elkhorn coral and staghorn coral in the Florida Keys (Monroe County, Florida) and Dry Tortugas, but none has been designated for the other threatened coral species included here. A species description of elkhorn coral is presented in the recovery plan for the species (NMFS, 2015).

In November 2020, NMFS proposed to designate critical habitat for the boulder star coral, lobed star coral, mountainous star coral, pillar coral, and rough cactus coral in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. For the areas in the Gulf of Mexico this includes the

Flower Garden Banks and the waters near Miami-Dade and Monroe counties, Florida, and the Dry Tortugas.

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of Mexico. A small fuel spill would not affect threatened coral species because the oil would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

Impacts of a Large Oil Spill

A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 315 statute miles [507 km]), and the difference in water depth between the project area (2,081 m [6,826 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, oil would not be expected to contact corals on the seafloor. Natural or chemical dispersion of oil could cause a subsurface plume which would have the remote possibility of contacting seafloor corals.

If a subsurface plume were to occur, impacts on the Flower Garden Banks would be unlikely due to the distance between the project area and corals within the Flower Garden Banks (approximately 315 statute miles [507 km]), and the shallow location of the coral cap of the Banks. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf. Valentine et al. (2014) observed the spatial distribution of excess hopane, a crude oil tracer from *Deepwater Horizon* spill sediment core samples, to be in the deeper waters and not transported up the shelf, thus confirming that near-bottom currents flow along the isobaths.

In the unlikely event that a subsurface plume reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017), impacts relevant to these corals could include loss of habitat, biodiversity, and live coral coverage. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM, 2017).

Due to the distance between the project area and coral habitats, there is a low chance of oil contacting threatened coral habitat in the event of a spill, and no significant impacts on threatened coral species are expected.

C.4 Coastal and Marine Birds

C.4.1 Marine Birds

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a; Clapp et al., 1982b; 1983; Davis and Fargion, 1996; Davis et al., 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast (on the mainland and on barrier islands). In addition, other birds such as waterfowl, marsh birds, and shorebirds may occasionally be present over open ocean areas. No Endangered or Threatened bird species are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of Mexico were surveyed from ships during the GulfCet II program (Davis et al., 2000) which reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in deepwater areas of the Gulf of Mexico. From these surveys, four ecological categories of seabirds were documented in the deepwater areas of the Gulf: summer migrants (shearwaters, storm petrels, boobies); summer residents that breed in the Gulf (Sooty Tern, Least Tern, Sandwich Tern, Magnificent Frigatebird); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls, Royal Terns, Bridled Terns) (Davis et al., 2000).

Common marine bird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird (*Fregata magnificens*), Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris diomedea*), Greater Shearwater (*Puffinus gravis*), and Audubon's Shearwater (*Puffinus lherminieri*). Seabirds are distributed Gulf-wide and are not specifically associated with the project area.

Relationships with hydrographic features were found for several marine bird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. The GulfCet II study did not estimate bird densities; however, Haney et al. (2014) indicated that marine bird densities over the open ocean were estimated to be 1.6 birds km^{-2}.

IPFs that potentially may affect marine birds include drilling rig presence, marine noise, lighting, support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on birds. The IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Marine birds that frequent offshore drilling operations may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Birds migrating over water have been known to collide with offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine noise (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of drilling activities described in this EP, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures. A study in the North Sea indicated that rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 miles (5km) (Poot et al., 2008). A study in the Gulf of Mexico also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of Mexico would include the lower incidence of cloudy and foggy days in the Gulf of Mexico versus the North Sea. In laboratory experiments, Poot et al. (2008) found the magnetic compass of migratory birds to be wavelength dependent. Migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts their magnetic orientation. They designed a field study to test if and how changing light color influenced migrating birds under field conditions. During field studies they found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation) (Poot et al., 2008).

Overall, potential negative impacts to birds from drilling rig lighting, noise, collisions, or other adverse effects are highly localized (considering the single structure) and may affect individual birds during migration periods. Noise generated from the drilling rig is not expected to impact marine birds. Therefore, these potential impacts are not expected to affect marine birds at the population or species level and are not significant.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb marine birds in open, offshore waters. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individual birds would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

Impacts of a Small Fuel Spill

Potential spill impacts on marine birds are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on marine birds. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for marine birds would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Marine birds exposed to oil on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, minimal if any impacts on pelagic birds would be expected.

Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. Davis et al. (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater Gulf of Mexico (>200 m). Haney et al. (2014) estimated that seabird densities over the open ocean were approximately 1.6 birds km^{-2}. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

Data following the *Deepwater Horizon* incident provide relevant information about the species of pelagic birds that may be affected in the event of a large oil spill. Birds that were treated for oiling include several pelagic species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby. The Northern Gannet is among the species with the largest numbers of birds affected by the spill. Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2016).

C.4.2 Coastal Birds

Threatened and Endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Sections C.3.6** and **C.3.7**. Various species of non-endangered birds are also found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches also provide important feeding and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern, Wilson's Plover, Black Skimmer, Forster's Tern, Gull-Billed Tern, Laughing Gull, Least Tern, and Royal Tern. Additional information is presented by BOEM (2017).

The Eastern Brown Pelican (*Pelecanus occidentalis*) was delisted from federal Endangered status in 2009 (USFWS, 2016b) and was delisted from state species of special concern status by the State of Florida in 2017 (Florida Fish and Wildlife Conservation Commission, 2021) and Louisiana (Louisiana Wildlife and Fisheries, 2020). However, this species remains listed as endangered by the state of Mississippi (Mississippi Natural Heritage Program, 2018). Brown Pelicans inhabit coastal habitats and forage within both coastal waters and waters of the inner continental shelf.

Aerial and shipboard surveys, including GulfCet and GulfCet II, indicate that Brown Pelicans do not occur in deep offshore waters (Fritts and Reynolds, 1981; Davis and Fargion, 1996; Davis et al., 2000).

