UNITED STATES GOVERNMENT
MEMORANDUM

January 20, 2022

To: Public Information
From: Plan Coordinator, Plans Section

Subject: Public Information copy of plan

Control # - N-10181
Type - Initial Exploration Plan
Lease(s) - OCS-G35969 Block - 412 Mississippi Canyon Area
Operator - Chevron U.S.A. Inc.
Description - Subsea wells A1, A2, A3, A4, RW-S, RW-SE, RW-W
Rig Type - Drillship

Attached is a copy of the subject plan.

It has been deemed submitted as of this date and is under review for approval.

Laura Christensen
Plan Coordinator

Site Type/Name	**Botm Lse/Area/Blk**	**Surface Location**	**Surf Lse/Area/Blk**
WELL/A1	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/A2	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/A3	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/A3	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/A4	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/A4	G35969/MC/412	3728 FSL, 6977 FWL	G35969/MC/412
WELL/RW-S	G35969/MC/412	1090 FSL, 6905 FWL	G35969/MC/412
WELL/RW-SE	G35969/MC/412	2582 FSL, 6485 FEL	G35969/MC/412
WELL/RW-W	G35969/MC/412	3345 FSL, 4365 FWL	G35969/MC/412

INITIAL EXPLORATION PLAN

CHEVRON U.S.A. INC.

MISSISSIPPI CANYON BLOCK 412

OCS-G 35969

OFFSHORE LOUISIANA

"STARMAN" PROSPECT

PUBLIC INFORMATION

Claire H. Morse
Assistant Secretary

December 21, 2021

Bureau of Ocean Energy Management
GOM Plans Section (MS – GM1053C)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Attention: Regional Supervisor, Leasing and Plans

Re: Initial Exploration Plan
Mississippi Canyon Area Block 412
Federal Lease OCS-G 35969
Offshore Louisiana (Starman)

Ladies and Gentlemen:

Chevron U.S.A. Inc. submits for the Bureau of Ocean Energy Management's review and approval this Exploration Plan (EP) for the drilling, completion, and /or abandonment of up to seven (7) wells in the Mississippi Canyon Area, Block 412, OCS-G 35969. We estimate operations on one of the wells listed in the EP could commence as early as April 1, 2021.

Enclosed are the following:

- One (1) Proprietary Paper Copy and One (1) Proprietary CD in PDF format of the EP
- One (1) Public Information Paper Copy and One (1) Public Information CD in PDF format of the EP
- One (1) Hard Copy and One (1) Digital Copy on CD of the proprietary: "Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G 35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico, Volumes I and II", Geoscience Earth & Marine Services, Inc. ®, Project No. 0602-2969, November 17, 2021
- One (1) Hard Copy and One (1) Digital Copy on CD of the proprietary: "Sile Clearance Letters, Proposed Wellsites, MC412-A, MC412-RW-S, MC412-RW-SE, MC412-RW-W, Block 412, Mississippi Canyon Area, Gulf of Mexico, Geoscience Earth & Marine Services, Inc. ®, Project No0602-2969, November 17, 2021
- Pay.gov Receipt in Confidential Copy of Plan

Should you have any questions or need additional information, please contact Philip Von Dullen, pvondullen@chevron.com, or call 832-854-3644.

Sincerely,
Chevron U.S.A. Inc.

Claire H. Morse

Assistant Secretary

Chevron U.S.A. Inc.
1400 Smith Street
Houston, Texas 77002
Tel 713 372 6308
morsech@chevron.com

INITIAL EXPLORATION PLAN

CHEVRON U.S.A. INC.

MISSISSIPPI CANYON BLOCK 412

OCS-G 35969

OFFSHORE LOUISIANA

“STARMAN” PROSPECT

PUBLIC INFORMATION

SECTION A PLAN CONTENTS

(a) PLAN INFORMATION FORM
Included as attachment A-1 at the end of this section is Form BOEM-0137 "OCS Plan Information Form".

This Exploration Plan (EP) describes the proposed activities for Mississippi Canyon (MC) Block 412; Lease OCS-G 35969.

Chevron U.S.A. Inc. (Chevron) is the designated operator of this lease.

Chevron plans to use a **Subsea BOP** in the drilling of the wells proposed in this plan.

The activities proposed in this plan will not utilize pile-driving, nor is Chevron proposing any new pipelines expected to make landfall.

Proposed Schedule
The proposed schedule includes drilling, completing, and/or abandoning any of the following wells from April 1, 2022 through December 31, 2024:

- MC 412 A1, A2, A3, A4
- MC 412 RW-S, RW-SE, RW-W

Each well is expected to take 125 days to drill, complete, and/or abandon. Of the seven (7) wells included in the plan, three are potential relief well locations (RW-S, RW-SE, and RW-W). Of the remaining four (4) wells, the plan is to drill one of the A locations and if there is a discovery, possibly drill a sidetrack or an appraisal well within the three-year period. The additional A locations also provide contingencies for a potential re-spud if needed.

(b) LOCATION / BATHYMETRY MAP
A location/bathymetry map at a scale of 1" =2,000', showing the surface locations for the proposed wells, is included below.

(c) SAFETY and POLLUTION PREVENTION FEATURES
Chevron plans to use a dynamically positioned drillship to drill the wells proposed in this plan. The wells will be drilled using a Subsea BOP system. Rig specifications will be provided with the Applications for Permit to Drill. If another rig type is used, any differences regarding air emissions, safety, drilling or pollution control equipment will be addressed in a revised Exploration Plan.

In accordance with 30 CFR 250.406, safety features will include well control, pollution prevention, welding procedure, and blowout prevention equipment and as further clarified by the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) Notices to Lessees (NTL's) and current policy making invoked by BSEE and BOEM.

The rig will be monitored daily by a Chevron drilling representative and any waste or fuel resulting in pollution of the Gulf waters will be reported to the representative in charge for immediate isolation and correction of the problem. Any spill will be reported to governmental agencies in accordance with applicable laws, rules, and regulations. Chevron will comply with all BSEE and BOEM regulations during the course of the activities.

The rig is equipped with safety, firefighting, and lifesaving equipment required for compliance with USCG, ABS, SOLAS, and IMO code requirements.

Chevron will comply with all pertinent regulations in 30 CFR 250.203, NTLs, and all applicable federal and state requirements. Chevron will maintain compliance with the EPA NPDES Permit and lease agreement during these proposed activities.

(d) TABLE of STORAGE TANKS and PRODUCTION VESSELS
Information regarding representative storage tanks that may be used to conduct the proposed activities in this plan that will store oil, as defined at 30 CFR 254.6, is provided in the table below.

Storage Tank	Facility Type	Tank Capacity (bbls)	Tanks (no.)	Total Capacity (bbls)	Fluid Gravity (API)
Main Fuel Oil	Drillship	18,000	2	36,000	No. 2 diesel
Diesel Settling		837	2	1,674	
Diesel Day		837	2	1,674	
Emergency Diesel		100	1	100	
Diesel Overflow		823	1	823	
Diesel Oil Drain Aft		42	1	42	
Engine Oil Storage		182	1	182	26.2
Gear Oil Aft		62	1	62	27
Gear Oil Fwd		176	1	176	27
Hydraulic Oil Aft		84	1	84	31
Hydraulic Oil Fwd		87	1	87	31

(f) MEASURES to PREVENT DISCHARGE of OILS and GREASES DURING RAINFALL and ROUTINE OPERATIONS
The drillship is equipped with a comprehensive network of piping, drains and scuppers to minimize the risk of pollutants being discharged into the marine environment.

All drains and drain material are collected in various holding tanks and located in the ship and then processed by the oily water separator systems. Clean water, either from hazardous or nonhazardous sources, may be directed overboard according to regulatory requirements if the effluent discharge is within the environmental limits. Any remaining sludge and oil are directed to the necessary holding tanks for proper disposal according to regulatory requirements.

(g) ADDITIONAL SAFETY, POLLUTION PREVENTION, and EARLY SPILL DETECTION MEASURES
In addition to pollution prevention measures utilized by Chevron, the drillship has a comprehensive, proactive plan to address emergency situations that could result in an unanticipated oil/chemical release. The "Shipboard Oil Pollution Emergency Plan" has specific checklists and procedures to address accidental releases due to fuel/oil transfer, tank overflow, hull leakage, fire, explosion, collision and grounding. This plan is reviewed annually and oil pollution prevention drills are conducted as specified by MARPOL regulations. A fully stocked environmental equipment locker is located on the main deck, forward of the Moon-pool and numerous spill kits located throughout the main deck. The decks of the drillship are fully contained, a comprehensive scupper management plan in place, and any spills on the deck would be immediately cleaned up using absorbents or permitted solvents.

ATTACHMENTS TO SECTION A

- Form BOEM-0137 "OCS Plan Information Form" – Public Information Copy
- Location/Bathymetry Plat, Scale: 1" =2,000'

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

General Information

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

Company Name: Chevron U.S.A. Inc.	BOEM Operator Number: 00078
Address:	Contact Person: Philip Von Dullen
1500 Louisiana Street	Phone Number: 832-854-3644
Houston, Texas 77002	E-Mail Address: pvondullen@chevron.com

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	$14,692.00	Receipt No.	76177236579

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G 35969	Area: MC	Block(s): 412	Project Name (If Applicable): Starman

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

Platform/Well Name: MC 412 "A1"	Total Volume of WCD: 28,405,671 bbls	API Gravity: 36
Distance to Closest Land (Miles): 27	Volume from uncontrolled blowout: 261,867 STB/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?		Yes	X	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
Exploration drilling	04/01/2022	12/31/2024	no greater than 277 days per year
Development drilling			
Well completion			details in Section A of the EP
Well test flaring (for more than 48 hours)			
Installation or modification of structure			
Installation of production facilities			
Installation of subsea wellheads and/or manifolds			
Installation of lease term pipelines			
Commence production			
Other (Specify and attach description)			

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)

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): MC 412 "A1"			Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	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): 261,867	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid 36

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 35969	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	412		
Blockline Departures (in feet)	N/S Departure: F S L 3728	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W L 6977	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 941537	X:	X: X: X:
	Y: 10363088	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude N 28 32 20.4932	Latitude	Latitude Latitude Latitude
	Longitude W 89 10 37.6854	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 1499	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	NA			

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): MC 412 "A2"	Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	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):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G 35969	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	412		
Blockline Departures (in feet)	N/S Departure: F S L 3728	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W L 6977	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 941537	X:	X: X: X:
	Y: 10363088	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude N 28 32 20.4932	Latitude	Latitude Latitude Latitude
	Longitude W 89 10 37.6854	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 1499	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	NA			

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

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<tr><th colspan="8">Proposed Well/Structure Location</th></tr>
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<tr><td>Is this an existing well or structure?</td><td>Yes</td><td>No X</td><td colspan="5">If this is an existing well or structure, list the Complex ID or API No.</td></tr>
<tr><td colspan="5">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X Yes</td><td></td><td>No</td></tr>
<tr><td>WCD info</td><td colspan="2">For wells, volume of uncontrolled blowout (Bbls/day):</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls):</td><td colspan="2">API Gravity of fluid</td><td></td></tr>
<tr><td></td><td colspan="2">Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="3">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td colspan="2">OCS G 35969</td><td colspan="2">OCS</td><td colspan="3">OCS
OCS</td></tr>
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N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
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<tr><td colspan="2">Longitude
W 89 10 37.6854</td><td colspan="2">Longitude</td><td colspan="3">Longitude
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Longitude</td></tr>
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MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="4">Anchor Radius (if applicable) in feet:</td><td>NA</td></tr>
</table>

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

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<tr><th colspan="6">Proposed Well/Structure Location</th></tr>
<tr><td colspan="2">Well or Structure Name/Number (If renaming well or structure, reference previous name): MC 412 "A4"</td><td colspan="2">Previously reviewed under an approved EP or DOCD?</td><td>Yes</td><td>X No</td></tr>
<tr><td colspan="2">Is this an existing well or structure? Yes | No X</td><td colspan="2">If this is an existing well or structure, list the Complex ID or API No.</td><td colspan="2"></td></tr>
<tr><td colspan="4">Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?</td><td>X Yes</td><td>No</td></tr>
<tr><td>WCD info</td><td>For wells, volume of uncontrolled blowout (Bbls/day):</td><td colspan="2">For structures, volume of all storage and pipelines (Bbls):</td><td colspan="2">API Gravity of fluid</td></tr>
<tr><td></td><td>Surface Location</td><td colspan="2">Bottom-Hole Location (For Wells)</td><td colspan="2">Completion (For multiple completions, enter separate lines)</td></tr>
<tr><td>Lease No.</td><td>OCS
G 35969</td><td colspan="2">OCS</td><td colspan="2">OCS
OCS</td></tr>
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N/S Departure: F____ L
N/S Departure: F____ L</td></tr>
<tr><td>E/W Departure: F W L
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Y:</td></tr>
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<tr><td>Longitude
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<tr><td colspan="2">Water Depth (Feet):
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MD (Feet):
MD (Feet):</td><td rowspan="2">TVD (Feet):
TVD (Feet):
TVD (Feet):</td></tr>
<tr><td colspan="3">Anchor Radius (if applicable) in feet:</td><td>NA</td></tr>
</table>

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): MC 412 "RW-S"	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	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):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G 35969	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	412		
Blockline Departures (in feet)	N/S Departure: F S L 1090	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W L 6905	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 941465	X:	X: X: X:
	Y: 10360450	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude N 28 31 54.3695	Latitude	Latitude Latitude Latitude
	Longitude W 89 10 37.9555	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 1527	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	NA			

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): MC 412 "RW-SE"	Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes		No X	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):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	Bottom-Hole Location (For Wells)	Completion (For multiple completions, enter separate lines)
Lease No.	OCS G 35969	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	412		
Blockline Departures (in feet)	N/S Departure: F S L 2582	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F E L 6485	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 943915	X:	X: X: X:
	Y: 10361942	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude N 28 32 09.5769	Latitude	Latitude Latitude Latitude
	Longitude W 89 10 10.8003	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 1561	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	NA			

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): MC 412 "RW-W"	Previously reviewed under an approved EP or DOCD?		Yes	X	No

Is this an existing well or structure?		Yes		No X	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

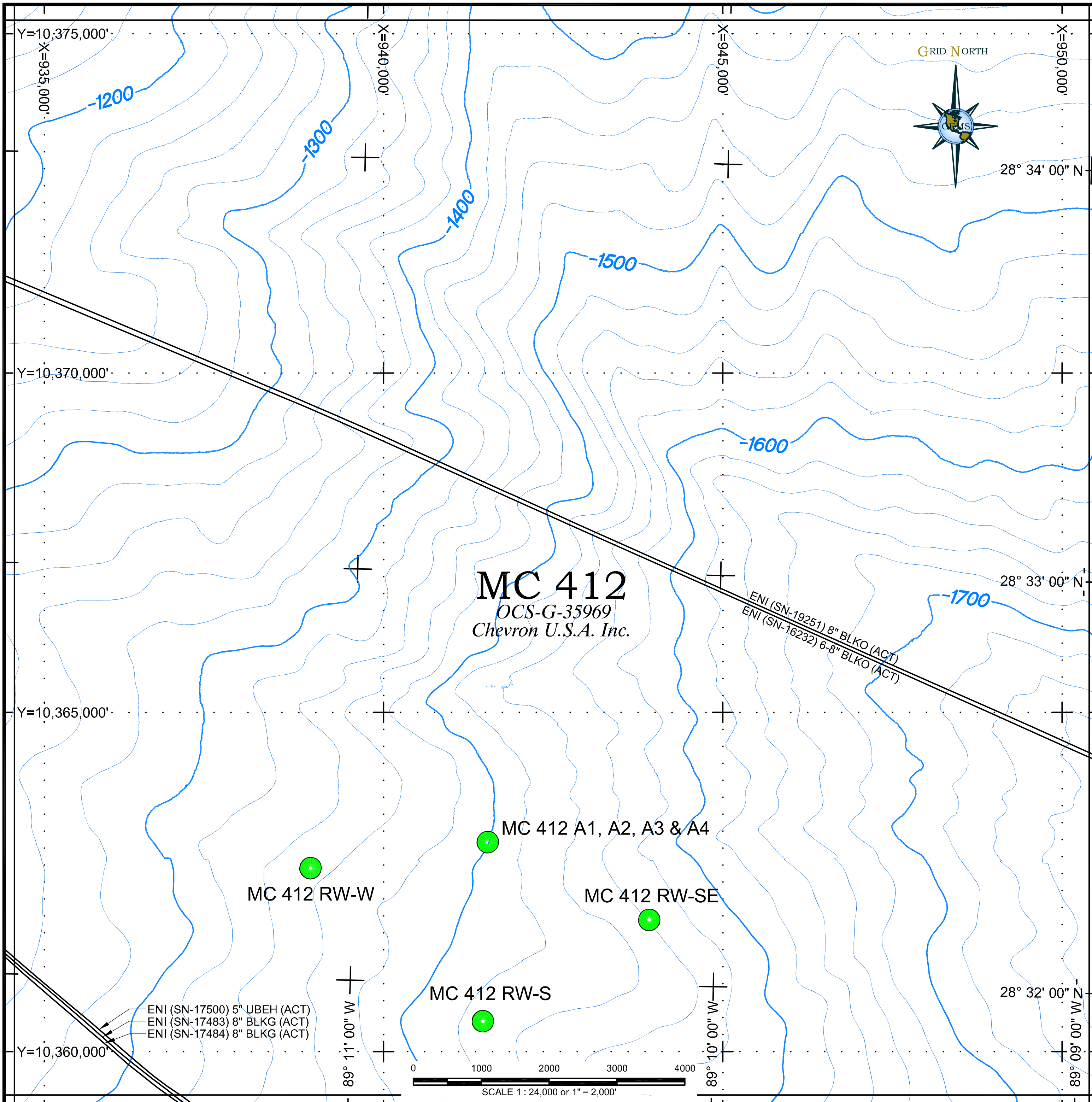
WCD info	For wells, volume of uncontrolled blowout (Bbls/day):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS G 35969	OCS	OCS OCS
Area Name	MISSISSIPPI CANYON		
Block No.	412		
Blockline Departures (in feet)	N/S Departure: F S L 3345	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F W L 4365	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 938925	X:	X: X: X:
	Y: 10362705	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude N 28 32 16.2318	Latitude	Latitude Latitude Latitude
	Longitude W 89 11 06.8823	Longitude	Longitude Longitude Longitude

Water Depth (Feet): 1455	MD (Feet):	TVD (Feet):	MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:	NA			

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 =	



PROPOSED WELL LOCATION.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION, AS REPORTED BY BOEM.

WATER DEPTH CONTOUR IN FEET.
CONTOUR INTERVAL = 20 FEET.

NOTE: CONTOURS DERIVED FROM MULTIBEAM BATHYMETRY (AUV).

DATE : 17 NOVEMBER 2021
GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
PROJECTION: BLM
ZONE: 16 NORTH
GRID UNITS: US FEET

PROJECT NO.: 0620-2969

FILE NAME: 2969_PLAT.DWG

CHEVRON U.S.A. INC.

STARMAN PROSPECT SURFACE LOCATION PLAT

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

LOCATION MAP

GEOSCIENCE EARTH & MARINE SERVICES, INC.

Well Designation	Cartesian Coordinates (ft) BLM Zone 16		Geographic Coordinate (deg., min., sec.) Clarke 1866, NAD27		Block Calls (ft)	
	X	Y	Latitude	Longitude		
MC 412 A1, A2, A3 & A4	941537	10363088	N 28 32 20.4932	W 89 10 37.6854	3728 FSL	6977 FWL
MC 412 RW-S	941465	10360450	N 28 31 54.3695	W 89 10 37.9555	1090 FSL	6905 FWL
MC 412 RW-SE	943915	10361942	N 28 32 09.5769	W 89 10 10.8003	2582 FSL	6485 FEL
MC 412 RW-W	938925	10362705	N 28 32 16.2318	W 89 11 06.8824	3345 FSL	4365 FWL

SECTION B GENERAL INFORMATION

(a) APPLICATIONS AND PERMITS

In the table below, information is provided on the filing or approval status of the Federal, State, and local application approvals or permits that must be obtained to conduct the proposed activities. Only those individual or site-specific application approvals that must be obtained are listed.

Application/Permit	Issuing Agency	Status
NPDES Permit	EPA	Approved
EEP	U.S. Coast Guard	To be submitted
APD	BSEE	To be submitted

(b) DRILLING FLUIDS

(1) Information on the types (including chemical constituents) and amounts of the drilling fluids planned for use in drilling the proposed wells:

Type of Drilling Fluid	Est. Volume of Drilling Fluid (bbls/well)
Water based (seawater, brine, freshwater)	44,640
Synthetic based (internal olefin, ester)	40,500
Oil based (diesel, mineral oil)	0

(2) Major Components of Synthetic-based drilling fluid listed above:

Product Name	Amount to be Used	Reference Number	Haz Mat No
Lime (Calcium Hydroxide)	5,955 50-lb bags	SAP # 210265	HM001002
Calcium Chloride	4,230 50-lb bags	SAP # 201174	HM000142
Adapta	2,555 50-lb bags	SAP # 388827	HM004609
Suspension Package 1	3,946 50-lb bags	SAP # 102164339	HM007356
Aquagel Gold Seal	50.3 tons	SAP # 200584	HM003470
LE Supermul	52,711 gals	SAP # 201732	HM003680
Rhemod-L	5,392 gals	SAP # 101289484	HM004610
BaraVis 568	7,167 gals	SAP # 1008562	HM003503
Barite 325	5,006 tons	SAP # 959712	HM008002
Encore Base	12,059 bbls	SAP # 377938	HM005313
Baracarb	8,776 50-lb bags	SAP # 201312	HM003484
Barofibre O	1,913 25-lb bags	SAP # 101655984	HM006401
Barofibre	1,521 50-lb bags	SAP # 201600	HM003539
Steelseal	2,474 50-lb bags	SAP # 101618889	HM003768

(e) NEW OR UNUSUAL TECHNOLOGY

No new or unusual technology will be used to carry out the activities proposed in this plan.

(f) BONDING STATEMENT

The bond requirements for the activities and facilities proposed in this EP are satisfied by an area-wide bond, furnished and maintained according to 30 CFR part 556, subpart I (Bonding or Other Financial Assurance). Should BOEM require Chevron to post additional security in accordance with NTL No. 2016-N01 “Requiring Additional Security” or under 30 CFR part 556 subpart I, Chevron will either provide the required additional security or a third-party guarantee as soon as possible after receipt of such request from BOEM.

(g) OIL SPILL FINANCIAL RESPONSIBILITY (OSFR)

Chevron U.S.A. Inc., BOEM company number 00078, 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.”

(h) DEEPWATER WELL CONTROL STATEMENT

Chevron U.S.A. Inc., BOEM company number 00078, has the financial capability to drill a relief well and conduct other emergency well control operations.

(j) BLOWOUT SCENARIO

The MC 412 “A1” proposed location was chosen as the representative well for the Worst Case Discharge (WCD) scenario for this plan. The initial Open Flow Potential Rate was calculated with systems analysis using the Prosper nodal software package from Petroleum Experts, Ltd.

Estimated flow rate

Systems analysis indicates that an uncontrolled blowout in the 8-1/2” x 9-1/2” open hole section will lead to a maximum WCD scenario initial flow rate of 261,867 bopd.

Total volume and maximum duration of the potential blowout

The total time required to drill the relief well and conduct the kill operation in an uncontrolled blow-out is 115 days. Production decline is expected and assumed to occur however sand bridging has not been assumed in the calculations. Total Potential Spill Volume is estimated at 28,405,671 bbls using the material balance model.

Potential for well to bridge over

Although some sand is likely to be produced under a blowout scenario, Chevron expects that the amount of sand is small enough to be lifted to the seafloor without bridging.

Likelihood for surface intervention to stop the blowout

The likelihood of surface intervention to stop a blowout is based on the equipment specific to the MODU(s) or drillships that will drill the well(s). Chevron’s contracted drillships and personnel have the following methods and equipment available to minimize the risk of an incident occurring:

- Deadman / Autoshear functions on the BOP;
- Permanently fixed ROV panels on the BOP to allow an ROV to function the BOP via standard hot stab interfaces;
- Acoustic Pods on the BOP to function the BOP in the event the primary BOP control system is compromised.

In the event of a well blowout, Chevron will act as soon as practical to reduce the overall risk of injury to personnel and damage to the environment and may consider potential actions that may have short term increases in effluent flow in the interest of reducing overall environmental impact or incident escalation. One such action that Chevron would consider is removal of any compromised or damaged equipment that may be restricting Chevron's ability to control the effluent flow (a BOP, LMRP, and / or riser) and to allow for installation of the appropriate response equipment (an alternate BOP or capping stack) to assist in controlling the well.

Initial response actions could include, but are not limited to:

- Actions necessary for personnel safety, including evacuation.
- ROV mobilization and tactics, including:
    - Identify the source(s) of hydrocarbon release
    - Assess the post incident geometry of equipment
- Identification of existing BOP / LMRP options and / or take action:
    - Status
    - Functionality
    - Actuate rams
    - Disconnection of existing BOP / LMRP / Riser to affect an appropriate connection point for capping / intervention options

Chevron will consider multiple capping stack alternatives to cap and contain a well during a loss of well control event. As a member of the Marine Well Containment Company (MWCC), Chevron has access to MWCC's Interim Containment System and Expanded Containment Systems (ECS). The Containment Systems includes two Modular Capture Vessels (MCVs), four capping stacks; Subsea Umbilical, Risers and Flowlines (SURF) equipment; and additional ancillary equipment. The system consists of equipment rated for 10,000 feet and up to 20k psi and 400 deg F. It has the capacity to contain up to 100,00 barrels of liquid per day (50k bopd per vessel) and handle up to 200 million standard cubic feet of gas per day. The system also has dispersant and injection capability.

In addition to MWCC's capping stacks, Chevron has access to additional capping options through the immediate availability of two complete 18 ¾" 15k BOP stacks, which are held as permanent secondary stacks located on two of Chevron's contracted drillships operating in the Gulf of Mexico. Access to both the MWCC and Chevron-specific equipment provides Chevron with increased flexibility in capping and containing a well blowing out. The selection of the appropriate capping method will be dependent upon the incident circumstances.

Time to contract rig, move it onsite and drill relief well

Chevron estimates ten (10) days to acquire and demobilize a rig, four (4) days to move the rig onsite, and 101 days to drill the relief well, intersect the blowout well, and conduct a kill operation for a total of 115 days.

Availability of a rig to drill a relief well and rig package constraints

Chevron plans to drill the well with one of the two drill ships under contract. Chevron has the capability to cease current operations and move one of our contracted drill ships to drill the relief well or contract a rig of opportunity. These drill ships do not have any equipment constraints with respect to drilling a relief well. The 10-1/8"" casing shoe is selected as the intervention point for the relief well.

There are no platforms or other infrastructure nearby that would hamper relief well operations. Relief well surface locations were selected to avoid subsurface hazards. Site surveys were conducted near the current drilling location to identify surface hazards that might impact the selection of a relief well location. Surface locations to the south, southeast and east of the original hole are preferred because they avoid the maximum number of potential shallow hazards (seafloor faults and anomalous amplitudes) while maintaining an anticipated up-wind and up-current position with respect to the potential blowout well. Three potential relief well surface locations were selected. Selection of the actual location would be constrained by typical parameters such as planned inclination, benign water-bottom, wind and current direction, and subsurface hazard avoidance. Casing design for the relief well will be similar to that proposed for the exploration well.

Measures to enhance the ability to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout

In order to address its ability to prevent blowouts, reduce the likelihood of blowouts, and conduct effective/early intervention in the event of a blowout, Chevron has developed standards for well control, personnel safety, and emergency response plans. Chevron has also entered into agreements with industry Subject Matter Experts (SME).

At all times from planning through execution, Chevron takes the necessary steps to maintain primary well control to prevent the occurrence of blowouts as outlined in the Chevron Well Control Guide.

The drilling team works in conjunction with the geological and geophysical operations team and the exploration project team to use their knowledge and good judgment to create best possible well plans and program for any particular prospect. All relevant geological information is used to understand the risks and uncertainties that are unique to the location. Appropriate plans are then generated to eliminate or mitigate the identified risks. Special equipment for contingency plans is sourced, and qualified personnel are identified for conducting the various tasks.

Prior to the execution phase, all the well control equipment on the rig undergoes a rigorous inspection and acceptance process/procedure by the Chevron Well Intervention group.

To reduce the likelihood of a blowout, Chevron applies offset information to generate pore pressure models that predict localized high pore pressure zones. Maximum Anticipated Surface Pressure (MASP) is calculated to help avoid exceeding the working pressure of the BOP equipment at any time during well construction. Pressure While Drilling (PWD) and Log While Drilling (LWD) data, such as gamma ray, resistivity, sonic, are used during the drilling operation to monitor real time pore pressure variances.

Adjustments can then be made to the mud system to maintain the appropriate overbalance on the pore pressure. Mud tank volumes and trip tank volumes are monitored while drilling for early detection of changes in anticipated trends. Routine maintenance and testing of blowout prevention equipment help to confirm that the equipment is in good working condition during operations. Data sheets and critical wellbore information which are needed in well control situations are maintained at the well site.

Two (2) barriers shall be available during all normal well activities, operations, suspensions, and abandonments to prevent uncontrolled flow from the wellbore to the environment. Two mechanical barriers will be in place before removing the Blowout Preventer (BOP) from a well which has hydrocarbons.

Preliminary plans are developed for potential relief well locations(s) during the planning phase for the primary well(s). These preliminary plans can be used to develop detailed relief well drilling plans as needed in a timely manner. Relief well locations have been identified for the primary well location.

In addition to Chevron's contracted resources to assist in the event of a blowout, Chevron is a founding member of the Marine Well Containment Company, currently has access to MWCC's

Interim Containment Response System (ICRS) and MWCC's Expanded Containment System (ECS). These resources, along with Chevron's own well containment and emergency response planning, give Chevron a high probability of regaining control of a blown out well.

Supplemental Worst Case Discharge Information to comply with NTL No. 2015-N01 is included as Appendix B in the confidential copy of this Plan.

SECTION C GEOLOGICAL AND GEOPHYSICAL INFORMATION

(a) GEOLOGICAL DESCRIPTION
Proprietary Information

(b) STRUCTURE CONTOUR MAPS
Proprietary Information

(c) INTERPRETED 2-D AND/OR 3-D SEISMIC LINES
Proprietary Information

(d) GEOLOGICAL STRUCTURE CROSS-SECTION
Proprietary Information

(e) SHALLOW HAZARDS REPORT
A Shallow Hazards and Archaeological Assessment was prepared by Geoscience Earth and Marine Service (GEMS) in November 2021 (Project No. 0620-2969). The Assessment describes seafloor and subsurface conditions in the "Starman" Prospect Area, MC Block 412 and vicinity. The assessment is based on interpretation of high-resolution reprocessed 3D exploration seismic data and high-resolution data collected by an AUV. A TGS multi-azimuth shot-based Reverse Time Migration (RTM) using an Orthorhombic TTI velocity model was the primary seismic volume used. The acquisition phase of data was from the TGS Patriot /Independent WAZ Acquisition. The data has been processed using de-ghosting, SRME, phase only Q compensation, post-migration amplitude balance and spectral shaping.

The assessment complies with current BOEM NTL Nos. 2005-G07, 2008-G04, 2008-G05 and 2009-G40, both extended by 2015-N02.

One hard copy and one digital copy of the proprietary Shallow Hazards and Archaeological Assessment Volumes I and II is being submitted as an enclosure with this plan.

(f) SHALLOW HAZARDS ASSESSMENT
Site Clearance Letters for the proposed wellsites were prepared by GEMS to comply with NTL Nos. 2008-G04, 2008-G05 and 2009-G40. The site-specific wellsite clearance letters are based on findings provided in the main body of the Shallow Hazards and Archaeological Assessment (Project No. 0602-2969). The Site Clearance Letters were prepared in November 2021.

The Site Clearance Letters for the proposed wellsites are in Volume III: Site Clearance Letters Proposed Wellsites

(g) HIGH RESOLUTION SEISMIC LINES
Proprietary Information

(h) STRATIGRAPHIC COLUMN
Proprietary Information

(i) TIME vs. DEPTH TABLE
Proprietary Information

ATTACHMENTS TO SECTION C - Proprietary Information

- **C-1, 2, 3** - Depth Structure Contour Maps
- **C-4** - Index Map with Lines of Cross Section
- **C-5, 7, 9** - Interpreted 3- D Seismic Lines
- **C-6, 8, 10** - Schematic Cross Sections
- **C-11** - Stratigraphic Column

PROPRIETARY ENCLOSURE TO PLAN

- Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico, Volumes I and II, Geoscience Earth & Marine Services, Inc., November 17, 2021 (Project No. 0602-2969) (One Hard Copy and One Digital Copy)
- Site Clearance Letters, Proposed Wellsites, MC412-A, MC412-RW-S, MC412-RW-SE, MC412-RW-W, Block 412 (OCS-G-35969), Mississippi Canyon Area, Gulf of Mexico, Volume III, Geoscience Earth & Marine Services, Inc., November 17, 2021 (Project No. 0602-2969) (One Hard Copy and One Digital Copy)

A non-proprietary copy of the GEMS site clearance letters for the proposed well surface locations is included below:

GEOSCIENCE EARTH & MARINE SERVICES, INC.
15810 Park Ten Place, Suite 100
Houston, Texas 77084
832.603.4352
www.gemsinc.com

November 17, 2021

Project No.: 0620-2969

Chevron U.S.A. Inc.
1500 Louisiana
Houston, Texas 77002

Attention: Mr. Phillip Von Dullen III

Site Clearance Letter, Proposed Wellsite MC 412 A Block 412 (OCS-G-35969), Mississippi Canyon Area, Gulf of Mexico

Chevron U.S.A. Inc. (Chevron) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for Proposed Wellsite MC 412 A, whose surface location is in Block 412 (OCS-G-35969), Mississippi Canyon Area (MC), Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Limit of Investigation at a depth of about 6,000 ft below the mudline (bml).

Seafloor conditions appear favorable within the vicinity of the proposed location as based on the high-resolution geophysical and 3-D seismic datasets. The proposed wellsite is located along smooth, east-southeasterly dipping seafloor, which regionally, is marked with numerous gullies. The surface location lies within a former unexploded ordnance (UXO) dumpsite. Circular impact craters and mapped side-scan sonar contacts within the vicinity of the proposed location could contain UXO remains. There are no potential sites for deepwater benthic communities within 2,000 ft of the proposed wellsite. The sediments beneath the surface location are comprised of hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes consisting of clays and silts with interbedded sand layers below ~774 ft bml. There is a Negligible to Moderate potential for encountering shallow gas within the Limit of Investigation. The potential for shallow water flow is Negligible to High.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed MC 412 A well lies in the south-central portion of MC 412. Chevron provided the following coordinates:

Table 1. Proposed Location Coordinates

Proposed Wellsite MC 412 A			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 16 North		3-D Seismic Line Reference	Block Calls (MC 412)
X: 941,537 ft	Latitude: 28° 32′ 20.4932″ N	Inline 9405	6,977 ft FWL
Y: 10,363,088 ft	Longitude: 89° 10′ 37.6854″ W	Crossline 24045	3,728 ft FSL

Chevron plans to drill the well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings from the geohazard and archaeologic assessment performed within MC 412 and portions of the surrounding blocks (GEMS, 2021). The subsurface geologic conditions were assessed within MC 412 plus a ~3,820 ft halo to the north and a 2,000 ft halo to the east, west, and south ("Study Area", Figure 1). An expanded seafloor assessment covers MC 412 plus a one block halo covering MC 367-369, 411, 413, and 455-457.

Chevron provided the following geophysical data sets and offset well data for this site clearance assessment. The detailed data specifications are provided in Appendix C of the main report (GEMS, 2021).

- Reprocessed depth-migrated TGS seismic depth volume "TGS_Fusion_MWAZ_Kir_Raw_Stk_Secshap_062019.sgy" and the associated velocity volume "TGS_Fusion_MWAZ_merge_sb4_Pvels_122618.sgy".
- High-resolution data collected by Oceaneering (OII) in September 2020 using an Autonomous Underwater Vehicle (AUV). The data collected include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler. The survey area covers approximately 10 mi^2 within a portion of MC 412, extending into portions of the adjacent blocks MC 368, 369, and MC 413.
- High-resolution AUV data collected by OII in September 2021 that extends the 2020 survey area coverage to include the remaining portions of MC 412 plus a 2,000 ft halo to the south into MC 456. The data collected also include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler.
- Geologic data (well logs, scout tickets etc.) from multiple existing wells in the seismic volume extents.

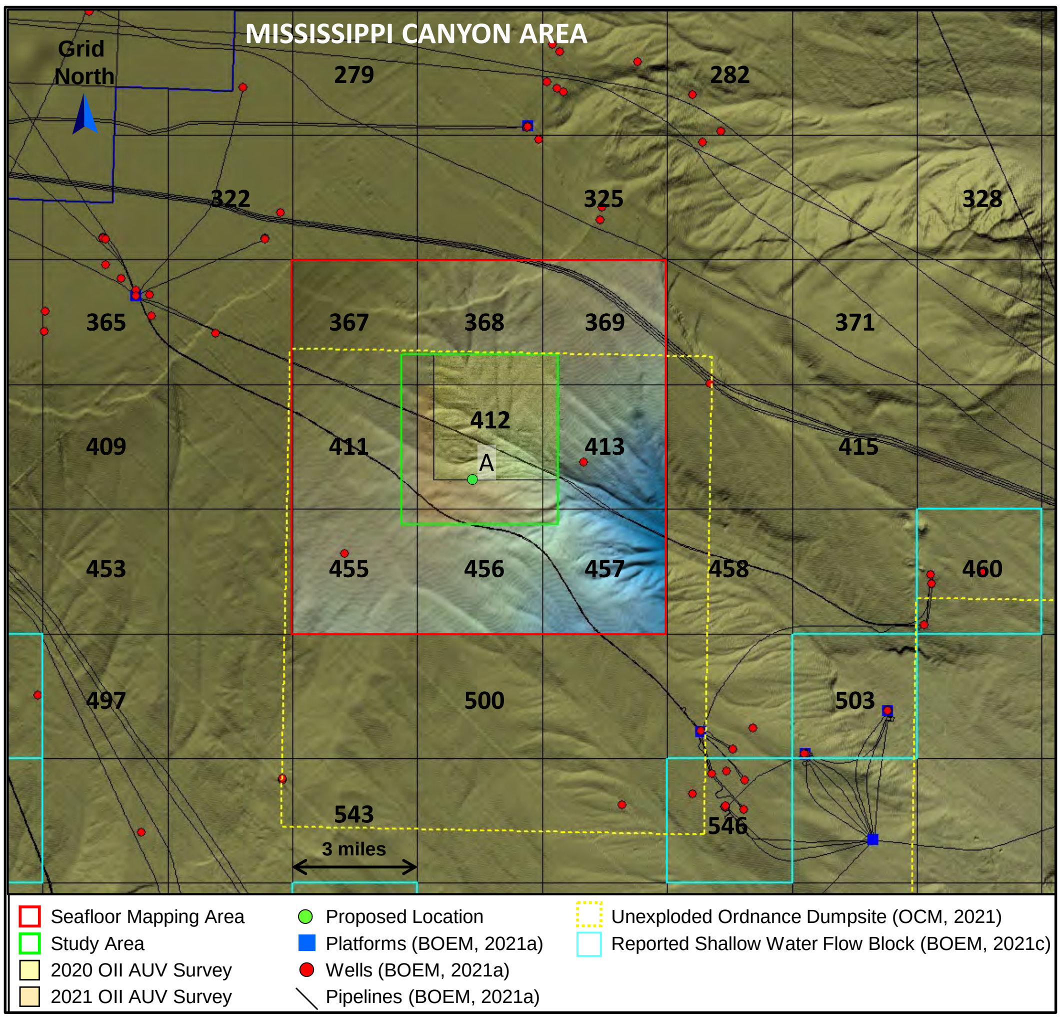


Figure 1. Seafloor Rendering of the Mississippi Canyon Study Area and Vicinity.

Attachments

Wellsite maps are centered on the proposed location and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. A-1: Bathymetry Map

Map No. A-2: Seafloor Features Map

Map No. A-3: Side-Scan Sonar Mosaic
Map No. A-4: Seafloor Amplitude Rendering
Map No. A-5: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration A-1: Subbottom Profiler Line 202.2 Showing Near-Surface Conditions Near Proposed Wellsite MC 412 A.

Illustration A-2: Portions of Inline 9405 and Crossline 24045 Showing Conditions Beneath Proposed Wellsite MC 412 A. Surface Location in Mississippi Canyon Area, Block 412.

Illustration A-3: Tophole Prognosis Chart, Proposed Wellsite MC 412 A, Mississippi Canyon Area, Block 412.

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) NTLs 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) with respect to benthic community and shallow hazard assessments. BOEM may require an assessment for potential archaeological resources surrounding the proposed location. To satisfy the requirements prescribed in NTL 2005-G07 and the "Pre-Seabed Disturbance Survey Mitigation" (MMS, 2005; BOEM, 2011), GEMS conducted an archaeological assessment using the 2020 and 2021 AUV survey data. The results of the archaeological assessment are provided as Volume II of the shallow hazards and archaeological report (GEMS, 2021).

