



Ephesus Prospect Controlled Source Electromagnetic Survey

Project Description

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Table of Contents

1	Introduction.....	1
2	Project Description.....	1
2.1	Project Overview and Rationale.....	1
2.2	Project Location.....	3
2.3	Schedule	4
2.4	Project Components and Activities.....	4
	2.4.1 Survey Vessel and Crew.....	4
	2.4.2 CSEM Source	5
	2.4.3 CSEM Receivers.....	6
2.5	Accidental Events.....	6
3	Health, Safety and Environmental Management.....	6
4	Indigenous and Stakeholder Consultation.....	8
5	Environmental Setting	9
6	Summary and Conclusion.....	10
7	References.....	11

List of Figures

Figure 1	Project Area and Study Area for Ephesus Prospect CSEM Survey.....	2
Figure 2	Schematic of CSEM Survey.....	3
Figure 3	Schematic of the CSEM Source	6

List of Tables

Table 1	Project Area and Study Area Coordinates.....	4
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List of Acronyms

BP	BP Canada Energy Group ULC
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CSEM	controlled source electromagnetic
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA	environmental assessment
EL	Exploration Licence
EM	electromagnetic
EMGS	Electromagnetic Geoservices ASA
FLO	fisheries liaison officer
FSC	food, social and ceremonial
HSSE	health, safety, security and environment
km	kilometres
MARPOL	International Convention for the Prevention of Pollution from Ships
NAFO	Northwest Atlantic Fisheries Organization
NL	Newfoundland and Labrador
SARA	<i>Species at Risk Act</i>
SBA	significant benthic area
SOPEP	Shipboard Oil Pollution Emergency Plan

1 Introduction

BP Canada Energy Group ULC (BP) is proposing to conduct a controlled source electromagnetic (CSEM) survey over Exploration Licences (ELs) 1145 and 1146 in the Orphan Basin offshore Newfoundland and Labrador (the Project) (see Figure 1). The purpose of the Project is to collect data to inform prospectivity for a proposed future exploration drilling program within these ELs.

Separate environmental assessment (EA) and authorization processes are being carried out for the proposed Newfoundland Orphan Basin Drilling Program. The Project will require an authorization as a geophysical survey from the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) pursuant to section 138 of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and section 134 of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* (the Accord Acts).

This Project Description is being submitted to the C-NLOPB to initiate an EA process for the Project. It has been prepared and submitted in accordance with the *Geophysical, Geological, Environmental and Geotechnical Guidelines* (C-NLOPB 2019) and will allow the C-NLOPB to confirm EA requirements and provide a Scoping Document that will help inform the planning, preparation and submission of the EA report.

2 Project Description

2.1 Project Overview and Rationale

BP is proposing to conduct the Project in 2020 to help inform planning for the proposed Newfoundland Orphan Basin Exploration Drilling Program. CSEM uses electromagnetic remote sensing technology to map electric sensitivity distribution of the subsurface to help indicate the presence and extent of hydrocarbons below the seabed.

Prior to the start of the survey, an array of receivers is deployed in a grid pattern on the seafloor. An electromagnetic source is then towed behind the survey vessel, approximately 30 m above the seabed along predetermined tow lines. Although survey design planning is still in progress it is anticipated that the towlines will range in length from approximately 100 km to 150 km and survey line spacing will be approximately 3 km. Final survey location maps will be submitted to the C-NLOPB and shared with fisheries stakeholders prior to survey mobilization.