The Bald Eagle (*Haliaeetus leucocephalus*) was delisted from its Threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. The Bald Eagle is a terrestrial raptor widely distributed across the southern U.S., including coastal habitats along the Gulf of Mexico. The Gulf Coast is inhabited by both wintering migrant and resident Bald Eagles (Johnsgard, 1990; Ehrlich et al., 1992).

IPFs that potentially may affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect shorebirds or coastal nesting birds, as the project area is 77 statute miles (124 km) from the nearest shoreline. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on shorebirds.

Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters will transit coastal areas near Port Fourchon and Houma, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within coastal habitats (e.g., wetlands that may support feeding, resting, or breeding birds).

Vessel traffic may disturb some foraging and resting birds with flushing distances varying among species and among individuals (Rodgers and Schwikert, 2002; Schwemmer et al., 2011; Mendel et al., 2019). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 20 to 49 m (65 to 160 ft) for personal watercrafts and 23 to 58 m (75 to 190 ft) for outboard-powered boats (Rodgers and Schwikert, 2002). Support vessels will not approach nesting or breeding areas on the shoreline, so disturbances to nesting birds, eggs, and chicks is not expected. Vessel operators are expected to use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope and short duration of drilling activities, any short-term impacts are not expected to be significant to coastal bird populations.

Helicopter traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that the animals were previously engaged in, and previous exposures to overflights (Efromyson et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989; Rojek et al., 2008; Fuller et al., 2018). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 610 m (2,000 ft) when flying over marine noise-sensitive areas such as parks, forest, primitive areas, wilderness areas, National Seashores, or National Wildlife Refuges, and maintain flight paths to reduce aircraft marine noise in these marine noise-sensitive areas. The 2,000-feet altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). It is assumed that adherence to these guidelines would reduce potential behavioral disturbances (such as temporary displacement or avoidance behavior) of individual birds in coastal and inshore areas. The potential impacts from helicopter traffic are not expected to be significant to coastal bird populations or species in the project area.

Impacts of Large Oil Spill

The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Louisiana and Florida could be contacted within 30 days (1% to 11% conditional probability).

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death (BOEM, 2017). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans are especially at risk from direct and indirect impacts from spilled oil within inner shelf and inshore waters, such as embayments. The range of these species is generally limited to these waters and surrounding coastal habitats. Brown Pelicans feed on mid-sized fish that they capture by diving from above (“plunge diving”) and then scooping the fish into their expandable gular pouch, while White Pelicans feed from the surface by dipping their beaks in the water. These behaviors make pelicans susceptible to plumage oiling if they feed in areas with surface oil or an oil sheen. They may also capture prey that has been physically contaminated with oil or has ingested oil. Issues for Brown and White Pelicans include direct contact with oil, disturbance by cleanup activities, and long-term habitat contamination (BOEM, 2017).

The Bald Eagle may also be at risk from direct and indirect impacts from spilled oil. This species often captures fish within shallow water areas (snatching prey from the surface or wading into shallow areas to capture prey with their bill) and so may be susceptible to plumage oiling and, as with the Brown and White Pelicans, they may also capture prey that has been physically contaminated with oil or has ingested oil (BOEM, 2017). It is expected that impacts to coastal birds from a large oil spill resulting in the death of individual birds would be adverse but not significant at population levels.

C.5 Fisheries Resources

C.5.1 Pelagic Communities and Ichthyoplankton

Biggs and Ressler (2000) reviewed the biology of pelagic communities in the deepwater environment of the northern Gulf of Mexico. The biological oceanography of the region is dominated by the influence of the Loop Current, whose surface waters are among the most oligotrophic in the world’s oceans. Superimposed on this low-productivity condition is productive “hot spots” associated with entrainment of nutrient-rich Mississippi River water and mesoscale oceanographic features. Anticyclonic and cyclonic hydrographic features play an important role in determining biogeographic patterns and controlling primary productivity in the northern Gulf of Mexico (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989; Richards et al., 1993). A study by Ross et al. (2012) on midwater fauna to characterize vertical distribution of mesopelagic fishes in selected deepwater areas in the Gulf of Mexico substantiated high species richness but general domination by relatively few families and species.

IPFs that potentially may affect pelagic communities and ichthyoplankton include drilling rig presence, marine noise, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a fish aggregating device (FAD). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). Positive fish associations with offshore rigs and platforms in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982; Wilson et al., 2003; 2006; Edwards and Sulak, 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Drilling rig noise could potentially cause masking in fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). The only defined acoustic threshold levels for non-impulsive noise are given by Popper et al. (2014) and apply only to species of fish with swim bladders that provide some hearing (pressure detection) function. Popper et al. (2014) estimated an SPL threshold level of 170 dB re 1 µPa over a 48-hour period for onset of recoverable injury and 158 dB re 1 µPa over a 12-hour period for onset temporary auditory threshold shifts. However, no consistent behavioral thresholds for fish resulting from non-impulsive noise have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1 µPa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Noise may also influence fish behaviors, such as predator-avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Bruintjes and Radford, 2013; McLaughlin and Kunc, 2015). Fish aggregating is likely to occur to some degree due to the presence of the drilling rig, but the impacts would be limited in geographic scope and no population level impacts are expected.

Few data exist regarding the impacts of noise on pelagic larvae and eggs. Generally, it is believed that larval fish will have similar hearing sensitivities as adults, but may be more susceptible to barotrauma injuries associated with impulsive noise (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced SEL_{24h} of 206 dB re 1 μPa^2 s but resulted in no increased mortality between the exposure and control groups. Non-impulsive noise sources (such as drilling rig operations) are expected to be far less injurious than impulsive noise. Because of the periodic and transient nature of ichthyoplankton, they are not expected to remain in proximity to the source for a full 24-hour period to receive above-threshold sound, and no impacts to these life stages are expected.

Impacts of Effluent Discharges

Muds and cuttings discharges may have a slight effect on the benthic environment near the wellsite, including a localized increase in water turbidity, the limited blanketing of seafloor sediments and slightly increased concentrations of hydrocarbons and metals. Treated cuttings are monitored for visible sheen prior to discharge. Contaminants released into the water column will be diluted rapidly within the open ocean environment. Minimal impacts on pelagic communities are anticipated.