Military Warning Areas (MWA) represent regions where the U.S. Department of Defense conducts various testing and training operations. Lessees within MWA's are required to enter into an agreement with the appropriate command headquarters concerning the control of electromagnetic emissions and the use of boats and aircraft within the warning area (NTL 2014-G04; BOEM, 2014). The closest MWA is W-92, about 67 miles southwest of the proposed location. The stipulations outlined in NTL 2014-G04 are not applicable for this surface location.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic dataset provided by Chevron (Figure 2). The extraction was generated within a 2,000-ft radius at the proposed wellsite between the Seafloor and one second bml. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 17 to 81 Hz (Figure 2).

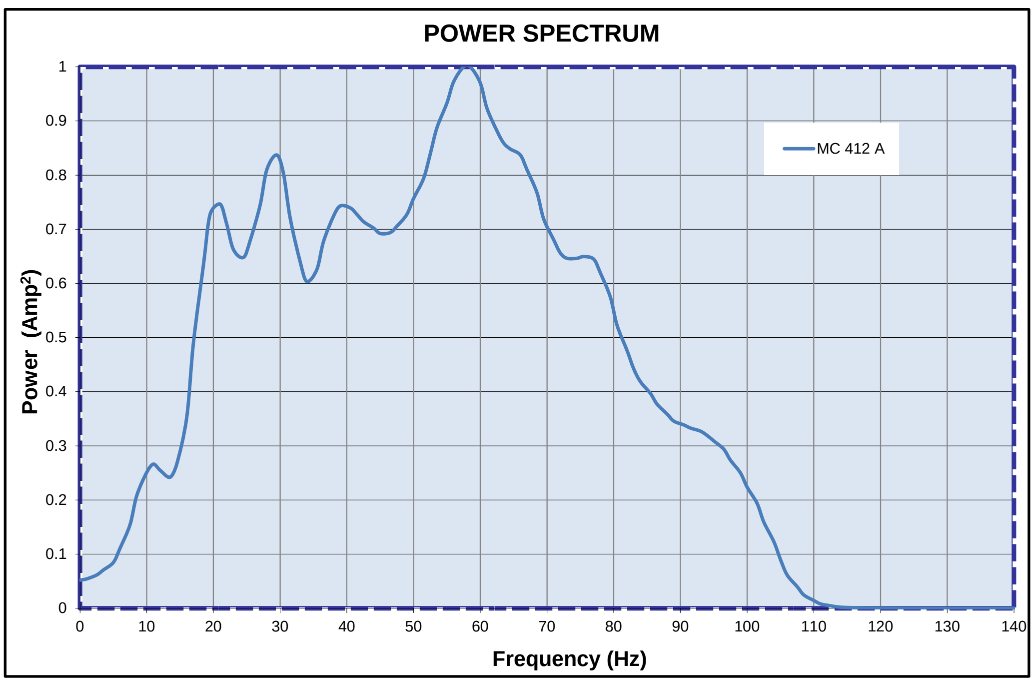


Figure 2. Power Spectrum Curve, Proposed Wellsite MC 412 A

Man-Made Features

Infrastructure. The surface location is clear of any wells, pipelines, or platforms within a 2,000 ft radius from the proposed wellsite (Map A-1 and Figure 1); BOEM, 2021a. The closest existing wells, Equinor USA E&P Inc.'s MC 413 #1 and Unocal's MC 455 #1, are located approximately 2.7 miles to the east-northeast and 3.5 miles southwest, respectively (Figure 1). The MC 413 #1 well was drilled by Spinnaker Exploration in 2005-2006 and is reported as permanently abandoned (BOEM, 2021a). The MC 455 #1 well was drilled by Unocal in 1985-1986 and is listed as temporarily abandoned. Four oil and gas pipelines and an umbilical lie within about a mile of the proposed location with the closest pipeline about 4,761 ft to the northeast (Figure 1). The active pipelines and umbilical are associated with ENI US Operating Co Inc.'s Corral platform in MC 365.

Unexploded Ordnance Dumpsite. The MC 412 Study Area lies within a former UXO dumpsite (Figure 1). Hundreds of small circular depressions are evident on the multibeam dataset, some of which have highly reflective centers on the side-scan sonar data. These features could represent impact craters created from possible UXO striking the seafloor, many of which likely still contain UXO remains. Any explosive weapons present could still pose a risk of detonation. Multiple craters and highly-reflective sonar contacts lie within 2,000 ft of the proposed surface location; however, none are interpreted within 500 ft of the proposed well (Map A-2).

Despite efforts to identify hazardous material from the acoustic data, it is possible that dumped UXO could remain undetected on or below the seafloor. Extreme caution is recommended for any bottom founded development within this area.

Archaeological Assessment

The following wellsite archaeological assessment is based on the 2021 report entitled "Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico", written by GEMS and P&C Scientific, LLC. and provided to Chevron, Inc.

A review of the available datasets found 26 sonar contacts within 2,000 feet of the Proposed MC 412 A wellsite. All the side-scan sonar contacts mapped within the AUV Survey Area measure from 1 to 64 ft (0.3 to 19.5 m) long, and 1 to 41 ft (0.3 to 12.5 m) wide, and from no measurable height to 3 ft high. A standard 100-foot radius BOEM avoidance zone is in place around each of these contacts. The closest sonar contact to the proposed wellsite is Sonar Contact No. 208 approximately 543 feet to the south. All the sonar contacts are considered modern debris associated with lease development or shipping activities, unexploded ordnance, or as potential geologic features. Many of the contacts present as depressions with highly reflective centers on the side-scan sonar data may represent impact craters created by UXO striking the seafloor.

None of the 26 sonar contacts within the Proposed MC 412 A wellsite assessment area have acoustic signatures indicative of archaeological resources. Based on the review of available AUV data, the Area of Potential Effect around the proposed wellsite appears clear of archaeological resources. If any wood, ceramics, textiles or ferrous objects become exposed during the course of bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

Wellsite Conditions

The Proposed MC 412 surface location is clear of any constraining seafloor conditions as defined by the 3-D seismic and high-resolution geophysical data. The shallow stratigraphy to the Limit of Investigation will consist of interbedded hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes generally composed of clays and silts with sand layers likely below 774 ft bml (Illustrations A-1 through -3).

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,499 ft and the seafloor slopes 3° to the east-southeast (Map A-1). The wellsite is located along smooth seafloor, which regionally, is marked with numerous gullies (Map A-2). The gullies are typically low-relief features that form an extensive drainage system that trends to the southeast into a mid-slope valley (Figure 1). These features are generally buried and represent relict sediment transport features that originated at a time of active deposition during the late Pleistocene.

The low side-scan sonar reflectivity and seafloor amplitude response in the vicinity of the proposed wellsite suggests the seabed is covered by very soft clays and/or silty-clays (Maps A-3 and -4). Based on the geophysical data provided, the present-day seabed and near-surface sediments at the proposed location are stable and not prone to failure.

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite (Maps A-3 and -4). Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location (BOEM, 2021b).

Stratigraphy. The stratigraphy at the proposed well location is depicted on Illustrations A-1 through -3. The Tophole Prognosis Chart (Illustration A-3) shows the crossline, annotated with depths to the various horizons and predicted lithology of the sequences, along with their potential for shallow gas and shallow water flow. GEMS mapped seven horizons (Horizons 5, 10, 20, 30, 35, 40, 50) on the AUV and 3-D seismic datasets within the Limit of Investigation (GEMS, 2021). Well logs from several nearby wells indicate sand layers within mud-prone sequences within the tophole section (GEMS, 2021).

The subbottom profiler data defines the upper few hundred feet of sediments beneath the mudline around the proposed wellsite (Illustration A-1). The uppermost ~12 ft of sediment at the well is a hemipelagic drape consisting of layered, soft, high water content clays. Beneath the drape, to about 30 ft bml, are layered clay-rich deposits followed by alternating bedded hemipelagic clays and silts to about 145 ft bml. The top of a thick unit of stacked, clay-prone mass-transport deposits is visible on the subbottom profiler directly below 145 ft bml (Illustration A-1). The AUV and 3-D seismic profiles illustrate mass-transport deposition through the remainder of Unit 1 (Illustration A-3). The base of the unit, Horizon 10 at about 281 ft bml, is mapped along an erosional surface on the 3-D seismic volume.

The strata within Units 2 and 3 (Horizon 10 to Horizon 30, 281 ft to 1,575 ft bml) generally consists of stratified turbidites and hemipelagic clays interbedded with thin mass-transport deposits. Erosional sequences within the units indicate a dynamic environment of sediment bypass and deposition. Units 2 and 3 are expected to be predominately clay and silt prone, with thin interbedded sands possible in Unit 3 (774 ft to 1,575 ft bml).

Horizon 30 to Horizon 35 (Unit 4, 1,575 ft to 2,634 ft bml) likely contains slope-fan deposits, which may correlate with the regional sand-rich slope-fan sequence of the Blue Unit (Winker and Booth, 2000). This channelized unit contains thick, mass-transport deposits interbedded with turbidites. Thick sand layers may be encountered, particularly in the upper and middle portions of the sequence between 1,575 ft and 2,244 ft bml. Mudlogs for the MC 413 #1 and MC 366 #1 wells indicate sand layers within correlative stratigraphy.

The strata within Unit 5 (Horizon 35 to Horizon 40, 2,634 ft to 3,509 ft bml) consists of layered turbidites interbedded with thick mass-transport sequences. The sediments likely comprise of clays and silts with occasional sand layers. A defined channel is mapped across MC 412 near the base of Unit 5 and upper portion of Unit 6, roughly 3,800 ft east of the proposed location. Some thin sand layers may be present within overbank deposits, particularly along and/or near Horizon 40.

The Horizon 40 to Horizon 50 unit (Unit 6, 3,509 ft to 4,970 ft bml) consists of well-layered turbidites and hemipelagic clays with occasional thin mass-transport deposits. The unit is predominately clay-rich with isolated sands. The strata below Horizon 50 to the Limit of Investigation (Unit 7, 4,970 ft to 6,000 ft bml) is composed of stacked mass-transport deposits interbedded with turbidites containing clays, silts, and interbedded sands.

Faults. A vertical borehole for the proposed location MC 412 A will not encounter any seafloor or buried faults through the Limit of Investigation (Maps A-2 and -5 and Illustrations A-1 and -2). Buried faults are, however, expected to be encountered at depth, below the Limit of Investigation. There are no seafloor faults within a 2,000 ft radius of the proposed surface location.

Shallow Gas and Shallow Water Flow. Based on the assessment of the 3-D seismic data in the vicinity of the proposed wellsite and offset well information, the potential for shallow gas at the proposed well is Negligible to Moderate. The potential for shallow water flow is considered Negligible to High.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below or in the immediate area surrounding the proposed wellsite (Map A-5). The nearest high-amplitude anomaly indicative of gas is located about 1,555 ft west-northwest of the proposed wellsite. The anomaly is identified within Unit 4 at about 1,860 ft bml. Numerous anomalous amplitude events were mapped within Unit 4 throughout MC 412 (GEMS, 2021). In addition, the scout ticket and mudlog for the nearby MC 413 #1 well indicated that gas circulated from the riser and choke at about 3,760 ft TVD (1,924 ft bml), which correlates to mid-Unit 4. The #1 well experienced unspecified hole problems around 5,126 ft TVD (upper portion of Unit 6) as well, which resulted in a side-track operation. The potential for gas accumulation at the proposed location is interpreted as Low to Moderate within likely sands from 1,575 ft to 2,244 ft bml (Illustration A-3).

There is a Low potential for gas within possible sand layers below 2,244 ft bml to the Limit of Investigation at 6,000 ft bml. Near-normally pressured solution gas could be present within sand layers within these stratigraphic intervals; however, no anomalous amplitudes are present at the well and the structural and stratigraphic framework is not suitable for significant gas accumulations. The potential for encountering gas within Units 1 through 3 (Seafloor to 1,575 ft bml) is assessed as Negligible.

Shallow Water Flow. The potential for shallow water flow at this well location is considered Negligible to High. The Study Area lies along the northern margin of the shallow water flow prone "Blue Unit" and the sand-rich deposits appear to extend to the proposed location. Multiple wells surrounding the Study Area have reported water flow conditions (Table 3; GEMS, 2021).

Table 3. Wells Within 12 miles of the Proposed Wellsite Reporting Shallow Water Flow (BOEM, 2021c)

Block	Well	Depth (ft, bml)	Depth (ft, subsea)	Severity	Correlative Sequence to SHL	Distance (mi) /Direction from SHL
MC 546	ENI #2	1,712	4,220	Unknown	Unit 4	9.8 / Southeast
MC 503	LLOG #SS001	830	3,929	Moderate	Lower Unit 3/ Upper Unit 4	11.4 / Southeast
MC 460	ENI #SS001	1,160	3,983	Moderate	Unit 4	11.4 / Southeast
MC 496	Marubeni #2	2,671	4,308	Unknown	Outside provided seismic area	11.7 / Southwest
MC 587	BP #1	2,092	4,430	Low	Outside provided seismic area	11.9 / South-Southwest

SHL = Surface Hole Location

Given the likelihood of slope-fan deposits containing sands within Unit 4 and the multiple nearby reported water flow events within similar stratigraphy, we assess the shallow water flow potential as Moderate to High from 1,575 ft to 2,244 ft bml (Illustration A-3). Numerous additional wells have been drilled within 12 miles of the proposed location that did not report water flow conditions to BOEM, including the two closest wells in MC 413 and 455. Detailed mudlog data in much of the tophole section for the MC 413 #1 well did not indicate shallow water flow conditions were encountered. However, if any of the other wells encountered water flow while drilling, it is possible that the operators were able to apply appropriate mitigation and not required to report the occurrence.

There is a Low potential for shallow water flow within possible sand layers in Unit 3 (774 ft to 1,575 ft bml) and below 2,244 ft bml to the Limit of Investigation (6,000 ft bml). A Negligible potential for overpressured sands is assessed for fine-grained Units 1 and 2 (Seafloor to 774 ft bml).

Results

No seafloor hazards or constraints are defined by the available data at the proposed surface location; however, caution is recommended for any bottom founded development within this area with respect to potential UXO remains. No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed wellsite. It is likely that sand layers may be encountered below 774 ft bml. Caution is recommended when drilling through the potential sand-prone interval with a Moderate to High shallow water flow potential and Low to Moderate gas potential from 1,575 ft to 2,244 ft bml.

Closing

We appreciate the opportunity to be of service to Chevron U.S.A. Inc. and look forward to working with Chevron on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Erin Williams Janes
Sr. Geoscientist/Project Manager

Daniel Lanier
President

Attachments (5 Maps and 3 Illustrations)

Distribution:
Mr. Phillip Von Dullen III, Chevron, Houston, TX (1 copy)

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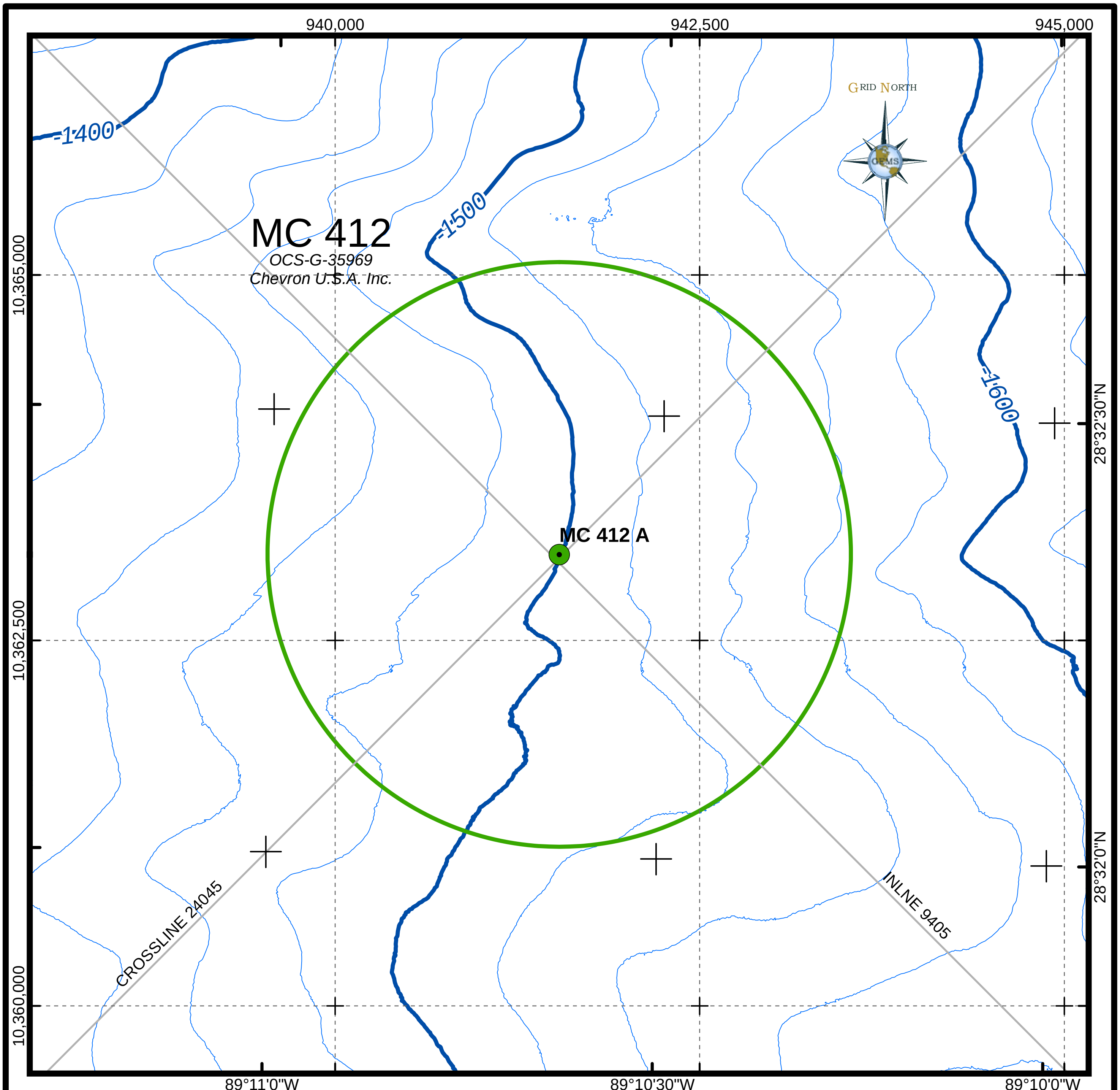


PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

WATER DEPTH CONTOUR IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

CHEVRON U.S.A. INC.

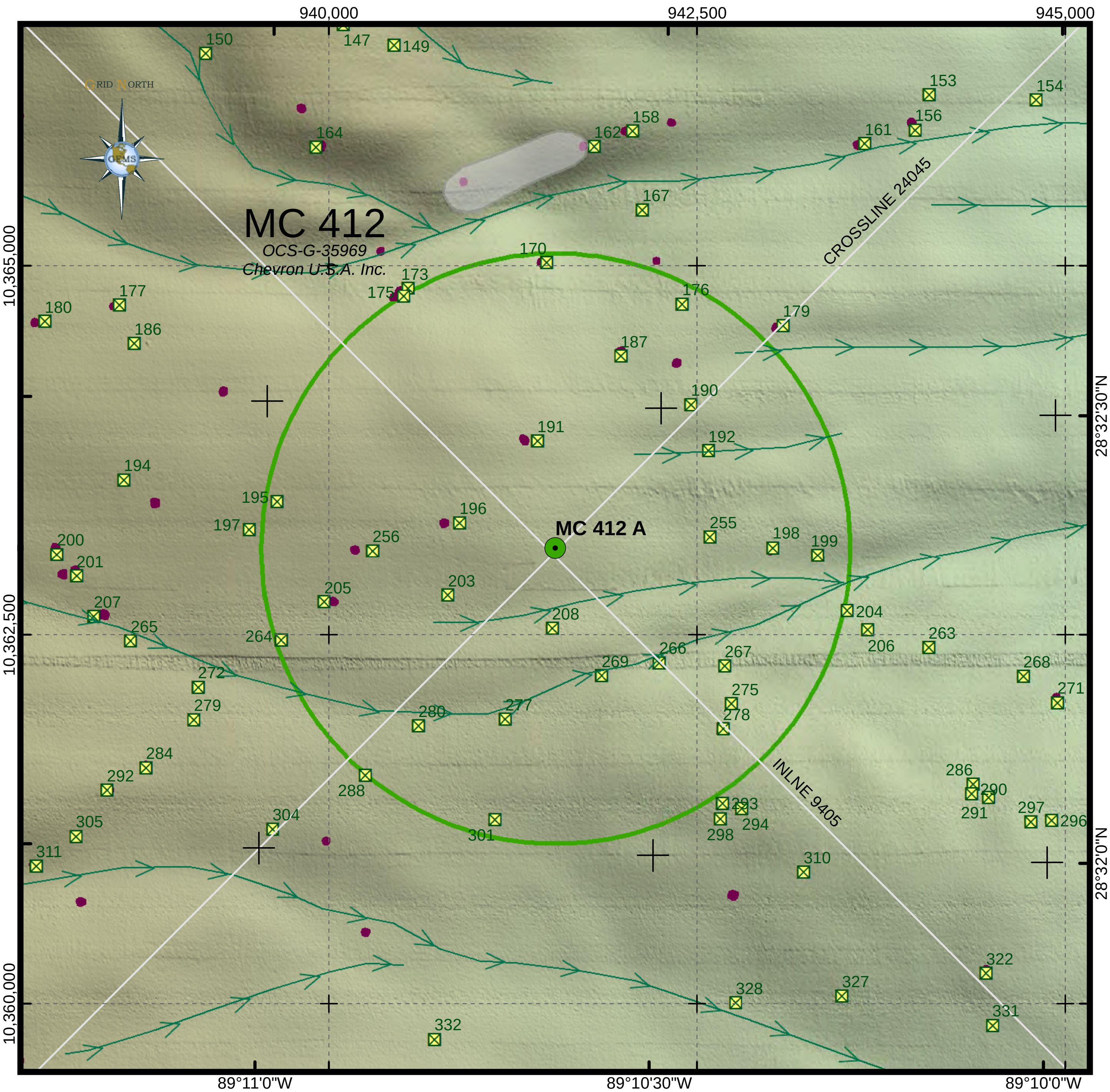
BATHYMETRY MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412A-1.mxd
PROJECT NO.: 0620-2969

MAP NO. A-1



PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

3-D SURVEY LINE.

SEAFLOOR EXPRESSION OF GULLIES.
ARROWS INDICATE FLOW DIRECTION.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS
FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

SEAFLOOR SLOPES 5° OR GREATER.

WATER DEPTH IN FEET

MIN: -718 | *-1,000* | *-1,250* | *-1,500* | *-1,750* | *-2,000* | *MAX: -2,276*

ALTITUDE = 50°
AZIMUTH = 45°
V.E. = 3 X

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

SEAFLOOR FEATURES MAP

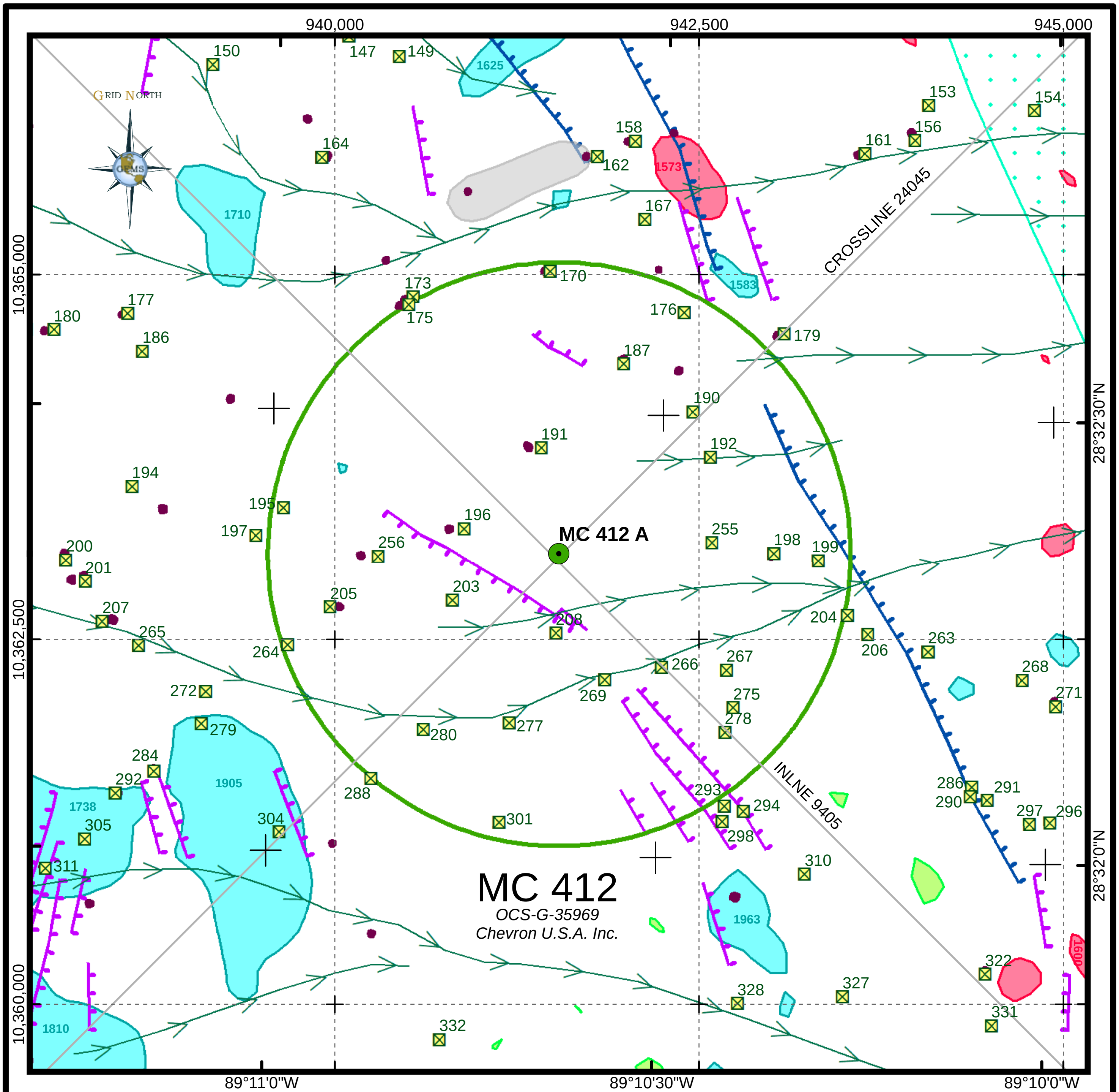
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000
Feet

GEOSCIENCE EARTH & GEMS MARINE SERVICES, INC.

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412A-2.mxd
PROJECT NO.: 0620-2969

MAP NO. A-2



PROPOSED WELL LOCATION. CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

TOP OF SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

TOP OF BURIED FAULTS (MAPPED ON 3-D SEISMIC).

SEAFLOOR EXPRESSION OF GULLIES. ARROWS INDICATE FLOW DIRECTION.

SEAFLOOR SLOPES 5° OR GREATER.

BURIED CHANNEL ALONG HORIZON 40.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

AMPLITUDE ANOMALIES ALONG HORIZON 30.

AMPLITUDE ANOMALIES BETWEEN HORIZON 30 AND HORIZON 35 (UNIT 4).

AMPLITUDE ANOMALIES BETWEEN THE SEAFLOOR AND THE LIMIT OF INVESTIGATION (IN AREAS WHERE SUBSURFACE HORIZONS WERE NOT MAPPABLE).

NOTE: NUMBERS INDICATE DEPTH BELOW MUDLINE IN FEET.

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

GEOLOGIC FEATURES MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412A-5.mxd
PROJECT NO.: 0620-2969

MAP NO. A-5

GEOSCIENCE EARTH & MARINE SERVICES, INC.
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November 17, 2021

Project No.: 0620-2969

Chevron U.S.A. Inc.
1500 Louisiana
Houston, Texas 77002

Attention: Mr. Phillip Von Dullen III

Site Clearance Letter, Proposed Wellsite MC 412 RW-S Block 412 (OCS-G-35969), Mississippi Canyon Area, Gulf of Mexico

Chevron U.S.A. Inc. (Chevron) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for Proposed Wellsite MC 412 RW-S, whose surface location is in Block 412 (OCS-G-35969), Mississippi Canyon Area (MC), Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Limit of Investigation at a depth of about 6,000 ft below the mudline (bml).

Seafloor conditions appear favorable within the vicinity of the proposed location as based on the high-resolution geophysical and 3-D seismic datasets. The proposed wellsite is located along smooth, southeasterly dipping seafloor, which regionally, is marked with numerous gullies. The surface location lies within a former unexploded ordnance (UXO) dumpsite. Circular impact craters and mapped side-scan sonar contacts within the vicinity of the proposed location could contain UXO remains. There are no potential sites for deepwater benthic communities within 2,000 ft of the proposed wellsite. The sediments beneath the surface location are comprised of hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes consisting of clays and silts with interbedded sand layers below ~782 ft bml. There is a Negligible to Moderate potential for encountering shallow gas within the Limit of Investigation. The potential for shallow water flow is Negligible to High.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed MC 412 RW-S well lies in the south-central portion of MC 412. Chevron provided the following coordinates:

Table 1. Proposed Location Coordinates

Proposed Wellsite MC 412 RW-S			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 16 North		3-D Seismic Line Reference	Block Calls (MC 412)
X: 941,465 ft	Latitude: 28° 31′ 54.3695″ N	Inline 9386	6,905 ft FWL
Y: 10,360,450 ft	Longitude: 89° 10′ 37.9555″ W	Crossline 23957	1,090 ft FSL

Chevron plans to drill the well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings from the geohazard and archaeologic assessment performed within MC 412 and portions of the surrounding blocks (GEMS, 2021). The subsurface geologic conditions were assessed within MC 412 plus a ~3,820 ft halo to the north and a 2,000 ft halo to the east, west, and south ("Study Area", Figure 1). An expanded seafloor assessment covers MC 412 plus a one block halo covering MC 367-369, 411, 413, and 455-457.

Chevron provided the following geophysical data sets and offset well data for this site clearance assessment. The detailed data specifications are provided in Appendix C of the main report (GEMS, 2021).

- Reprocessed depth-migrated TGS seismic depth volume "TGS_Fusion_MWAZ_Kir_Raw_Stk_Secshap_062019.sgy" and the associated velocity volume "TGS_Fusion_MWAZ_merge_sb4_Pvels_122618.sgy".
- High-resolution data collected by Oceaneering (OII) in September 2020 using an Autonomous Underwater Vehicle (AUV). The data collected include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler. The survey area covers approximately 10 mi^2 within a portion of MC 412, extending into portions of the adjacent blocks MC 368, 369, and MC 413.
- High-resolution AUV data collected by OII in September 2021 that extends the 2020 survey area coverage to include the remaining portions of MC 412 plus a 2,000 ft halo to the south into MC 456. The data collected also include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler.
- Geologic data (well logs, scout tickets etc.) from multiple existing wells in the seismic volume extents.

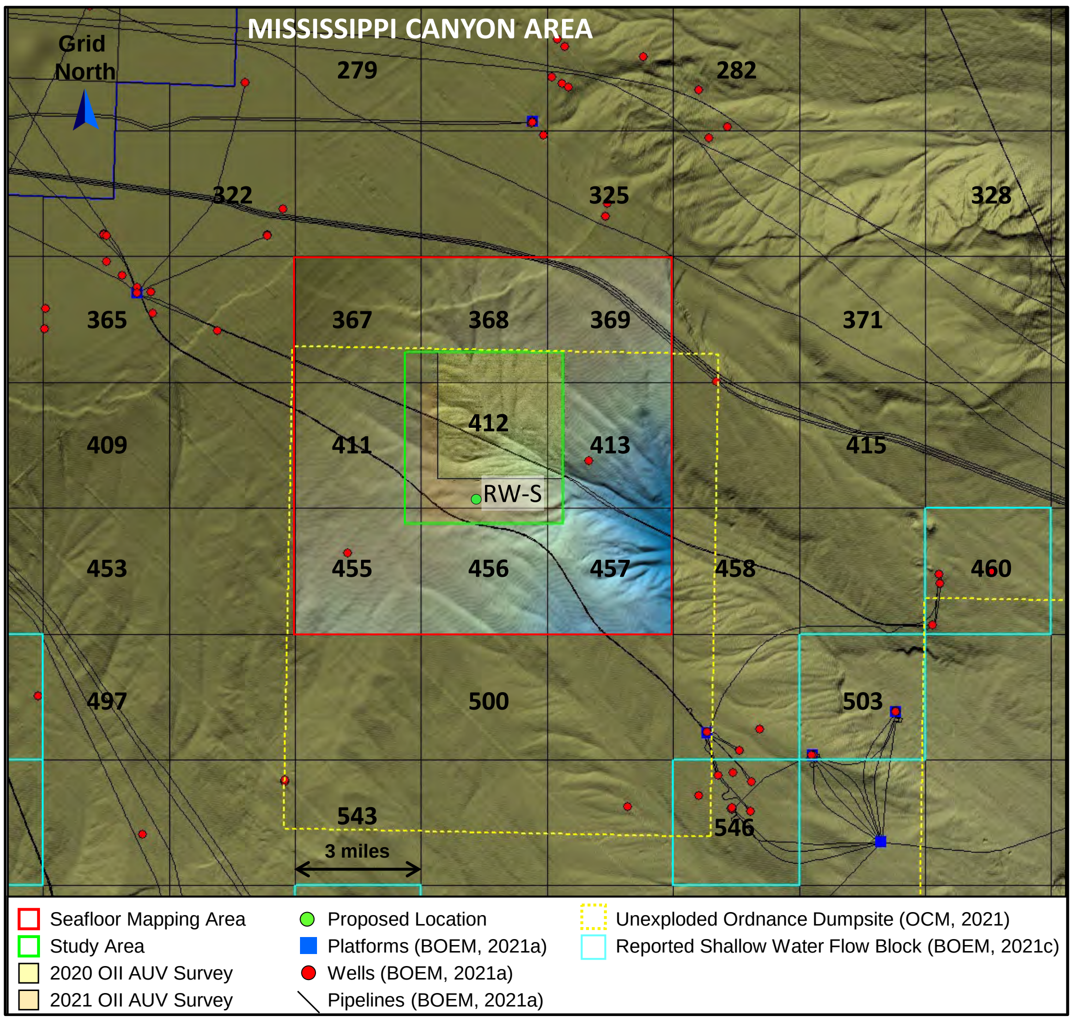

Figure 1. Seafloor Rendering of the Mississippi Canyon Study Area and Vicinity.

Attachments

Wellsite maps are centered on the proposed location and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. RW-S-1: Bathymetry Map
Map No. RW-S-2: Seafloor Features Map

Map No. RW-S-3: Side-Scan Sonar Mosaic

Map No. RW-S-4: Seafloor Amplitude Rendering

Map No. RW-S-5: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration RW-S-1: Subbottom Profiler Line 123 Showing Near-Surface Conditions Near Proposed Wellsite MC 412 RW-S.

Illustration RW-S-2: Portions of Inline 9386 and Crossline 23957 Showing Conditions Beneath Proposed Wellsite MC 412 RW-S. Surface Location in Mississippi Canyon Area, Block 412.

Illustration RW-S-3: Tophole Prognosis Chart, Proposed Wellsite MC 412 RW-S, Mississippi Canyon Area, Block 412.

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) NTLs 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) with respect to benthic community and shallow hazard assessments. BOEM may require an assessment for potential archaeological resources surrounding the proposed location. To satisfy the requirements prescribed in NTL 2005-G07 and the "Pre-Seabed Disturbance Survey Mitigation" (MMS, 2005; BOEM, 2011), GEMS conducted an archaeological assessment using the 2020 and 2021 AUV survey data. The results of the archaeological assessment are provided as Volume II of the shallow hazards and archaeological report (GEMS, 2021).

Military Warning Areas (MWA) represent regions where the U.S. Department of Defense conducts various testing and training operations. Lessees within MWA's are required to enter into an agreement with the appropriate command headquarters concerning the control of electromagnetic emissions and the use of boats and aircraft within the warning area (NTL 2014-G04; BOEM, 2014). The closest MWA is W-92, about 66 miles southwest of the proposed location. The stipulations outlined in NTL 2014-G04 are not applicable for this surface location.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic dataset provided by Chevron (Figure 2). The extraction was generated within a 2,000-ft radius at the proposed wellsite between the Seafloor and one second bml. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 18 to 80 Hz (Figure 2).

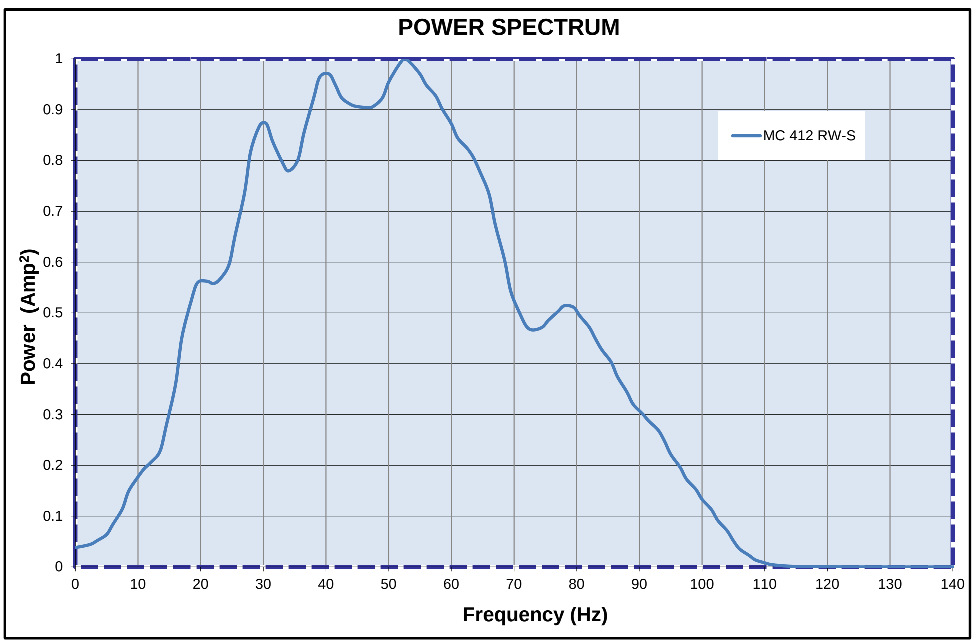

Figure 2. Power Spectrum Curve, Proposed Wellsite MC 412 RW-S

Man-Made Features

Infrastructure. The surface location is clear of any wells, pipelines, or platforms within a 2,000 ft radius from the proposed wellsite (Map RW-S-1 and Figure 1); BOEM, 2021a. The closest existing wells, Equinor USA E&P Inc.'s MC 413 #1 and Unocal's MC 455 #1, are located approximately 2.8 miles to the east-northeast and 3.3 miles west-southwest, respectively (Figure 1). The MC 413 #1 well was drilled by Spinnaker Exploration in 2005-2006 and is reported as permanently abandoned (BOEM, 2021a). The MC 455 #1 well was drilled by Unocal in 1985-1986 and is listed as temporarily abandoned. Four oil and gas pipelines and an umbilical lie within about 1.5 miles of the proposed location with the closest infrastructure (umbilical) about 2,961 ft to the southwest (Figure 1 and Map RW-S-1). The active pipelines and umbilical are associated with ENI US Operating Co Inc.'s Corral platform in MC 365.

Unexploded Ordnance Dumpsite. The MC 412 Study Area lies within a former UXO dumpsite (Figure 1). Hundreds of small circular depressions are evident on the multibeam dataset, some of which have highly reflective centers on the side-scan sonar data. These features could represent impact craters created from possible UXO striking the seafloor, many of which likely still contain UXO remains. Any explosive weapons present could still pose a risk of detonation. Multiple craters and highly-reflective sonar contacts lie within 2,000 ft of the proposed surface location (Map RW-S-2). The nearest mapped potential UXO lies about 867 ft north-northwest of the proposed location.

Despite efforts to identify hazardous material from the acoustic data, it is possible that dumped UXO could remain undetected on or below the seafloor. Extreme caution is recommended for any bottom founded development within this area.

Archaeological Assessment

The following wellsite archaeological assessment is based on the 2021 report entitled "Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico", written by GEMS and P&C Scientific, LLC. and provided to Chevron, Inc.

A review of the available datasets found 19 sonar contacts within 2,000 feet of the Proposed MC 412 RW-S wellsite. All the side-scan sonar contacts mapped within the AUV Survey Area measure from 1 to 64 ft (0.3 to 19.5 m) long, and 1 to 41 ft (0.3 to 12.5 m) wide, and from no measurable height to 3 ft high. A standard 100-foot radius BOEM avoidance zone is in place around each of these contacts. The closest sonar contact to the proposed wellsite is Sonar Contact No. 301 approximately 867 feet to the north-northwest. All the sonar contacts are considered modern debris associated with lease development or shipping activities, unexploded ordnance, or as potential geologic features. Many of the contacts present as depressions with highly reflective centers on the side-scan sonar data may represent impact craters created by UXO striking the seafloor.