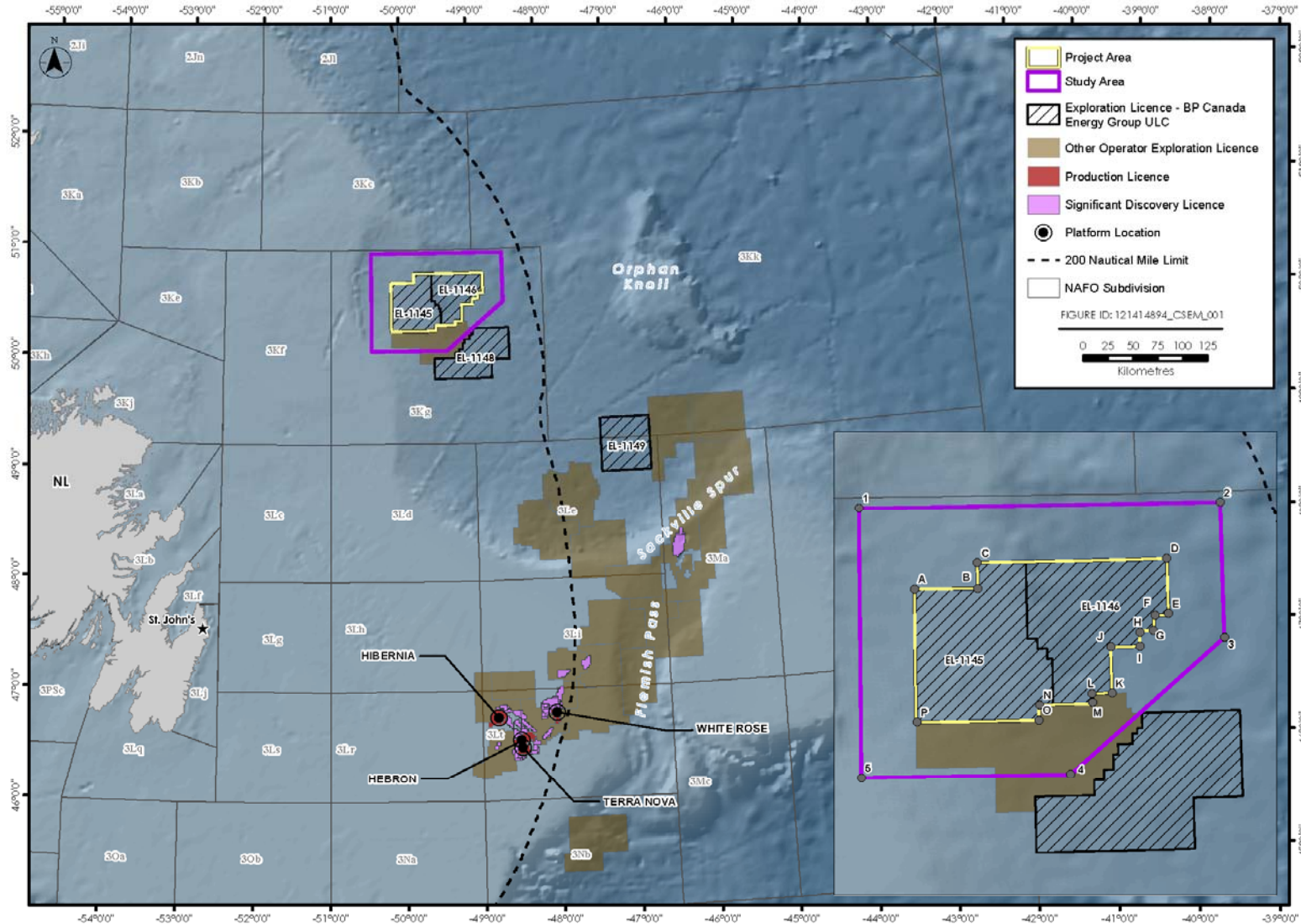
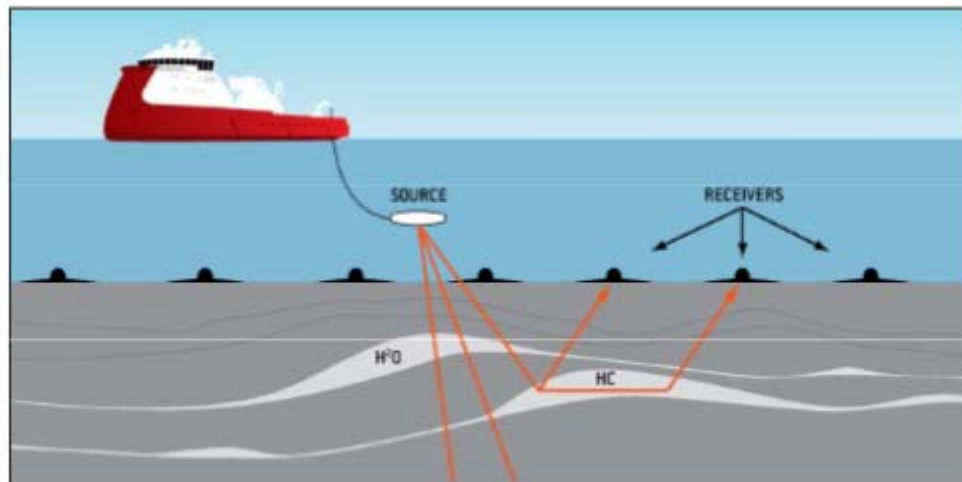