Treated sanitary and domestic wastes may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. These wastes may have elevated levels of nutrients, organic matter, and chlorine, but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Deck drainage may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. Deck drainage from contaminated areas will be passed through an oil-and-water separator prior to release, and discharges will be monitored for visible sheen. The discharges may have slightly elevated levels of hydrocarbons but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on pelagic communities.

Impacts of Water Intake

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. The intake of seawater for cooling water will entrain plankton. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990; Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). Due to the limited scope and short duration of drilling activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017). The drilling rig ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements.

Impacts of a Small Fuel Spill

Potential spill impacts on fisheries resources are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill will be brief and the potential for impacts to occur would be minimal.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would dissipate naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on phytoplankton, zooplankton, and nekton. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts on pelagic communities and ichthyoplankton.

Impacts of a Large Oil Spill

Potential spill impacts on pelagic communities and ichthyoplankton are discussed by BOEM (2017). A large oil spill could affect water column biota including phytoplankton, zooplankton, ichthyoplankton, and nekton. A large spill that persisted for weeks or months would be more likely to affect these communities. While adult and juvenile fishes may actively avoid a large spill, planktonic eggs and larvae would be unable to avoid contact. Eggs and larvae of fishes are especially vulnerable to oiling because they inhabit the upper layers of the water column, and they will die if exposed to certain toxic fractions of spilled oil. Impacts potentially would be greater if local-scale currents retained planktonic larval assemblages (and the floating oil slick) within the same water mass. Impacts to ichthyoplankton from a large spill would be greatest during spring and summer when shelf concentrations peak (BOEM, 2016b).

Oil spill impacts to phytoplankton include changes in community structure and increases in biomass, which have been attributed to the effects of oil contamination and of decreased predation due to zooplankton mortality (Abbriano et al., 2011; Ozhan et al., 2014). Ozhan et al. (2014) reported that the formation of oil films on the water surface can limit gas exchange through the air-sea interface and can reduce light penetration into the water column which will limit phytoplankton photosynthesis. Determining the impact of a diesel spill on phytoplankton is a complex issue as some phytoplankton species are more tolerant of oil exposure than others (Ozhan et al., 2014). Phytoplankton populations can change quickly on small temporal and spatial scales, making it difficult to predict how a phytoplankton community as a whole will respond to an oil spill.

Mortality of zooplankton has been shown to be positively correlated with oil concentrations (Lennuk et al., 2015). Spills that are not immediately lethal can have short- or long-term impacts on biomass and community composition, behavior, reproduction, feeding, growth and development, immune response and respiration (Harvell et al., 1999; Wootton et al., 2003; Auffret et al., 2004; Hannam et al., 2010; Bellas et al., 2013; Blackburn et al., 2014). Zooplankton are especially vulnerable to acute oil pollution, showing increased mortality and sublethal changes in physiological activities (e.g., egg production; Moore and Dwyer, 1974; Linden, 1976; Lee et al., 1978; Suchanek, 1993). Zooplankton may also accumulate PAHs through diffusion from surrounding waters, direct ingestion of micro-droplets (e.g., Berrojalbiz et al., 2009; Lee et al., 2012; Lee, 2013), and by ingestion of droplets that are attached to phytoplankton

(Almeda et al., 2013). Bioaccumulation of hydrocarbons can lead to additional impacts among those higher trophic level consumers that rely on zooplankton as a food source (Almeda et al., 2013; Blackburn et al., 2014).

Planktonic communities have a high capacity for recovery from the effects of oil spill pollution due to their short life cycle and high reproductive capacity (Abbriano et al., 2011). Planktonic communities drift with water currents and recolonize from adjacent areas. Because of these attributes, plankton usually recover relatively rapidly to normal population levels following hydrocarbon spill events. Research in the aftermath of the *Deepwater Horizon* incident found that phytoplankton population recovered within weeks to months and zooplankton populations may have only been minimally affected (Abbriano et al., 2011).

C.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council (GMFMC) has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (GMFMC, 2005). The EFH for most of these GMFMC-managed species is on the continental shelf in waters shallower than 183 m (600 ft). The shelf edge is the outer boundary for coastal migratory pelagic fishes, reef fishes, and shrimps. EFH for corals and coral reefs includes some shelf-edge topographic features on the Texas-Louisiana OCS located approximately 71 statute miles (114 km) from the project area (**Figure 3**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 7** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009c) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the project area (**Figure 4**). The areal extent of the HAPC is approximately 300,000 km^2 (115,831 mi^2). Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern U.S. and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c). The Atlantic bluefin tuna has also been designated as a species of concern (NMFS, 2011). An amendment to the original EFH Generic Amendment was finalized in 2005 (GMFMC, 2005). One of the most significant proposed changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing the EFH description and identification from waters between 100 fathoms and the seaward limit of the Exclusive Economic Zone (EEZ). The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009c).

Table 7. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Block 956, including life stage(s) potentially present within the project area.

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic bluefin tuna	*Thunnus thynnus*	Spawning, eggs, larvae, adults
Bigeye tuna	*Thunnus obesus*	Juveniles, adults
Bigeye thresher shark	*Alopias superciliosus*	All
Blue marlin	*Makaira nigricans*	Juveniles, adults
Longbill spearfish	*Tetrapturus pfluegeri*	Juveniles, adults
Longfin mako shark	*Isurus paucus*	All
Night shark	*Carcharhinus signatus*	All
Oceanic whitetip shark	*Carcharhinus longimanus*	All
Silky Shark	*Carcharhinus falciformis*	All
Skipjack tuna	*Katsuwonus pelamis*	Spawning, adults
Swordfish	*Xiphias gladius*	Larvae, juveniles, adults
Tiger shark	*Galeocerdo cuvier*	Adults
White marlin	*Tetrapturus albidus*	Juveniles, adults
Yellowfin tuna	*Thunnus albacares*	Spawning, juveniles, adults

NTLs 2009-G39 and 2009-G40 that provide guidance and clarification of the regulations with respect to biologically sensitive underwater features and areas and benthic communities that are considered EFH. As part of an agreement between BOEM and NMFS to complete a new programmatic EFH consultation for each new Five-Year Program, an EFH consultation was initiated between BOEM's Gulf of Mexico Region and NOAA's Southeastern Region during the preparation, distribution, and review of BOEM's 2017-2022 WPA/CPA Multisale EIS (BOEM, 2017). The EFH assessment was completed and there is ongoing coordination among NMFS, BOEM, and BSEE, including discussions of mitigation (BOEM, 2016c).