None of the 19 sonar contacts within the Proposed MC 412 RW-S wellsite assessment area have acoustic signatures indicative of archaeological resources. Based on the review of available AUV data, the Area of Potential Effect around the proposed wellsite appears clear of archaeological resources. If any wood, ceramics, textiles or ferrous objects become exposed during the course of bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

Wellsite Conditions

The Proposed MC 412 surface location is clear of any constraining seafloor conditions as defined by the 3-D seismic and high-resolution geophysical data. The shallow stratigraphy to the Limit of Investigation will consist of interbedded hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes generally composed of clays and silts with sand layers likely below 782 ft bml (Illustrations RW-S-1 through -3).

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,527 ft and the seafloor slopes 1° to the southeast (Map RW-S-1). The wellsite is located along smooth seafloor, which regionally, is marked with numerous gullies (Map RW-S-2). The gullies are typically low-relief features that form an extensive drainage system that trends to the southeast into a mid-slope valley (Figure 1). These features are generally buried and represent relict sediment transport features that originated at a time of active deposition during the late Pleistocene.

The low side-scan sonar reflectivity and seafloor amplitude response in the vicinity of the proposed wellsite suggests the seabed is covered by very soft clays and/or silty-clays (Maps RW-S-3 and -4). Based on the

geophysical data provided, the present-day seabed and near-surface sediments at the proposed location are stable and not prone to failure.

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite (Maps RW-S-3 and -4). Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location (BOEM, 2021b).

Stratigraphy. The stratigraphy at the proposed well location is depicted on Illustrations RW-S-1 through -3. The Tophole Prognosis Chart (Illustration RW-S-3) shows the crossline, annotated with depths to the various horizons and predicted lithology of the sequences, along with their potential for shallow gas and shallow water flow. GEMS mapped seven horizons (Horizons 5, 10, 20, 30, 35, 40, 50) on the AUV and 3-D seismic datasets within the Limit of Investigation (GEMS, 2021). Well logs from several nearby wells indicate sand layers within mud-prone sequences within the tophole section (GEMS, 2021).

The subbottom profiler data defines the upper ~418 feet of sediments beneath the mudline around the proposed wellsite (Illustration RW-S-1). The uppermost ~12 ft of sediment at the well is a hemipelagic drape consisting of layered, soft, high water content clays. Beneath the drape, to about 33 ft bml, are layered clay-rich deposits followed by alternating bedded hemipelagic clays and silts to about 135 ft bml. The top of a thick unit of stacked, clay-prone mass-transport deposits is visible on the subbottom profiler directly below 135 ft bml (Illustration RW-S-1). The AUV and 3-D seismic profiles illustrate mass-transport deposition through the remainder of Unit 1 (Illustration RW-S-3). The base of the unit, Horizon 10 at about 347 ft bml, is mapped along an erosional surface on the 3-D seismic volume.

The strata within Units 2 and 3 (Horizon 10 to Horizon 30, 347 ft to 1,542 ft bml) generally consists of stratified turbidites and hemipelagic clays interbedded with thin mass-transport deposits. Erosional sequences within the units indicate a dynamic environment of sediment bypass and deposition. Units 2 and 3 are expected to be predominately clay and silt prone, with thin interbedded sands possible in Unit 3 (782 ft to 1,542 ft bml).

Horizon 30 to Horizon 35 (Unit 4, 1,542 ft to 2,682 ft bml) likely contains slope-fan deposits, which may correlate with the regional sand-rich slope-fan sequence of the Blue Unit (Winker and Booth, 2000). This channelized unit contains thick, mass-transport deposits interbedded with turbidites. Thick sand layers may be encountered, particularly in the upper and middle portions of the sequence between 1,542 ft and 2,278 ft bml. Mudlogs for the MC 413 #1 and MC 366 #1 wells indicate sand layers within correlative stratigraphy.

The strata within Unit 5 (Horizon 35 to Horizon 40, 2,682 ft to 3,501 ft bml) consists of layered turbidites interbedded with thick mass-transport sequences. The sediments likely comprise of clays and silts with occasional sand layers. The Horizon 40 to Horizon 50 unit (Unit 6, 3,501 ft to 4,973 ft bml) consists of well-layered turbidites and hemipelagic clays with occasional thin mass-transport deposits. The unit is predominately clay-rich with isolated sands. The strata below Horizon 50 to the Limit of Investigation (Unit 7, 4,973 ft to 6,000 ft bml) is composed of stacked mass-transport deposits interbedded with turbidites containing clays, silts, and interbedded sands.

Faults. A vertical borehole for the proposed location MC 412 RW-S will not encounter any seafloor or buried faults through the Limit of Investigation (Maps RW-S-2 and -5 and Illustrations RW-S-1 and -2). Buried faults are, however, expected to be encountered at depth, below the Limit of Investigation. There are no seafloor faults within a 2,000 ft radius of the proposed surface location.

Shallow Gas and Shallow Water Flow. Based on the assessment of the 3-D seismic data in the vicinity of the proposed wellsite and offset well information, the potential for shallow gas at the proposed well is Negligible to Moderate. The potential for shallow water flow is considered Negligible to High.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below or in the immediate area surrounding the proposed wellsite (Map RW-S-5). The nearest high-amplitude anomaly indicative of gas is located about 500 ft south-southeast of the proposed wellsite. The anomaly is identified along Horizon 30 (top of Unit 4) at about 1,530 ft bml. Numerous anomalous amplitude events were mapped along Horizon 30 and within Unit 4 throughout MC 412 (GEMS, 2021). In addition, the scout ticket and mudlog for the nearby MC 413 #1 well indicated that gas circulated from the riser and choke at about 3,760 ft TVD (1,924 ft bml), which correlates to mid-Unit 4. The #1 well experienced unspecified hole problems around 5,126 ft TVD (upper portion of Unit 6) as well, which resulted in a side-track operation. The potential for gas accumulation at the proposed location is interpreted as Low to Moderate within likely sands from 1,542 ft to 2,278 ft bml (Illustration RW-S-3).

There is a Low potential for gas within possible sand layers below 2,278 ft bml to the Limit of Investigation at 6,000 ft bml. Near-normally pressured solution gas could be present within sand layers within these stratigraphic intervals; however, no anomalous amplitudes are present at the well and the structural and stratigraphic framework is not suitable for significant gas accumulations. The potential for encountering gas within Units 1 through 3 (Seafloor to 1,542 ft bml) is assessed as Negligible.

Shallow Water Flow. The potential for shallow water flow at this well location is considered Negligible to High. The Study Area lies along the northern margin of the shallow water flow prone "Blue Unit" and the sand-rich deposits appear to extend to the proposed location. Multiple wells surrounding the Study Area have reported water flow conditions (Table 3; GEMS, 2021).

Table 3. Wells Within 12 miles of the Proposed Wellsite Reporting Shallow Water Flow (BOEM, 2021c)

Block	Well	Depth (ft, bml)	Depth (ft, subsea)	Severity	Correlative Sequence to SHL	Distance (mi) /Direction from SHL
MC 546	ENI #2	1,712	4,220	Unknown	Unit 4	9.4 / Southeast
MC 503	LLOG #SS001	830	3,929	Moderate	Lower Unit 3/ Upper Unit 4	11.2 / Southeast
MC 460	ENI #SS001	1,160	3,983	Moderate	Unit 4	11.3 / Southeast
MC 496	Marubeni #2	2,671	4,308	Unknown	Outside provided seismic area	11.4 / Southwest
MC 587	BP #1	2,092	4,430	Low	Outside provided seismic area	11.4 / South-Southwest

SHL = Surface Hole Location

Given the likelihood of slope-fan deposits containing sands within Unit 4 and the multiple nearby reported water flow events within similar stratigraphy, we assess the shallow water flow potential as Moderate to High from 1,542 ft to 2,278 ft bml (Illustration RW-S-3). Numerous additional wells have been drilled within 12 miles of the proposed location that did not report water flow conditions to BOEM, including the two closest wells in MC 413 and 455. Detailed mudlog data in much of the tophole section for the MC 413 #1 well did not indicate shallow water flow conditions were encountered. However, if any of the other wells encountered water flow while drilling, it is possible that the operators were able to apply appropriate mitigation and not required to report the occurrence.

There is a Low potential for shallow water flow within possible sand layers in Unit 3 (782 ft to 1,542 ft bml) and below 2,278 ft bml to the Limit of Investigation (6,000 ft bml). A Negligible potential for overpressured sands is assessed for fine-grained Units 1 and 2 (Seafloor to 782 ft bml).

Results

No seafloor hazards or constraints are defined by the available data at the proposed surface location; however, caution is recommended for any bottom founded development within this area with respect to potential UXO remains. No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed wellsite. It is likely that sand layers may be encountered below 782 ft bml. Caution is recommended when drilling through the potential sand-prone interval with a Moderate to High shallow water flow potential and Low to Moderate gas potential from 1,542 ft to 2,278 ft bml.

Closing

We appreciate the opportunity to be of service to Chevron U.S.A. Inc. and look forward to working with Chevron on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Erin Williams Janes
Sr. Geoscientist/Project Manager

Daniel Lanier
President

Attachments (5 Maps and 3 Illustrations)

Distribution:
Mr. Phillip Von Dullen III, Chevron, Houston, TX (1 copy)

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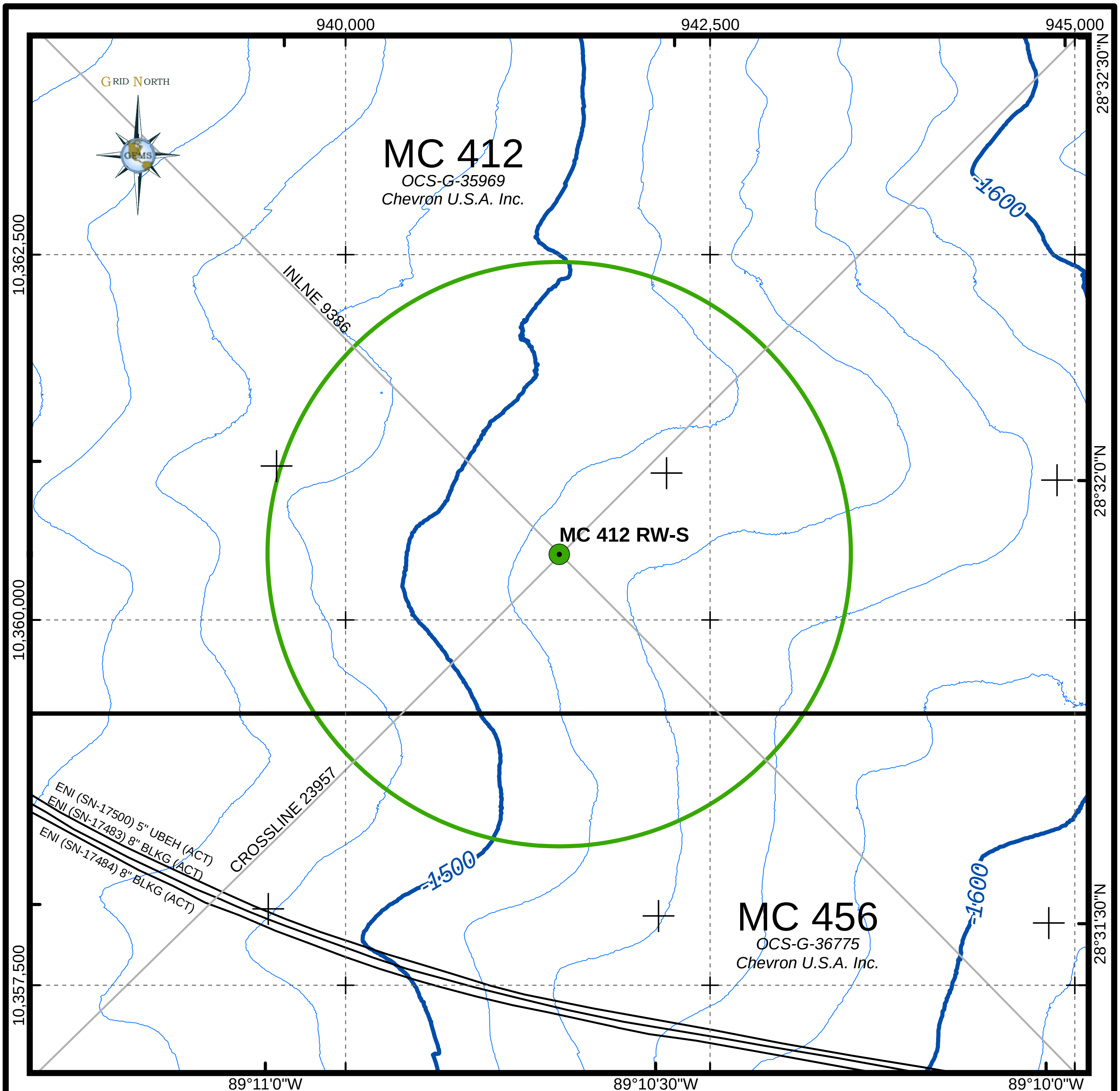


PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION,
AS REPORTED BY BOEM.

WATER DEPTH CONTOUR IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN
UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

BATHYMETRY MAP

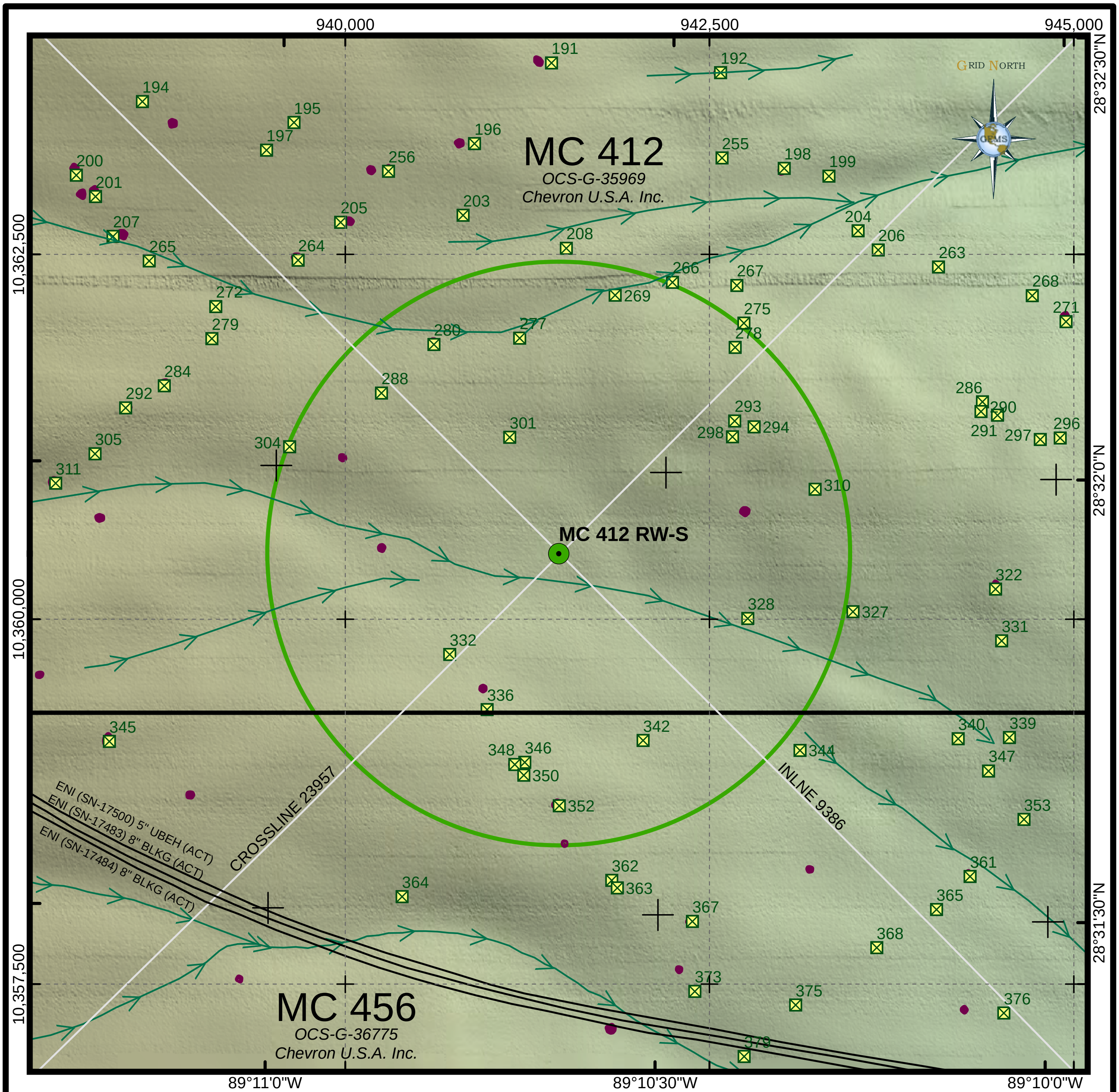
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000
Feet

GEOSCIENCE EARTH & GEMS MARINE SERVICES, INC.

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-S-1.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-S-1



PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINES/UMBILICAL/CABLE LOCATION,
AS REPORTED BY BOEM.

SEAFLOOR EXPRESSION OF GULLIES.
ARROWS INDICATE FLOW DIRECTION.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS
FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

NOTE: PROPOSED LOCATION LIES WITHIN AN
UNEXPLODED ORDNANCE AREA (OCM, 2021).

WATER DEPTH IN FEET

MIN: -718 | *-1,000* | *-1,250* | *-1,500* | *-1,750* | *-2,000* | *MAX: -2,276*

ALTITUDE = 50°
AZIMUTH = 45°
V.E. = 3 X

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

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SEAFLOOR FEATURES MAP

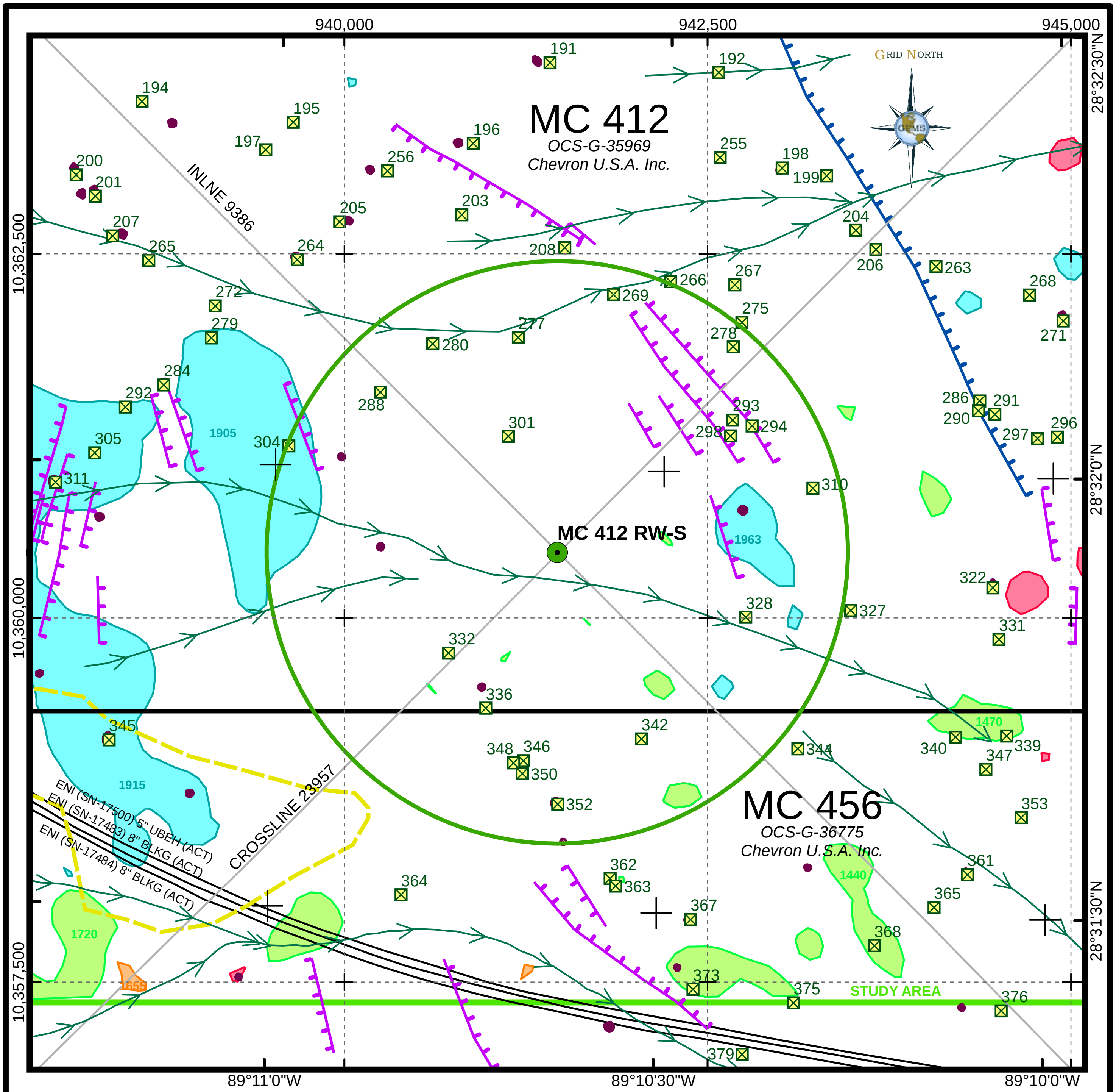
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000
Feet

GEOSCIENCE EARTH & GEMS MARINE SERVICES, INC.

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-S-2.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-S-2



PROPOSED WELL LOCATION. CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION, AS REPORTED BY BOEM.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

TOP OF SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

TOP OF BURIED FAULTS (MAPPED ON 3-D SEISMIC).

SEAFLOOR EXPRESSION OF GULLIES. ARROWS INDICATE FLOW DIRECTION.

AREAS CONTAINING NUMEROUS SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

AMPLITUDE ANOMALIES BETWEEN HORIZON 20 AND HORIZON 30 (UNIT 3).

AMPLITUDE ANOMALIES ALONG HORIZON 30.

AMPLITUDE ANOMALIES BETWEEN HORIZON 30 AND HORIZON 35 (UNIT 4).

AMPLITUDE ANOMALIES BETWEEN THE SEAFLOOR AND THE LIMIT OF INVESTIGATION (IN AREAS WHERE SUBSURFACE HORIZONS WERE NOT MAPPABLE).

NOTE: NUMBERS INDICATE DEPTH BELOW MUDLINE IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

GEOLOGIC FEATURES MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & GEMS MARINE SERVICES, INC.

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-S-5.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-S-5

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November 17, 2021

Project No.: 0620-2969

Chevron U.S.A. Inc.
1500 Louisiana
Houston, Texas 77002

Attention: Mr. Phillip Von Dullen III

Site Clearance Letter, Proposed Wellsite MC 412 RW-SE Block 412 (OCS-G-35969), Mississippi Canyon Area, Gulf of Mexico

Chevron U.S.A. Inc. (Chevron) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for Proposed Wellsite MC 412 RW-SE, whose surface location is in Block 412 (OCS-G-35969), Mississippi Canyon Area (MC), Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Limit of Investigation at a depth of about 6,000 ft below the mudline (bml).

Seafloor conditions appear favorable within the vicinity of the proposed location as based on the high-resolution geophysical and 3-D seismic datasets. The proposed wellsite is located along smooth, northeasterly dipping seafloor, which regionally, is marked with numerous gullies. The surface location lies within a former unexploded ordnance (UXO) dumpsite. Circular impact craters and mapped side-scan sonar contacts within the vicinity of the proposed location could contain UXO remains. There are no potential sites for deepwater benthic communities within 2,000 ft of the proposed wellsite. The sediments beneath the surface location are comprised of hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes consisting of clays and silts with interbedded sand layers below ~797 ft bml. There is a Negligible to Moderate potential for encountering shallow gas within the Limit of Investigation. The potential for shallow water flow is Negligible to High.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed MC 412 RW-SE well lies in the south-central portion of MC 412. Chevron provided the following coordinates:

Table 1. Proposed Location Coordinates

Proposed Wellsite MC 412 RW-SE			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 16 North		3-D Seismic Line Reference	Block Calls (MC 412)
X: 943,915 ft	Latitude: 28° 32′ 09.5769″ N	Inline 9414	6,485 ft FEL
Y: 10,361,942 ft	Longitude: 89° 10′ 10.8003″ W	Crossline 23925	2,582 ft FSL

Chevron plans to drill the well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings from the geohazard and archaeologic assessment performed within MC 412 and portions of the surrounding blocks (GEMS, 2021). The subsurface geologic conditions were assessed within MC 412 plus a ~3,820 ft halo to the north and a 2,000 ft halo to the east, west, and south ("Study Area", Figure 1). An expanded seafloor assessment covers MC 412 plus a one block halo covering MC 367-369, 411, 413, and 455-457.

Chevron provided the following geophysical data sets and offset well data for this site clearance assessment. The detailed data specifications are provided in Appendix C of the main report (GEMS, 2021).

- Reprocessed depth-migrated TGS seismic depth volume "TGS_Fusion_MWAZ_Kir_Raw_Stk_Secshap_062019.sgy" and the associated velocity volume "TGS_Fusion_MWAZ_merge_sb4_Pvels_122618.sgy".
- High-resolution data collected by Oceaneering (OII) in September 2020 using an Autonomous Underwater Vehicle (AUV). The data collected include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler. The survey area covers approximately 10 mi^2 within a portion of MC 412, extending into portions of the adjacent blocks MC 368, 369, and MC 413.
- High-resolution AUV data collected by OII in September 2021 that extends the 2020 survey area coverage to include the remaining portions of MC 412 plus a 2,000 ft halo to the south into MC 456. The data collected also include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler.
- Geologic data (well logs, scout tickets etc.) from multiple existing wells in the seismic volume extents.

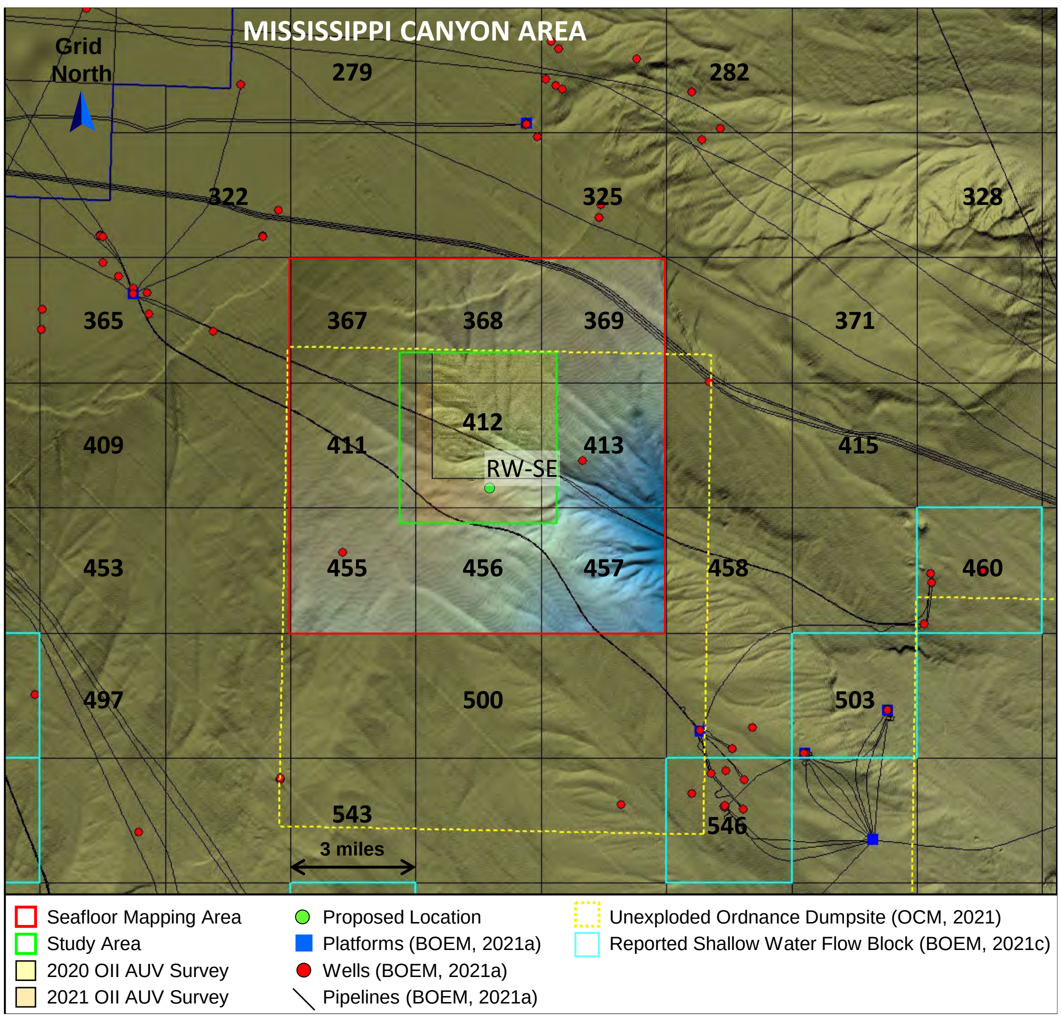

Figure 1. Seafloor Rendering of the Mississippi Canyon Study Area and Vicinity.

Attachments

Wellsite maps are centered on the proposed location and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. RW-SE-1: Bathymetry Map

Map No. RW-SE-2: Seafloor Features Map

Map No. RW-SE-3:	Side-Scan Sonar Mosaic
Map No. RW-SE-4:	Seafloor Amplitude Rendering
Map No. RW-SE-5:	Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration RW-S-1:	Subbottom Profiler Line 121 Showing Near-Surface Conditions Near Proposed Wellsite MC 412 RW-SE.
Illustration RW-SE-2:	Portions of Inline 9414 and Crossline 23925 Showing Conditions Beneath Proposed Wellsite MC 412 RW-SE. Surface Location in Mississippi Canyon Area, Block 412.
Illustration RW-SE-3:	Tophole Prognosis Chart, Proposed Wellsite MC 412 RW-SE, Mississippi Canyon Area, Block 412.

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) NTLs 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) with respect to benthic community and shallow hazard assessments. BOEM may require an assessment for potential archaeological resources surrounding the proposed location. To satisfy the requirements prescribed in NTL 2005-G07 and the "Pre-Seabed Disturbance Survey Mitigation" (MMS, 2005; BOEM, 2011), GEMS conducted an archaeological assessment using the 2020 and 2021 AUV survey data. The results of the archaeological assessment are provided as Volume II of the shallow hazards and archaeological report (GEMS, 2021).

Military Warning Areas (MWA) represent regions where the U.S. Department of Defense conducts various testing and training operations. Lessees within MWA's are required to enter into an agreement with the appropriate command headquarters concerning the control of electromagnetic emissions and the use of boats and aircraft within the warning area (NTL 2014-G04; BOEM, 2014). The closest MWA is W-92, about 67 miles southwest of the proposed location. The stipulations outlined in NTL 2014-G04 are not applicable for this surface location.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic dataset provided by Chevron (Figure 2). The extraction was generated within a 2,000-ft radius at the proposed wellsite between the Seafloor and one second bml. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 17 to 95 Hz (Figure 2).

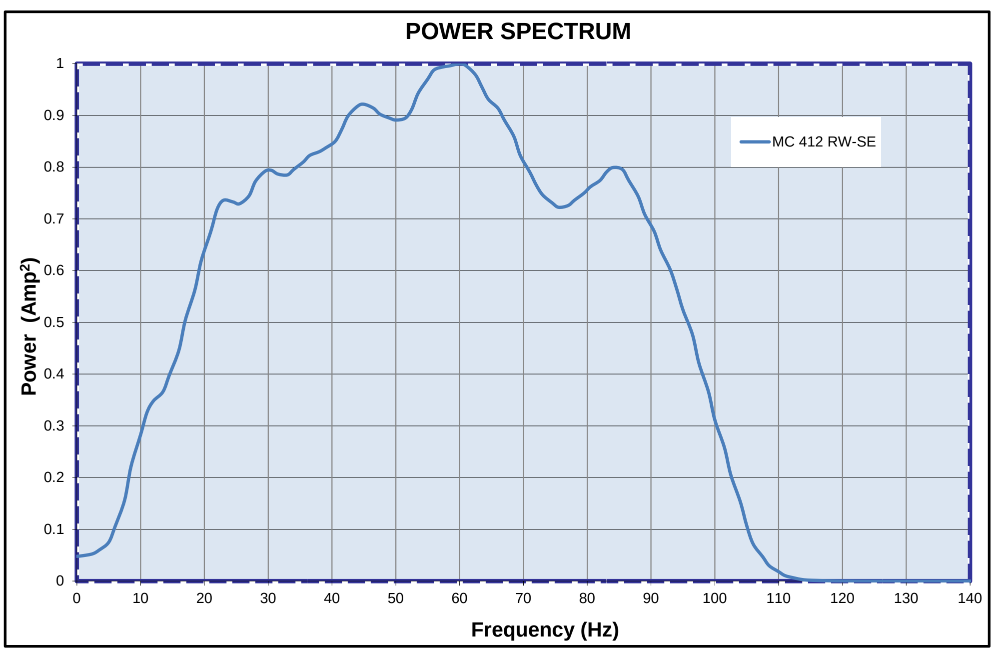

Figure 2. Power Spectrum Curve, Proposed Wellsite MC 412 RW-SE

Man-Made Features

Infrastructure. The surface location is clear of any wells, pipelines, or platforms within a 2,000 ft radius from the proposed wellsite (Map RW-SE-1 and Figure 1); BOEM, 2021a. The closest existing wells, Equinor USA E&P Inc.'s MC 413 #1 and Unocal's MC 455 #1, are located approximately 2.3 miles to the east-northeast and 3.8 miles southwest, respectively (Figure 1). The MC 413 #1 well was drilled by Spinnaker Exploration in 2005-2006 and is reported as permanently abandoned (BOEM, 2021a). The MC 455 #1 well was drilled by Unocal in 1985-1986 and is listed as temporarily abandoned. Four oil and gas pipelines and an umbilical lie within about one mile of the proposed location with the closest pipeline (6-8" bulk oil) about 4,839 ft to the north-northeast (Figure 1). The active pipelines and umbilical are associated with ENI US Operating Co Inc.'s Corral platform in MC 365.

Unexploded Ordnance Dumpsite. The MC 412 Study Area lies within a former UXO dumpsite (Figure 1). Hundreds of small circular depressions are evident on the multibeam dataset, some of which have highly reflective centers on the side-scan sonar data. These features could represent impact craters created from possible UXO striking the seafloor, many of which likely still contain UXO remains. Any explosive weapons present could still pose a risk of detonation. A few craters and multiple highly-reflective sonar contacts lie within 2,000 ft of the proposed surface location (Map RW-SE-2). The nearest mapped potential UXO lies about 499 ft north-northeast of the proposed location.

Despite efforts to identify hazardous material from the acoustic data, it is possible that dumped UXO could remain undetected on or below the seafloor. Extreme caution is recommended for any bottom founded development within this area.

Archaeological Assessment

The following wellsite archaeological assessment is based on the 2021 report entitled "Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico", written by GEMS and P&C Scientific, LLC. and provided to Chevron, Inc.

A review of the available datasets found 27 sonar contacts within 2,000 feet of the Proposed MC 412 RW-SE wellsite. All the side-scan sonar contacts mapped within the AUV Survey Area measure from 1 to 64 ft (0.3 to 19.5 m) long, and 1 to 41 ft (0.3 to 12.5 m) wide, and from no measurable height to 3 ft high. A standard 100-foot radius BOEM avoidance zone is in place around each of these contacts. The closest sonar contact to the proposed wellsite is Sonar Contact No. 263 approximately 499 feet to the north-northeast. All the sonar contacts are considered modern debris associated with lease development or shipping activities, unexploded ordnance, or as potential geologic features. Many of the contacts present as depressions with highly reflective centers on the side-scan sonar data may represent impact craters created by UXO striking the seafloor.

None of the 27 sonar contacts within the Proposed MC 412 RW-SE wellsite assessment area have acoustic signatures indicative of archaeological resources. Based on the review of available AUV data, the Area of Potential Effect around the proposed wellsite appears clear of archaeological resources. If any wood, ceramics, textiles or ferrous objects become exposed during the course of bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

Wellsite Conditions

The Proposed MC 412 surface location is clear of any constraining seafloor conditions as defined by the 3-D seismic and high-resolution geophysical data. The shallow stratigraphy to the Limit of Investigation will consist of interbedded hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes generally composed of clays and silts with sand layers likely below 797 ft bml (Illustrations RW-SE-1 through -3).

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,561 ft and the seafloor slopes 2° to the northeast (Map RW-SE-1). The wellsite is located along smooth seafloor, which regionally, is marked with numerous gullies (Map RW-SE-2). The gullies are typically low-relief features that form an extensive drainage system that trends to the southeast into a mid-slope valley (Figure 1). These features are generally buried and represent relict sediment transport features that originated at a time of active deposition during the late Pleistocene.

The low side-scan sonar reflectivity and seafloor amplitude response in the vicinity of the proposed wellsite suggests the seabed is covered by very soft clays and/or silty-clays (Maps RW-SE-3 and -4). Based on the

geophysical data provided, the present-day seabed and near-surface sediments at the proposed location are stable and not prone to failure.

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite (Maps RW-SE-3 and -4). Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location (BOEM, 2021b).

Stratigraphy. The stratigraphy at the proposed well location is depicted on Illustrations RW-SE-1 through -3. The Tophole Prognosis Chart (Illustration RW-SE-3) shows the crossline, annotated with depths to the various horizons and predicted lithology of the sequences, along with their potential for shallow gas and shallow water flow. GEMS mapped seven horizons (Horizons 5, 10, 20, 30, 35, 40, 50) on the AUV and 3-D seismic datasets within the Limit of Investigation (GEMS, 2021). Well logs from several nearby wells indicate sand layers within mud-prone sequences within the tophole section (GEMS, 2021).

The subbottom profiler data defines the upper ~378 feet of sediments beneath the mudline around the proposed wellsite (Illustration RW-SE-1). The uppermost ~12 ft of sediment at the well is a hemipelagic drape consisting of layered, soft, high water content clays. Beneath the drape, to about 35 ft bml, are layered clay-rich deposits followed by alternating bedded hemipelagic clays and silts to about 150 ft bml. The top of a unit of stacked, clay-prone mass-transport deposits is visible on the subbottom profiler directly below 150 ft bml (Illustration RW-SE-1). The AUV and 3-D seismic profiles illustrate mass-transport deposition through the remainder of Unit 1 (Illustration RW-SE-3). The base of the unit, Horizon 10 at about 249 ft bml, is mapped along an erosional surface on the 3-D seismic volume.

The strata within Units 2 and 3 (Horizon 10 to Horizon 30, 249 ft to 1,473 ft bml) generally consists of stratified turbidites and hemipelagic clays interbedded with thin mass-transport deposits. Erosional sequences within the units indicate a dynamic environment of sediment bypass and deposition. Units 2 and 3 are expected to be predominately clay and silt prone, with thin interbedded sands possible in Unit 3 (797 ft to 1,473 ft bml).

Horizon 30 to Horizon 35 (Unit 4, 1,473 ft to 2,606 ft bml) likely contains slope-fan deposits, which may correlate with the regional sand-rich slope-fan sequence of the Blue Unit (Winker and Booth, 2000). This channelized unit contains thick, mass-transport deposits interbedded with turbidites. Thick sand layers may be encountered, particularly in the upper and middle portions of the sequence between 1,473 ft and 2,187 ft bml. Mudlogs for the MC 413 #1 and MC 366 #1 wells indicate sand layers within correlative stratigraphy.

The strata within Unit 5 (Horizon 35 to Horizon 40, 2,606 ft to 3,487 ft bml) consists of layered turbidites interbedded with thick mass-transport sequences. The sediments likely comprise of clays and silts with occasional sand layers. A defined channel is mapped across MC 412 near the base of Unit 5 and upper portion of Unit 6, roughly 2,400 ft east of the proposed location. Some thin sand layers may be present within overbank deposits, particularly along and/or near Horizon 40.

The Horizon 40 to Horizon 50 unit (Unit 6, 3,487 ft to 4,878 ft bml) consists of well-layered turbidites and hemipelagic clays with occasional thin mass-transport deposits. The unit is predominately clay-rich with isolated sands. The strata below Horizon 50 to the Limit of Investigation (Unit 7, 4,878 ft to 6,000 ft bml) is composed of stacked mass-transport deposits interbedded with turbidites containing clays, silts, and interbedded sands.

Faults. A vertical borehole for the proposed location MC 412 RW-SE will not encounter any seafloor or buried faults through the Limit of Investigation (Maps RW-SE-2 and -5 and Illustrations RW-SE-1 and -2). Buried faults are, however, expected to be encountered at depth, below the Limit of Investigation. The nearest buried fault to the wellbore in the tophole section is a small intraformational fault near the base of Unit 2, about 200 ft to the northeast (Map RW-SE-5 and Illustration RW-SE-2). This fault is downthrown to the northeast, away from the wellbore, and should not impact drilling operations. There are no seafloor faults within a 2,000 ft radius of the proposed surface location.

Shallow Gas and Shallow Water Flow. Based on the assessment of the 3-D seismic data in the vicinity of the proposed wellsite and offset well information, the potential for shallow gas at the proposed well is Negligible to Moderate. The potential for shallow water flow is considered Negligible to High.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below or in the immediate area surrounding the proposed wellsite (Map RW-SE-5). The nearest high-amplitude anomaly indicative of potential gas is located about 368 ft northeast of the proposed wellsite. The anomaly is identified within Unit 4 at about 1,705 ft bml. Numerous anomalous amplitude events were mapped within Unit 4 throughout MC 412 (GEMS, 2021). In addition, the scout ticket and mudlog for the nearby MC 413 #1 well indicated that gas circulated from the riser and choke at about 3,760 ft TVD (1,924 ft bml), which correlates to mid-Unit 4. The #1 well experienced unspecified hole problems around 5,126 ft TVD (upper portion of Unit 6) as well, which resulted in a side-track operation. The potential for gas accumulation at the proposed location is interpreted as Low to Moderate within likely sands from 1,473 ft to 2,187 ft bml (Illustration RW-SE-3).

There is a Low potential for gas within possible sand layers below 2,187 ft bml to the Limit of Investigation at 6,000 ft bml. Near-normally pressured solution gas could be present within sand layers within these stratigraphic intervals; however, no anomalous amplitudes are present at the well and the structural and stratigraphic framework is not suitable for significant gas accumulations. The potential for encountering gas within Units 1 through 3 (Seafloor to 1,473 ft bml) is assessed as Negligible.

Shallow Water Flow. The potential for shallow water flow at this well location is considered Negligible to High. The Study Area lies along the northern margin of the shallow water flow prone "Blue Unit" and the sand-rich deposits appear to extend to the proposed location. Multiple wells surrounding the Study Area have reported water flow conditions (Table 3; GEMS, 2021).

Table 3. Wells Within 12 miles of the Proposed Wellsite Reporting Shallow Water Flow (BOEM, 2021c)

Block	Well	Depth (ft, bml)	Depth (ft, subsea)	Severity	Correlative Sequence to SHL	Distance (mi) /Direction from SHL
MC 546	ENI #2	1,712	4,220	Unknown	Unit 4	9.3 / Southeast
MC 503	LLOG #SS001	830	3,929	Moderate	Lower Unit 3/ Upper Unit 4	10.9 / Southeast
MC 460	ENI #SS001	1,160	3,983	Moderate	Unit 4	10.9 / Southeast
MC 587	BP #1	2,092	4,430	Low	Outside provided seismic area	11.7 / South-Southwest
MC 496	Marubeni #2	2,671	4,308	Unknown	Outside provided seismic area	12 / Southwest

SHL = Surface Hole Location

Given the likelihood of slope-fan deposits containing sands within Unit 4 and the multiple nearby reported water flow events within similar stratigraphy, we assess the shallow water flow potential as Moderate to High from 1,473 ft to 2,187 ft bml (Illustration RW-SE-3). Numerous additional wells have been drilled within 12 miles of the proposed location that did not report water flow conditions to BOEM, including the two closest wells in MC 413 and 455. Detailed mudlog data in much of the tophole section for the MC 413 #1 well did not indicate shallow water flow conditions were encountered. However, if any of the other wells encountered water flow while drilling, it is possible that the operators were able to apply appropriate mitigation and not required to report the occurrence.

There is a Low potential for shallow water flow within possible sand layers in Unit 3 (797 ft to 1,473 ft bml) and below 2,187 ft bml to the Limit of Investigation (6,000 ft bml). A Negligible potential for overpressured sands is assessed for fine-grained Units 1 and 2 (Seafloor to 797 ft bml).

Results

No seafloor hazards or constraints are defined by the available data at the proposed surface location; however, caution is recommended for any bottom founded development within this area with respect to potential UXO remains. No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed wellsite. It is likely that sand layers may be encountered below 797 ft bml. Caution is recommended when drilling through the potential sand-prone interval with a Moderate to High shallow water flow potential and Low to Moderate gas potential from 1,473 ft to 2,187 ft bml.

Closing

We appreciate the opportunity to be of service to Chevron U.S.A. Inc. and look forward to working with Chevron on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Erin Williams Janes
Sr. Geoscientist/Project Manager

Daniel Lanier
President

Attachments (5 Maps and 3 Illustrations)

Distribution:
Mr. Phillip Von Dullen III, Chevron, Houston, TX (1 copy)

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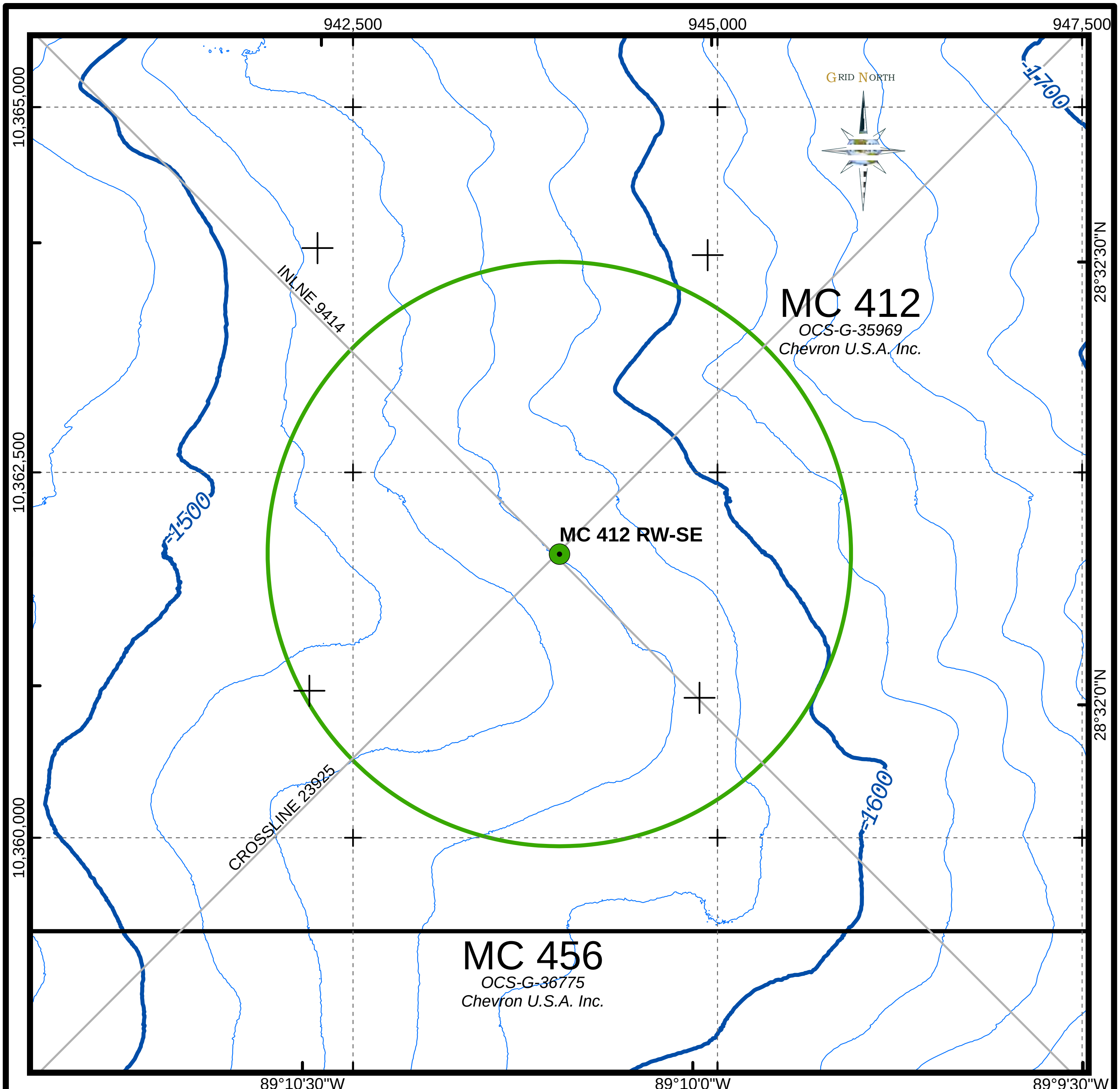


PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

WATER DEPTH CONTOUR IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

BATHYMETRY MAP

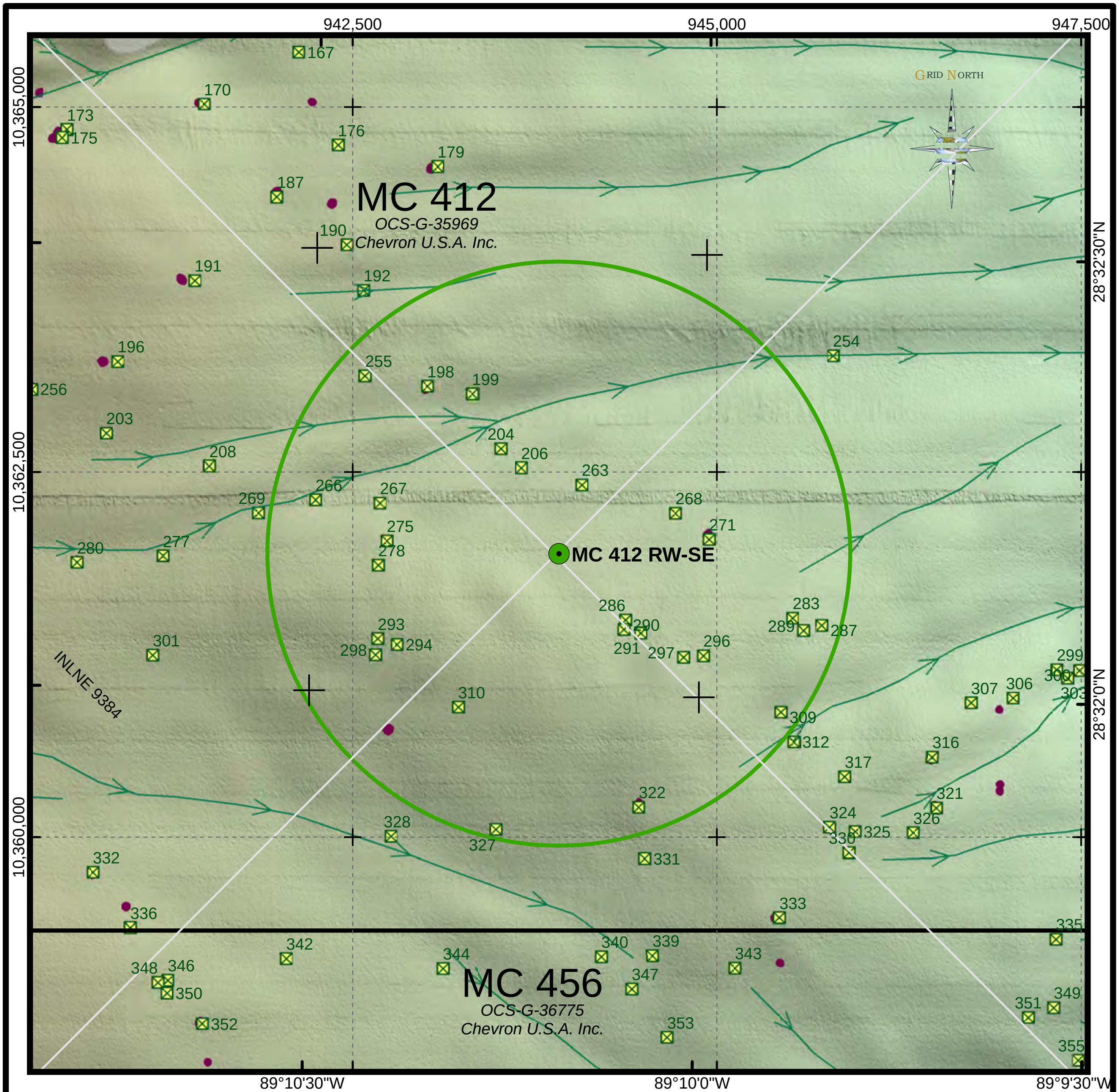
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000
Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-SE-1.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-SE-1



PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

SEAFLOOR EXPRESSION OF GULLIES.
ARROWS INDICATE FLOW DIRECTION.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS
FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

SEAFLOOR SLOPES 5° OR GREATER.

NOTE: PROPOSED LOCATION LIES WITHIN AN
UNEXPLODED ORDNANCE AREA (OCM, 2021).

WATER DEPTH IN FEET

MIN: -718 *-1,000* *-1,250* *-1,500* *-1,750* *-2,000* *MAX: -2,276*

ALTITUDE = 50°
AZIMUTH = 45°
V.E. = 3 X

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

CHEVRON U.S.A. INC.

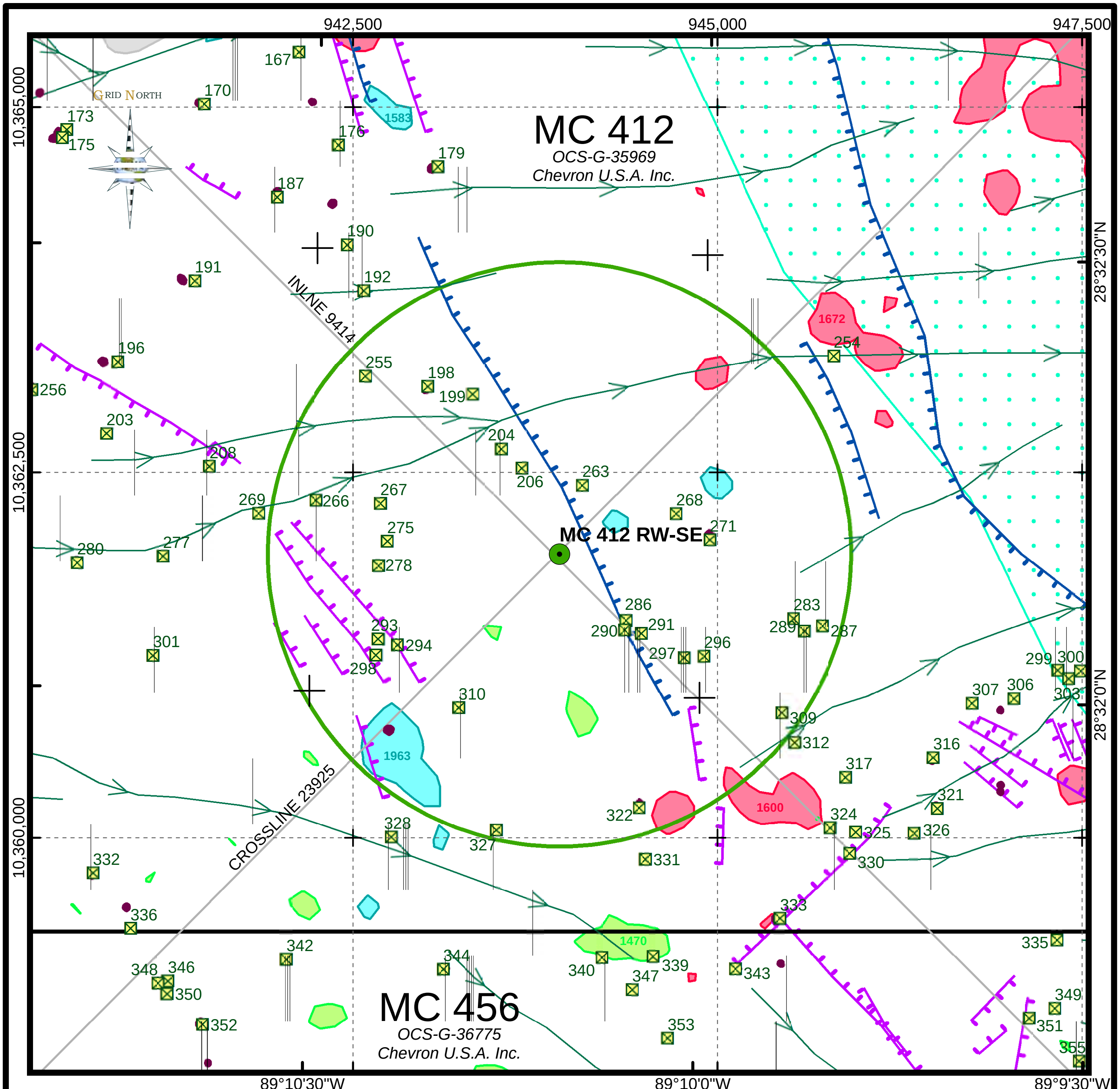
SEAFLOOR FEATURES MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000
Feet

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-SE-2.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-SE-2



PROPOSED WELL LOCATION. CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

TOP OF SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

TOP OF BURIED FAULTS (MAPPED ON 3-D SEISMIC).

SEAFLOOR EXPRESSION OF GULLIES. ARROWS INDICATE FLOW DIRECTION.

SEAFLOOR SLOPES 5° OR GREATER.

BURIED CHANNEL ALONG HORIZON 40.

AMPLITUDE ANOMALIES ALONG HORIZON 30.

AMPLITUDE ANOMALIES BETWEEN HORIZON 30 AND HORIZON 35 (UNIT 4).

AMPLITUDE ANOMALIES BETWEEN THE SEAFLOOR AND THE LIMIT OF INVESTIGATION (IN AREAS WHERE SUBSURFACE HORIZONS WERE NOT MAPPABLE).

NOTE: NUMBERS INDICATE DEPTH BELOW MUDLINE IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

GEOLOGIC FEATURES MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-SE-5.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-SE-5

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November 17, 2021 Project No.: 0620-2969

Chevron U.S.A. Inc.
1500 Louisiana
Houston, Texas 77002

Attention: Mr. Phillip Von Dullen III

**Site Clearance Letter,
Proposed Wellsite MC 412 RW-W
Block 412 (OCS-G-35969),
Mississippi Canyon Area,
Gulf of Mexico**

Chevron U.S.A. Inc. (Chevron) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for Proposed Wellsite MC 412 RW-W, whose surface location is in Block 412 (OCS-G-35969), Mississippi Canyon Area (MC), Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Limit of Investigation at a depth of about 6,000 ft below the mudline (bml).

Seafloor conditions appear favorable within the vicinity of the proposed location as based on the high-resolution geophysical and 3-D seismic datasets. The proposed wellsite is located along smooth, southeasterly dipping seafloor, which regionally, is marked with numerous gullies. The surface location lies within a former unexploded ordnance (UXO) dumpsite. Circular impact craters and mapped side-scan sonar contacts within the vicinity of the proposed location could contain UXO remains. There are no potential sites for deepwater benthic communities within 2,000 ft of the proposed wellsite. The sediments beneath the surface location are comprised of hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes consisting of clays and silts with interbedded sand layers below ~750 ft bml. There is a Negligible to Moderate potential for encountering shallow gas within the Limit of Investigation. The potential for shallow water flow is Negligible to High.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed MC 412 RW-W well lies in the southwest quadrant of MC 412. Chevron provided the following coordinates:

Table 1. Proposed Location Coordinates

Proposed Wellsite MC 412 RW-W			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 16 North		3-D Seismic Line Reference	Block Calls (MC 412)
X: 938,925 ft	Latitude: 28° 32′ 16.2318″ N	Inline 9384	4,365 ft FWL
Y: 10,362,705 ft	Longitude: 89° 11′ 06.8823″ W	Crossline 24121	3,345 ft FSL

Chevron plans to drill the well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings from the geohazard and archaeologic assessment performed within MC 412 and portions of the surrounding blocks (GEMS, 2021). The subsurface geologic conditions were assessed within MC 412 plus a ~3,820 ft halo to the north and a 2,000 ft halo to the east, west, and south ("Study Area", Figure 1). An expanded seafloor assessment covers MC 412 plus a one block halo covering MC 367-369, 411, 413, and 455-457.

Chevron provided the following geophysical data sets and offset well data for this site clearance assessment. The detailed data specifications are provided in Appendix C of the main report (GEMS, 2021).

- Reprocessed depth-migrated TGS seismic depth volume "TGS_Fusion_MWAZ_Kir_Raw_Stk_Secshap_062019.sgy" and the associated velocity volume "TGS_Fusion_MWAZ_merge_sb4_Pvels_122618.sgy".
- High-resolution data collected by Oceaneering (OII) in September 2020 using an Autonomous Underwater Vehicle (AUV). The data collected included multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler. The survey area covers approximately 10 mi^2 within a portion of MC 412, extending into portions of the adjacent blocks MC 368, 369, and MC 413.
- High-resolution AUV data collected by OII in September 2021 that extends the 2020 survey area coverage to include the remaining portions of MC 412 plus a 2,000 ft halo to the south into MC 456. The data collected also include multibeam bathymetry and backscatter, side-scan sonar, and subbottom profiler.
- Geologic data (well logs, scout tickets etc.) from multiple existing wells in the seismic volume extents.

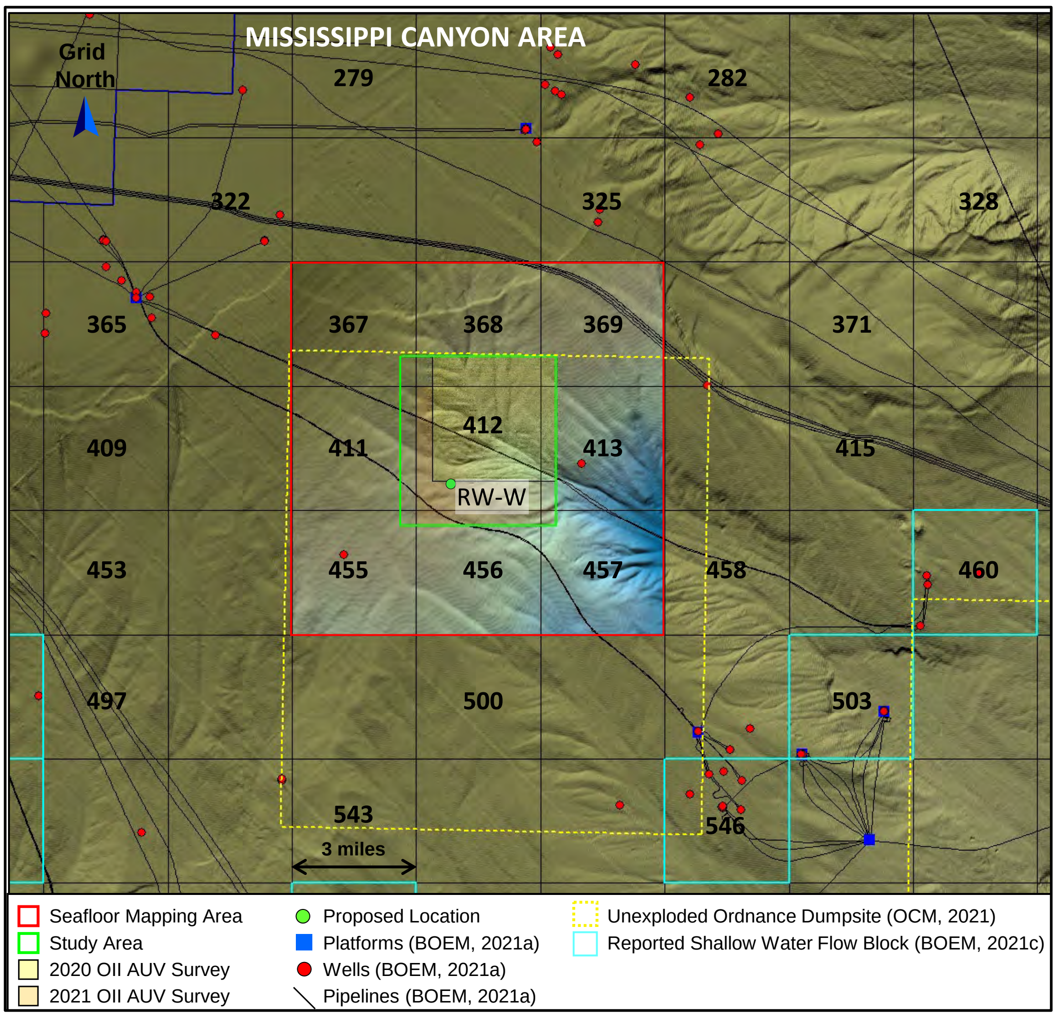

Figure 1. Seafloor Rendering of the Mississippi Canyon Study Area and Vicinity.

Attachments

Wellsite maps are centered on the proposed location and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. RW-W-1: Bathymetry Map
Map No. RW-W-2: Seafloor Features Map

Map No. RW-W-3: Side-Scan Sonar Mosaic

Map No. RW-W-4: Seafloor Amplitude Rendering

Map No. RW-W-5: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration RW-W-1: Subbottom Profiler Line 120 Showing Near-Surface Conditions Near Proposed Wellsite MC 412 RW-W.

Illustration RW-W-2: Portions of Inline 9384 and Crossline 24121 Showing Conditions Beneath Proposed Wellsite MC 412 RW-W. Surface Location in Mississippi Canyon Area, Block 412.

Illustration RW-W-3: Tophole Prognosis Chart, Proposed Wellsite MC 412 RW-W, Mississippi Canyon Area, Block 412.

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) NTLs 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) with respect to benthic community and shallow hazard assessments. BOEM may require an assessment for potential archaeological resources surrounding the proposed location. To satisfy the requirements prescribed in NTL 2005-G07 and the "Pre-Seabed Disturbance Survey Mitigation" (MMS, 2005; BOEM, 2011), GEMS conducted an archaeological assessment using the 2020 and 2021 AUV survey data. The results of the archaeological assessment are provided as Volume II of the shallow hazards and archaeological report (GEMS, 2021).

Military Warning Areas (MWA) represent regions where the U.S. Department of Defense conducts various testing and training operations. Lessees within MWA's are required to enter into an agreement with the appropriate command headquarters concerning the control of electromagnetic emissions and the use of boats and aircraft within the warning area (NTL 2014-G04; BOEM, 2014). The closest MWA is W-92, about 66 miles southwest of the proposed location. The stipulations outlined in NTL 2014-G04 are not applicable for this surface location.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic dataset provided by Chevron (Figure 2). The extraction was generated within a 2,000-ft radius at the proposed wellsite between the Seafloor and one second bml. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 27 to 78 Hz (Figure 2).

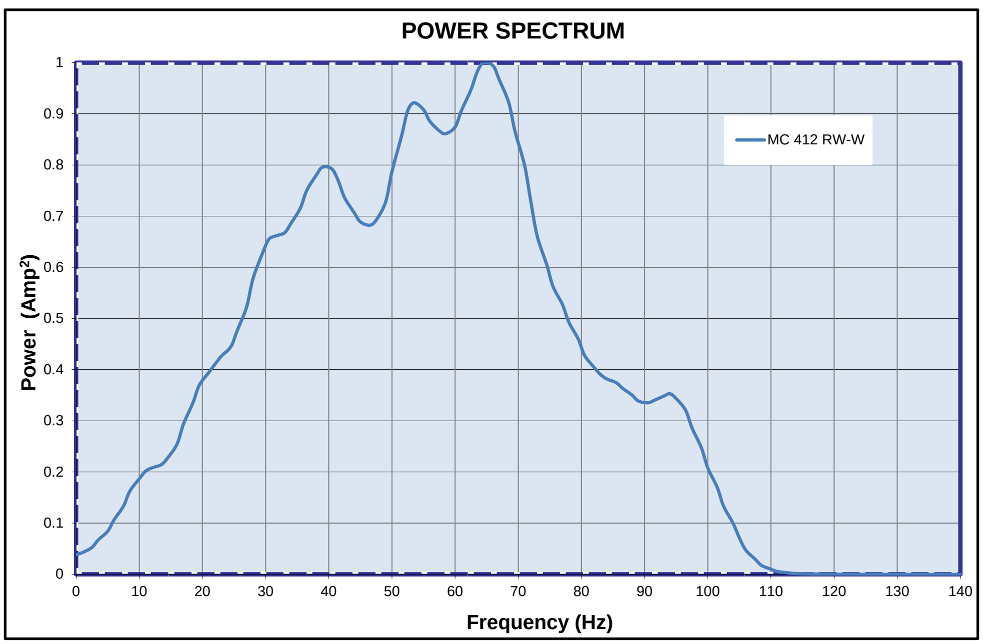

Figure 2. Power Spectrum Curve, Proposed Wellsite MC 412 RW-W

Man-Made Features

Infrastructure. The surface location is clear of any wells, pipelines, or platforms within a 2,000 ft radius from the proposed wellsite (Map RW-W-1 and Figure 1); BOEM, 2021a. The closest existing wells, Unocal's MC 455 #1 and Equinor USA E&P Inc.'s MC 413 #1, are located approximately 3.1 miles to the southwest and 3.2 miles east-northeast, respectively (Figure 1). The MC 455 #1 well was drilled by Unocal in 1985-1986 and is listed as temporarily abandoned (BOEM, 2021a). The MC 413 #1 well was drilled by Spinnaker Exploration in 2005-2006 and is reported as permanently abandoned. Four oil and gas pipelines and an umbilical lie within about 1.5 miles of the proposed location with the closest infrastructure (umbilical) about 3,834 ft to the southwest (Figure 1 and Map RW-W-1). The active pipelines and umbilical are associated with ENI US Operating Co Inc.'s Corral platform in MC 365.

Unexploded Ordnance Dumpsite. The MC 412 Study Area lies within a former UXO dumpsite (Figure 1). Hundreds of small circular depressions are evident on the multibeam dataset, some of which have highly reflective centers on the side-scan sonar data. These features could represent impact craters created from possible UXO striking the seafloor, many of which likely still contain UXO remains. Any explosive weapons present could still pose a risk of detonation. Multiple craters and highly-reflective sonar contacts lie within 2,000 ft of the proposed surface location (Map RW-W-2). The nearest mapped potential UXO lies about 366 ft southwest of the proposed location.

Despite efforts to identify hazardous material from the acoustic data, it is possible that dumped UXO could remain undetected on or below the seafloor. Extreme caution is recommended for any bottom founded development within this area.

Archaeological Assessment

The following wellsite archaeological assessment is based on the 2021 report entitled "Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico", written by GEMS and P&C Scientific, LLC. and provided to Chevron, Inc.

A review of the available datasets found 22 sonar contacts within 2,000 feet of the Proposed MC 412 RW-W wellsite. All the side-scan sonar contacts mapped within the AUV Survey Area measure from 1 to 64 ft (0.3 to 19.5 m) long, and 1 to 41 ft (0.3 to 12.5 m) wide, and from no measurable height to 3 ft high. A standard 100-foot radius BOEM avoidance zone is in place around each of these contacts. The closest sonar contact to the proposed wellsite is Sonar Contact No. 265 approximately 366 feet to the southwest. All the sonar contacts are considered modern debris associated with lease development or shipping activities, unexploded ordnance, or as potential geologic features. Many of the contacts present as depressions with highly reflective centers on the side-scan sonar data may represent impact craters created by UXO striking the seafloor.

None of the 22 sonar contacts within the Proposed MC 412 RW-W wellsite assessment area have acoustic signatures indicative of archaeological resources. Based on the review of available AUV data, the Area of Potential Effect around the proposed wellsite appears clear of archaeological resources. If any wood, ceramics, textiles or ferrous objects become exposed during the course of bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

Wellsite Conditions

The Proposed MC 412 surface location is clear of any constraining seafloor conditions as defined by the 3-D seismic and high-resolution geophysical data. The shallow stratigraphy to the Limit of Investigation will consist of interbedded hemipelagic clays, channelized slope-fan deposits, turbidites, and mass-transport complexes generally composed of clays and silts with sand layers likely below 750 ft bml (Illustrations RW-W-1 through -3).

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,455 ft and the seafloor slopes 2° to the southeast (Map RW-W-1). The wellsite is located along smooth seafloor, which regionally, is marked with numerous gullies (Map RW-W-2). The gullies are typically low-relief features that form an extensive drainage system that trends to the southeast into a mid-slope valley (Figure 1). These features are generally buried and represent relict sediment transport features that originated at a time of active deposition during the late Pleistocene.

The low side-scan sonar reflectivity and seafloor amplitude response in the vicinity of the proposed wellsite suggests the seabed is covered by very soft clays and/or silty-clays (Maps RW-W-3 and -4). Based on the

geophysical data provided, the present-day seabed and near-surface sediments at the proposed location are stable and not prone to failure.

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite (Maps RW-W-3 and -4). Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location (BOEM, 2021b).

Stratigraphy. The stratigraphy at the proposed well location is depicted on Illustrations RW-W-1 through -3. The Tophole Prognosis Chart (Illustration RW-W-3) shows the crossline, annotated with depths to the various horizons and predicted lithology of the sequences, along with their potential for shallow gas and shallow water flow. GEMS mapped seven horizons (Horizons 5, 10, 20, 30, 35, 40, 50) on the AUV and 3-D seismic datasets within the Limit of Investigation (GEMS, 2021). Well logs from several nearby wells indicate sand layers within mud-prone sequences within the tophole section (GEMS, 2021).

The subbottom profiler data defines the upper few hundred feet of sediments beneath the mudline around the proposed wellsite (Illustration RW-W-1). The uppermost ~10 ft of sediment at the well is a hemipelagic drape consisting of layered, soft, high water content clays. Beneath the drape, to about 30 ft bml, are layered clay-rich deposits followed by alternating bedded hemipelagic clays and silts to about 148 ft bml. The top of a thick unit of stacked, clay-prone mass-transport deposits is visible on the subbottom profiler directly below 148 ft bml (Illustration RW-W-1). The AUV and 3-D seismic profiles illustrate mass-transport deposition through the remainder of Unit 1 (Illustration RW-W-3). The base of the unit, Horizon 10 at about 344 ft bml, is mapped along an erosional surface on the 3-D seismic volume.

The strata within Units 2 and 3 (Horizon 10 to Horizon 30, 344 ft to 1,558 ft bml) generally consists of stratified turbidites and hemipelagic clays interbedded with thin mass-transport deposits. Erosional sequences within the units indicate a dynamic environment of sediment bypass and deposition. Units 2 and 3 are expected to be predominately clay and silt prone, with thin interbedded sands possible in Unit 3 (750 ft to 1,558 ft bml).

Horizon 30 to Horizon 35 (Unit 4, 1,558 ft to 2,568 ft bml) likely contains slope-fan deposits, which may correlate with the regional sand-rich slope-fan sequence of the Blue Unit (Winker and Booth, 2000). This channelized unit contains thick, mass-transport deposits interbedded with turbidites. Thick sand layers may be encountered, particularly in the upper and middle portions of the sequence between 1,558 ft and 2,257 ft bml. Mudlogs for the MC 413 #1 and MC 366 #1 wells indicate sand layers within correlative stratigraphy.

The strata within Unit 5 (Horizon 35 to Horizon 40, 2,568 ft to 3,485 ft bml) consists of layered turbidites interbedded with thick mass-transport sequences. The sediments likely comprise of clays and silts with occasional sand layers. The Horizon 40 to Horizon 50 unit (Unit 6, 3,485 ft to 5,118 ft bml) consists of well-layered turbidites and hemipelagic clays with occasional thin mass-transport deposits. The unit is predominately clay-rich with isolated sands. The strata below Horizon 50 to the Limit of Investigation (Unit 7, 5,118 ft to 6,000 ft bml) is composed of stacked mass-transport deposits interbedded with turbidites containing clays, silts, and interbedded sands.

Faults. A vertical borehole for the proposed location MC 412 RW-W will not encounter any seafloor or buried faults through the Limit of Investigation (Maps RW-W-2 and -5 and Illustrations RW-W-1 and -2). Buried faults are, however, expected to be encountered at depth, below the Limit of Investigation. There are no seafloor faults within a 2,000 ft radius of the proposed surface location.

Shallow Gas and Shallow Water Flow. Based on the assessment of the 3-D seismic data in the vicinity of the proposed wellsite and offset well information, the potential for shallow gas at the proposed well is Negligible to Moderate. The potential for shallow water flow is considered Negligible to High.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below or in the immediate area surrounding the proposed wellsite (Map RW-W-5). The nearest high-amplitude anomaly indicative of gas is located about 742 ft south of the proposed wellsite. The anomaly is identified within Unit 4 at about 1,915 ft bml. Numerous anomalous amplitude events were mapped within Unit 4 throughout MC 412 (GEMS, 2021). In addition, the scout ticket and mudlog for the nearby MC 413 #1 well indicated that gas circulated from the riser and choke at about 3,760 ft TVD (1,924 ft bml), which correlates to mid-Unit 4. The #1 well experienced unspecified hole problems around 5,126 ft TVD (upper portion of Unit

6) as well, which resulted in a side-track operation. The potential for gas accumulation at the proposed location is interpreted as Low to Moderate within likely sands from 1,558 ft to 2,257 ft bml (Illustration RW-W-3).

There is a Low potential for gas within possible sand layers below 2,257 ft bml to the Limit of Investigation at 6,000 ft bml. Near-normally pressured solution gas could be present within sand layers within these stratigraphic intervals; however, no anomalous amplitudes are present at the well and the structural and stratigraphic framework is not suitable for significant gas accumulations. The potential for encountering gas within Units 1 through 3 (Seafloor to 1,558 ft bml) is assessed as Negligible.

Shallow Water Flow. The potential for shallow water flow at this well location is considered Negligible to High. The Study Area lies along the northern margin of the shallow water flow prone "Blue Unit" and the sand-rich deposits appear to extend to the proposed location. Multiple wells surrounding the Study Area have reported water flow conditions (Table 3; GEMS, 2021).

Table 3. Wells Within 12 miles of the Proposed Wellsite Reporting Shallow Water Flow (BOEM, 2021c)

Block	Well	Depth (ft, bml)	Depth (ft, subsea)	Severity	Correlative Sequence to SHL	Distance (mi) /Direction from SHL
MC 546	ENI #2	1,712	4,220	Unknown	Unit 4	10.0 / Southeast
MC 496	Marubeni #2	2,671	4,308	Unknown	Outside provided seismic area	11.2 / Southwest
MC 587	BP #1	2,092	4,430	Low	Outside provided seismic area	11.7 / South-Southwest
MC 503	LLOG #SS001	830	3,929	Moderate	Lower Unit 3/ Upper Unit 4	11.8 / Southeast
MC 460	ENI #SS001	1,160	3,983	Moderate	Unit 4	11.9 / Southeast

SHL = Surface Hole Location

Given the likelihood of slope-fan deposits containing sands within Unit 4 and the multiple nearby reported water flow events within similar stratigraphy, we assess the shallow water flow potential as Moderate to High from 1,558 ft to 2,257 ft bml (Illustration RW-W-3). Numerous additional wells have been drilled within 12 miles of the proposed location that did not report water flow conditions to BOEM, including the two closest wells in MC 413 and 455. Detailed mudlog data in much of the tophole section for the MC 413 #1 well did not indicate shallow water flow conditions were encountered. However, if any of the other wells encountered water flow while drilling, it is possible that the operators were able to apply appropriate mitigation and not required to report the occurrence.

There is a Low potential for shallow water flow within possible sand layers in Unit 3 (750 ft to 1,558 ft bml) and below 2,257 ft bml to the Limit of Investigation (6,000 ft bml). A Negligible potential for overpressured sands is assessed for fine-grained Units 1 and 2 (Seafloor to 750 ft bml).

Results

No seafloor hazards or constraints are defined by the available data at the proposed surface location; however, caution is recommended for any bottom founded development within this area with respect to potential UXO remains. No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed wellsite. It is likely that sand layers may be encountered below 750 ft bml. Caution is recommended when drilling through the potential sand-prone interval with a Moderate to High shallow water flow potential and Low to Moderate gas potential from 1,558 ft to 2,257 ft bml.

Closing

We appreciate the opportunity to be of service to Chevron U.S.A. Inc. and look forward to working with Chevron on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Erin Williams Janes
Sr. Geoscientist/Project Manager

Daniel Lanier
President

Attachments (5 Maps and 3 Illustrations)

Distribution:
Mr. Phillip Von Dullen III, Chevron, Houston, TX (1 copy)

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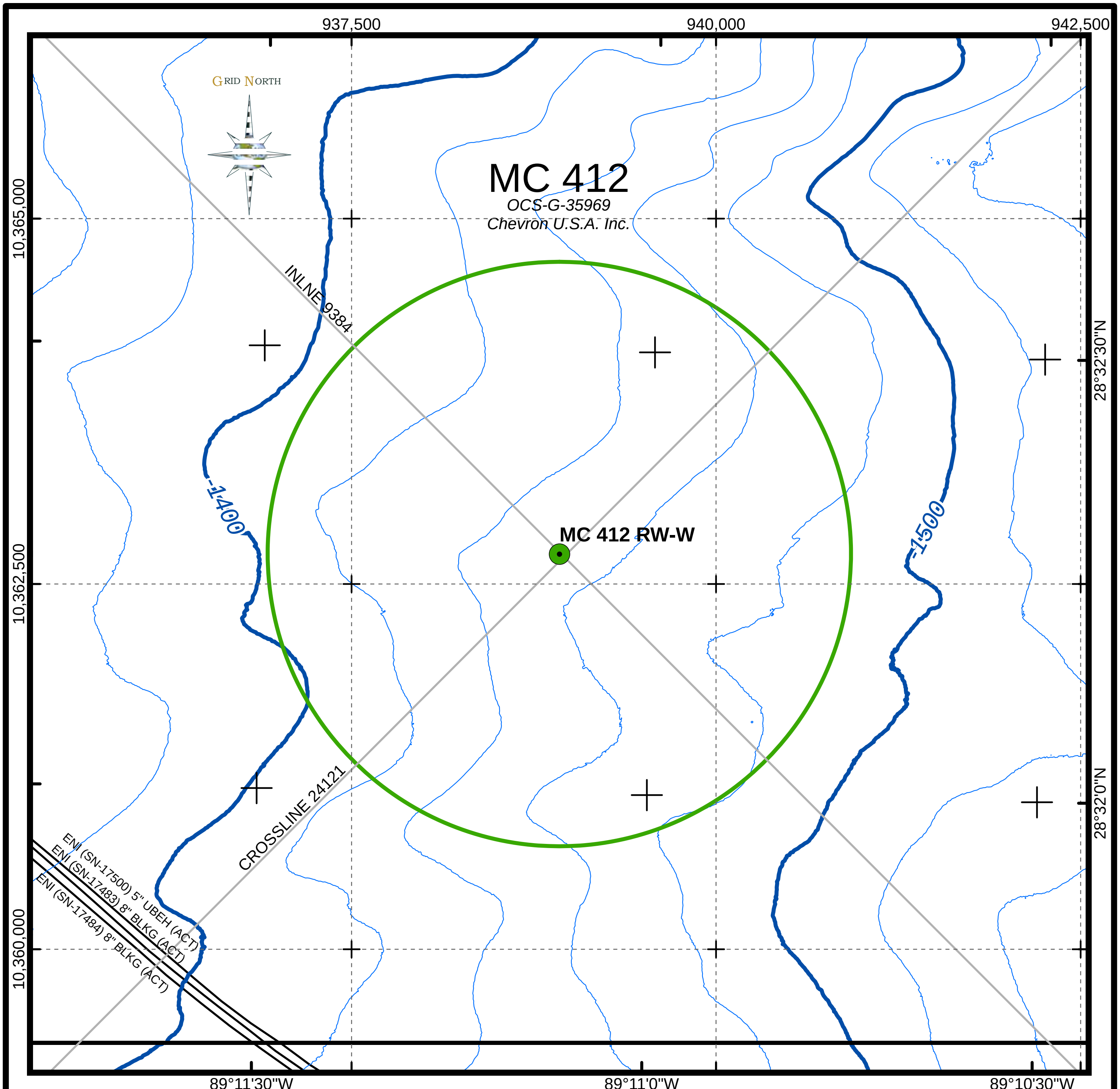


PROPOSED WELL LOCATION.
CIRCLE REPRESENTS 2000 FT RADIUS
AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION,
AS REPORTED BY BOEM.