Other HAPCs have been identified by the GMFMC (2005). These include the Florida MiddleGrounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico. Madison-Swanson Marine Reserve is the HAPC located nearest to the project area (approximately 169 statute miles [272 km]).

IPFs that potentially may affect EFH include drilling rig presence, marine noise, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill).

Impacts of Drilling Rig Presence, Marine Noise, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as a FAD with most pronounced effects on epipelagic fishes that include species with EFH designation (Holland, 1990; Higashi, 1994; Relini et al., 1994; Gates et al., 2017). The FAD effect would likely attract and concentrate smaller fish species and thus enhance feeding of epipelagic predators.

Drilling rig vessel noise could potentially cause acoustic masking for fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). Noise may also influence fish behaviors such as predator avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Bruintjes and Radford, 2013; McLaughlin and Kunc, 2015). The only defined acoustic threshold levels for non-impulsive noise are given by Popper et al. (2014) and apply only to species of fish with swim bladders, including some species with EFH designation, that provide some hearing (pressure detection) function. Popper et al. (2014) recommended SPL threshold levels of 170 dB re 1 µPa over a 48-hour period for onset of recoverable injury and an SPL threshold of 158 dB re 1 µPa over a 12-hour period for onset temporary auditory threshold shifts. No consistent behavioral thresholds for fish resulting from non-impulsive noise have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1 µPa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Because the drilling rig is a temporary structure, any impacts on EFH for managed species are considered negligible.

Impacts of Effluent Discharges

Other effluent discharges affecting EFH by diminishing ambient water quality include drilling muds and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No detectable impacts on EFH for managed species are expected from these discharges.

Impacts of Water Intake

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope and short duration of drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The recent lease sale EIS (BOEM, 2017) discusses cooling water discharge. Water with an elevated temperature may accumulate around the discharge pipe. However, the warmer water should be diluted rapidly to ambient temperature levels within 100 m (328 ft) of the discharge pipe. Any impacts to pelagic species would be localized and brief (BOEM, 2014a).

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to help diminish the potential for impacts on EFH. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and the potential for impacts to EFH minimal.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be dissipated naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on EFH for highly migratory pelagic fishes, including tunas, swordfishes, billfishes, and sharks. These species occur as transients in the project area. A spill would produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of Mexico. The areal extent of impact from a small fuel spill would represent a negligible portion of the HAPC.

A small fuel spill would not likely affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 71 statute miles (114 km) from the project area. A small fuel spill would float and dissipate on the sea surface and would not contact these features.

Impacts of a Large Oil Spill

Potential spill impacts on EFH are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially in the subsurface as well. Given the extent of EFH designations in the Gulf of Mexico (Gulf of Mexico Fishery Management Council, 2005; NMFS, 2009c), some impact from a large oil spill on EFH would be unavoidable.

A large spill could affect EFH for many managed species including shrimps, stone crab, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. It would result in adverse impacts on water quality and consequentially on water column biota including phytoplankton, zooplankton, and nekton. In coastal waters, sediments could be contaminated and result in persistent degradation of the seafloor habitat for managed demersal fish and shellfish species.

The project area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 2009c). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c).

The topographic features located 71 statute miles (114 km) from the project area are designated as EFH under the corals and coral reefs management plan (GMFMC, 2005). An accidental spill would be unlikely to affect these features, since an oil spill plume or surface slick would be unlikely to reach them due to their shallower depth relative to the project area.

C.6 Archaeological Resources

C.6.1 Shipwreck Sites

The project area is on the list of archaeology survey blocks with a high potential for historic shipwrecks (BOEM, 2011). The archeological assessment identified no archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed wellsite based on an autonomous underwater vehicle survey (Oceaneering, 2022b). bp and its contractors will abide by the applicable requirements of NTL 2005-G07 and 30 CFR § 550.194(c), which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed.

Because there are no shipwreck sites within 610 m (2,000 ft) of the proposed wellsite, there are no routine IPFs that are likely to affect shipwrecks. The only IPF of relevance to shipwrecks is a large oil spill as listed in **Table 2** are discussed below. A small fuel spill would not affect shipwrecks because the fuel would float and dissipate on the sea surface.

Impacts of a Large Oil Spill

The 2017-2025 Lease Sale EIS (BOEM, 2017) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-meter (984-feet) radius. Because there are no historic shipwrecks within a 300-meter radius of the proposed wellsite, this impact would not be relevant. Should there be any indication that potential shipwreck sites could be affected, in accordance with NTL 2005-G07, bp will immediately halt drilling or other project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. Following shipwreck discovery, all operations within 305 m (1,000 ft) of the site would cease until the Regional Supervisor provides instructions on steps to take to protect the site and assess the potential historic significance.

Beyond this 300-meter (984-feet) radius, there is the potential for impacts from oil, dispersants, and depleted oxygen levels. These impacts could include chemical contamination, alteration of the rates of microbial activity (BOEM, 2017), and reduced biodiversity at shipwreck-associated sediment microbiomes (Hamdan et al., 2018). During the *Deepwater Horizon* incident, subsurface plumes were reported at a water depth of about 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could have the potential to contact shipwreck sites beyond the 300-meter (984-feet) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence.

A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known coastal shipwreck site. BOEM (2012a) stated that if an oil spill contacted a coastal historic site, such as a fort or a lighthouse, the major impact would be a visual impact from oil contact and contamination of the site and its environment.

C.6.2 Prehistoric Archaeological Sites

With a water depth at the location of the proposed wellsite of approximately 2,081 m (6,826 ft), the proposed wellsite is well beyond the 60-meter (197-feet) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not found in the project area, the only relevant IPF is a large oil spill. A small fuel spill would not affect prehistoric archaeological resources because the oil would float and dissipate on the sea surface.

Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the project area, they would not be affected by the physical effects of a subsea blowout. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-meter (984-feet) radius.

Along the northern Gulf Coast, prehistoric sites exist along the barrier islands and mainland coast and along the margins of bays and bayous (BOEM, 2017). The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Louisiana and Florida could be contacted within 30 days (1% to 11% conditional probability).

If a spill did reach a prehistoric site along these shorelines, it could coat fragile artifacts or site features and compromise the potential for radiocarbon dating of organic materials (other dating methods are available, and it is possible to decontaminate an oiled sample for radiocarbon dating). Coastal prehistoric sites could also be damaged by spill cleanup operations (e.g., by destroying fragile artifacts and disturbing the provenance of artifacts and site features).

C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northeastern Gulf of Mexico that may be affected by oil and gas activities are described by BOEM (2017) and by Mendelssohn et al (2017). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. Generally, most of the northeastern Gulf is fringed by barrier beaches, with wetlands, oyster reefs and/or submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries.

Due to the distance from shore, the only IPF associated with routine activities in the project area that potentially may affect beaches and dunes, wetlands, oyster reefs, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area is support vessel traffic from support bases at Port Fourchon and Houma, Louisiana that are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

The only other IPF of relevance for coastal habitats and protected areas is an accidental large oil spill. A small fuel spill in the project area would be not affect coastal habitats, as the project area is 77 statute miles (124 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Support Vessel Traffic

Support operations, including crew boats and supply boats as detailed in EP Section 12, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

Support operations, including crew boats and supply boats are not anticipated to have a significant impact on submerged seagrass beds. While submerged seagrass beds could be uprooted, scarred, or lost due to direct contact from vessels, use of navigation channels and adherence to local requirements and implemented programs will decrease the likelihood of impacts to these resources (BOEM, 2017).

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. For this EP, there are no unique site-specific issues with respect to coastal habitats.

The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Louisiana and Florida could be contacted within 30 days of a spill (1% to 11% conditional probability).

NWRs and other protected areas along the coast are discussed in BOEM (2017) and bp's ROSRP. Coastal and near-coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts based on the 30-day OSRA model (**Table 4**) are presented in **Table 8**. The level of impacts from oil spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time of the spill (BOEM, 2017).

Table 8. Wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days of a hypothetical spill from Launch Area 59 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Cameron, Louisiana	Lacassine National Wildlife Refuge
	Sabine National Wildlife Refuge
	Rockefeller State Wildlife Refuge and Game Preserve
	Peveto Woods Sanctuary
Vermilion, Louisiana	Paul J. Rainey Wildlife Refuge and Game Preserve
	Rockefeller State Wildlife Refuge and Game Preserve
	State Wildlife Refuge
Terrebonne, Louisiana	Isles Dernieres Barrier Islands Refuge
	Pointe aux Chenes Wildlife Management Area
	Mandalay NWR
Lafourche, Louisiana	Pointe aux Chenes Wildlife Management Area
	Wisner Wildlife Management Area (Includes Picciola Tract)
Jefferson, Louisiana	Grand Isle State Park
Plaquemines, Louisiana	Breton National Wildlife Refuge
	Delta National Wildlife Refuge
	Pass a Loutre Wildlife Management Area
St. Bernard, Louisiana	Biloxi Wildlife Management Area
	Breton National Wildlife Refuge

Table 8. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Walton, Florida	Choctawhatchee River Delta Preserve
	Choctawhatchee River Water Management Area
	Deer Lake State Park
	Grayton Beach State Park
	Point Washington State Forest
	Topsail Hill Preserve State Park
Bay, Florida	Camp Helen State Park
	SS Tarpon Underwater Archaeological Preserve
	St. Andrews Aquatic Preserve
	St. Andrews State Park
	Vamar Underwater Archaeological Preserve

Coastal wetlands are highly sensitive to oiling and can be significantly affected because of the inherent toxicity of hydrocarbon and non-hydrocarbon components of the spilled substances (Beazley et al., 2012; Lin and Mendelssohn, 2012; Mendelssohn et al., 2012). Numerous variables such as oil concentration and chemical composition, vegetation type and density, season or weather, preexisting stress levels, soil types, and water levels may influence the impacts of oil exposure on wetlands. Impacts to slightly oiled vegetation are considered short term and reversible as recent studies suggest that they will experience plant die-back, followed by recovery without replanting (BOEM, 2012a). Vegetation exposed to oil that persists in wetlands could take years to recover (BOEM, 2017). Vegetation coated with oil experiences the highest mortality rates due to decreased photosynthesis (BOEM, 2012a). A recent review of the literature and new studies indicated that oil spill impacts to seagrass beds are often limited and may be limited to when oil is in direct contact with these plants (Fonseca et al., 2017). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing were assessed by BOEM (2017). The main commercial fishing activity in deep waters of the northern Gulf of Mexico is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002; Beerkircher et al., 2009). Pelagic longlining has occurred historically in the project area, primarily during spring and summer seasons. In August 2000, the federal government closed two areas, outside the project area, in the northeastern Gulf of Mexico to longline fishing (65 *FR* 47214).

Longline gear consists of monofilament line deployed from a moving vessel and generally allowed to drift for 4 to 5 hours (Continental Shelf Associates, 2002). As the mainline is put out, baited leaders and buoys are clipped in place at regular intervals. It takes 8 to 10 hours to deploy a longline and about the same time to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment. Vessels typically are 10 to 30 m (33 to 98 ft) long, and their fishing trips last from about 1 to 3 weeks.