WATER DEPTH CONTOUR IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

BATHYMETRY MAP

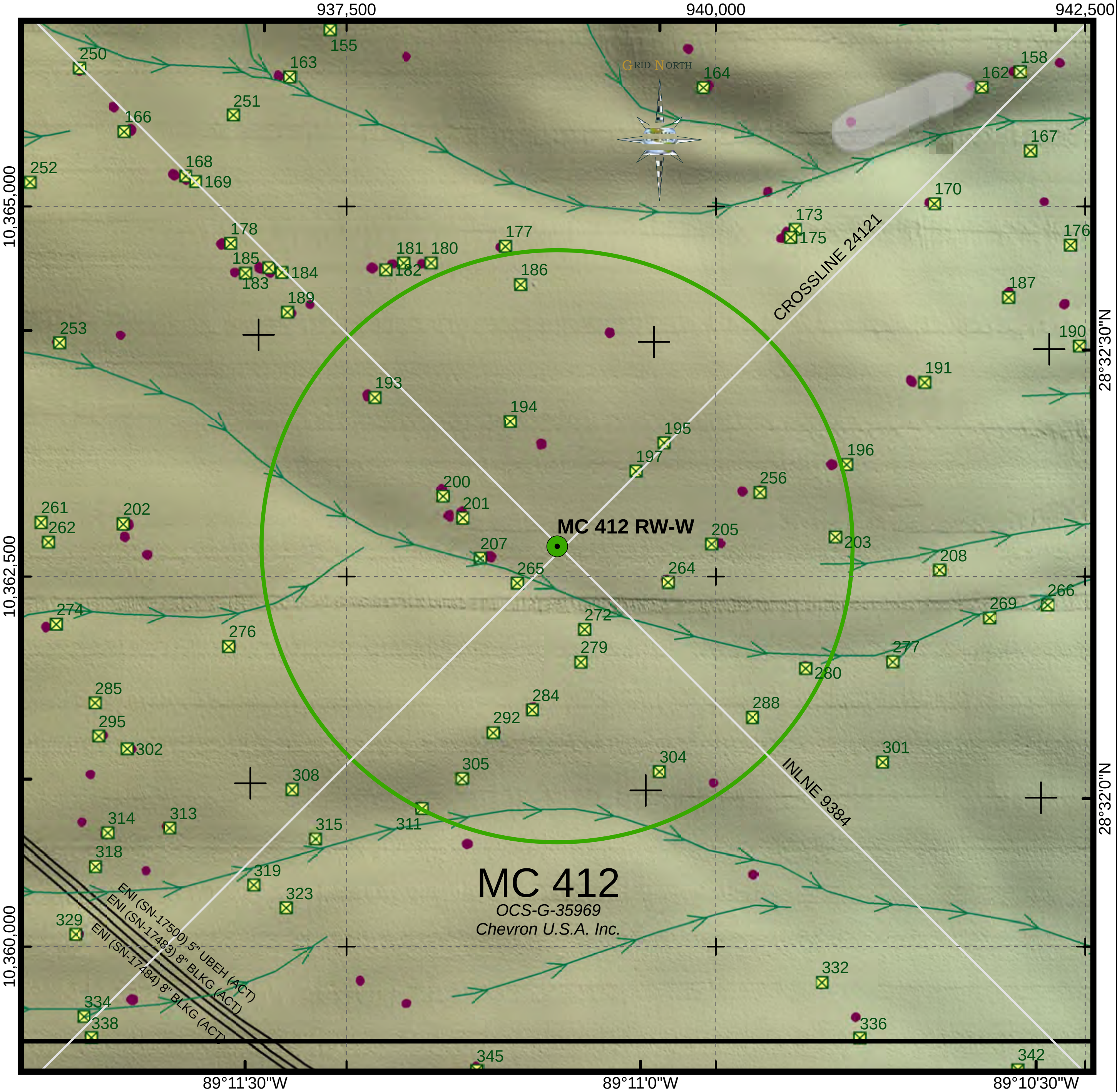
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-W-1.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-W-1



PROPOSED WELL LOCATION. CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION, AS REPORTED BY BOEM.

SEAFLOOR EXPRESSION OF GULLIES. ARROWS INDICATE FLOW DIRECTION.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

SEAFLOOR SLOPES 5° OR GREATER.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

WATER DEPTH IN FEET

MIN: -718 | *-1,000* | *-1,250* | *-1,500* | *-1,750* | *-2,000* | *MAX: -2,276*

ALTITUDE = 50°
AZIMUTH = 45°
V.E. = 3 X

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

SEAFLOOR FEATURES MAP

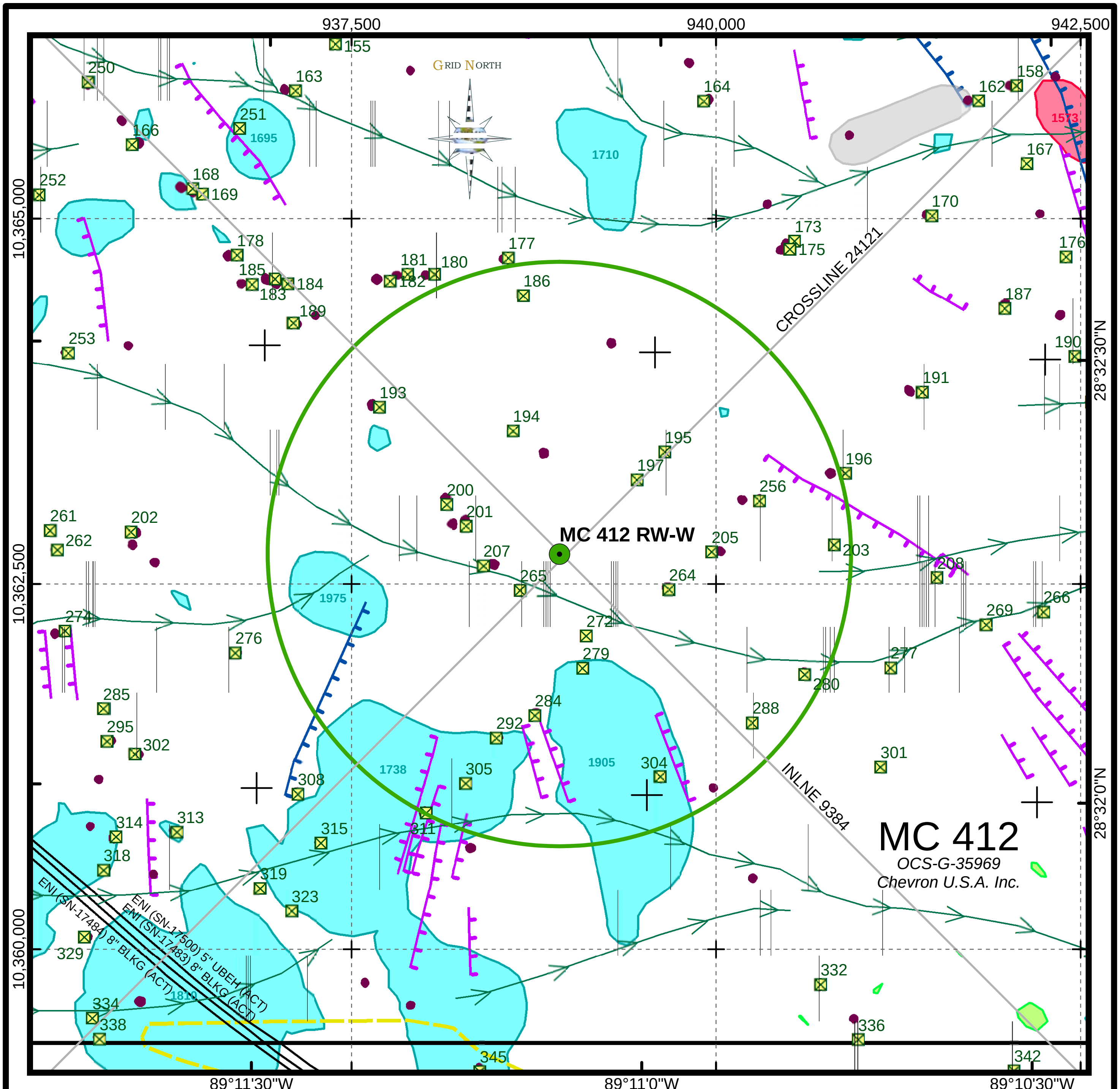
BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-W-2.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-W-2



PROPOSED WELL LOCATION. CIRCLE REPRESENTS 2000 FT RADIUS AROUND PROPOSED WELLSITE.

3-D SURVEY LINE.

EXISTING PIPELINE/UMBILICAL/CABLE LOCATION, AS REPORTED BY BOEM.

SIDE-SCAN SONAR TARGETS.

SEAFLOOR DEPRESSIONS, MANY OF WHICH LIKELY REPRESENT IMPACT CRATERS FROM DUMPING OR OTHER MAN-MADE DISTURBANCES.

TOP OF SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

TOP OF BURIED FAULTS (MAPPED ON 3-D SEISMIC).

SEAFLOOR EXPRESSION OF GULLIES. ARROWS INDICATE FLOW DIRECTION.

AREAS CONTAINING NUMEROUS SHALLOW BURIED FAULTS (MAPPED ON SBP DATA).

SEAFLOOR SLOPES 5° OR GREATER.

AMPLITUDE ANOMALIES ALONG HORIZON 30.

AMPLITUDE ANOMALIES BETWEEN HORIZON 30 AND HORIZON 35 (UNIT 4).

AMPLITUDE ANOMALIES BETWEEN THE SEAFLOOR AND THE LIMIT OF INVESTIGATION (IN AREAS WHERE SUBSURFACE HORIZONS WERE NOT MAPPABLE).

NOTE: NUMBERS INDICATE DEPTH BELOW MUDLINE IN FEET.

NOTE: PROPOSED LOCATION LIES WITHIN AN UNEXPLODED ORDNANCE AREA (OCM, 2021).

GEODETIC DATUM: NAD 1927
ELLIPSOID: CLARKE 1866
ZONE: 16
GRID UNITS: US FEET

Chevron

CHEVRON U.S.A. INC.

GEOLOGIC FEATURES MAP

BLOCK 412
MISSISSIPPI CANYON AREA
GULF OF MEXICO

1,000 500 0 1,000 Feet

GEOSCIENCE EARTH & MARINE SERVICES, INC. GEMS

DATE: 17 NOVEMBER 2021
FILE NAME: 2969a_MC412RW-W-5.mxd
PROJECT NO.: 0620-2969

MAP NO. RW-W-5

SECTION D HYDROGEN SULFIDE (H_2S) INFORMATION

(a) CONCENTRATION
It is not expected that H_2S will be encountered or handled while conducting the activities proposed in this plan.

(b) CLASSIFICATION
Chevron requests the Regional Supervisor to make a determination of the area's classification of the probability of encountering H_2S during operations. No Hydrogen Sulfide has been produced or encountered in the closest wells to area and is not anticipated in the wells in this plan. The wells will not penetrate Mesozoic sediments. Based on this evidence, Chevron requests that the area be classified as a zone where the absence of H_2S has been confirmed.

(c) H_2S CONTINGENCY PLAN
Should the Regional Supervisor not classify the activities proposed in this plan as being situated in an area designated as "H_2S absent" - an H_2S contingency plan will be proposed and submitted for approval. This proposed contingency plan would accompany the Application for Permit to Drill (APD) for the respective proposed well(s).

(d) MODELING REPORT
H_2S concentrations greater than 500 parts per million (ppm) have not been determined or estimated to be encountered or handled while conducting the activities proposed in this plan, therefore a modeling report is not required for this plan based on the guidelines provided in NTL No. 2008-G04.

SECTION E BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC INFORMATION

(a) HIGH-DENSITY DEEPWATER BENTHIC COMMUNITIES INFORMATION

The proposed wells in this plan will be drilled with a dynamically positioned drillship, so no associated anchors, anchor chains, or wire ropes are involved.

High-Density Deepwater Benthic Communities Summary Statement from the GEMS Site Clearance Letters for the proposed surface locations:

MC 412 “A” Surface Location (A1, A2, A3, A4):

No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite. Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location.

MC 412 RW-S:

No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite. Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location.

MC 412 RW-SE:

No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite. Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location.

MC 412 RW-W:

No features or areas were interpreted within 2,000 ft of the proposed location that can support high-density chemosynthetic or other deepwater benthic communities. The Side-Scan Sonar and Seafloor Amplitude Rendering shows ambient returns from the water bottom in the vicinity of the proposed wellsite. Additionally, there are no BOEM seabed anomalies located within 2,000 ft of the proposed location.

(b) TOPOGRAPHIC FEATURES MAP
The proposed bottom disturbing activity is greater than 305 meters (1,000 feet) from the "No Activity Zone" of an identified topographic feature; therefore, the map described in Attachment 2, Section A, Item No. 1 of NTL No. 2004-G05 is not required for this plan based on the guidelines provided in NTL No. 2008-G04.

(c) TOPOGRAPHIC FEATURES STATEMENT (SHUNTING)
Chevron does not propose to drill two wells from the same surface location outside the 1-mile Zone but within the Protective Zone of an identified topographic feature. The statement described in Attachment 2, Section A, Item No.2 of NTL No. 2004-G05 is not required for this plan based on the guidelines provided in NTL No. 2008-G04.

(d) LIVE BOTTOMS (PINNACLE TREND) MAP
The leases in this proposed plan do not have the Live Bottoms (Pinnacle Trend) stipulation.

(e) LIVE BOTTOMS (LOW RELIEF) MAP
The leases in this proposed plan do not have the Live Bottoms (Low Relief) stipulation.

(f) POTENTIALLY SENSITIVE BIOLOGICAL FEATURES
No bottom disturbing activities will occur within 30 meters (100 feet) of potentially sensitive biological features. Therefore, the map described in Attachment 8, Section A of NTL No. 2004-G05 is not required for this plan based on the guidelines provided in NTL No. 2008-G04.

(g) REMOTELY OPERATED VEHICLE (ROV) MONITORING SURVEY PLAN
This plan is no longer required.

(h) THREATENED OR ENDANGERED SPECIES, CRITICAL HABITAT, AND MARINE MAMMAL INFORMATION
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, which are protected under the Marine Mammal Protection Act (MMPA).

The sperm whale, five species of sea turtles, and the oceanic whitetip shark are the only endangered or threatened species likely to occur at or near the lease area. Critical habitat has been designated for the loggerhead turtle. No critical habitat has been designated in the Gulf of Mexico for the sperm whale or the other sea turtle species.

Coastal endangered or threatened species include the West Indian manatee, Piping Plover, Florida salt marsh vole, Whooping Crane, Gulf sturgeon, and four subspecies of beach mouse. Critical habitat has been designated for all of these species except the Florida salt marsh vole.

Federally listed endangered and threatened species potentially occuring in the lease area and along the northern Gulf Coast:

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice's whale	*Balaenoptera ricei*[1]	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)
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
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*	E	--	X	None

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

[1] In 2021, NMFS 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.

On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

[3] The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011)

(i) ARCHAEOLOGICAL REPORT

Chevron contracted GEMS to provide an archaeological assessment of the MC 412 Study area based on two high-resolution geophysical AUV surveys conducted by Oceaneering International, Inc. (OII). The first was conducted between September 4-6, 2020, over portions of Block 412 and adjacent blocks in the Mississippi Canyon Area (MC) excluding an area along the western and southern block boundaries. The second survey, conducted between September 2-5, 2021, acquired additional data covering the western and southern boundaries of Block MC 412 not included in the original survey. Both AUV surveys collected side-scan sonar, subbottom profiler (SBP), and multibeam bathymetric and backscatter data. All data were examined to locate potential submerged archaeological resources within the area of potential effect (APE).

RESULTS and RECOMMENDATIONS

No archaeological constraints exist for drilling and development in the AUV Survey Area.
The following information summarizes the archaeological assessment findings:

- Unexplored Ordnance Areas:
    - The Survey Area is partially within a disused Unexploded Ordnance (UXO) Dumping Zone.

- Side-Scan Sonar Data Assessment:
    - The side-scan sonar data assessment detected three hundred eighty-one (381) sonar contacts.
    - These contacts likely represent small modern debris associated with lease development activities, unexploded ordnance dumping, or are possibly geological in origin.
    - None of the sonar contacts are considered to represent archaeological remains.
    - The Area of Potential Effect appears clear of archaeological remains
    - All the side-scan sonar contacts have the mandatory BOEM 100-foot geohazard avoidance.

- Subbottom Profiler Data Assessment:
    - Subbottom profiler data were acquired and reviewed as for archaeological potential. The Survey Area's water depths exceed those expected for prehistoric sites, and no potential archaeological resources were observed.
    - The subbottom profiler data corroborated some of the sonar contacts which appear as seafloor depressions.

- Multibeam Bathymetry Data Assessment:
    - Water depths in the AUV Survey Area range from 1,109 ft to 1,844 ft below sea level.
    - Seafloor bathymetry within the Survey Area is variable.
    - Some of the observed sonar contacts appear to be visible in the multibeam bathymetry data as depressions.
    - No potential archaeological contacts were observed in the multibeam bathymetry data.

• Multibeam Backscatter Data Assessment:
  - • GEMS reviewed the multibeam backscatter data for archaeological potential.
  - • Some of the observed sonar contacts appear to be visible in the multibeam backscatter data as points of higher reflectivity.
  - • No potential archaeological contacts were observed in the multibeam backscatter data.

• Existing Infrastructure Constraints:
  - • The BOEM/BSEE databases list five pipelines crossing a portion of the Survey Area.
  - • The pipelines were observed in the subbottom data as acoustic parabolas but were not observed in any other geophysical data.

Due to the nature of acoustic data, it is possible that archaeological resources remain undetected within the Study Area. Should any potentially historic materials such as textiles, wood, ceramics, or other items be uncovered during exploration or production activities, all operations will cease and BOEM be notified within 48 hours.

Despite efforts to identify hazardous material in the Survey Area from the acoustic data, it is possible that dumped unexploded ordnance could remain undetected on or below the seafloor. Because of the potential for unexploded ordnance extreme caution is recommended for any bottom founded development within the Study Area.

PROPRIETARY ENCLOSURE TO PLAN

- Shallow Hazards and Archaeological Assessment, Block 412 (OCS-G-35969) and Vicinity, Mississippi Canyon Area, Gulf of Mexico, Volumes I and II, Geoscience Earth & Marine Services, Inc., November 17, 2021 (Project No. 0602-2969) (One Hard Copy and One Digital Copy)

SECTION F WASTE AND DISCHARGE INFORMATION

(a) PROJECTED GENERATED WASTES
(b) PROJECTED OCEAN DISCHARGES

Water Quality Spreadsheets, included below, replace the Projected Generated Wastes and the Projected Generated Ocean Discharges Tables.

TABLE 1. WASTES YOU WILL GENERATE, TREAT AND DOWNHOLE DISPOSE OR DISCHARGE TO THE GOM ~ Starman - 125 drilling days

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

Projected generated waste				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 drilling fluid	Water-based drilling muds	44,640 bbls/well		4,464 bbls/day	Discharge at mudline prior to riser installation.		No
Cuttings wetted with water-based fluid	Cuttings coated with water-based drilling muds	3,802 bbls/well		380 bbls/day	Discharge at mudline prior to riser installation.		No
Cuttings wetted with synthetic-based fluid	Cuttings coated with Synthetic drilling muds, including drilled out cement	5,937 bbls/well		52 bbls/day	Treated cuttings will be discharged overboard during drilling of SBM interval. Cuttings will pass through curttings dryer substantially reducing ROC percentage from worst case quoted below. Or stored in cutting boxes and transported to shore.		No
Will humans be there? If yes, expect conventional waste							
Domestic waste	Gray water from living quarters,control	47,125 bbls/well		377 bbls/day	Food grinder. Starboard Caisson.		No
Sanitary waste	Sanitary waste from living quarters,control rooms, and common	23,375 bbls/well		187 bbls/day	USCG-approved MSD with chlorination. Starboard Caisson.		No
Is there a deck? If yes, there will be Deck Drainage							
Deck Drainage	Deck drainage from drilling floor,	142,125 bbls/well		1,137 bbls/day	Hull discharge overboard.		No
Will you conduct well treatment, completion, or workover?							
Well completion fluids	NA	NA	0	N/A	NA	0	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.							
Desalinization unit discharge	Rejected water from watermaker unit	228,375 bbls/well		1,827 bbls/day	Hull discharge overboard.		No
Blowout prevent fluid	Stackmagic 200/0/5% glycol based on 2% mixture with potable water	260 bbls/well		2.08 bbls/day	discharge at sea floor, or w/ deck drainage when tested on the surface		No
Ballast water	Uncontaminated seawater used to maintain proper draft	633,500 bbls/well		5,068 bbls/day	Hull discharge overboard.		No
Excess cement	Cement,Fluid Loss Additive,Cement Retarder,Free Water Control Additive,Defoamer,Surfacant	800 bbls/well		800 bbls/well	Discharged at seafloor during riserless drilling		No
Fire water	Seawater with no addition of chemicals	51,428 bbls/day when flaring		51,428 bbls/day when flaring	Hull discharge overboard.		No
Cooling water	Seawater with no addition of chemicals	62,500,000 bbls/well		500,000 bbls/day	Hull discharge overboard.		No
Hydrate control fluid	Glycol	25 gals/well		25 gals/well	Discharge at seafloor		No
Sub sea wellhead preservation fluid	Sub sea wellhead preservation fluid	2 bbls/well		2 bbls/well	Discharge at seafloor		No
Leak tracer dye	Lignite	21,000 lbs/well		21,000 lbs/well	Discharge at seafloor		No
Will you produce hydrocarbons? If yes fill in for produced water.							
Will you be covered by an individual or general NPDES permit ?		General					

NOTE: If you will not have a type of waste, enter NA in the row.

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

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

	Projected generated waste	Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**	**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
Will drilling occur ? If yes, fill in the muds and cuttings.					
EXAMPLE: Synthetic-based drilling fluid or mud	*internal olefin, ester*	*Below deck storage tanks on offshore support vessels*	*Newport Environmental Services Inc., Ingleside, TX*	*X bbl/well*	*Recycled*
Oil-based drilling fluid or mud	N/A	N/A	N/A	N/A	N/A
Synthetic-based drilling fluid or mud	Synthetic-based drilling muds	Internal mud tanks on motor vessel	Ecoserv, Port Fourchon, LA	40,500 bbls/well	Transport by boat in cutting bins to shorebase; truck to disposal facility. Recycled where possible, or injected.
Cuttings wetted with Water-based fluid	N/A	N/A	N/A	N/A	N/A
Cuttings wetted with Synthetic-based fluid	Cuttings coated with Synthetic drilling muds, including drilled out cement	Cuttings box on workboat/crewboat	Ecoserv, Port Fourchon, LA	1,000 bbs/well	Transport by boat in cutting bins to shorebase; truck to disposal facility. Treated and landfilled.
Cuttings wetted with oil-based fluids	N/A	N/A	N/A	N/A	N/A
Will you produce hydrocarbons? If yes fill in for produced sand.					
Produced sand	N/A	N/A	N/A	N/A	N/A
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.					
EXAMPLE: trash and debris (recylables)	*Plastic, paper, aluminum*	*barged in a storage bin*	*ARC, New Iberia, LA*	*X lb/well*	*Recycled*
Trash and debris	Plastic, paper, aluminum, glass, and other refuse	Storage bins on crew boat	Total Waste Solutions, Port Fourchon, LA	1,800 lbs/day	Transport by boat in storage bins to shorebase. Landfilled.
Wash water		Transport by boat in tanks to shorebase	Ecoserv, Port Fourchon, LA	2-5 bbls/day	Transport by boat in cutting bins to shorebase; truck to disposal facility. Injected.
Chemical product wastes	Used oil, hazardous waste, and nonhazardous waste	Drums on crew boat	Chemical Waste Management, Sulfur, La; WMI Woodside, Walker, LA; Aaron Oil, Berwick,LA	3 bbls/day	Transport in portable tanks or drums on crew boat to shorebase; truck to disposal facility. Recycled where possible, otherwise landfilled or incinerated.
Completion Fluids	Calcium Bromide	Transport by boat in tanks back to vendor	Halliburton-Baroid, Golden Meadow, LA	10,000 bbls/well	Recycled

NOTE: If you will not have a type of waste, enter NA in the row.

SECTION G AIR EMISSIONS INFORMATION

(a) EMISSIONS WORKSHEETS AND SCREENING QUESTIONS
The emissions for the drillship are based on the 2020 historical actual fuel usage for the Valaris DS-18 (formerly, Rowan Relentless) with a 150% contingency factor added. The historical actual fuel usage is based on the fuel usage recorded each day on the drilling reports. Attachment G-2 shows the actual fuel usage data for 2020 for the DS-18. An average fuel usage of 823 gals/hr (historical average daily fuel plus 150%) was utilized in the air emissions spreadsheets. The DS-18's actual fuel usage was used to calculate emissions in the AQR because this drillship had the highest fuel usage across the 2020 Chevron GOM drillship fleet. Therefore, any other drillship in the Chevron GOM fleet would be able to comply with the annual fuel usage limit. The actual daily fuel usage will be recorded on the daily drilling report and be kept on the drilling rig.

The activity proposed in this plan will occur in Mississippi Canyon 412. An AQR sheet was prepared to show exploratory drilling, completing, and abandoning operations in this surface block during each calendar year. Please note, 277 days of activity has been included in the AQR for all the years calculated. This is for contingency purposes to accommodate any schedule changes within the overall drilling schedule. MC 412 is within 200 km from the Breton National Wildlife Refuge (BNWR); however, the drillship will be on location for less than three years. The Complex Total Emissions are the same as the Plan Emissions, and therefore only one set of emissions calculations is included for each surface block.

MC 412

SCREENING QUESTIONS FOR EP'S	YES	NO
Is any calculated Complex Total (CT) Emission amount (in tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: CT = 3400D2/3 for CO, and CT = 33.3D for the other pollutants (where D = distances to shore in miles)?	☐	☒
Do your emissions calculations include any emission reduction measures or modified emissions factors?	☒	☐
Are your proposed exploration activities located east of 87.5° W longitude?	☐	☒
Do you expect to encounter H2S at concentrations greater than 20 parts per million (ppm)?	☐	☒
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?	☐	☒
Do you propose to burn produced hydrocarbon liquids?	☐	☒

Emission Source	Reduction Control Method	Amount of Reduction	Annual Fuel Usage Limit for Drillship (gal/yr)	Monitoring System
DS-18	Actual fuel consumption	~1505 lb/hr NOx	5,471,552	Fuel log

CONTACT INFORMATION

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MODELING REPORT

A Modeling Report is not required for activities proposed in this plan.

ATTACHMENTS TO SECTION G

•G-1 – Form BOEM-0138 “Gulf of Mexico Air Emissions Calculations for EP's”
•G-2 – Valaris DS-18 Historical Actual Fuel Usage

EP - AIR QUALITY

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

COMPANY	Chevron U.S.A. Inc.
AREA	Mississippi Canyon
BLOCK	412
LEASE	OCS-G 35969
FACILITY	NA - DP Drillship
WELL	A1, A2, A3, A4, RW1, RW2, RW3
COMPANY CONTACT	Kathy Sharp
TELEPHONE NO.	985-773-6230
REMARKS	DP Drillship - Emissions based on DS-18 fuel usage.

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	Reference Links
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	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
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	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
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	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
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	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
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	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s03.pdf
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	https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf
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	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf https://cfpub.epa.gov/webfire/
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	https://www3.epa.gov/ttnchie1/ap42/ch03/final/c03s01.pdf
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	https://cfpub.epa.gov/webfire/
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
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	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf https://cfpub.epa.gov/webfire/
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	https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_02-05-18.pdf
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	https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
Fugitives	lbs/hr/component						0.0005				API Study	12/93	https://www.api.org/
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014	https://www.boem.gov/environment/environmental-studies/2011-gulfwide-emission-inventory
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017	https://www.boem.gov/environment/environmental-studies/2014-gulfwide-emission-inventory
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	https://www3.epa.gov/ttnchie1/ap42/ch02/final/c02s01.pdf
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	https://www.epa.gov/moves/nonroad2008a-installation-and-updates
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	https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2014-1001.pdf
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
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	https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data

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

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

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

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA		BLOCK	LEASE	FACILITY	WELL					CONTACT		PHONE		REMARKS										
Chevron U.S.A. Inc.	Mississippi Canyon		412	OCS-G 35969	NA - DP Drillship	A1, A2, A3, A4, RW1, RW2, RW3					Kathy Sharp		985-773-6230		DP Drillship - Emissions based on DS-18 fuel usage.										
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	VESSELS- Drilling - Propulsion Engine - Diesel	DS-18*	15998.08254	823.037356	19752.90	24	277	11.29	6.81	6.61	0.16	270.41	7.77	0.00	42.41	0.08	37.52	22.63	21.96	0.55	898.85	25.84	0.00	140.98	0.26
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS- Drilling - Propulsion Engine - Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels - Diesel Boiler		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vessels – Drilling Prime Engine, Auxiliary		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Heavy Lift Vessel/Derrick Barge Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			BPD																						
DRILLING	Liquid Flaring		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	COMBUSTION FLARE - no smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - light smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - medium smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
	COMBUSTION FLARE - heavy smoke			0		0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--
ALASKA-SPECIFIC SOURCES	**VESSELS**		**kW**			**HR/D**	**D/YR**																		
	VESSELS - Ice Management Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
2022-2024	**Facility Total Emissions**							**11.29**	**6.81**	**6.61**	**0.16**	**270.41**	**7.77**	**0.00**	**42.41**	**0.08**	**37.52**	**22.63**	**21.96**	**0.55**	**898.85**	**25.84**	**0.00**	**140.98**	**0.26**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**																**899.10**			**899.10**	**899.10**	**899.10**		**30,600.00**	
	27.0																								
DRILLING	VESSELS- Crew Diesel		10800	555.616801	13334.80	0	0	7.62	4.60	4.46	0.11	182.55	5.25	0.00	28.63	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		6600	339.5436	8149.05	0	0	4.66	2.81	2.72	0.07	111.56	3.21	0.00	17.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Tugs Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	VESSELS - Material Tug Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Crew Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS - Supply Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRODUCTION	VESSELS - Support Diesel		0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALASKA-SPECIFIC SOURCES	**On-Ice Equipment**			**GAL/HR**	**GAL/D**																				
	Man Camp - Operation (maximum people per day)		**PEOPLE/DAY**																						
	VESSELS		**kW**			**HR/D**	**D/YR**																		
	On-Ice – Loader			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Construction Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Other Survey Equipment			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Tractor			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for gravel island)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	On-Ice – Truck (for surveys)			0	0.0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
	Man Camp - Operation		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	
	VESSELS - Hovercraft Diesel		0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022-2024	**Non-Facility Total Emissions**							**12.28**	**7.41**	**7.18**	**0.18**	**294.11**	**8.46**	**0.00**	**46.13**	**0.09**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

* Based on 2020 actual fuel usage plus contingency.

** This AQR includes additional drilling days each year for contingency purposes. Number of days included in AQR will not match Form 137.

NOx Emission Reduction 1504.59 lb/hr

Annual Fuel Limit 5,471,552 gallons

AIR EMISSIONS CALCULATIONS

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL
Chevron U.S.A. Inc.	Mississippi Can	412	OCS-G 35969	NA - DP Drillship	A1, A2, A3, A4, RW1, RW2, RW3

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
2022-2024	37.52	22.63	21.96	0.55	898.85	25.84	0.00	140.98	0.26
Allowable	899.10			899.10	899.10	899.10		30600.00	

Fuel Usage: DS-18

Month	gal/mth	avg gal/day
Jan-20	394965.90	12740.84
Feb-20	362673.20	12505.97
Mar-20	426468.80	13757.06
Apr-20	418077.60	13935.92
May-20	425319.70	13719.99
Jun-20	373715.50	12457.18
Jul-20	271967.20	8773.14
Aug-20	410894.10	13254.65
Sep-20	452497.00	15083.23
Oct-20	474898.40	15319.30
Nov-20	392899.80	13096.66
Dec-20	414756.20	13379.23
	Average	**13,168.60**
	MAX	**15,319.30**

SECTION H OIL SPILLS INFORMATION

(a) OIL SPILL RESPONSE PLANNING

REGIONAL OSRP INFORMATION

All the proposed activities in this plan will be covered by Chevron's Gulf of Mexico Regional Oil Spill Response Plan (OSRP), approved by BSEE on March 22, 2016; biennial review received by BSEE on June 1, 2021, was deemed in compliance with 30 CFR 254 by BSEE on June 24, 2021. Companies covered under this OSRP: Chevron Corporation (02335), Chevron U.S.A. Inc. (00078), Chevron Pipe Line Company (00400), Sabine Pipe Line Company Inc. (00835), Union Oil Company of California (00003), Unocal Pipeline Company (01113), and PRS Offshore, L.P. (01767).

SPILL RESPONSE SITES

In the table below, information is provided concerning the location of the primary spill response equipment and the location of the planned staging area(s) that would be used should an oil spill occur resulting from activities proposed in this plan.

Primary Response Equipment Locations	Preplanned Staging Location(s)
Ingleside, Galveston, and Port Arthur, TX; Lake Charles, Morgan City, Houma, Port Fourchon, Leeville, Venice, Fort Jackson, Harvey, Belle Chasse, and Baton Rouge, LA; Pascagoula, MS; Theodore, AL; Tampa, Miami, and Jacksonville, FL.	Ingleside, TX; Port Fourchon and Galliano, LA; Theodore, AL.

OIL SPILL REMOVAL ORGANIZATION (OSRO) INFORMATION

Clean Gulf Associates (CGA) and Marine Spill Response Corporation (MSRC) cooperatives are the primary surface response equipment providers for Chevron in the Gulf of Mexico Region. CGA & MSRC each maintain a dedicated fleet of vessels and other equipment strategically positioned along the Gulf Coast. CGA & MSRC each maintain a network trained Oil Spill Removal Organizations (OSROs) deploy and operate their equipment. CGA & MSRC have the capability to plan the mobilization and rapid deployment of spill response resources on a 24-hour, 7 days a week basis, year round.

Marine Well Containment Company (MWCC) is the primary subsea containment service provider for Chevron. MWCC equipment is available on a 24-hour, 7 days a week basis, year round.

Chevron's primary staging areas, marine transportation facilities and helicopter bases are located in Port Fourchon and Galliano, Louisiana. Chevron also can contract for additional staging areas throughout Gulf of Mexico coastal ports.

Chevron's primary command post for an oil spill is located in Covington, LA; however, Chevron has the ability to set up and effectively manage spills at Chevron facilities located in Houma and Lafayette, LA and Houston, TX. Chevron can also contract additional command posts facilities as necessary throughout Gulf Coast region.

WORST CASE DISCHARGE COMPARISON TABLE
The table below provides a comparison of the worst-case scenario from Chevron's Regional OSRP with the worst-case scenario from the proposed activities in this plan.

The Regional OSRP calculations and assumptions used to calculate the WCD volume from a blowout in accordance with NTL No. 2015-N01 was approved May 12, 2016 by the BOEM in Exploration Plan N-09930, Mississippi Canyon Blocks 122 and 166, OCS-G 34424 and 35318.

Category	Regional OSRP "Drilling > 10 miles" Worst-Case Discharge Scenario	EP
Type of Activity *(Types of activities include pipeline, platform, caisson, subsea completion or manifold, and mobile drilling rig)*	Exploratory Drilling	Exploratory Drilling
Facility Location (area/block)	Mississippi Canyon Block 122	Mississippi Canyon Block 412
Facility Designation *(e.g., Well No. 2, Platform JA, Pipeline Segment No. 6373)*	MC 122 "AA"	MC 412 "A1"
Distance to Nearest Shoreline	46 miles	27 miles
Volume Uncontrolled blowout (volume per day)	465,709 barrels	261,867 barrels
Type of Oil(s) - *(crude oil, condensate, diesel)*	Crude Oil	Crude Oil
Gravity(s) API - *(Provide API gravity of all oils given under "Type of Oil(s)" above. Estimate for EP's)*	38.2 °	36.0°

Chevron has the capability to respond to the appropriate worst-case spill scenario included in its Regional OSRP. The worst-case scenario determined for this EP does not replace the appropriate worst-case scenario in our Regional OSRP. Therefore, Chevron hereby certifies that Chevron 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 Chevron's Plan.[1]

(b) OIL SPILL RESPONSE DISCUSSION
Given below is a discussion of the response to an oil spill resulting from the activities proposed in this plan. All the applicable information described in 30 CFR 254.26(b), (c), (d), and (e) is included.

Oil spill response-related activities for facilities included in this document are governed by the Chevron regional Gulf of Mexico Oil Spill Response Plan (OSRP). This OSRP meets all requirements contained in 30 CFR 250. The Chevron regional Gulf of Mexico OSRP was approved by BSEE on March 22, 2016; biennial review received by BSEE on June 1, 2021, was deemed in compliance with 30 CFR 254 by BSEE on June 24, 2021. The Chevron regional Gulf

[1] This certification is provided as required by NTL No. 2008-G04 at page 19.

of Mexico OSRP encompasses all facilities operated by Chevron U.S.A. Inc. and, herein, the jurisdiction of the BOEM and BSEE.

Upon notification of a major oil release from a Chevron facility or operation in the Gulf of Mexico, Chevron response personnel will make the initial notifications to all involved government agencies, Oil Spill Response Organizations (OSROs), and associated support services.

Chevron has a contract in effect with MWCC, MSRC and CGA, as well as other OSROs, to ensure availability of personnel, services, and equipment on a 24-hour-per-day basis. The OSROs can provide personnel, equipment, and materials in sufficient quantities and recovery capacity to respond effectively to oil spills from the facilities and leases covered by this plan, including the Worst Case Discharge scenarios. OSROs under contract with Chevron have oil spill response equipment located throughout the Gulf Coast area. Much of the equipment is in road-ready condition and is available to be transported on short notice to the nearest predetermined staging areas(s). The “road-ready condition” provides the shortest reasonable response times for transporting equipment to the staging areas.

These assets are listed in the Chevron Oil Spill Response Plan.

Trajectory Analysis
Land areas that could potentially be impacted by an oil spill were determined using the BOEM Oil Spill Risk Analysis Model (OSRAM) trajectory results. The OSRAM estimates the probability that oil spills from designated locations would contact shoreline and offshore natural resources. These probabilities indicate, in terms of percentage, the chance that an oil spill occurring in a particular launch area will contact a certain county or parish within 3, 10, and 30 days. OCS Launch Area C056 was used as the point of origin for Mississippi Canyon Block 412. Land segments identified by the model are listed below:

County Parish	Conditional Probability[a] of Contact (%)		
	3 Days	10 Days	30 Days
C08 Matagorda TX	-	-	1
C10 Galveston TX	-	-	1
C12 Jefferson TX	-	-	1
C13 Cameron LA	-	-	3
C14 Vermillion LA	-	-	2
C15 Iberia LA	-	-	1
C17 Terrebonne LA	-	3	5
C18 Lafourche LA	1	4	5
C19 Jefferson LA	-	1	2
C20 Plaquemines LA	6	13	16
C21 St. Bernard LA	-	-	1
C23 Jackson MS	-	-	1
C26 Escambia FL	-	-	1

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

Resource Identification
Resources of special economic or environmental importance found in land segments identified in the above paragraph can be found in the NOAA ESI Coastal Sensitivity Atlas (Maps). These maps can be accessed through NOAA and will be used during any spill occurring from the locations listed in this document.

Additionally, information on environmental sensitivities is contained in the Coast Guard Area Contingency Plans listed below. These plans will be accessed and followed during an oil spill that threatens the Gulf of Mexico shoreline.

- Corpus Christi, TX Area Contingency Plan
- Port Arthur, TX Area Contingency Plan
- Houston-Galveston, TX Area Contingency Plan
- Southeast Louisiana Area Contingency Plan
- Sector New Orleans, LA Area Contingency Plan
- Mobile, AL Area Contingency Plan
- St. Petersburg, FL Area Contingency Plan

Response Discussion

Chevron maintains numerous resources, equipment and expertise to respond to an oil spill in the Gulf of Mexico. Chevron has oil spill response service contracts with both local and international companies and cooperatives and has a large corps of dedicated Chevron emergency responders that can work in the Gulf of Mexico. Chevron has contracts with the following oil spill response service providers.

Oil Spill Removal Organizations (OSRO). These companies have on-hand shoreline protection and cleanup equipment to respond to a spill in the Gulf of Mexico.

- OMI LLC
- Clean Gulf Associates Services
- U.S. Environmental Services
- ES&H Consulting
- American Pollution Control
- T&T Marine
- Oil Spill Response (OSRL)

Oil Spill Cooperatives (OSC). OSCs have equipment pre-staged in the Gulf of Mexico, including Lake Charles, Intracoastal City, Houma, Fort Jackson and Venice, Louisiana; Galveston, Texas; and Pascagoula, Mississippi. OSCs provide resources to respond to offshore incidents including areas identified in this plan.

- Clean Gulf Associates (CGA) – This major cooperative is strictly dedicated to Gulf of Mexico oil and gas developers and producers.
- Marine Spill Response Corporation (MSRC) – This national cooperative has extensive dedicated offshore resources located in the Gulf of Mexico

Well Control Emergency Response Companies

- Wild Well Control Inc.
- Boots & Coots
- IWC Services, Inc.

Oil Spill Management and Response Consultants

- The Response Group (TRG)

Chemical Dispersant Companies (capable of delivering air and vessel dispersants)

- Airborne Support, Inc
- MSRC
- CCA
- OSRL

Chevron will use a layered approach to respond to a worst case discharge from the area by conducting simultaneous response operations at the **well site**, in the **offshore environment** and in **nearshore and shoreline areas**. Plans will be implemented, resources deployed and response operations established within these environmental areas to accomplish the following objectives:

- Provide for the safety of responders and the general public
- Intervene at the well site to stop the flow of oil
- Minimize the spread of oil at the surface
- Minimize encroachment to the coastline environment
- Protect coastal and natural resources

Upon notification of a worst case discharge oil spill at the locations listed in this plan, Chevron will mobilize resources listed in the attached enclosures. This information comes directly from the Chevron regional Gulf of Mexico Oil Spill Response Plan and applies to a worst case discharge volume of 465,709 barrels per day that could occur at a Chevron facility located in Mississippi Canyon Block 122. These same assets would be mobilized to all sites contained in this plan.

- Aerial Surveillance Equipment
- Offshore Recovery Equipment
- Nearshore Recovery Equipment
- In-Situ Burn Equipment
- Aerial Dispersant Equipment
- Shoreline Protection Equipment
- Offshore Storage Equipment

Chevron will also take the following general actions to mobilize and coordinate response operations:

- Set up and staff its command center in Covington, LA
- Set up a source control group in Houston, TX or Covington, LA
- Mobilize well site resources to cap, contain and disperse oil at the well head
- Mobilize assets to drill relief wells
- Mobilize assets to contain and collect surface oil at the well site and in the offshore environment
- Mobilize assets to disperse and burn surface oil at the well site and in the offshore environment
- Establish a deepwater staging area from a LA port or location
- Deploy assets to track the movement of oil on the surface

Follow up actions will include the following:

- Locate, monitor, track and project the movement of the oil spill
- Mobilize nearshore skimming and booming vessels, barges and systems to shorebase locations for rapid deployment in the nearshore environment
- Mobilize oil spill removal organization (OSRO) resources and assets to staging areas for rapid deployment of shoreline protection resources
- Mobilize wildlife protection and rehabilitation resources to staging areas for rapid deployment of resources
- Determine Incident Command Post (ICP) locations based on intervention operations and results and surface oil spill trajectories
- Determine ICP Operations Branch locations based on intervention operations and results and surface oil spill trajectories

- Determine additional staging areas based on the spill trajectory

Spill Response Resources and Deployment Time

Offshore Response: Offshore response operations will integrate simultaneous containment booming, mechanical recovery, aerial dispersants and in-situ burning. Response objectives within the offshore layer are to:

- Provide for the safety of responders and the general public
- Minimize wide-scale spread of oil
- Minimize encroachment to coastline environment

The strategy for offshore response will be to:

- Station mechanical recovery vessels and barges that are outfitted with ocean boom systems closest to the source to contain and collect as much oil as possible.
- Station mechanical recovery vessels and barges that deploy skimming systems on vessels of opportunity close to the source to rapidly contain and collect oil that strays from the main oil slick.
- Station in-situ burn assets close to the source to burn as much oil as possible.
- Aerially disperse oil that cannot be mechanically recovered.

Simultaneous implementation of these strategies is designed to effectively contain and recover an oil spill significantly offshore in order to minimize the potential impacts to public health, wildlife and the environment. Separate and distinct resources will be assigned for each operation. Based on the anticipated worst case discharge scenario, Chevron can be onsite with 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 an estimated 24 hours.

The following sections provide more information on each operation needed to contain a worst case discharge to the maximum extent possible.

(1) Mechanical Recovery and Slick Containment. Offshore skimming and booming vessels, barges and systems will be deployed to the source of the spill and stationed in the thickest parts of the spill to enhance the encounter rate, collect and contain the oil. VHF radio communications will be established between skimming vessels and barges and spotter aircraft and surveillance systems to direct vessels to coordinates of thickest oil to maximize the effectiveness and efficiency of on-water recovery resources. Vessels operating in oil will relay spill characteristics (thickness, trajectory) to the Forward Operating Branch and Incident Command Post in order to station additional vessels and barges that are equipped with night-sensing systems in areas of recoverable oil prior to nightfall. This will again maximize the oil recovery encounter rate. MSRC Responder Class vessels, the CGA Hoss barge, Production Support Vessels, Dual Purpose Vessels and vessels of opportunity outfitted with KOSEQ skimming systems will deploy J-boom or U-boom configurations that will maximize containment of oil to collect using skimmers. These vessels will work in tandem to cover as large of a geographic area as possible at the location of the surface spill where oil is thickest.

Vessels deployed with MSRC and CGA Fast Response Units and CGA Fast Response Vessels will be stationed to collect oil that moves past the front line mechanical assets. These units will deploy a J-boom configuration because it only requires one support vessel. Oil that escapes the above assets and moves shoreward will be collected by vessels of opportunity that deploy sorbent boom, collection nets or other types of equipment that absorbs surface oil. These assets will be deployed as task forces that can rapidly respond to light oil.

(2) In-Situ Burning. Offshore in-situ burn assets will be deployed as primary response resources for all locations within federal waters. Vessels of opportunity that can operate near the spill site will be used to deploy fire boom and trained in-situ burn responders. Fire boom will be configured in a "U" shape or similar to the NOFI Ocean Buster design.

(3) Aerial Dispersants. Aerial dispersants will be deployed as primary response resources for all locations that fall within the FOSC pre-approval process. Dispersant aircraft that arrive on-scene before mechanical recovery or in-situ burn resources will apply dispersants to areas until relieved by a different asset.

Vessel radar systems and infrared cameras will be used to detect and mechanically collect oil at night. This will allow surveillance operations to continue both day and night and through inclement weather. These systems also will be used to track the movement of oil which will assist with shoreline response planning.

Louisiana and Texas resources potentially at risk may include but are not limited to the following: marine sensitivities, beaches, waterfowl, shoreline resources, marshes, marinas/piers, populated areas, and environmental sensitivities

The BOEM oil spill trajectory model indicates that Louisiana parishes and Mississippi, Alabama, and Florida counties could be impacted by an oil spill from areas listed in this plan. These areas are dominated by fine sand beaches, coarse sand beaches, swamps and salt water marshes. The four subsections below summarize potential concerns with each environment. This information is taken from various Coast Guard Area Contingency Plans.

Fine Sand Beach Environment

- Sensitivity: Fine sand beaches have a low sensitivity to oil spill impacts and cleanup methods.
- Oil Behavior: Oil typically stains and covers the beach sands with low permeability.
- Cleanup: The penetration is low to moderate depending on the water table and the position of the oiling on the shoreline. A potential environmental issue during beach cleanup is the protection of the dune habitat from the cleanup operations. Fine sand beaches typically have poor access, but good transportation ability. Fine sand beaches are relatively easier to clean in contrast to marshes. Large volumes of stained sand and debris can be generated by beach cleanup.

Coarse Sand Beach Environment

- Sensitivity: The environmental sensitivity of coarse sand beaches is low due to the limited animal and vegetation population.
- Oil Behavior: Spilled oil typically stains and coats coarse grain beach sands with moderate to high permeability.
- Cleanup: Sediment penetration on coarse grain beaches is moderate/high depending on the water table and the location of oil deposition. A potential environmental issue is the protection of the dune habitat from cleanup operations. The transit ability of this shoreline type is less than fine sand beaches because the bearing strength is lower, and this type of sand builds steep beach faces. Access is typically poor.

Swamp Environment

- Sensitivity: The environmental sensitivity is high for swamps because of the presence of wetland habitat.
- Oil Behavior: Oil usually coats and covers the sediment and vegetation with low sediment penetration.
- Cleanup: The sediment penetration potential is low due to the high water table and the water content of the sediments. A potential environmental issue is that the cleanup may be more damaging than the oil itself. The access to swamps is poor due to the soft sediment and the presence of dense tree growth.

Salt Marsh Environment

- Sensitivity: The environmental sensitivity is high for salt marsh because of the presence of wetland habitat.
- Oil Behavior: Oil usually coats and covers the sediment and vegetation with low sediment penetration.
- Cleanup: The sediment penetration potential is low/moderate due to the high water table and water content of the sediment. A potential environmental issue is that the cleanup may be more damaging than the oil itself. Access is typically poor in Louisiana.

The protection of waterfowl and wildlife during the course of an oil release is an essential element in every spill response operation. Federal and state natural resource trustees will be notified in the event that a wildlife habitat may be affected by a spill event. Information concerning methods to protect waterfowl and wildlife are contained in the Chevron OSRP. For fish and wildlife resources, the emphasis is on habitats where:

- Large numbers of animals are concentrated in small areas, such as bays where waterfowl concentrate during migration or for overwintering
- Early life stages are present in somewhat restricted areas or in shallow water, such as anadromous fish streams and turtle nesting beaches
- Habitats are extremely important to specific life stages or migration patterns such as foraging or overwintering
- Specific areas are vital sources for seed or propagation
- The species are on Federal or state threatened or endangered lists
- A significant percentage of the population is likely to be exposed to oil

Human-use resources of concern are listed in the Chevron OSRP. Areas of economic importance, like waterfront hotels, should also be considered when establishing resource protection priorities. Human-use resources are most sensitive when:

- Archaeological and cultural sites are located in the intertidal zones
- Oiling can result in potential significant commercial losses through fouling, tainting, or avoidance because of public perception of a problem
- The resource is unique, such as a historical site
- Oiling can result in potential human health concerns, such as tainting of water intakes and/or subsistence fisheries

Response Capability

Chevron is a member of both Clean Gulf Associates (CGA) and Marine Spill Response Corporation (MSRC) cooperatives. CGA & MSRC are the primary surface response equipment providers for Chevron in the Gulf of Mexico Region. CGA & MSRC each maintain a dedicated fleet of vessels and other equipment strategically positioned along the Gulf Coast. CGA & MSRC each maintain a network of trained Oil Spill Removal Organizations (OSROs) deploy and operate their equipment. CGA & MSRC have the capability to plan the mobilization and rapid deployment of spill response resources on a 24-hour, 7 days a week basis, year-round.

Chevron maintains service contracts with several private OSROs including American Pollution Control Corporation (AmPol), U.S. Environmental Services (USES), OMIES, ES&H Environmental Services and Airborne Support Inc.

Chevron's Aviation Group operates and maintains a private fleet of helicopters servicing our operation in the Gulf of Mexico. Chevron helicopters provide aerial surveillance.

Marine Well Containment Company (MWCC) is the designated subsea containment service provider for Chevron. MWCC equipment is available on a 24-hour, 7 days a week basis, year-round. MWCC equipment locations are Ingleside, TX and Theodore, AL.

Chevron's primary staging areas are located in Fourchon and Galliano, Louisiana. Chevron has the capability to contract for additional staging areas throughout Gulf of Mexico coastal ports.

Chevron's primary command post for an oil spill is located in Covington, LA; however, Chevron has the ability to set up and effectively manage spills at Chevron facilities located in Houma and Lafayette, LA and Houston, TX. Chevron has the capability to contract for additional command posts facilities as necessary throughout Gulf Coast region.

Estimated Initial Equipment Response Times

Capability	Equipment[1]	ETA	Source
Aerial Surveillance	Manned Aircraft (Helicopters and Fixed-wing)	~1 to 2 hours	Chevron Aviation (Galliano, LA & Picayune, MS)
On-water Containment, Skimming, & Storage	Response Vessels (w/ boom, skimmer and storage and surveillance technology)	~10 to 14 hours	CGA & MSRC: Venice, Fort Jackson, Harvey, Belle Chasse, Fourchon
Aerial Dispersant	Spotter and Spray aircraft	~4 to 6 hours	MSRC (Stennis) and/or CGA Airborne Support (Houma)
In-Situ Burn	Vessels, Boom and support equipment	~12 to 24 hours	CGA (Harvey) & MSRC (Fort Jackson)
Sub-sea Surveillance	Remote Operated Vehicles (ROVs)	~18 to 24 hours	Chouest Offshore (Fourchon)
Additional resources will continue to be deployed over subsequent days, weeks, and/or months as necessary			

([1]This includes supervisors and response technicians trained to operate all equipment listed.)

Response Technology

Chevron, through our cooperative response organizations (Clean Gulf Associates (CGA) and Marine Spill Response Corporation (MSRC)), we have developed high-tech surveillance capabilities with the primary objective of positioning on-water assets in the thickest parts of the spill by detection and classification of potential oil targets as recoverable, tracking moving oil, and expanding the operating window of skimming operations to low-light conditions.

This technology includes high-definition (HD) cameras, optical and thermal infrared imaging systems, and X-band radar oil detection. These systems are integrated into an electronic chart system that provides an exact geographic position and can project the image onto the electronic map for oil spill recovery.

This capability can be leveraged across the response zones and enables the on-water recovery task force strategy where multiple skimming vessels may be directed by a command and control vessel.

The above information is taken from the Chevron GOM Regional Oil Spill Response Plan (OSRP), submitted to BSEE in accordance with 30 CFR 254.

Suitability of Resources
All response equipment, materials, support vessels and strategies listed in this document and in the Chevron regional Gulf of Mexico Oil Spill Response Plan have proven suitable for the many environmental conditions existing at the locations listed in this plan. Chevron additionally conducts annual oil spill response training, drills and exercises and validates the content of the Oil Spill Response Plan. The Chevron regional Gulf of Mexico Oil Spill Response Plan is maintained by the Chevron Greater Gulf of Mexico Emergency Management Coordinator.

SECTION I ENVIRONMENTAL MONITORING INFORMATION

(a) MONITORING SYSTEMS

Moon Pool Monitoring and Reporting Operations

Chevron will document visual observation of the moon pool to confirm whether sea turtles or marine mammals are present. A log of observations will be maintained, including Vessel Identification, Vessel Location (Area, Block), Date of Observation, Time of Observation, Sea Turtle/Marine Mammal Observed, Type of Activity Occurring in Moonpool, Initials of Observer.

If sea turtle or marine mammals are observed in the moon pool, BSEE and NMFS will be contacted for additional guidance.

Moon Pool Requirements Before Transit

Document that the observation was made prior to closure of the hull door and no animals were present.

(b) INCIDENTAL TAKES

Chevron does not expect any "takes" of protected species as a result of the operations proposed under this Plan.

Chevron will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the Endangered Species Act (ESA) as a result of the operations conducted herein:

- NTL No. 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program" (Note: there are no seismic surveys proposed in this Plan)
- NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination"
- "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, Appendices to the Programmatic Biological Opinion on the Gulf of Mexico Oil and Gas Program", Appendices A, B, C, and J

(c) FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

No activities proposed in this plan will be conducted within the Protective Zones of the Flower Garden Banks and Stetson Bank.

SECTION J LEASE STIPULATIONS INFORMATION

Lease OCS-G 35969 has Stipulation Numbers 1- Military Areas and 4- Protected Species assigned.

Stipulation Number 1, Military Areas:
Chevron is aware that this stipulation requires the lessee to enter into an agreement with the appropriate individual military command headquarters concerning the control of electromagnetic emissions and use of boat and aircraft in the applicable warning area before commencing such traffic.

Warning Area W-92	Fleet Area Control and Surveillance Facility Attention: Deputy Airspace Officer 118 Albemare Ave. P.O. Box 40 Jacksonville, Florida 32212 Contact: Ronald McNeal Telephone: (904) 542-2112 Email: Ronald.Mcneal@navy.mil

Stipulation Number 4, Protected Species:
The Endangered Species Act (16 U.S.C. 1531-1544) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361-1423h) are designed to protect threatened and endangered species and marine mammals and apply to activities on the Outer Continental Shelf (OCS). The OCS Lands Act (43 U.S.C. 1331-1356a) provides that the OCS should be made available for expeditious and orderly development subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs (see 43 U.S.C. 1332).

Chevron will follow all guidelines:

1) Collect and remove flotsam resulting from activities related to exploration, development, and production of this lease;
2) Post signs in prominent places on all vessels and platforms used as a result of activities related to exploration, development, and production of this lease detailing the reasons (legal and ecological) why release of debris must be eliminated;
3) Observe for marine mammals and sea turtles while on vessels, reduce vessel speed to 10 knots or less when assemblages of cetaceans are observed, and maintain a distance of 90 meters or greater from whales, and a distance of 45 meters or greater from small cetaceans and sea turtles;
4) Employ mitigation measures prescribed by BOEM/BSEE or the National Marine Fisheries Service (NMFS) for all seismic surveys, including the use of an "exclusion zone" based upon the appropriate water depth, ramp-up and shutdown procedures, visual monitoring, and reporting; (Note: there are no seismic surveys proposed in this Plan)
5) Identify important habitats, including designated critical habitat, used by listed species (e.g., sea turtle nesting beaches, piping plover critical habitat), in oil spill contingency planning and require the strategic placement of spill cleanup equipment to be used only by personnel trained in less-intrusive cleanup techniques on beaches and bay shores; and
6) Immediately report all sightings and locations of injured or dead protected species (e.g., marine mammals and sea turtles) to the appropriate stranding network. If oil and gas industry activity is responsible for the injured or dead animal (e.g., because of a vessel strike), the responsible parties should remain available to assist the stranding network. If the injury or

death was caused by a collision with the lessee's vessel, the lessee must notify BOEM within 24 hours of the strike.

BOEM and BSEE issue NTLs, which more fully describe measures implemented in support of the above-mentioned implementing statutes and regulations, as well as measures identified by the U.S. Fish and Wildlife Service and NMFS arising from, among others, conservation recommendations, rulemakings pursuant to the MMPA, or consultation. Chevron and its operators, personnel, and subcontractors, while undertaking activities authorized under these leases, will implement and comply with the specific mitigation measures outlined in BOEM NTL No. 2016-G01 (Vessel Strike Avoidance and Injured/Dead Protected Species Reporting), BOEM NTL No. 2016-G02 (Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program) (Note: there are no seismic surveys proposed in this Plan) and BSEE NTL No. 2015-G03 (Marine Trash and Debris Awareness and Elimination). Chevron, its operators, personnel, and contractors may comply with the most current measures to protect species in place at the time an activity is undertaken under these leases, including, but not limited to, new or updated versions of the NTLs identified in this paragraph. Chevron and its operators, personnel, and subcontractors will be required to comply with the mitigation measures, identified in the above referenced NTLs, and additional measures in the conditions of approvals for plans or permits.

SECTION K <u>ENVIRONMENTAL MITIGATION MEASURES INFORMATION</u>

(a) Measures Taken to Avoid, Minimize, and Mitigate Impacts
This plan does not propose activities for which the state of Florida is an affected state; however, Chevron will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of the operations conducted herein:

- NTL No. 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program" (Note: there are no seismic surveys proposed in this Plan)
- NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination"
- "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, Appendices to the Programmatic Biological Opinion on the Gulf of Mexico Oil and Gas Program", Appendices A, B, C, and J

<u>Entanglement/Entrainment Reduction Measures</u>
Chevron will ensure that all underwater lines will be stiff, taut, and non-looping, and no excess underwater line will be used.

<u>Sea Turtle Resuscitation Guidelines</u>
Chevron will follow the procedures provided under Appendix J. Sea Turtle Handling and Resuscitation Guidelines found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020.
If a turtle becomes trapped in the moon pool, no attempt to remove the turtle will be made without explicit direction to do so from BOEM/BSEE or NMFS.

Appendix J. Sea Turtle Handling and Resuscitation Guidelines
Any sea turtles taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to the following procedures:

I. Sea turtles that are actively moving or determined to be dead (as described in paragraph (B)(4) below) must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.
II. Resuscitation must be attempted on sea turtles that are comatose or inactive by:
    i. Placing the turtle on its bottom shell (plastron) so that the turtle is right side up and elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 to 24 hours. The amount of elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response.
    ii. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstance be placed into a container holding water. A water-soaked towel

placed over the head, carapace, and flippers is the most effective method in keeping a turtle moist.

iii. Sea turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles.

iv. A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise, the turtle is determined to be comatose or inactive and resuscitation attempts are necessary.

Any sea turtle so taken must not be consumed, sold, landed, offloaded, transshipped, or kept below deck.

These requirements are excerpted from 50 CFR 223.206(d)(1). Failure to follow these procedures is therefore a punishable offense under the Endangered Species Act.

(b) Incidental Takes
Chevron does not expect any "takes" of protected species as a result of the operations proposed under this Plan.

Chevron will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the Endangered Species Act (ESA) as a result of the operations conducted herein:

- NTL No. 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program" (Note: there are no seismic surveys proposed in this Plan)
- NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination"
- "Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, Appendices to the Programmatic Biological Opinion on the Gulf of Mexico Oil and Gas Program", Appendices A, B, C, and J

See SECTION E BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC INFORMATION for a list of Threatened and Endangered Species, Critical Habitat and Marine Mammal Information.

SECTION L SUPPORT VESSELS AND AIRCRAFT INFORMATION

(a) GENERAL
In the table below, information is provided regarding the vessels (e.g., tug boats, anchor-handling vessels, construction barges, lay barges, supply boats, crew boats) and aircraft you will use to support your proposed activities. If specific vessels have not yet been determined, use the maximum capacities, numbers, and trip frequencies for the types of vessels you will use.

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Crew Boat	47,382 gals.	One	Once per week
Supply Boat	303,093 gals.	Two	Every 2 to 3 days
Helicopter	2,800 lbs. / 430 gals.	One	7 trips per week

(b) DIESEL OIL SUPPLY VESSELS
Information on the vessels used to supply diesel oil. Any vessels that will transfer diesel oil you will use for purposes other than fuel.

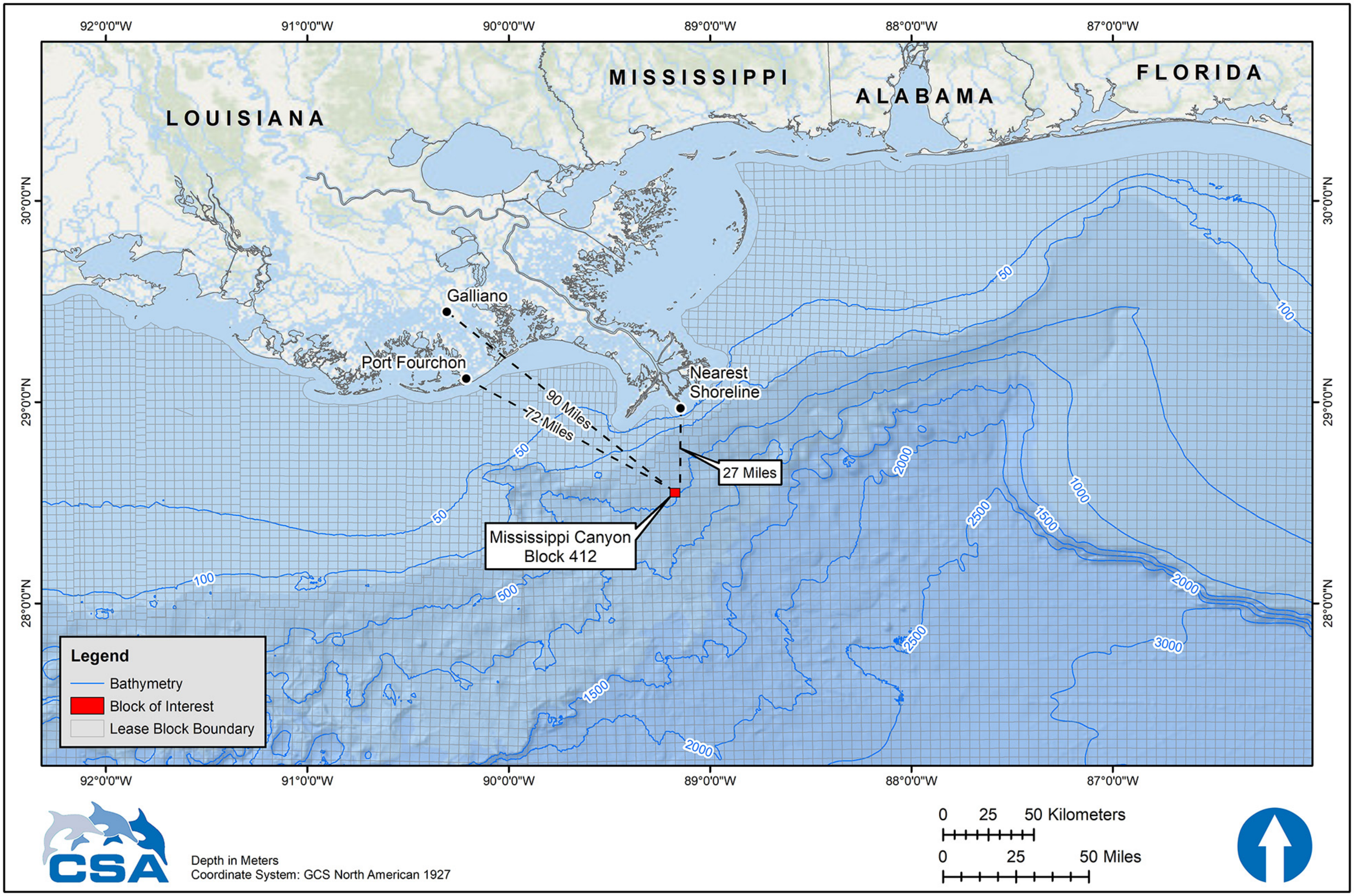
Size of Fuel Supply Vessel	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel Will Take
280 foot	860,000 gals	quarterly	From shore base to block
280 foot	275,000 gals	4-6 weeks	From shore base to block

(d) SOLID AND LIQUID WASTES TRANSPORTATION
Water Quality Spreadsheets replace the Solid and Liquid Wastes Transportation Table.

(e) VICINITY MAP
A map showing 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 you will use when traveling between the onshore support facilities and the drilling unit is provided as attachment L-1 at the end of this section.

The drilling unit, vessels, crew boats and supply boats associated with the operations proposed in this plan will not transit the Bryde's whale area.

ATTACHMENTS TO SECTION L
- **L-1** – Vicinity Map



Attachment L-1: Vicinity Map

SECTION M ONSHORE SUPPORT FACILITIES INFORMATION

(a) GENERAL

The table below provides a listing of the onshore facilities that will be used to provide supply and service support for the proposed activities.

Name	Location	Existing/New/Modified
C-Port Shorebase - Port Fourchon	Port Fourchon, Louisiana	Existing
Chevron Galliano Airbase	Galliano, Louisiana	Existing

(b) SUPPORT BASE CONSTRUCTION OR EXPANSION

Chevron will use its existing onshore base facilities located in Port Fourchon and Galliano, Louisiana. The bases have adequate facilities for marine and air transportation to accommodate the activities proposed in this plan. The proposed operations do not require expansion or modifications to the bases.

(d) WASTE DISPOSAL

Water Quality Spreadsheets replace the Waste Disposal Table.

SECTION N COASTAL ZONE MANAGEMENT ACT (CZMA) INFORMATION

(a) CONSISTENCY CERTIFICATION

A Coastal Zone Management Act consistency certification is attached at the end of this section as **N-1** for the State of Louisiana.

(b)OTHER INFORMATION

To the best of our knowledge, the set of findings included in the Environmental Impact Analysis and this Exploration Plan indicate that the proposed activity and its associated facilities and effects are all consistent with, and comply with, the provisions and guidelines of the Louisiana Coastal Resources Program. The proposed activity will be conducted in a manner consistent with such programs.

Evaluations of consistency with the Louisiana Coastal Resources Program is included below:

COASTAL ZONE MANAGEMENT
CONSISTENCY CERTIFICATION

INITIAL EXPLORATION PLAN
Type of OCS Plan

Mississippi Canyon Block 412
Area and Block

OCS-G 35969
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.

CHEVRON U.S.A. INC.
Lessee and Operator

Assistant Secretary

Certifying Official

December 21, 2021

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

1 Background

Chevron U.S.A. Inc. (Chevron) is submitting an Initial Exploration Plan (EP) for Mississippi Canyon (MC) Block 412 (MC 412). Under this EP, Chevron proposes to drill up to seven wells (A1, A2, A3, A4, RW-W, RW-SE, and RW-S) from a total of four surface hole locations. This document evaluates Chevron'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 Chevron'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 impact analysis for the drilling activities based on the locations in MC 412 and is included in EP Appendix A. 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 Bureau of Ocean Energy Management (BOEM) 2015-N02 and partially amended by 2020-G01 and BOEM 2015-N01.

The proposed activities will be conducted in accordance with BOEM, Bureau of Safety and Environmental Enforcement (BSEE), 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 27 statute miles (43 km) from the nearest Louisiana shoreline (**Figure 1**). A dynamically positioned drilling vessel is anticipated to be on site for 125 days for drilling and completion of a well, from 2022 until 2024

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

All the proposed activities and facilities in this EP are covered by the Chevron's Gulf of Mexico Regional Oil Spill Response Plan (OSRP), filed by Chevron in accordance with 30 CFR § 254 and approved by the BSEE on March 22, 2016. The biennial review and update to the OSRP was deemed in compliance with BSEE on June 24, 2021. The OSRP details Chevron's plan to rapidly and effectively manage oil spills that may result from drilling and production operations. Chevron has designed its spill response program based on a regional capability of response to spills ranging from small operational spills to a worst-case discharge from a well blowout. Chevron's spill response program meets the response planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. The OSRP also includes information regarding Chevron's regional oil spill organization and dedicated response assets, potential spill risks, local environmental team organization, and an overview of actions and notifications that will be taken in the event of a spill.

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in MC 412, projected using information in the 60-day Oil Spill Risk Analysis model for the Gulf of Mexico (see BOEM, 2017), indicates there is up to a 52% conditional probability of a spill contacting any Louisiana shoreline within 60 days of a spill.

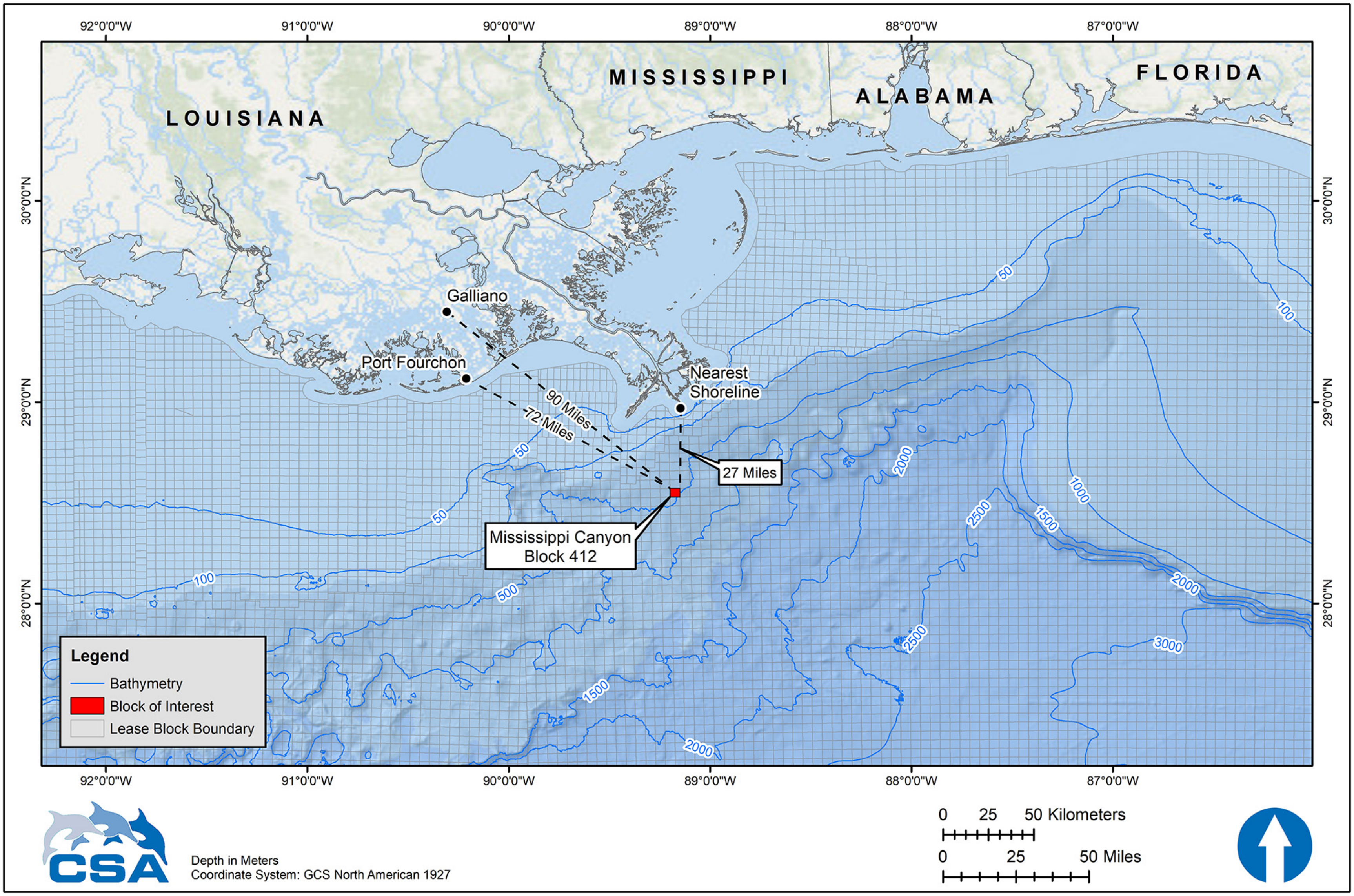


Figure 1. Location of Mississippi Canyon Block 412.

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 Chevron's proposed project in MC 412 are summarized below.

§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 412 project, and Chevron 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 F, G, and Appendix A.

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 B, E, I, and Appendix A.

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 E, I, and Appendix A.

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 Section B and Appendix A.

§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.

§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 Section F and Appendix A.

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 F, K, and Appendix A.

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 Section F and Appendix A.

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

Not applicable.

§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 412, approximately 27 statute miles (43 km) from the nearest Louisiana shoreline. Geological and geophysical information is provided in EP Section C.

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 412, approximately 27 statute miles (43 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 B, E, I, and Appendix A. 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 412. Shore-based support will originate from Louisiana. The nearest Louisiana shoreline is approximately 27 statute miles (43 km) from the project area.

During a large-scale incident, the Louisiana Wildlife Refuges, Wilderness Areas, and State and National Parks that could potentially be affected by oiling within 30 days of a large spill, along with the natural resources found in each area, is 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 412, approximately 27 statute miles (43 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 L, M, and Appendix A.

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 B, F, G, H, and K.

Table 1. Louisiana Wildlife Refuges, Wilderness Areas, State and National Parks, 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 56 (From: BOEM, 2017).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Cameron Parish	
Peveto Woods Bird and Wildlife Sanctuary	A bird sanctuary owned by the Baton Rouge Audubon Society, this sanctuary is a 16.2-hectare (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 (*Danaus plexippus*) (Baton Rouge Audubon Society, 2010).
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 annually emergent and submerged aquatics. When deeded to the state, the refuge encompassed approximately 34,803 hectares (86,000 acres), but beach erosion has taken a heavy toll, and the most recent surveys indicate only 30,773 hectares (76,042 acres) remain. This area borders the Gulf of Mexico for 26.5 miles (42.6 kilometers) and extends inland toward the Grand Chenier ridge, a stranded beach ridge 6 miles (9.7 kilometers) from the Gulf of Mexico. Common resident animals include Mottled Ducks (*Anas fulvigula*), nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), rails, raccoon, mink, otter, opossum, white-tailed deer (*Odocoileus virginianus*), and American alligators (*Alligator mississippiensis*). An abundant fisheries population provides recreational opportunities to fishermen seeking shrimp, redfish (*Sciaenops ocellatus*), speckled trout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), and largemouth bass (*Micropterus salmoides*), among others (Louisiana Department of Wildlife and Fisheries, n.d. - a).
Sabine National Wildlife Refuge (NWR)	Sabine NWR includes 50,388 hectares (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 (*Ardea alba*), Neotropic Cormorants (*Phalacrocorax brasilianus*), Snowy Egrets (*Egretta thula*), and various species of wading birds and shorebirds. American alligators are known to be very common in the refuge as well (USFWS, 2017).
Vermilion Parish	
Paul J. Rainey Wildlife Refuge and Game Preserve	Paul J. Rainey Wildlife Refuge and Game Preserve is a privately owned 10,522-hectares (26,000-acres) coastal wetland in Vermilion Parish owned by the National Audubon Society. Formerly open to gas drilling, hydrocarbon exploration ended in 1999. Notable fauna includes 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 5,261-hectare (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).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Iberia Parish	
Marsh Island Wildlife Refuge	Approximately 175,445-hectare (71,000 acres) in size, Marsh Island Wildlife Refuge is located between Vermilion Bay and the Gulf of Mexico. The refuge is comprised of brackish marsh, without very little tree cover. The refuge is an important waterfowl wintering area and serves as habitat for numerous species of wading birds, shorebirds, birds of prey, and several commercially important species such as blue crabs and shrimp (Louisiana Department of Wildlife and Fisheries n.d. – c).
Shell Keys NWR	Shell Keys NWR is a s all group is islets located in the Gulf of Mexico approximately 3.5 miles south of Marsh Island, Louisiana. Accessible only by boat, the number of islets varies due to ongoing erosion and deposition with passing storms. The islet is comprised of shell fragments and there is no substantial vegetation (USFWS, 2016).
Terrebonne Parish	
Isles 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 255 hectares (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. - d).
Point-aux-Chenes Wildlife Management Area (WMA)	Point-aux-Chenes WMA is a 14,164-hectare (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, 2016a).
Lafourche Parish	
Wisner WMA	Owned by the Edward Wisner Donation Advisory Committee, the WMA is approximately 8,498 hectares (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.
Plaquemines Parish	
Delta NWR	The Delta NWR was established in 1935 and covers 19,830 hectares (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 (*Crocodylus acutus*). 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, 2018a).
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 kilometers) 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 46,539 hectares (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, 2016b).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Breton NWR	Established in 1904 and approximately 5,258 hectares (2,128 acres) in size, 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 are designated as critical habitat for the Endangered Piping Plover (*Charadrius melodus*), which is a common visitor to the refuge during fall, winter, and spring. The Western Gulf Coast population of Brown Pelicans (*Pelecanus occidentalis*) 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 (*Leucophaeus atricilla*), Royal Gulls, and Caspian and Sandwich Terns (*Hydroprogne caspia* and *Thalasseus sandvicensis*, respectively). Waterfowl winter near the refuge islands and use the adjacent shallows, marshes, and sounds for feeding and for protection during inclement weather. Redheads (*Aythya* americana) and Lesser Scaup (*Aythya affinis*) 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, 2018b).
St. Bernard Parish	
Biloxi WMA	Biloxi WMA is a brackish to saline marsh which includes several species of vegetation including marsh hay cordgrass, black rush, hog cane, smooth cordgrass, saltgrass, glasswort, and three square The WMA provides habitat to numerous species of fish, crabs, waterfowl, and furbearers. Recreational opportunities in the WMA include hunting, trapping, fishing, boating, and birding (Louisiana Department of Wildlife and Fisheries, n.d. – e).
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 B.

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 Section B and Appendix A.

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

Addressed in EP Appendix A.

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

Addressed in EP Sections E, H, I, K, and Appendix A.

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 Section H and Appendix A.

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 K and Appendix A.

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

Addressed in EP Section B.