It is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. Benthic species targeted by commercial fishers occur predominantly on the upper continental slope, well inshore of the project area. Royal red shrimp (*Pleoticus robustus*) are caught by trawlers in water depths of about 250 to 550 m (820 to 1,804 ft) (Stiles et al., 2007). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 165 to 450 m (540 to 1,476 ft) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 200 m (656 ft) (Continental Shelf Associates, 1997; 2002; Keithly and Roberts, 2017). In deeper water, the main attraction to recreational fishers would be petroleum platforms offshore Texas and Louisiana. Due to the distance from shore, it is unlikely that recreational fishing activity is occurring in the project area.

The only IPFs associated with routine operations that potentially may affect fishing is drilling rig presence which may present an entanglement risk for pelagic longlining. Two types of potential accidents (a small fuel spill and a large oil spill) are the other IPFs of relevance. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of Drilling Rig Presence, Marine Noise, and Lights

There is a slight possibility of pelagic longlines drifting into and becoming entangled in the drilling rig. For example, in January 1999, a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, 2002) and the line was removed without incident. Generally, longline fishers use radar and are aware of offshore structures and ships when placing their sets. Therefore, little or no impact on pelagic longlining is expected.

Because it is unlikely that any recreational fishing activity is occurring in the project area, no adverse impacts are anticipated. Other rig-related factors such as marine noise and lights are not relevant IPFs to commercial or recreational fishing.

Impacts of a Small Fuel Spill

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to potentially mitigate and reduce the potential for impacts. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and opportunity for impacts to fishing activities would be minimal.

Pelagic longlining activities in the project area, if any, could be interrupted in the event of a small fuel spill. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions (see **Section A.9.1**). Fishing activities could be interrupted due to the activities of response vessels operating in the project area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

Impacts of a Large Oil Spill

Potential spill impacts on fishing activities are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to this activity.

Pelagic longlining activities in the project area and other fishing activities in the northern Gulf of Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time of the spill, and the effectiveness of spill response measures. The *Deepwater Horizon* incident provides information about the maximum potential extent of fishery closures in the event of a large oil spill in the Gulf of Mexico (NMFS, 2010a). At its peak on 12 July 2010, closures encompassed 217,821 km^2 (84,101 mi^2), or 34.8% of the U.S. Gulf of Mexico EEZ.

According to BOEM (2012a; 2017), the potential impacts on commercial and recreational fishing activities from an accidental oil spill are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fishers are typically able to avoid the affected area. Fish populations may be affected by an oil spill event should it occur, but they would be primarily affected if the oil reaches the productive shelf and estuarine areas where many fishes spend a portion of their life cycle (BOEM, 2012a). The probability of an offshore spill affecting these nearshore environments is also low. Should a large oil spill occur, economic impacts on commercial and recreational fishing activities would likely occur, but are difficult to predict because impacts would differ by fishery and season (BOEM, 2016b).

C.8.2 Public Health and Safety

There are no IPFs associated with routine operations that are expected to affect public health and safety. A small fuel spill would be unlikely to cause any impacts on public health and safety because it would affect only a small area of the open ocean 77 statute miles (124 km) from the nearest shoreline, and nearly all of the diesel fuel would evaporate or disperse naturally within 24 hours (see **Section A.9.1**). Impacts of a large oil spill are addressed below.

Impacts of a Large Oil Spill

In the event of a large spill from a blowout, the main safety and health concerns are those of the offshore personnel involved in the incident and those responding to the spill. Once released into the water column, crude oil weathers rapidly (National Research Council, 2003a). Depending on many factors such as spill rate and duration, the physical/chemical characteristics of the oil, meteorological, and oceanographic conditions at the time, and the effectiveness of spill response measures, weathered oil may remain present on the sea surface and reach coastal shorelines.

Based on data collected during the *Deepwater Horizon* incident, the health risks resulting from a large oil spill appear to be minimal (Centers for Disease Control and Prevention, 2010). Health risks for spill responders and wildlife rehabilitation workers responding to a major oil spill are similar to the health risks incurred by response personnel during any large-scale emergency or disaster response (U.S. Department of Homeland Security, 2014), which includes the following:

- Possible accidents associated with response equipment;
- Hand, shoulder, or back pain, along with scrapes and cuts;
- Itchy or red skin or rashes due to potential chemical exposure;
- Heat or cold stress depending upon the working environment; and
- Possible upper respiratory symptoms due to potential dust inhalation, allergies, or potential chemical exposure.

C.8.3 Employment and Infrastructure

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. A small fuel spill that dissipates within a few days would have little or no economic impact as the spill response would use existing facilities, resources, and personnel. Impacts of a large oil spill are addressed below.

Impacts of a Large Oil Spill

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause economic impacts in several ways: it could result in extensive fishery closures that put fishermen out of work; it could result in temporary employment as part of the response effort (including the establishment of spill response staging areas); it could result in adverse publicity that affects employment in coastal recreation and tourism industries; and it could result in suspension of OCS drilling activities, including service and support operations that are an important part of local economies.

Non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations could also occur in the short-term. These negative, short-term social and economic consequences of a spill are expected to be modest in terms of projected cleanup expenditures and the number of people employed in cleanup and remediation activities (BOEM, 2017). Net employment impacts from a spill would not be expected to exceed 1% of baseline employment in any given year (BOEM, 2017).

C.8.4 Recreation and Tourism

There are no known recreational uses of the project area. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. Compliance with NTL BSEE-2015-G03 is intended to minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches. A small fuel spill in the project area would be unlikely to affect recreation and tourism because, as explained in **Section A.9.1**, it would not be expected to make landfall or reach coastal waters prior to dispersing naturally.

Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Louisiana and Florida could be contacted within 30 days (1% to 11% conditional probability).

According to BOEM (2017), should an oil spill occur and contact a beach area or other recreational resource, it could cause some disruption during the impact and cleanup phases of the spill. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, have effects that reach beyond the damaged area, effects to recreation and tourism could be significant (BOEM, 2012a).