3 Consistency Certification

The analysis indicates that Chevron's Initial EP for MC 412 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, Chevron will implement the measures of its Regional OSRP, 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 United States Code 1456(c)(3)(B) and 15 CFR § 930.76(c) for Louisiana is provided on the cover page.

4 References

Baton Rouge Audubon Society. 2010. Peveto Woods Sanctuary. http://www.braudubon.org/conservation/peveto-woods-sanctuary.

Bureau of Ocean Energy Management. 2017. Catastrophic Spill Event Analysis: High-Volume, Extended Duration Oil Spill Resulting from Loss of Well Control on the Gulf of Mexico Outer Continental Shelf. 1st Revision. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. New Orleans, LA. OCS Report BOEM 2017-007. 339 pp. https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Assessment/NEPA/Catastrophic-Spill-Event-Analysis.pdf

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U.S. Fish and Wildlife Service. 2018a. Delta National Wildlife Refuge. http://www.fws.gov/delta/.

U.S. Fish and Wildlife Service. 2018b. Breton National Wildlife Refuge. http://www.fws.gov/breton/.

SECTION O ENVIRONMENTAL IMPACT ANALYSIS (EIA)

The project-specific EIA is included at the end of this plan as Appendix A.

SECTION P ADMINISTRATIVE INFORMATION

(a) EXEMPTED INFORMATION

Proprietary information included in the confidential copy of this EP:

- BHL, TVD, MD and Worst Case Discharge Well Information (pages 3 and 4) on Form BOEM-0137 (OCS Plan Information Form)
- Supplemental Worst Case Discharge Information to comply with NTL No. 2015-N01 in Appendix B
- Correlative well names and information in H_2S Classification
- All items and enclosures under Geological and Geophysical Information
- Seafloor Features Map, Side Scan Sonar Mosaic Map, Seafloor Amplitude Rendering Map, Illustration of 3D Seismic Inline/Crossline, and the Tophole Prognosis Chart in the Wellsite Clearance Letters included as an enclosure in the Confidential Copy

(b) BIBLIOGRAPHY

Any previously submitted EP, DPP, or DOCD; study report; survey report; or other material referenced in this EP or its accompanying information, is listed below:

- Chevron's Regional Oil Spill Response Plan (Regional OSRP)
- Chevron Initial EP N-09930, MC Blocks 122 and 166, OCS-G 34424 and 35318, approved May 12, 2016.

Environmental Impact Analysis

for an

INITIAL EXPLORATION PLAN
for
Mississippi Canyon Block 412 (OCS-G-35969)

Offshore Louisiana

December 2021

Prepared for:

Chevron U.S.A. Inc.
1500 Louisiana Street
Houston, Texas 77002

Prepared by:

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Environmental Impact Analysis
for an
INITIAL EXPLORATION PLAN
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DOCUMENT NO. CSA-CHEVRON-FL-21-3711-01-REP-01-VER01

Internal review process					
Version	Date	Description	Prepared by:	Reviewed by:	Approved by:
INT-01	12/09/2021	Science and TE Review	J. Tiggelaar	K. Gifford	J. Tiggelaar

Client deliverable			
Version	Date	Description	Project Manager Approval
1	12/15/2021	Client deliverable	J. Tiggelaar

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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
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
Chevron	Chevron U.S.A. Inc.
CO	carbon monoxide
dB	decibel
DP	dynamically positioned
DPS	distinct population segment
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*
ha	hectare
HAPC	Habitat Area of Particular Concern
IPF	impact-producing factor
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Mississippi Canyon
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
NAAQS	National Ambient Air Quality Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NTL	Notice to Lessees and Operators
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OSRA	Oil Spill Risk Analysis
OSRP	Oil Spill Response Plan
PAH	polycyclic aromatic hydrocarbons
PM	particulate matter
re	referenced to
SBM	synthetic-based drilling muds
SEL_{24h}	sound exposure level over 24 hours
SO_x	sulfur oxide
SPL	sound pressure level
SPL	root-mean-square sound pressure level
PK	zero-to-peak sound pressure level
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WBM	water-based drilling muds
WCD	worst case discharge

Introduction

Chevron U.S.A. Inc. (Chevron) is submitting an Initial Exploration Plan (EP) for Mississippi Canyon (MC) Block 412 (MC 412). Under this EP, Chevron proposes to drill up to seven wells (A1, A2, A3, A4, RW-W, RW-SE, and RW-S) from a total of four surface hole locations. The Environmental Impact Analysis (EIA) provides information on potential environmental impacts of Chevron's proposed activities.

The project area is approximately 27 mi (43 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 72 mi (116 km) from the onshore support base at Port Fourchon, Louisiana, and 90 mi (145 km) from the helicopter base at Galliano, Louisiana (**Figure 1**). The water depth at the location of the proposed wellsites ranges from approximately 1,455 to 1,561 ft (443 to 476 m). The proposed activities will be completed using a dynamically positioned (DP) drillship. The project is expected to commence in April 2022, with drilling expected to be complete by December 2024

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 Chevron'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 and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NTLs 2008-G04 (extended by 2015-N02 and partially amended by 2020-G01) and 2015-N01. Potential impacts have been analyzed at a broader level in the 2017-2022 Programmatic Environmental Impact Statement (EIS) for the Outer Continental Shelf (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, 2014, 2015, 2016b, 2017a). The most recent multisale EIS contains updated environmental baseline information in light of the Deepwater Horizon incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a,b, 2013, 2014, 2015, 2016b, 2017a,b). Additionally, the NMFS Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico assesses impacts and mitigation measures to listed species under the Endangered Species Act (ESA) (NMFS, 2020a). The analyses from those documents are incorporated here by reference.

All the proposed activities in this plan will be covered by Chevron's Gulf of Mexico Regional Oil Spill Response Plan (OSRP), approved by BSEE on 22 March 2016; biennial review received by BSEE on 1 June 2021 was deemed in compliance with 30 CFR 254 by BSEE on 24 June 2021. Companies covered under this OSRP include Chevron Corporation (02335), Chevron U.S.A. Inc. (00078), Chevron Pipe Line Company (00400), Sabine Pipe Line Company Inc. (00835), Union Oil Company of California (00003), Unocal Pipeline Company (01113), and PRS Offshore, L.P. (01767). The biennial review and update to the OSRP is expected to be deemed in compliance with BSEE on 1 March 2022. The OSRP details Chevron's plan to rapidly and effectively manage oil spills that may result from drilling and production operations. Chevron has designed its spill response program based on a regional capability of response to spills ranging from small operational spills to a worst-case discharge (WCD) from a well blowout. Chevron's spill response program meets the response planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. The OSRP also includes information regarding Chevron's regional oil spill organization and dedicated response assets, potential spill risks, local environmental team organization, and an overview of actions and notifications that will 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 [IPFs]) and **Section C** (Impact Analysis). **Table 1** lists and summarizes the NTLs applicable to the EIA.

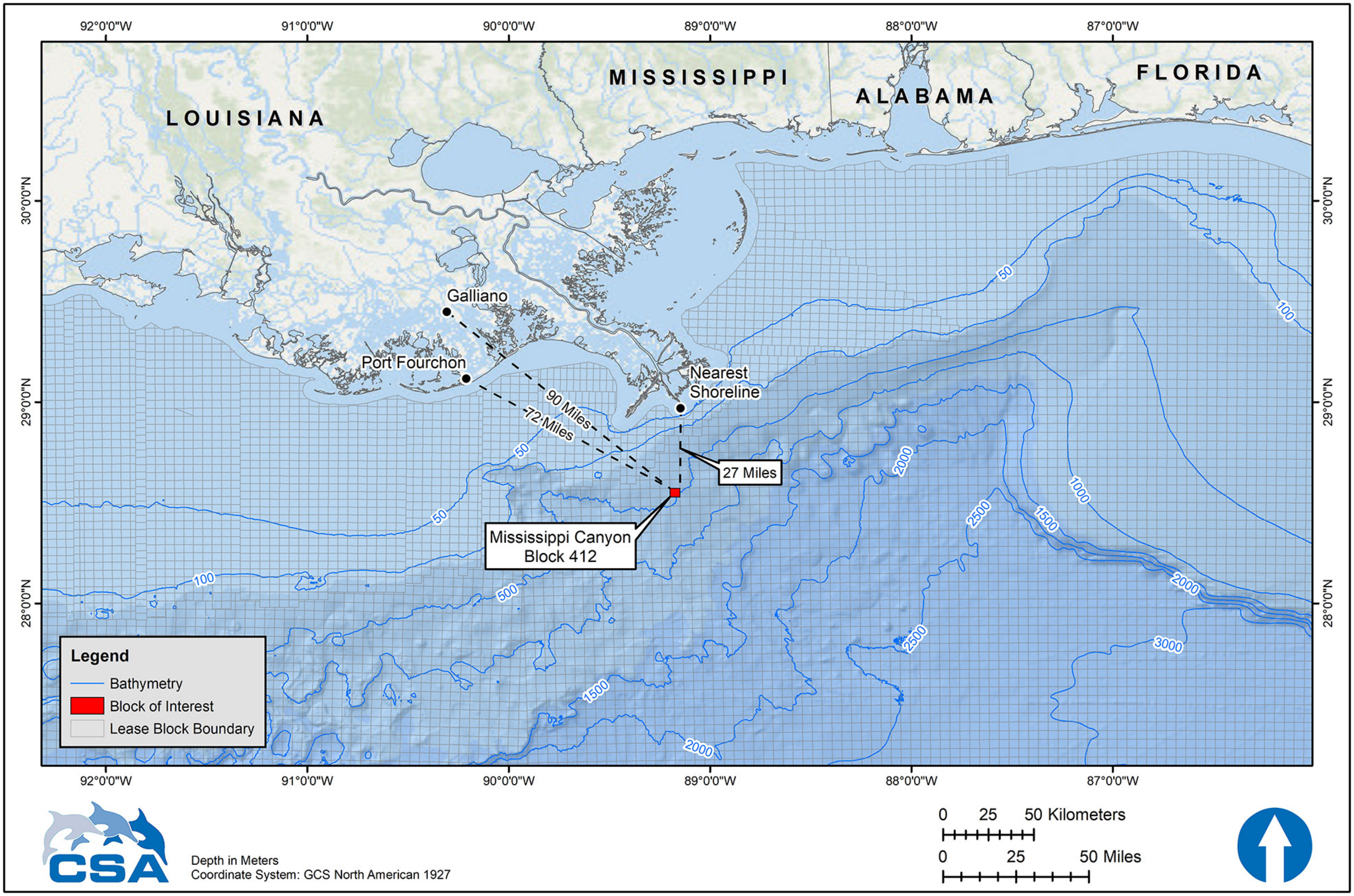

Figure 1. Location of Mississippi Canyon Block 412.

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 (National Marine Fisheries Service [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 striking 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 Appendix C (NMFS, 2020a) replaces compliance with this NTL.
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 Bureau of Ocean Energy Management (BOEM), Bureau of Safety and Environmental Enforcement (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 Appendix A (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. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion Appendix B (NMFS, 2020a) replaces compliance with this NTL.
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 (WCD) and Blowout Scenarios	Provides guidance regarding information required in WCD descriptions and blowout scenarios.

Table 1. (Continued).

NTL	Title	Summary
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.
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 BOEM 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 984 ft (300 m). Prescribes separation distances of 2,000 ft (610 m) from each mud and cuttings discharge location and 250 ft (76 m) 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 984 ft (300 m) 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 Environment Impact Assessment 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.

Table 1. (Continued).

NTL	Title	Summary
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 Chevron's proposed activities, a series of IPFs have been identified. **Table 2** identifies the environmental resources that may be affected in the left column and identifies sources of impacts 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. Where there may be an effect, an analysis 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 marine 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 wells proposed in this EP will be drilled using a DP drillship. DP vessels use a global positioning system, 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 is not feasible. Consequently, there will be no anchoring of the drilling rig during this project. The selected drilling rig is expected to be on site for an estimated 125 days per well to drill and complete, inclusive of mobilization and demobilization time. 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, working and safety lighting on the rig, and underwater sound produced during operations.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources. X = potential impact; dash (--) = no impact or negligible impact.

Environmental Resources	IPFs									
	Drilling Rig Presence (incl. marine 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(9)	--	--	--	--	--	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)
Threatened coral	--	--	--	--	--	--	--	--	--	X(6)
Coastal and Marine Birds										
Marine birds	X	--	--	--	--	--	--	X	X(6)	X(6)
Coastal Birds	--	--	--	--	--	--	--	X	--	X(6)

Table 2. (Continued).

Environmental Resources	IPFs									
	Drilling Rig Presence (incl. marine 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
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)
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.

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 500 ft (152 m) from any no-activity zone; or*
   (d) *Proximity of any submarine bank 500 ft [152 m] buffer zone) with relief greater than 7 ft (2 m) 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 interpreted areas of hard bottom within 2,000 ft (610 m) of the proposed wellsite locations (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d).

(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. While Mississippi Canyon Block 412 is on the list of high-probability blocks for shipwrecks (BOEM, 2011), the project area is well beyond the 60-m depth contour used by BOEM as the seaward extent for prehistoric archaeological site potential in the Gulf of Mexico. The archaeological survey reported that no archaeologically significant sonar contacts were identified within 2,000 ft (610 m) of the proposed wellsites (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d).

(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 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.

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 MODU 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, marine noise generated from MODUs 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.

A.2 Physical Disturbance to the Seafloor

In water depths of 1,969 ft (600 m) 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). For the four surface hole locations proposed in this EP, the total potential area of seafloor disturbance is expected to be approximately 1.0 ha (2.5 ac).

A.3 Air Pollutant Emissions

Offshore air pollutant emissions will result from drilling rig operations as well as support vessel (both supply and crew vessels) and helicopter transits. These emissions occur mainly from combustion of diesel and aviation fuel (Jet-A). The combustion of fuels occurs in diesel-powered generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with emissions from internal combustion engines are suspended particulate matter ($PM_{2.5}$ and PM_{10}), ammonia, lead, sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015).

The Air Quality Emissions Report (see EP Section G) prepared in accordance with BOEM requirements 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. No further analysis or control measures are required.

A.4 Effluent Discharges

The discharges will include treated sanitary and domestic wastes, deck drainage, desalination unit brine, BOP fluid, uncontaminated ballast and bilge water, noncontact cooling water, fire water, water-based drilling muds (WBM) and cuttings, cuttings wetted with synthetic-based drilling muds (SBM), hydrate control fluid, subsea wellhead preservation fluid, leak tracer dye, and excess cement. All offshore discharges will be in accordance with requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit No. GMG290006 issued by the U.S. Environmental Protection Agency (USEPA), including permit compliance terms, discharge volumes, discharge rates, and associated monitoring requirements.

WBM and cuttings will be released at the seafloor during initial well-drilling intervals. The marine riser that enables the return of muds and cuttings to the surface vessel will not be in place during the initial drilling intervals, requiring deposition of drilling muds and cuttings on the seafloor until the riser is in place. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. Once the riser is in place, SBM will be used and collected on the drilling rig through the riser. The collected SBM will be re-used by the vendor or transported to Port Fourchon, Louisiana, for recycling and disposal at an approved facility. Cuttings wetted with SBMs will be treated and discharged to the seafloor in accordance with the NPDES permit.

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. The drilling rig selected for this project will be in compliance with all applicable cooling water intake structure design requirements, monitoring, and limitations.

A.6 Onshore Waste Disposal

Wastes generated during the proposed activities are tabulated in EP Section F. A total of approximately 1,800 lbs per day of trash and debris will be generated over the life of the project. Trash will be transported to shore in disposal bags for final disposal by municipal operators in accordance with applicable regulations. Other wastes transported to shore for re-use, recycling, or disposal include SBM and associated cuttings, chemical product waste (well treatment fluids), and used oil. All wastes will be transported to shore in containers approved by the U.S. Department of Transportation for re-use, recycling, or disposal in accordance with applicable regulations. Compliance with these requirements is expected to result in either no or negligible impacts from this factor.

A.7 Marine Debris

Chevron will comply with all applicable regulations relating to solid waste handling, transportation, and disposal, including the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, and USEPA, U.S. Coast Guard (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. In addition to the regulations in 30 CFR § 250, BSEE issued NTL BSEE-2015-G03 which instructs operators to exercise caution in handling and disposal of small items and packaging materials, requires posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly training and certification process for marine trash and debris awareness. Compliance with these requirements is expected to result in either no or negligible impacts from this factor.

A.8 Support Vessel and Helicopter Traffic

Chevron will use existing shorebase facilities in Port Fourchon, Louisiana, for support vessel activities. Support helicopters are expected to be based at heliport facilities in Galliano, Louisiana. No terminal expansion or construction is planned at either location.

IPFs associated with support vessel and helicopter traffic include their physical presence and operational noise. Each factor is discussed in the following subsections.

A.8.1 Physical Presence

The project will be supported by onshore crew boats and supply vessels. The crew boat is expected to make approximately one trip per week between the shorebase and the project area. The supply boat is expected to make a trip between the shorebase and the project area every two to three days. 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 700 ft (213 m) while in transit offshore, 1,000 ft (305 m) over unpopulated areas or across coastlines, and 2,000 ft (610 m) overpopulated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (NMFS, 2020a).

A.8.2 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 sound (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° from vertical is mostly reflected from the sea surface and does not propagate into the water (Richardson et al., 1995). The duration of underwater sound from passing aircraft is much shorter in water than air; for example, a helicopter passing at an altitude of 500 ft (152 m) that is audible in air for 4 minutes may be detectable under water for only 38 seconds at 10 ft (3 m) depth and for 11 seconds at 59 ft (18 m) depth (Richardson et al., 1995).

Dominant tones in noise spectra from helicopters are below 500 Hz with a source levels ranging from approximately 149 to 151 dB re 1 µPa m (for a Bell 212 helicopter) (Richardson et al., 1995). Levels of noise received underwater 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). 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 focus 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 Chevron's spill response plans. Impacts are analyzed in **Section C**.

Recent EISs (BOEM, 2012a,b, 2013, 2014, 2015, 2016b, 2017a) 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 a H_2S release, are discussed briefly below.

<u>Loss of Well Control</u>. 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, 2017a). 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, 2017a). BOEM (2016a) noted that most OCS blowouts have resulted in the release of gas.

Chevron has a robust system in place to prevent loss of well control. Measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early intervention in the event of a blowout are 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.

<u>Vessel Collisions</u>. 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 in 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 (2017a), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. Chevron will comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard the 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. Chevron 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). Completion, workover, and treatment fluids are the largest quantity used and comprise 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 1 bbl. 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, 2017a).

Drilling Fluid Spills. There is the potential for drilling fluids, specifically SBMs, to be spilled due to an accidental riser disconnect (BOEM, 2017a). SBMs are relatively nontoxic to the marine environment and have the potential to biodegrade (BOEM, 2014). 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 (e.g., see Stout and Payne, 2018). Benthic impacts would be similar to those described in **Section C.2.1**. The potential for riser disconnect SBM spills will be minimized by adhering to the requirements of applicable regulations.

H_2S Release. MC 412 is classified as H_2S absent.

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, 2017a). 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 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 suspended solids loads (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 (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 was estimated using the National Oceanic and Atmospheric Administration's (NOAA) Automated Data Inquiry for Oil Spills 2 (ADIOS2) model (NOAA, 2016a). 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, 2016a). 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 ADIOS2 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 27 mi (43 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. EP Section H provides a discussion of Chevron's response efforts if a spill were to occur during operational activities associated with the EP.

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 Chevron's Regional OSRP, which meets the requirements contained in 30 CFR Part 254.

A.9.2 Large Oil Spill (Worst Case Discharge)

Spill Size. The WCD scenario for this project is defined as an uncontrollable oil discharge from the subsea wellbore resulting from a blowout incident during drilling operations. The initial Open Flow Potential Rate was calculated with systems analysis using the Prosper nodal software package from Petroleum Experts, Ltd. With the assumptions outlined below, systems analysis indicates that an uncontrolled blowout in the 8-1/2-inch × 9-1/2-inch open hole section will lead to a maximum Worst Case Discharge Scenario initial flow rate of 261,867 Based on an estimated 115 days required to drill a relief well and conduct a kill operation, the total potential spill volume is estimated at 28,405,671 bbl. Production decline is expected and assumed to occur; however, sand bridging has not been assumed in the calculations.

Blowout Scenario. Chevron prepared this blowout scenario pursuant to guidance provided in NTL No. 2015-N01. Based on NTL No. 2015-N01 guidance, the total time required to drill the relief well and conduct the kill operation in an uncontrolled blow-out is 115 days. The Total Potential Spill Volume is estimated at 28,405,671 bbl using the predicted rate profile.

Spill Probability. Holland (1997) estimated a probability of 0.0021 for a deep drilling blowout during exploration drilling based on U.S. Gulf of Mexico data. The International Association of Oil & Gas Producers (2010) conducted an analysis and estimated a blowout frequency of 0.0017 per exploratory well for non-North Sea locations. BOEM updated OCS spill frequencies (bbl spilled per bbl produced) to include the Macondo incident. According to ABS Consulting Inc. (2016), the spill rate for spills >1,000 bbl dropped to 0.22 spills per billion bbl produced. According to the ABSG Consulting (2018) analysis, the baseline risk of loss of well control spill >10,000 bbl on the OCS is estimated to be once every 27.5 years.

Spill Trajectory. The fate of a large oil spill in the project area would depend on meteorological and oceanographic conditions at the time. 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 the 30-day OSRA model for Launch Area 56 (where MC 412 is located) are presented in **Table 3**. The model predicts up to a 6% chance of shoreline contact within 3 days of a spill (Lafourche and Plaquemines parishes, Louisiana), up to 13% chance of shoreline contact within 10 days of a spill (Terrebonne, Lafourche, and Plaquemines parishes, Louisiana), and up to 16% chance of shoreline contact within 30 days of a spill (shorelines ranging from Matagorda County, Texas, to Escambia County, Florida; **Table 3**). Counties with a conditional probability for shoreline contact of <0.5% for 3, 10, and 30 days are not shown in **Table 3**.

Table 3. Conditional probabilities of a spill in the project area 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 OSRA Launch Area 56 could contact shoreline segments within 3, 10, or 30 days.

Shoreline Segment	County or Parish and State	Conditional Probability of Contact[1] (%)		
		3 Days	10 Days	30 Days
C08	Matagorda County, Texas	--	--	1
C10	Galveston County, Texas	--	--	2
C12	Jefferson County, Texas	--	--	1
C13	Cameron Parish, Louisiana	--	--	3
C14	Vermilion Parish, Louisiana	--	--	2
C15	Iberia Parish, Louisiana	--	--	1
C17	Terrebonne Parish, Louisiana	--	3	5
C18	Lafourche Parish, Louisiana	1	4	5
C19	Jefferson Parish, Louisiana	--	1	2
C20	Plaquemines Parish, Louisiana	6	13	16
C21	St. Bernard Parish, Louisiana	--	--	1
C24	Jackson County, Mississippi	--	--	1
C27	Escambia 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 56) 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.

BOEM presented additional OSRA modeling to simulate a spill that continues for 90 consecutive days, with each trajectory tracked for 60 days during four seasons. In this updated OSRA model (herein referred to as the 60-day OSRA model), 60 days was chosen as a conservative estimate of the maximum duration that spilled oil would persist on the sea surface following a spill (BOEM, 2017b). The spatial resolution is limited, with five launch points in the entire Western and Central Planning Areas of the Gulf of Mexico. These launch points were deliberately located in areas identified as having a high possibility of containing large oil reserves. The 60-day OSRA model launch point most appropriate for modeling a spill in the project area is Launch Point 3. The 60-day OSRA results for Launch Point 3 are presented in **Table 4**.

Table 4. Shoreline segments with a 1% or greater conditional probability of contact from a spill starting at Launch Point 3 based on the 60-day Oil Spill Risk Analysis (OSRA). Values are conditional probabilities that a hypothetical spill in the project area could contact shoreline segments within 60 days. Modified from: BOEM (2017a).

Season	Spring				Summer				Fall				Winter			
Day	3	10	30	60	3	10	30	60	3	10	30	60	3	10	30	60
County or Parish	Conditional Probability of Contact[1] (%)															
Cameron, Texas	--	--	--	--	--	--	--	2	--	--	--	1	--	--	--	1
Willacy, Texas	--	--	--	--	--	--	--	1	--	--	--	1	--	--	--	2
Kenedy, Texas	--	--	--	--	--	--	1	5	--	--	--	2	--	--	--	3
Kleberg, Texas	--	--	--	--	--	--	1	3	--	--	1	2	--	--	--	2
Nueces, Texas	--	--	--	--	--	--	--	2	--	--	1	2	--	--	--	3
Aransas, Texas	--	--	--	--	--	--	--	2	--	--	1	2	--	--	--	3
Calhoun, Texas	--	--	--	--	--	--	--	3	--	--	1	2	--	--	1	4
Matagorda, Texas	--	--	3	5	--	--	1	4	--	--	2	5	--	--	3	10
Brazoria, Texas	--	--	3	3	--	--	2	5	--	--	1	2	--	--	3	8
Galveston, Texas	--	--	3	5	--	--	2	3	--	--	1	2	--	--	2	5
Jefferson, Texas	--	--	4	5	--	--	1	1	--	--	--	--	--	--	1	2
Cameron, Louisiana	--	--	9	11	--	--	1	3	--	--	--	2	--	--	1	3
Vermilion, Louisiana	--	1	5	6	--	--	1	1	--	--	--	--	--	--	1	2
Iberia, Louisiana	--	1	3	3	--	--	--	--	--	--	--	--	--	--	--	1
St. Mary, Louisiana	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Terrebonne, Louisiana	--	5	12	13	--	--	1	2	--	--	1	1	–	1	2	2
Lafourche, Louisiana	--	2	5	6	--	--	1	2	--	--	--	--	--	--	1	2
Jefferson, Louisiana	--	--	1	1	--	--	--	1	--	--	--	--	--	--	--	--
Plaquemines, Louisiana	--	3	10	10	--	--	2	3	--	--	--	--	--	--	2	2
St. Bernard, Louisiana	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Baldwin, Alabama	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Escambia, Florida	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Okaloosa, Florida	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
Bay, Florida	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--
Miami-Dade, Florida	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--
State Coastline	Conditional Probability of Contact[1] (%)															
Texas	--	--	13	19	--	--	7	30	--	--	7	21	--	--	11	44
Louisiana	--	12	46	52	--	2	6	12	--	1	2	4	–	2	8	12
Mississippi	--	--	1	1	--	--	--	1	--	--	--	--	--	--	--	--
Alabama	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Florida	--	--	2	5	--	--	--	2	--	--	--	--	--	--	--	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 could contact shoreline segments within 60 days.

From Launch Point 3, potential shorelines with a 1% or greater conditional probability of contact within 60 days range from Cameron County, Texas (summer and fall season), to Miami-Dade County, Florida (summer season). Based on statewide contact probabilities within 60 days, Louisiana has the highest likelihood of contact during spring (52% conditional probability), while Texas has the highest probability of contact in summer, fall, and winter (ranging from 21% to

44% conditional probability). The model predicts potential contact with Mississippi shorelines in spring and summer with a 1% conditional probability (within 60 days of a spill). Florida shorelines are predicted to be potentially contacted during spring, summer, and winter, with a probability up to 2%. Based on the 60-day trajectories, counties or parishes with 10% or greater contact probability during any season include Matagorda County in Texas and Cameron, Terrebonne, and Plaquemines parishes in Louisiana (**Table 4**).

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 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.

<u>Weathering</u>. 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 weight % 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. Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface.

<u>Spill Response</u>. See EP Section H for a detailed description of Chevron's site-specific response to the WCD for this EP. These sections, along with Chevron's OSRP, also include a description of surface and subsea containment capabilities that could be implemented in the event of the WCD for this EP.

All the proposed activities in this plan will be covered by Chevron's Gulf of Mexico Regional OSRP, approved by BSEE on 22 March 2016; biennial review received by BSEE on 1 June 2021 was deemed in compliance with 30 CFR 254 by BSEE on 24 June 2021. Chevron has certified that it has the capability to respond to the maximum extent practical to a WCD from all Chevron facilities in the Gulf of Mexico.

B. Affected Environment

The project area is approximately 27 mi (43 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 72 mi (116 km) from the onshore support base at Port Fourchon, Louisiana, and 90 mi (145 km) from the helicopter base at Galliano, Louisiana (**Figure 1**). Water depths at the proposed wellsites range from approximately 1,455 to 1,561 ft (443 to 476m) (**Figure 2**).

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, 2014, 2015, 2016b, 2017a). These regional descriptions 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**.

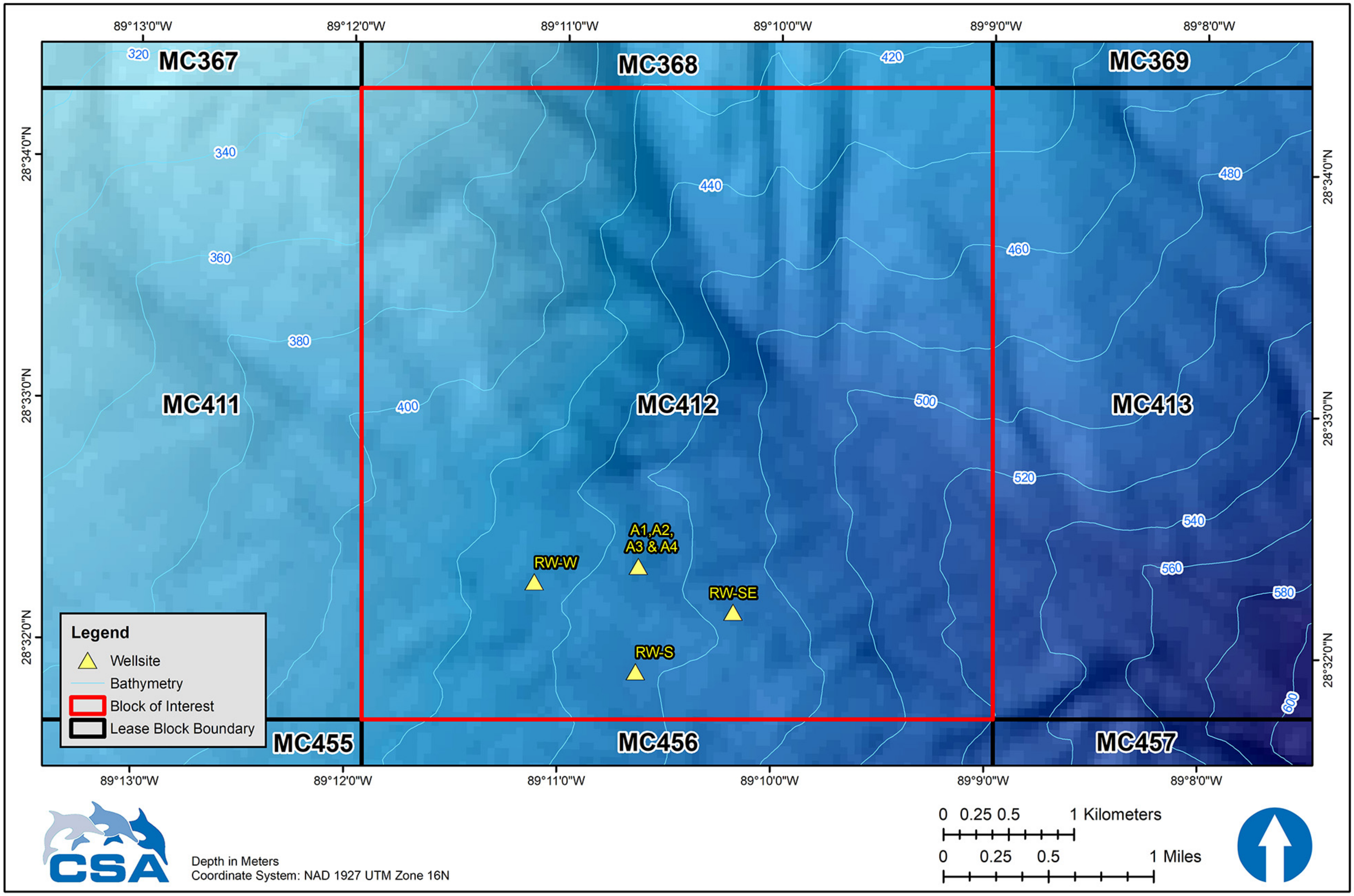

Figure 2. Bathymetric map of the project area showing the surface hole location of the proposed wellsite in Mississippi Canyon Block 412.

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, 2014, 2015, 2016a,b, 2017a). The information in these documents is incorporated by reference. Potential site-specific issues are addressed in this section, which is organized by the environmental resources identified in **Table 2** and addresses each potential IPF.

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 lack of sources offshore, air quality at the wellsite is expected to be good. The attainment status 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 November 2021, Mississippi, Alabama, and Florida Panhandle coastal counties are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2021). 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). One coastal metropolitan area in Florida (Tampa) was reclassified in October 2018 from a nonattainment area to maintenance status for lead based on the 2008 Standard (USEPA, 2021).

As noted earlier, based on calculations made pursuant to applicable regulations, 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 $PM_{2.5}$ and PM_{10}, ammonia, lead, SO_x, NO_x, VOCs, and CO. 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. The incremental contribution to cumulative impacts from activities similar to Chevron's proposed activities is not significant and is not expected to cause or contribute to a violation of NAAQS. Given the levels of expected emissions and the distance of the project from shore, emissions from the activities described in Chevron's EP are not likely to contribute to violations of any NAAQS onshore.

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 area and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2016a). Carbon dioxide and methane emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to the Programmatic and OCS lease sale EISs (BOEM, 2016a, 2017a), estimated carbon dioxide 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, 2017a), 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 heights, emission rates, and the distance of these emissions from the coastline. The Air Quality Emissions Report (see EP Section G) 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 Class I air quality area. Chevron is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from the proposed project may affect the Breton Class I area. Additional review and mitigation measures may be required for sources within 186 mi (300 km) of the Breton Class I area that exceed emission limits agreed upon by the administering agencies (National Park Service, 2010). The project area is approximately 72 mi (116 km) from the Breton Wilderness Area. Chevron intends to comply with all BOEM requirements regarding air emissions. No further analysis or control measures are required.

There are three Class I air quality areas on the west coast of Florida: St. Mark's Wildlife Refuge in Wakulla County, Florida, Chassahowitzka Wilderness Area in Hernando County, Florida, and Everglades National Park in Monroe, Miami-Dade, and Collier counties, Florida. The project area is approximately 298 mi (480 km) from the closest Florida Class I air quality area (Saint Mark's Wildlife Refuge Class I Air Quality Area). Chevron will comply with emissions requirements as directed by BOEM. No further analysis or control measures are required.

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, 2017a). The probability of a small spill would be minimized by Chevron's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to reduce the potential impacts. EP Section H includes a detailed discussion of the spill response measures that would be employed. Given the open ocean location of the project area, the extent and duration of air quality impacts from a small spill would not be significant.

A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The ADIOS2 model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2016a). 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 should not affect coastal air 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 impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a, 2015, 2016b, 2017a).

A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation from the slick. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time 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 USEPA.

Because of the project area's location 27 mi (43 km) from the nearest shoreline, most air quality impacts would occur in offshore waters.

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 homogeneous with respect to temperature, salinity, and oxygen (BOEM, 2017a). 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 natural seepage of oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No confirmed natural seeps were noted within 2,000 ft (610 m) of the proposed wellsites (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d).

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 SBM cuttings 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 drilling rig are expected to be treated to 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 as the cuttings sink through the water column (Neff et al., 2000). No persistent impacts on water quality in the project area are expected.

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. Discharges of drilling muds and cuttings are likely to have little 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). WBMs typically have low toxicity and there is little chance of toxic effects on water column organisms.

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. 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 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 hydraulic fluids; hydrate control fluid, subsea wellhead preservation fluid, leak tracer dye, 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 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, 2017a). The probability of a small spill would be minimized by Chevron's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to potentially help mitigate and reduce the impacts. EP Section H 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 oil constituents is light to intermediate and can be readily degraded by aerobic microbial oxidation. Diesel oil 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 oil 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 oil 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 oil 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 suspended solid loads (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 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, 2016a) (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 oil 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, 2017a).

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 VOCs released. 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. Results suggest deepwater 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 27 mi (43 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 3**) indicates nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days).

C.2 Seafloor Habitats and Biota

Water depths at the locations of the proposed wellsites range from approximately 1,455 to 1,561 ft (443 to 476 m). 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 letters did not note the presence of hard bottom areas within 2,000 ft (610 m) of the proposed wellsites that could support deepwater benthic communities (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d).

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 the vicinity and in similar water depths of the proposed wellsites.

Table 5. Baseline benthic community data from stations near the project area 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)	Density		
		Meiofauna (individuals m^{-2})	Macroinfauna (individuals m^{-2})	Megafauna (individuals ha^{-1})
MT2	680	535,216	6,172	370
C1	336	369,129	4,829	239

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006). m = meters; ha = hectares.

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 369,000 to 535,000 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 equation presented by Wei (2006), macroinfaunal densities in the water depths of the project area are expected to range from approximately 4,772 to 4,890 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 1, which includes stations on the upper Texas-Louisiana Slope, the west flank of the upper Mississippi Fan, the head of Mississippi Canyon, and the upper West Florida Terrace. The most abundant species in this zone were the polychaetes *Litocorsa antennata*, *Prionospio cirrifera*, and *Aricidea suecica*; the amphipod *Ampelisca mississippina*; and the bivalve *Heterodonta* spp (Wei, 2006).

The megafaunal density at a nearby station (MT2) in the vicinity of the project area was 370 individuals ha^{-1}. Common megafauna included motile groups such as decapods, ophiuroids, holothurians, and demersal fishes as well as sessile groups such as sponges and anemones (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 drillships 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 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 localized and will not likely have a significant impact on soft bottom benthic communities in the region.

Impacts of Effluent Discharges

Drilling muds and cuttings are the only effluents that are likely to affect benthic communities. During initial well interval(s) before the marine riser is set, cuttings and water-based mud will be released at the seafloor. Approximately 800 bbl per well of 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, 2015). 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 area within meters to tens of meters of the wellbore.

Discharges of washed 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, washed cuttings with adhering SBMs tend to clump together and form thick cuttings 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 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 1,640 ft (500 m), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. 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 drilling discharges are expected to have no significant impact on 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 984 ft (300 m) radius. While coarse sediments (sands) would probably settle at a rapid rate within 1,312 ft (400 m) 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, 2017a). During the *Deepwater Horizon* incident, subsurface oil plumes were reported in water depths of approximately 3,600 ft (1,100 m), extending at least 22 mi (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 features or areas that could support 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 1,640 ft (500 m) 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 letters did not identify any hard bottom that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed wellsites (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d). The nearest known high-density deepwater benthic community to the project area is approximately 58 miles (93) km away in Mississippi Canyon Block 969.

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 984 ft (300 m) of the wellhead (BOEM, 2012a, 2013). However, based on the site clearance letters for the proposed wellsites (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d), there are no seafloor features that could support high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed wellsites. 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, 2017a). During the *Deepwater Horizon* spill, subsurface plumes were reported at a water depth of approximately 3,600 ft (1,100 m), extending at least 22 mi (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, 2017a). 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 prior to the use of dispersants.

Numerous papers have been published discussing the nature of subsea oil plumes (e.g., Ramseur, 2010; 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, 2017a). 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, 2017a).

C.2.3 Designated Topographic Features

The 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 18 mi (29 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. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up 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 60 mi (97 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. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up 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 328 ft (100 m) 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 100 mi (161 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. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume up 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 ESA. In addition, it includes all marine mammal species in the region, 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 National Marine Fisheries Service (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 (*Trichechus manatus*), 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 USFWS (2020a) and NOAA Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice's whale	*Balaenoptera ricei*[1]	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)
Fishes					
Oceanic whitetip shark	*Carcharhinus longimanus*	T	X	--	None
Giant manta ray	*Mobula birostris*	T	X	X	None

Table 6. (Continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
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
Terrestrial Mammals					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	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, NMFS 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. On 30 March 2017, the USFWS announced the West Indian manatee, including the Florida manatee subspecies, was reclassified as threatened.

[3] The loggerhead turtle is composed of nine distinct population segments (DPS). The only DPS that may occur in the project area (Northwest Atlantic DPS) is listed as threatened (76 *Federal Register* [FR] 58868; 22 September 2011).

The sperm whale (*Physeter macrocephalus*), five species of sea turtles, and the oceanic whitetip shark (*Carcharhinus longimanus*) are the only Endangered or Threatened species likely to occur in or near 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.
Five endangered mysticetes (blue whale [*Balaenoptera musculus]*, fin whale [*B. physalus]*, humpback whale (*Megaptera novaeangliae*), North Atlantic right whale [*Eubalaena glacialis]*, and sei whale [*B. borealis])* have been reported in the Gulf of Mexico, but are considered rare or extralimital (Würsig et al., 2000). These species are not included in the most recent NMFS stock

assessment report (Hayes et al., 2021) nor in the most recent BOEM multisale EIS (BOEM, 2017a); 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 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 Threatened giant manta ray (*Mobula birostris*) is known from the Gulf of Mexico and could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks.

Seven Threatened coral species are known to be present in the 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*). None of these species are expected to be present in the project area (see **Section C.3.15**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are reasonably likely to be adversely affected by either routine or accidental events.

C.3.1 Sperm Whale (Endangered)

The only 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).

In 2013, NMFS conducted a status review to consider designating the Gulf of Mexico population of the sperm whale as a DPS under the ESA but concluded that the designation of a Gulf of Mexico DPS for sperm whales was not warranted (78 *FR* 68032).

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 656- and 3,280-ft (200- and 1,000-m) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 9,843 ft (3,000 m). Generally, groups of sperm whales sighted in the Gulf of Mexico during the Minerals Management Service funded Sperm Whale Seismic Study 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 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. The Sperm Whale Seismic Study results 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, 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 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.

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 nonlethally 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, 2015a; 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, with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, vessel-related noise is likely to be heard by sperm whales. Frequencies <150 Hz produced by the drilling operations 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 that primarily produce sounds between 30 Hz and 5 kHz (Wartzok and Ketten, 1999). Generally, most of the acoustic energy produced by sperm whales is present at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with source levels up to 236 dB re 1 µPa m (Møhl et al., 2003).

It is expected that, due to the relatively stationary nature of the proposed drilling operations, sperm whales would avoid the proposed operations area, and noise levels that could cause auditory injury would not be encountered. Noise associated with proposed vessel operations may cause behavioral disturbance effects to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic sounds, 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 (National Research Council, 2003b).

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 *Federal Register* (*FR*) 1871. 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 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, 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 a 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 a 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 will contribute to increases in the ambient marine noise environment of the Gulf of Mexico, but it is not expected in amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activity may cause disturbance effects, primarily avoidance or temporary displacement from the project area. Drilling rig lighting and presence are not identified as IPFs for sperm whales (NMFS, 2007; BOEM, 2016a, 2017a).

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 strikes, which are identified as a threat in the recovery plan for this species (NMFS, 2010b). To reduce the potential for vessel strikes, BOEM issued BOEM-2016-G01. 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. This recommends the use of a species guide to identify protected species. Appendix C of NMFS (2020a) directs that third-party observers or crew are required to have completed a protected species observer program. Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. When whales are sighted, vessel operators and crews are required to maintain a distance of 328 ft (100 m) or greater from the sighted animal whenever possible (NMFS, 2020a). Vessel operators are required to reduce vessel speed to 10 knots or less, if safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. 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 strikes as well as reduce the chance for disturbing sperm whales.

NMFS (2020a) analyzed the potential for vessel strikes and harassment of sperm whales. With implementation of the mitigation measures in NTL BOEM-2016-G01, 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 population level. With the implementation of the NMFS vessel strike 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 strikes 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 800 ft (245 m). 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 1,180 ft (360 m) 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 700 ft (213 m) 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. In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (BOEM, 2016a, 2017a; NMFS, 2020a). 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 (2017a). 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 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, 2016a). 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 Chevron’s preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Chevron’s OSRP 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 and therefore potential for impacts to occur would be very brief.

Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017a). 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., 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, 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 strikes, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking 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 (*Balaenoptera ricei*) through DNA analysis. The reclassification was approved by NMFS under 86 FR 47022 and will be 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 most frequently sighted in the waters over the DeSoto Canyon between the 328 ft (100 m) and 3,280 ft (400 m) isobaths (Rosel et al., 2016; Hayes et al., 2021). Based on the available data, it is possible 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. The listing was effective on 15 May 2019. 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.

IPFs that could affect the Rice's whales 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. It is unlikely that the Rice's whales could occur in the project area. 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 whales (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**).

Impacts of Drilling Rig Presence, Marine Noise, and Lights

Noise produced by the drilling rig and construction vessel 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 weak in intensity, and an individual animal's noise 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). Noise produced by the drilling rig and construction vessel may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Source levels associated with drilling and installation activities is relatively weak in intensity, and an individual animal's noise exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) noise with a maximum source level ranging from 180 to 190 dB re 1 µPa m (Hildebrand, 2005).

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. Therefore, vessel related noise is likely to be heard by Rice's whales. Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans.

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. The drilling rig will be located within a deepwater, open ocean environment. Sounds generated by drilling operations 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 Gulf of Mexico, but it is not expected to be in amplitudes sufficient enough to cause hearing effects to Rice's whales and due to the low density of Rice's whales in the Gulf of Mexico, no significant impacts are expected.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Rice's whales and creates the potential for vessel strikes. To reduce the potential for vessel strikes, 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 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. When baleen whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 1,640 ft (500 m) or greater whenever possible (NMFS, 2020a). Vessel operators are required to reduce vessel speed to 10 knots or less, when safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. 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 strikes 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 whales occur 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. Based on studies of cetacean responses to sound, the observed responses to brief overflights by aircraft were short-term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 700 ft (213 m) 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 1,000 ft (305 m) within 328 ft (100 m) of marine mammals (NMFS, 2020a). Due to the brief potential for disturbance and the low density of Rice's whales thought to reside 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, 2017a). 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 Chevron's OSRP will mitigate and reduce the potential for impacts on Rice's whales. Given the open ocean location of the project area and the duration of a small spill, any impacts are expected to be brief.

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, 2016a). The area of diesel fuel on the sea surface 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 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 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, 2017a), and NMFS (2020a). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by 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, noise, 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 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., 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 strikes, entanglement, or other injury or stress. 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. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking 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 occur within the project area and surrounding waters. 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 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 rarely been seen in deepwater areas, usually in 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 on the OCS during seismic mitigation surveys in mean water depths of over 1,969 ft (600 m) (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 27 mi (43 km) from the nearest shoreline (Plaquemines Parish, 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. In certain cases, guidance in Appendix A of NMFS (2020a) replaces guidance in the NTL per the June 2020 reissued BSEE-NTL-2015-G03.

Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel strikes, 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 strikes, 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 striking 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. Vessel strike avoidance measures described in NMFS (2020a) for the marine mammal species managed by that agency may also provide some additional indirect protections to manatees.

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

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

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 30-day OSRA modeling (**Table 3**) indicates nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days). No manatee critical habitat is designated within this range.

In the event that manatees are 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, 2017a). Indirect impacts include stress from the activities and 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 prey availability and 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 strikes, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing these animals, and therefore no significant impacts are expected.

The current PBR level for the Florida subspecies of Antillean 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 marine mammals that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales (*Kogia sima* and *K. breviceps*, respectively), 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 (*Stenella attenuata*), spinner dolphin (*S. longirostris*), and Clymene dolphin (*S. clymene*).

A brief summary is presented below, and additional information on these groups is presented by BOEM (2017a).

Dwarf and pygmy sperm whales. At sea, it is difficult to differentiate dwarf sperm whales from pygmy sperm whales, 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; Hayes et al., 2019, 2021). 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 (*M. bidens*), Gervais' beaked whale (*M. europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records (Würsig et al., 2000) 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 Gulf of Mexico side of Florida (Taylor et al., 2008). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000; Würsig, 2017).

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 3,281 ft (1,000 m) over lower slope and abyssal landscapes (Davis et al., 2000; Hldebrand 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 (*S. frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin, false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin, pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin, and striped dolphin (*S. coeruleoalba*). Any of these species could occur in the project area (Waring et al., 2016; Hayes et al., 2021).

The bottlenose dolphin 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, 2017a).

Noise from routine drilling and well completion operations have 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 (*Kogia* spp.) are in the high-frequency functional hearing group (NMFS, 2018b). 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 sound sources are out of 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 a SEL_{24h} of 198 dB re 1 μPa^2 s over a 24-hour period (NMFS, 2018a). Similarly, temporary threshold shifts are estimated to occur when a mammal has received a SEL_{24h} 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 drilling activities, it is not expected that any marine mammals will remain in proximity to the source for a full 24-hour period to receive SEL_{24h} necessary for the onset of auditory threshold shifts.

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 a behavioral reaction in some marine mammal species. The SPL 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 noise regime, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Support vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017a). Drilling rig lighting and rig presence are not identified as IPFs for marine mammals by BOEM (2017a).

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 strikes. Data concerning the frequency of vessel strikes are presented by BOEM (2012a). To reduce the potential for vessel strikes, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessels slow down or stop to avoid striking 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 328 ft (100 m) for toothed whales and 1,640 ft (500 m) for baleen whales or greater when sighted and 164 ft (50 m) 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.

Compliance with these mitigation measures will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing cetaceans. 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 whale = 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 to the local (Gulf of Mexico) stocks of these species.

Helicopter traffic also has the potential to disturb marine mammals (Würsig et al., 1998). However, while flying offshore, helicopters maintain altitudes above 700 ft (213 m) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 1,000 ft (305 m) within 328 ft (100 m) of marine mammals NMFS, 2020a). Maintaining this altitude will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017a).

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 Marine Mammal Commission (2011) and Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

In the unlikely event of a spill, implementation of Chevron's OSRP is expected to lessen the potential for impacts on marine mammals. EP Section H 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 noise 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 (2017a). 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 noise 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, 2017a). 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 strikes, entanglement or other injury, or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking 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, 2017a).

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 whale = 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 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, Kemp's ridley, and hawksbill turtles. As of 06 May 2016, the entire North Atlantic DPS of the green turtle is listed as Threatened (81 *FR* 20057). The DPS of loggerhead turtles that occurs in the Gulf of Mexico is listed as Threatened, although other DPSs are Endangered.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 3**. 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 mi (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).

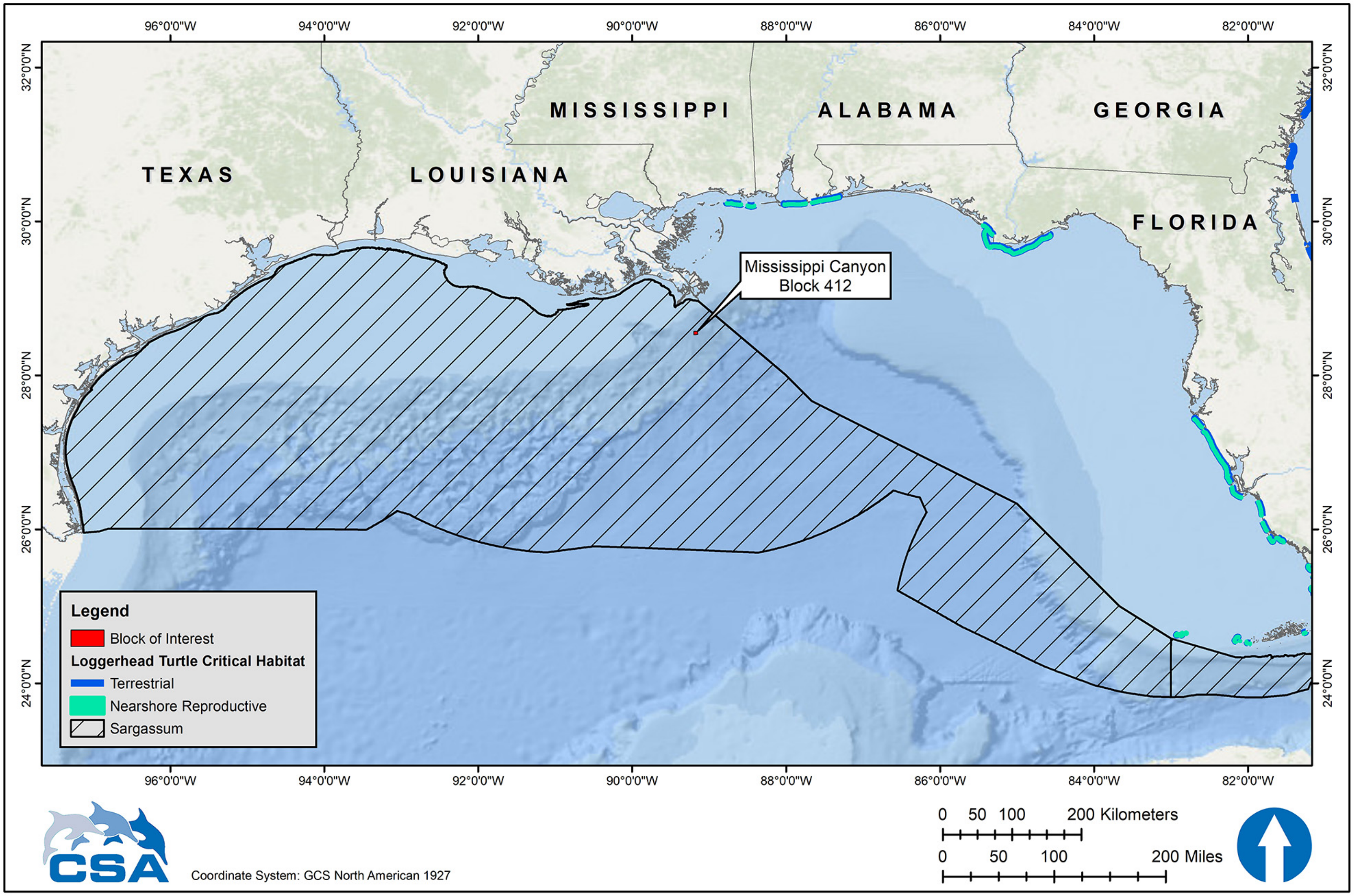

Figure 3. Location of loggerhead turtle designated critical habitat in relation to the project area.

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 116 mi (187 km) from the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 3**).

Leatherback and loggerhead turtles are the most likely species to be present near the project area as adults. Green, hawksbill, and Kemp's ridley turtles are typically inner shelf and nearshore species, unlikely to occur near the project area as adults. 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 floating mats of *Sargassum* 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. Leatherback turtles are the most pelagic of the sea turtles, feeding primarily on jellyfish.

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, 2018a) 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, 2018b,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 195 Kemp's ridley turtle nests have been counted on Texas beaches for the 2021 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, 2021). 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, although there have been occasional reports of Kemp's ridleys nesting in Alabama (Share the Beach, 2016).
- 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 potentially may 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, the intermittent nature of the discharges, and the mobility of sea turtles.

Though NMFS (2020a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G03 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 (See **Table 2**).

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. There is scarce information regarding hearing and acoustic thresholds for marine turtles.

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 1,000 Hz (Ketten and Bartol, 2005; Dow Piniak et al., 2012). 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. No distinction is made between impulsive and non-impulsive sources for these thresholds. 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. 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 strikes. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997; NMFS, 2020a). 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 strikes, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for sea turtles 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. When sea turtles are sighted, vessel operators and crews are required to maintain a distance of 164 ft (50 m) or greater whenever possible (NMFS, 2020a). Compliance with these mitigation measures will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing sea turtles. Therefore, no significant impacts are expected.

Noise generated from support helicopter traffic also has the potential to disturb sea turtles. However, while flying offshore, helicopters maintain altitudes above 700 ft (213 m) 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, 2020a; BOEM, 2012a).

Impacts of a Small Fuel Spill

Potential spill impacts on sea turtles are discussed by NMFS (2020a) and BOEM (2017a). 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 Chevron's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to minimize potential impacts on sea turtles. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

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 noise of response vessels and aircrafts (NMFS, 2020a). 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, 2016a). 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.

<u>Loggerhead Critical Habitat – Nesting Beaches</u>. 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 116 mi (187 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.

Loggerhead Critical Habitat – *Sargassum*. The project area is within the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**). If juvenile sea turtles come into contact with or ingest diesel oil, impacts could include death, injury, or other sublethal effects. 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, 2014a). In the unlikely event of a spill, implementation of Chevron's OSRP is expected to minimize the potential for these types of impacts on sea turtles. EP Section H 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, 2020a).

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).

Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days). The nearest nearshore reproductive critical habitat for the loggerhead turtle is located in Jackson County, Mississippi, approximately 116 mi

(187 km) from the project area and is predicted by the 60-day OSRA model to have a <0.5% or less conditional probability of contact within 60 days of a spill.

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 3**) (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. However, the 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014). It is unlikely that the entire 40,662,810 ha (100,480,000 ac) of *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* spp. is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* spp. vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to *Sargassum* and its associated communities (BOEM, 2017a). *Sargassum* spp. 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 *Sargassum* spp. The *Sargassum* spp. 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* spp. 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* spp. community would be expected to occur within a short time (BOEM, 2017a).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sea turtles and potentially result in vessel strikes, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 (see **Table 1**) to reduce the potential for striking or disturbing sea turtles. 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 (*Charadrius melodus*) 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, 2018). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 4**). 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 (USFWS, nd).

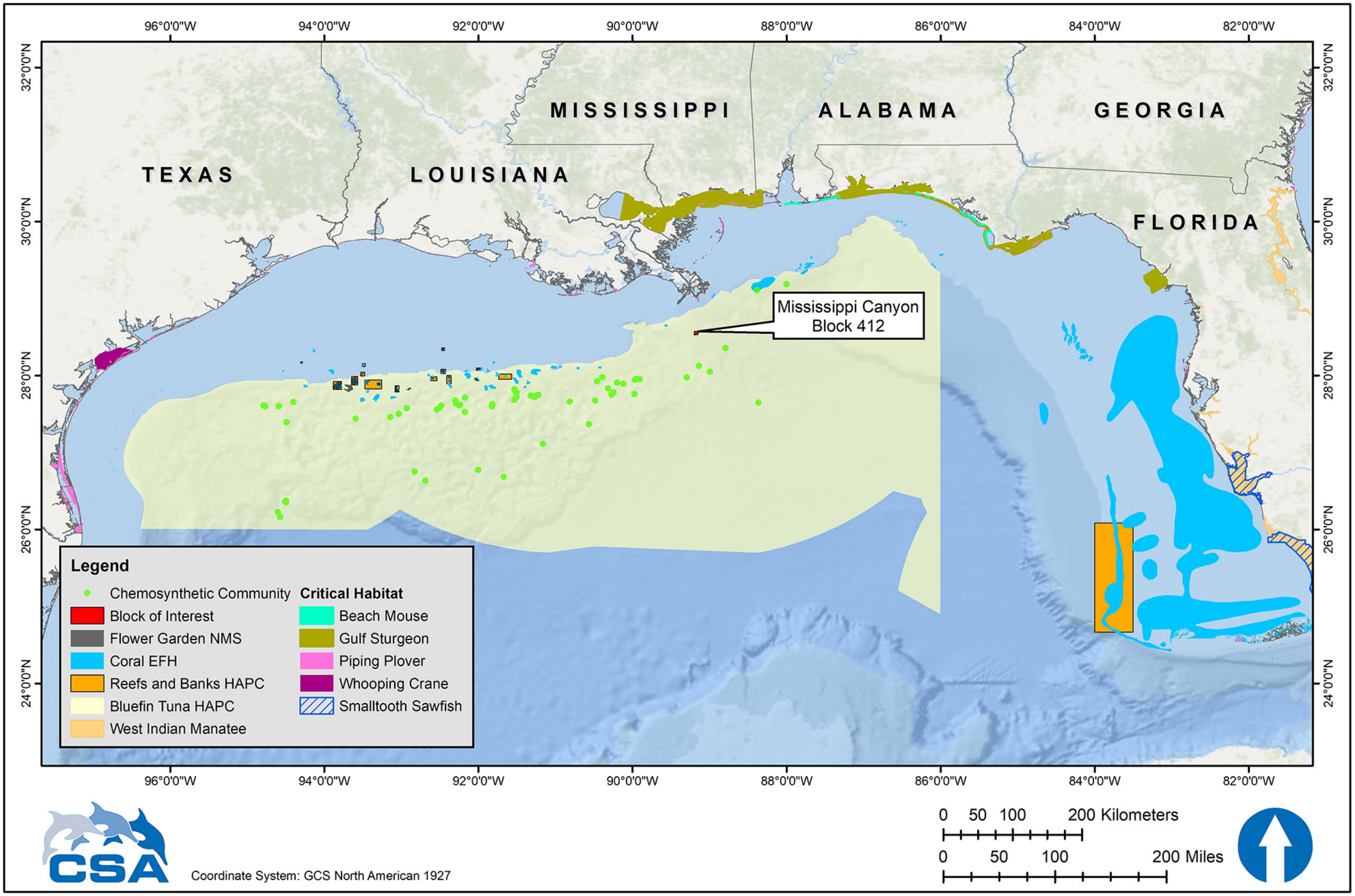

Figure 4. Location of selected environmental features in relation to the project area.

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 1,000 ft (305 m) over unpopulated areas or across coastlines.

Impacts of a Large Oil Spill

The project area is approximately 29 mi (47 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 4**). Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days), a stretch of shoreline that includes numerous areas of Piping Plover critical habitat.

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017a). 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. Chevron has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

C.3.7 Whooping Crane (Endangered)

The Whooping Crane (*Grus americana*) 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 a record estimated population of 506 at Aransas NWR during the 2019 to 2020 winter (USFWS, 2020b). 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 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.

Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 442 mi (711 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 3**) predicts <0.5% chance of oil contacting Whooping Crane critical habitat within 30 days of a spill. The 60-day OSRA model (**Table 4**) predicts that there is up to a 4% chance oil contacting Whooping Crane critical habitat within 60 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, Chevron would work with the applicable state and federal agencies to prevent impacts on Whooping Cranes. Chevron has extensive resources available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the OSRP.

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 (Baum et al., 2015). 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 (Baum et al., 2015).

Oceanic whitetip shark management is complicated due to it being globally distributed, highly migratory, and overlapping in areas of high fishing; thus, assessment of population trends has been left 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, 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 sounds 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 frequencies exhibited by individual species such as the nurse shark (*Ginglymostoma cirratum*; 300 and 600 Hz) and the lemon shark (*Negaprion brevirostris*; 20 Hz to 1 kHz) (Casper and Mann, 2006). These frequencies overlap with SPLs associated with drilling activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive noise) 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 and the subsequent response activities 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 (less than 1,000 individuals) (Marshall et al., 2020; NOAA, 2018). Stewart et al. (2018) 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, 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 sounds 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 that the most sensitive hearing ranges for individual species were 300 and 600 Hz (yellow stingray [*Urobatis jamaicensis*]) and 100 to 300 Hz (little skate [*Erinacea raja*]) (Casper et al., 2003; Casper and Mann, 2006). These frequencies overlap with SPLs associated with drilling activities (typically 10 Hz to 10 kHz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive noise) 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 33 ft (10 m) 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 only 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 and the subsequent response activities could impact 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, 2014b) (**Figure 4**). 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 strikes 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 strike in the 50 years of proposed action.

Impacts of a Large Oil Spill

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2020a) and BOEM (2012a, 2017a). For this EP, there are no unique site-specific issues with respect to this species.

The project area is approximately 111 mi (179 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 3**) predicts that a spill in the project area has up to a 1% conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days of a spill. The 60-day OSRA modeling (**Table 4**) predicts that a spill in the project area has up to a 1% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 60 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 the subsequent response, and would be vulnerable from approximately October through April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2020b).

C.3.11 Nassau Grouper (Threatened)

The Nassau grouper (*Epinephelus striatus*) 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 has 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 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 118 ft (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).

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 oil spill is the only relevant IPF that could affect Nassau grouper.

Impacts of a Large Oil Spill

Based on the 60-day OSRA modeling results (**Table 4**), a large hydrocarbon spill would be unlikely (<0.5% probability) to reach Nassau grouper habitat in the Florida Keys (Monroe County, Florida). 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 and the difference in water depth between the project area the Banks. While on the surface, oil would not be expected to contact subsurface fish.

In the unlikely event that oil contacts Nassau grouper habitat, oil 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. Response activities are not expected to impact Nassau grouper due to the very low density of these fish in the northern Gulf of Mexico.

C.3.12 Smalltooth Sawfish (Endangered)

The smalltooth sawfish (*Pristis pectinata*), 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 4**). A species description is presented in the recovery plan for this species (NMFS, 2009a).

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 that could affect smalltooth sawfish.

Impacts of a Large Oil Spill

The project area is approximately 436 mi (702 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). The 60-day OSRA modeling (**Table 4**) predicts a <0.5% probability of shoreline contact within 60 days of a spill between the project area to coastal areas containing smalltooth sawfish critical habitat.

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 the 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 from a spill and the subsequent response activities 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. They are 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; **Figure 4** shows the critical habitat combined for all four subspecies. One additional species of beach mouse in habiting 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 beach mice are discussed by BOEM (2017a). 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 132 mi (212 km) from the project area. The 30-day OSRA results (**Table 3**) predicts <0.5% conditional probability of oil contact with beach mouse critical habitat within 30 days of a spill. The 60-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a 1% or less conditional probability of reaching either the Alabama or Florida shorelines inhabited by beach mice within 60 days of a spill.

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). 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 562 mi (904 km) from the project area. The 30-day OSRA modeling (**Table 3**) predicts that a spill in the project area has <0.5% conditional probability of contacting any coastal areas containing Florida salt marsh voles within 30 days. The 60-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 60 days of a spill.

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 from oiling and/or response activities. However, any such impacts are unlikely due to the distance from the project area to Florida salt marsh vole habitat.

C.3.15 Threatened Coral Species

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*). 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, 2018d). 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, 2015b).

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 the Dry Tortugas and Monroe and Miami-Dade counties, Florida.

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 that could affect Threatened corals.

Impacts of a Large Oil Spill

Based on the 60-day OSRA modeling results (**Table 4**), a large oil spill would be unlikely (<0.5% probability) to reach elkhorn coral critical habitat in the Florida Keys (Monroe County, Florida). 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 433 mi [697 km]), and the difference in water depth between the project area (1,455 to 1,561 ft [443 to 476 m]) and the Banks (approximately 56 to 476 ft [17 to 145 m]). 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 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 433 mi [697 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 up onto the continental shelf edge. 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 an oil slick 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 (2017a), impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; change in sediment characteristics; and reduction or loss of one or more commercial and recreational fishery habitats. 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, 2017a).

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 from a spill or subsequent cleanup activities.

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; 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 [*Onychoprion fuscatus*], Least Tern [*Sternula antillarum*], Sandwich Tern [*Thalasseus sandvicensis*], Magnificent Frigatebird [*Fregata magnificens*]); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls [*Leucophaeus atricilla*], Royal Terns [*Thalasseus maximus*], Bridled Terns [*Onychoprion anaethetus*]) (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}.

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.

IPFs that potentially may affect marine birds 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 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.

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 strike offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005; Ronconi et al., 2015). 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.

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 mi (5 km) (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, collisions, or other adverse effects are highly localized (considering the single structure) and may affect individual birds during migration periods. 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 (2017a). 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 Chevron's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to reduce the potential for impacts on marine birds. EP Section H 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, 2016a). 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, no significant 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 (2017a). 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 (USFWS, 2011). 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, 2016b). Offshore response activities could also result in increased bird strikes with offshore structures to the increased number of vessels present.

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 (*Charadrius wilsonia*), Black Skimmer (*Rynchops niger*), Forster's Tern (*Sterna forsteri*), Gull-Billed Tern (*Gelochelidon nilotica*), Laughing Gull, Least Tern, and Royal Tern (USFWS, 2010).

The Eastern Brown Pelican (*Pelecanus occidentalis*) was delisted from federal Endangered status in 2009 (USFWS, 2016b). The Brown Pelican was delisted as a species of special concern by the State of Florida in 2017 and more recently by Louisiana (Louisiana Wildlife & 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). Nearly half the southeastern population of Brown Pelicans lives in the northern Gulf Coast, generally nesting on protected islands (USFWS, 2010).

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 27 mi (43 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 Galliano, 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. Flushing distances vary 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 65 to 160 ft (20 to 49 m) for personal watercrafts and 75 to 109 ft (23 to 58 m) 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., 2007; Fuller et al., 2018). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 2,000 ft (610 m) 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-ft (610-m) 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

Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days).

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oiled birds can lose the ability to fly, dive for food, or float on the water, which could lead to drowning (USFWS, 2010). 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, 2017a). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans (*Pelecanus erythrorhynchos*) 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, 2017a).

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, 2017a). It is expected that impacts to coastal birds from a large oil spill and/or cleanup activities 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 are 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 SPL threshold levels 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 Fisheries Hydroacoustic Working Group (2008) recommend a behavioral threshold SPL of 150 dB re 1 µPa 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 (Neff et al., 2005). 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 benthic organisms 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 water column biota.

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, 2017a). The drilling rig 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 (2017a). 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 Chevron's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very 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 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, 2016a). 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 (2017a). 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 or dispersants. 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; 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 has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster (*Panulirus argus*), reef fishes, coastal migratory pelagic fishes, and red drum (*Sciaenops ocellatus*). In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (Gulf of Mexico Fishery Management Council, 2005). The EFH for most of these Gulf of Mexico Fishery Management Council -managed species is on the continental shelf in waters shallower than 600 ft (183 m). 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 21 mi (34 km) from the project area (**Figure 4**).

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.

Table 7. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Mississippi Canyon Block 412, including life stage(s) potentially present within the project area (Adapted from National Marine Fisheries Service [NMFS], 2009a).

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic angel shark	*Squatina dumeril*	Juveniles, adults
Atlantic bluefin tuna	*Thunnus thynnus*	Spawning, eggs, larvae
Bigeye thresher shark	*Alopias superciliosus*	All
Blue marlin	*Makaira nigricans*	Juveniles, adults
Bull shark	*Carcharhinus leucas*	Juveniles
Longfin mako shark	*Isurus paucus*	All
Oceanic whitetip shark	*Carcharhinus longimanus*	All
Scalloped hammerhead shark	*Sphyrna lewini*	Juveniles, adults
Shortfin mako shark	*Isurus oxyrinchus*	All
Silky shark	*Carcharhinus falciformis*	All
Skipjack tuna	*Katsuwonus pelamis*	Spawning
Smooth Dogfish	*Mustelus canis*	All
Swordfish	*Xiphias gladius*	Larvae, juveniles, adults
Tiger shark	*Galeocerdo cuvier*	Adults
Whale shark	*Rhincodon typus*	All
White marlin	*Tetrapturus albidus*	Juveniles, adults
Yellowfin tuna	*Thunnus albacares*	Spawning, juveniles, adults

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009b) 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 115,831 mi^2 (300,000 km^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, 2009b). The Atlantic bluefin tuna has also been designated as a species of concern (NMFS et al., 2011). An amendment to the original EFH Generic Amendment was finalized in 2005 (Gulf of Mexico Fishery Management Council, 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. The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009b).

NTLs 2009-G39 and 2009-G40 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, 2017a). 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 Gulf of Mexico Fishery Management Council (2005). These include the Florida Middle Grounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico (**Figure 4**). Jakkula Bank is the HAPC located nearest to the project area (approximately 148 mi [238 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. 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; Gates et al., 2017). The FAD effect would possibly enhance feeding of epipelagic predators by attracting and concentrating smaller fish species.

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 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 reliable behavioral thresholds for fish have been established. 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 significant 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, 2017a) 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 328 ft (100 m) of the discharge pipe. Any impacts to pelagic species would be extremely localized and brief (BOEM, 2014).

Impacts of a Small Fuel Spill

Potential spill impacts on EFH are discussed by BOEM (2017a). 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 Chevron's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to help diminish the potential for impacts on EFH. EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very 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 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, 2016a). 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 also 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 the affected area would represent a negligible portion of the HAPC.

A small fuel spill would likely not affect EFH for corals and coral reefs, the nearest EFH being approximately 21 mi (34 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 (2017a). 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, 2009b), some impact 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 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, 2009b). 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, 2009b).

The nearest EFH under the corals and coral reefs management plan (Gulf of Mexico Fishery Management Council, 2005) is located 21 mi (34 km) from the project area. An accidental spill would be unlikely to affect this area, since a surface slick would be unlikely to reach these features due to their depth.

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 2,000 ft (610 m) of the proposed wellsites locations (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d). Chevron 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 known shipwreck sites within 2,000 ft (610 m) of the proposed wellsites, there are no routine IPFs that are likely to affect shipwrecks. Impacts of a large oil spill are the only IPFs considered. A small fuel spill would not affect shipwrecks because the oil would float and dissipate on the sea surface. These IPFs with potential impacts listed in **Table 2** are discussed below.

Impacts of a Large Oil Spill

The 2017-2025 Lease Sale EIS (BOEM, 2017a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 984-ft (300-m) radius. Because there are no historic shipwrecks within a 984-ft (300-m) 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, Chevron 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. Chevron would cease all operations within 1,000 ft (305 m) of the site until the Regional Supervisor provides instructions on steps to take to assess the site's potential historic significance and protect it.

Beyond this 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, 2017a), 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 3,600 ft (1,100 m), extending at least 22 mi (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 984-ft (300-m) 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. Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days). 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 water depths at the locations of the proposed wellsites ranging from approximately 1,455 to 1,561 ft (443 to 476 m), the proposed wellsites are well beyond the 197-ft (60-m) 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 984-ft (300-m) 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, 2017a). Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days).

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 organic materials in a site (although 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 (2017a). 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 and helicopter traffic. The support bases at Port Fourchon and Galliano, Louisiana, are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

Impacts of support vessel traffic and a large oil spill are the only IPFs analyzed for coastal habitats and protected areas. A small fuel spill in the project area would be unlikely to affect coastal habitats, as the project area is 27 mi (43 km) from the nearest shoreline (Plaquemines Parish, 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 and Helicopter Traffic

Support operations, including crew boats and supply boats as detailed in EP Section L, 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, 2017a).

Impacts of a Large Oil Spill

Potential spill impacts on coastal habitats are discussed by BOEM (2017a). 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.

Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days).

The shorelines within the geographic range predicted by the OSRA modeling (**Tables 3** and **4**) include extensive barrier beaches, wetlands, and oyster reefs with submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries. NWRs and other protected areas along the coast are discussed in BOEM (2017a) and Chevron's OSRP. 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 3**) 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 (BOEM, 2017a,b). 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 56 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Matagorda, Texas	Big Boggy National Wildlife Refuge
	Matagorda Bay Nature Park
	Oyster Lake Park
	San Bernard National Wildlife Refuge
	West Moring Dock Park
Galveston, Texas	Anahuac National Wildlife Refuge
	Bolivar Flats Shorebird Sanctuary
	Fort Travis Seashore Park
	Galveston Island State Park
	Horseshoe Marsh Bird Sanctuary
	Mundy Marsh Bird Sanctuary
	R.A. Apffel Park
	Seawolf Park
Jefferson, Texas	McFaddin National Wildlife Refuge
	Sea Rim State Park
	Texas Point National Wildlife Refuge
Cameron, Louisiana	Peveto Woods Sanctuary
	Rockefeller State Wildlife Refuge and Game Preserve
	Sabine National Wildlife Refuge
Vermilion, Louisiana	Paul J. Rainey Wildlife Refuge and Game Preserve
	Rockefeller State Wildlife Refuge and Game Preserve
	State Wildlife Refuge
Iberia, Louisiana	Marsh Island Wildlife Refuge
	Shell Key National Wildlife Refuge
Terrebonne, Louisiana	Isles Dernieres Barrier Islands Refuge
	Pointe aux Chenes Wildlife Management Area
Lafourche, Louisiana	Pointe aux Chenes Wildlife Management Area
	Wisner WMA (Includes Picciola Tract)
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
Jackson, Mississippi	Bellefontaine Marsh Preserve
	Davis Bayou Preserve
	Escatawpa River Marsh Preserve
	Grand Bay National Estuarine Research Reserve
	Grand Bay Savanna Preserve
	Graveline Bay Preserve
	Gulf Islands National Seashore
	Gulf Islands Wilderness
	Horn Island Preserve
	Old Fort Bayou Preserve

Table 8. (Continued).

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
	Pascagoula River Marsh Preserve
	Petit Bois Island Preserve
	Round Island Preserve
	Shepard State Park
Escambia, Florida	Bayou Marcus Wetlands
	Big Lagoon State Park
	Blue Angel Recreation Park
	Bay Bluffs Park
	Ft. Pickens Aquatic Preserve
	Gulf Islands National Seashore
	Mallory Heights Park #3
	Perdido Bay/Crown Pointe Preserve
	Perdido Key State Park
	Tarkiln Bayou Preserve State Park
	USS Massachusetts (BB-2) Underwater Archaeological Preserve
	Wayside Park

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, pre-existing stress levels, soil types, and water levels may influence the impacts of oil exposure on wetlands. Light oiling could cause plant die back, followed by recovery in a fairly short time. Vegetation exposed to oil that persists in wetlands could take years to recover (BOEM, 2017a). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017a). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

A review of studies by BOEM (2012a) determined that effects of oil on marsh vegetation depend on the type of oil, the type of vegetation, and environmental factors of the area. 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 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). However, clean-up activities may cause substantial impacts to marshes including crushing of plants, stems, and rhizomes.

C.8 Socioeconomic and Other Resources

C.8.1 Recreational and Commercial Fishing

Potential impacts to recreational and commercial fishing are analyzed by BOEM (2017a). 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. In August 2000, the federal government closed two areas in the northeastern Gulf of Mexico to longline fishing (65 *FR* 47214). The project area is outside of the closure areas.

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 33 to 98 ft (10 to 30 m) long, and their 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 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 820 to 1,804 ft (250 to 550 m) (Stiles et al., 2007). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 540 to 1,476 ft (165 to 450 m) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 656 ft (200 m) (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 fisheries is drilling rig presence (including marine noise and lights). Two types of potential accidents are also addressed below (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

There is a slight possibility of pelagic longlines 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). 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 factors such as effluent discharges are likely to have negligible impacts on commercial or recreational fisheries due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Impacts of a Small Fuel Spill

The probability of a fuel spill is expected to be minimized by Chevron's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of Chevron's OSRP is expected to potentially mitigate and reduce the potential for impacts.

EP Section H provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill and opportunity for impacts to occur would be very brief.

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 (2017a). 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, 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 July 12, 2010, closures encompassed 84,101 mi^2 (217,821 km^2), or 34.8% of the U.S. Gulf of Mexico Economic Exclusion Zone.

According to BOEM (2012a, 2017a), 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 fishes 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. Impacts of a small fuel spill and a large oil spill are addressed below. 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. The project area is approximately 27 mi (43 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

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, 2011). 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. Impacts of a large oil spill are addressed below. 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

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017a). For the EIA, 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.

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 (2017a). 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.

Based on the 30-day OSRA modeling (**Table 3**), nearshore waters and embayments in Terrebonne, Lafourche, and Plaquemines parishes in Louisiana are the coastal areas most likely to be affected (5% to 16% probability within 30 days). Other shorelines from Matagorda County, Texas to Escambia County, Florida could be affected within 30 days with up to 3% probability of contact. Based on the 60-day OSRA modeling estimates (**Table 4**), the potential shoreline contacts range from Cameron County, Texas to Miami-Dade County, Florida (up to 13% conditional probability within 60 days).

According to BOEM (2017a), 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 (2017a). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana. The land use at the existing shorebase sites 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 likely to affect land use. 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, 2014).

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. Chevron will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. The site clearance letters identified no existing seafloor infrastructure in the vicinity of the proposed wellsites. The archaeological survey reported no archaeologically significant sonar contacts were identified within 2,000 ft (610 m) of the proposed wellsites (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d).

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 accident IPF likely to affect other marine uses. 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

An accidental spill would be unlikely to significantly affect shipping or other marine uses. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. Chevron will comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

In the event of a large spill requiring numerous vessels in the area, coordination would be required to ensure that no anchoring or seafloor-disturbing activities occur near the existing infrastructure.

C.9 Planned Actions[1]

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 Chevron's EP are within the range of activities described and evaluated by BOEM in the 2017 to 2022 Programmatic EIS 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, 2017a). Past, present, and reasonably foreseeable activities were identified in these documents, and 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, 2014, 2015, 2016b, 2017a).

Description of Planned Actions to Occur in the Vicinity of Project Area. Other exploration and development activities may occur in the vicinity of the project area. Chevron does not anticipate other projects in the vicinity of the project area beyond the types of projects analyzed in the lease sale and Supplemental EISs (BOEM, 2012a, 2013, 2014, 2015, 2016b, 2017a).

Impacts of Other Planned Activities in this EP. The BOEM (2017a) Final EIS included a discussion of impacts of planned actions, 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 EISs considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The EISs examined the potential effects of the planned actions on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in Chevron’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 this EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. For all impacts, the incremental contribution of Chevron’s proposed actions to the impacts from all planned activities in these prior analyses are not expected to be significant.

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[1] On 16 July 2020, the Council on Environmental Quality (CEQ), which is responsible for Federal agency implementation of the National Environmental Policy Act (NEPA), updated the regulations for implementing the procedural provisions of NEPA (85 *FR* 43304–43376). The new implementing regulations went into effect on 14 September 2020. The update eliminated explicit references to “cumulative impacts” from the regulations. Instead, “the environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s).” As such, the term “cumulative” has been replaced by planned actions throughout this EIA.

D. Environmental Hazards

D.1 Geologic Hazards

The site clearance letters provided by Chevron concluded that the proposed wellsites are generally favorable for the proposed activities (Geoscience Earth & Marine Services, Inc., 2021a,b,c,d). See EP Section C 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 under consideration 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 suspend some activities for safety reasons until the storm or weather event passes. In the event of a hurricane, procedures as outlined in the Hurricane Evacuation Plan would be adhered to. Evacuation in the event of a hurricane or other severe weather would increase the number and frequency of support vessel and helicopter trips to and from the project area.

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 Chevron.

F. Mitigation Measures

The proposed action includes numerous mitigation measures required by laws, regulations, and BSEE and BOEM lease stipulations and NTLs (**Table 1**). The project will comply with all applicable federal, state, and local requirements concerning air pollutant emissions, discharges to water, and solid waste disposal. All project activities will be conducted under guidance by Chevron's OSRP and Safety and Environmental Management System. Additional information can be found in EP Section H.

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);
- Kathleen Gifford (Project Scientist);
- Dustin Myers (GIS/Remote Sensing Specialist); and
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