C.8.5 Land Use

Land use along the northern Gulf coast is discussed by BOEM (2017). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana where land use is industrial. The project will not involve any new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large oil spill is the only relevant IPF. A small fuel spill should not have any impacts on land use, as the response would be staged out of existing shorebases and facilities.

Impacts of a Large Oil Spill

The initial response for a large oil spill would be staged out of existing facilities, with no expected effects on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed. For example, during the *Deepwater Horizon* incident, temporary staging areas were established in Louisiana, Mississippi, Alabama, and Florida for spill response and cleanup efforts. In the event of a large spill in the project area, similar temporary staging areas could be needed. These areas would eventually return to their original use as the response is demobilized. It is not expected that a large oil spill and subsequent cleanup would substantially reduce available space in nearby landfills or decrease their usable life (BOEM, 2014a).

An accidental oil spill is not likely to significantly affect land use and coastal infrastructure in the region, in part because an offshore spill would have a small probability of contacting onshore resources. BOEM (2016b) states that landfill capacity would probably not be an issue at any phase of an oil spill event or the long-term recovery. In the case of the *Deepwater Horizon* incident and response, the USEPA reported that existing landfills receiving oil spill waste had plenty of capacity to handle waste volumes; the wastes that were disposed of in landfills represented less than 7% of the total daily waste normally accepted at these landfills (USEPA, 2016).

C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. bp intends to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. The site clearance letter for the proposed wellsite did not identify any existing infrastructure within 610 m (2,000 ft) of the proposed wellsite location (Oceaneering, 2022a).

There are no IPFs from routine project activities that are likely to affect other marine uses of the project area. A large oil spill is the only relevant IPF. A small fuel spill would not have any impacts on other marine uses because spill response activities would be mainly within the project area and the duration would be brief.

Impacts of a Large Oil Spill

A large accidental spill would be unlikely to significantly affect shipping or other marine uses. The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. bp and its contractor intend to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

C.9 Cumulative Impacts[3]

Prior Studies. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in bp's EP are within the range of activities described and evaluated by BOEM in the 2017 to 2022 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017). Past, present, and reasonably foreseeable activities were identified in these documents, which are incorporated by reference. The proposed action should not result in any additional impacts beyond those evaluated in the multi-lease sale and Final EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017).

[3] On May 20, 2022, the National Environmental Policy Act (NEPA) original requirements came into effect and were reinstated by the Council on Environmental Quality (CEQ), which is responsible for Federal agency implementation of NEPA.

Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area. Other exploration and development activities may occur in the vicinity of the project area but bp does not anticipate other projects beyond the types analyzed in the lease sale and Supplemental EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017).

Cumulative Impacts of Planned Actions. The BOEM (2017) Final EIS included a discussion of cumulative impacts, which analyzed the incremental environmental and socioeconomic impacts of the 10 proposed lease sales, in addition to all activities (including non-OCS activities) projected to occur from past, proposed, and future lease sales. The EIS considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EIS examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in bp's EP are within the range of activities described and evaluated in the recent lease sale EISs. The EIA incorporates and builds on these analyses by examining the potential impacts on physical, biological, and socioeconomic resources from the work planned in bp's EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. For all impacts, the incremental contribution of bp's proposed actions to the analyses in these prior reports are not expected to be significant.

D. Environmental Hazards

D.1 Geologic Hazards

The site clearance letter did not identify geologic hazards at the location of the proposed wellsite (Oceaneering, 2022a). See EP Section 3 for supporting geological and geophysical information.

D.2 Severe Weather

Under most circumstances, weather is not expected to have any effect on the proposed activities. Extreme weather, including high winds, strong currents, and large waves, was considered in the design criteria for the drilling rig selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to implement bp contingency plans to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes. In the event of severe weather, guidance as outlined in bp's and/or bp's drilling contractor's site specific EEP, its site-specific hurricane preparation checklist, and the Gulf of Mexico Region Severe Weather Contingency Plan would be adhered to.

D.3 Currents and Waves

Metocean conditions such as sea states, wind speed, ocean currents, etc. will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the drilling program brought on by such conditions would be closely monitored and managed by the team managing the project. In some cases, it may be necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

E. Alternatives

No formal alternatives were evaluated in the EIA for the proposed project. However, various technical and operational options, including the location of the wellsite and the selection of a potential drilling unit, were considered by bp. The activity being proposed is the result of a rigorous screening and right-scoping process. It was selected as the best design candidate to reduce risk and optimize deliverability, chosen from numerous options with varying well locations, trajectories, construction designs, and drilling strategies, amongst other variables.

F. Mitigation Measures

The proposed program includes numerous processes and actions that are intended to mitigate potential impact to the environment. The project is expected to comply with applicable federal, state, and local requirements as well as permit conditions of approval concerning protected species, air pollutant emissions, discharges to water, and waste management.

In addition, bp and its drilling contractor intend to implement the following specific measures to prevent marine pollution:

- Proper job planning is an important overall mitigation measure. The fundamental concept and discussion in the pre-tour and pre-job safety meetings is the prevention of harm to people and the environment. Personnel are reminded daily to inspect work areas for safety issues as well as potential pollution issues.
- Per Safety and Environmental Management System requirements, the skills and knowledge of personnel are assessed prior to working offshore for bp.
- Equipment transferred to and from the drilling rig will be inspected to ensure pollution pans have been cleaned and to confirm that plugs have been installed prior to leaving the dock and prior to loading on the boat.
- Preventive maintenance of rig and vessel equipment and other service equipment, including visual inspection of hydraulic lines and reservoirs, will be conducted on a scheduled basis.
- Items deemed safety and environmentally critical are listed and managed on a schedule recommended by the manufacturer/operator.

- Waste generation and storage will be managed as per the bp Gulf of Mexico Waste Management procedures and/or the drilling contractor's established waste management procedures. Wastes are expected to be categorized, packaged, labeled, stored, manifested, and shipped to an appropriately permitted disposal site.
- Municipal trash containers will be kept covered. Where applicable, trash destined for recycling will be compacted.
- Chemical drums and totes will be stored on containment skids in designated areas of the rig.
- Hazardous waste shall be placed in approved containers on the rig.
- Rig fuel vents will have containment boxes.
- All municipal, non-hazardous, hazardous, universal wastes are placed in applicable Recycling bag or box, Omega bin, Department of Transportation Drum, cutting box, universal box, waste bin, E&P Drum, tote tank or NORM container, labelled, and shipped to shore via a rig support vessel.
- Tank overflow, discharge overflow spill prevention fittings as well as quick disconnect hoses will be installed on hydrocarbon-based fluid hoses and liquid mud hoses to ensure isolation of any hose failures.
- On site spill kits are inspected regularly and re-stocked as needed.
- Drills are conducted regularly, often engaging the IMT onshore to measure the effectiveness and quality of processes deployed to address oil spill scenarios.
- Fuel hoses and SBM hoses will be changed based on the maintenance schedule of the drilling rig and in accordance with USCG regulation annual inspection.

G. Consultation

No persons or agencies other than those listed as Preparers (**Section H**) were consulted during the preparation of the EIA.

H. Preparers

The EIA was prepared by CSA Ocean Sciences Inc. Contributors included:

- John M. Tiggelaar II (Project Scientist);
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- Deborah Murray (Document Production); and
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Appendix J: New Technology

MPD for GoM Exploration Wells

Context

Managed Pressure Drilling (MPD) is defined by the International Association of Drilling Contractors (IADC) as "An adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore." The ability to control the annular pressure profile facilitates remaining within the downhole pressure limits imposed by the well's Pore Pressure Fracture Gradient (PPFG) and including additional factors like wellbore stability and trip margin. A study conducted by the Drilling Engineers Association on behalf of the U.S. Department of Interior Minerals Management Service concluded "MPD is as safe as or safer than conventional offshore drilling" (Malloy, 2008).

Background

BP has been using Surface Back Pressure (SBP) MPD to successfully deliver complex High Pressure High Temperature (HPHT) exploration wells in Egypt since 2007. This MPD method has many advantages for this environment, where geological uncertainty and associated challenges often lead to high Non-Productive Time (NPT) or inability to deliver exploration objectives. BP has also used this method to successfully deliver a shallow water deep gas exploration well in the GoM in 2009. The advantages of this method in exploration wells have long been established.

It is worth mentioning that the SBP method is not limited to exploration and appraisal wells, and it has been used successfully within BP to drill development wells where the high mud weight required for wellbore stability leads to a narrow drilling window and an increased risk of losses in depleted sands.

SBP MPD Theory

SBP MPD, often referred to within the industry as Constant Bottom Hole Pressure (CBHP), uses surface pressure to supplement a lighter than conventional mud weight to maintain an overbalanced condition. This technique enables maintaining a near constant pressure throughout the open hole well bore when both dynamic and static. This prevents the pressure cycling experienced by the open hole well bore which can cause well bore fatigue and lead to underbalanced conditions (i.e. kicks taken at pumps off events). The ability to apply SBP reduces the well control risk of allowing an influx during pumps off events and on trips. The system also provides an early kick and loss detection capability through the use of pressure monitoring and high accuracy flow rate monitors such as a Coriolis meter.

Benefits of SBP MPD for Exploration wells in GoM

GoM deepwater exploration wells, particularly sub-salt, face many challenges such as:

1. PPFG uncertainty, particularly with poor seismic imaging sub-salt.
2. Tight operating window between Pore Pressure and Fracture Gradient, which may potentially increase the risk of losses or well control issues.

3. Equivalent Circulating Density (ECD) management.
4. Risk and time associated with riser gas events.
5. Wellbore ballooning.
6. Challenges associated with salt exit uncertainty
7. Difficulty tripping out or pumping of hole due to narrow window and swabbing / losses.

SBP MPD allows managing and mitigating these challenges through the ability to control bottomhole pressure and maintain it near constant. Benefits of SBP MPD for exploration wells may include:

1. Early Kick/Loss detection.
2. Fast and Precise control of BHP.
3. Constant BHP reduces or eliminates ballooning. Unmanageable wellbore ballooning is a common cause for high NPT and failure to reach Total Depth (TD) objectives in exploration and HPHT environments.
4. Allows identification of operating window boundaries. A dynamic Formation Integrity Test (FIT) can be quickly carried out to test wellbore integrity prior to making any changes to mud weight.
5. Allows tripping out with surface pressure to mitigate swabbing effects, instead of pumping out or raising Mud Weight (MW).
6. The SBP system provides a safer and more efficient well and riser degassing method for floating operations.

<u>BP use of SBP MPD for Exploration wells in GoM</u>

The SBP MPD method is the MPD method which is most suitable to address the drilling challenges encountered in GoM exploration, as it is more suited to deal with well challenges such as geological uncertainty, tight PPFG window, well bore ballooning and well bore stability with rapid response capabilities to react to changing down hole conditions by adjusting the BHP precisely and quickly. In addition, the SBP MPD system provides additional techniques to examine the well bore boundaries of the PPFG by performing well bore bleed downs and dynamic FITs.

<u>SBP MPD equipment for Exploration wells in GoM</u>

The SBP MPD equipment package will be detailed in a technology permit submitted and approval sought from BSEE for each rig equipped with MPD.

Appendix K: Fees Recovery

Receipt

Tracking Information

Pay.gov Tracking ID: 272PSVAO

Agency Tracking ID: 76329959398

Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

Payment Information

Payment Type: Debit or credit card

Payment Amount: $4,348.00

Transaction Date: 12/08/2022 04:27:14 PM EST

Payment Date: 12/08/2022

Region: Gulf of Mexico

Contact: Adalberto Garcia (281) 995-2815

Company Name/No: BP Exploration & Production Inc., 02481

Lease Number(s): 36263

Area-Block: Mississippi Canyon MC,956

Surface Locations: 1

Account Information

Cardholder Name: Adalberto Garcia

Card Type: Master Card

Card Number: ************1978