Figure 1 Project Area and Study Area for Ephesus Prospect CSEM Survey

The electromagnetic signal from the towed source propagates through the subsurface and back to receivers on the seabed (see Figure 2). The electromagnetic field measured by the receivers is dependent upon the resistivity distribution within the subsurface. Hydrocarbon-bearing rock shows greater resistivity relative to water-bearing rock and thus areas that appear highly resistive may indicate the presence of hydrocarbons (Buchanan et al. 2011). With the presence of a resistive layer, such as a hydrocarbon-bearing rock, the electromagnetic signal can propagate back to the seabed with little attenuation (i.e., higher amplitude) when compared to the case where no such resistive layer is present (EMGS 2015).



Source: Carstens 2009

Figure 2 Schematic of CSEM Survey

The survey will take approximately 45 days, after which the receivers will be retrieved and the recordings interpreted to infer subsurface resistivity.

Resistivity data provided using CSEM methods is used to assess the presence of geological structures and type of fluids in a reservoir, which, when combined with available seismic data, can provide information on the type and scale of hydrocarbon sources within a reservoir. The identification of a subsurface resistor within a prospective reservoir can therefore substantially increase the probability of drilling success while reducing commercial risk and the environmental footprint of exploratory drilling programs. Data from the Project will be interpreted and used in well planning for the proposed Newfoundland Orphan Basin Exploration Drilling Program.

2.2 Project Location

Survey design planning is still in progress, although survey lines will be located within an area that encompasses ELs 1145 and 1146 in the Orphan Basin (see Figure 1) (Project Area). Water depth in the Project Area ranges from 960 m to 2,275 m. A larger Project Area has been defined to provide a more conservative estimate of the survey footprint to encompass all gear deployment and vessel turns while towing. Survey vessel operations related to the deployment and testing of survey equipment and turning of vessel will not occur outside of the Project Area.

The “corner” coordinates (Decimal degrees, WGS84 projection) of the Project Area are provided in Table 1 and on Figure 1.

Table 1 Project Area and Study Area Coordinates

Vertex	Coordinates - Degrees Minutes Seconds	
	X	Y
Project Area		
A	50° 8' 56.147" W	50° 41' 59.782" N
B	49° 49' 26.133" W	50° 41' 59.737" N
C	49° 49' 26.119" W	50° 46' 59.731" N
D	48° 50' 56.068" W	50° 46' 59.690" N
E	48° 50' 56.086" W	50° 36' 14.685" N
F	48° 55' 3.591" W	50° 35' 59.671" N
G	48° 55' 48.598" W	50° 32' 59.654" N
H	48° 59' 56.104" W	50° 32' 44.469" N
I	48° 59' 56.111" W	50° 29' 59.470" N
J	49° 8' 56.117" W	50° 29' 59.711" N
K	49° 8' 56.127" W	50° 20' 59.708" N
L	49° 14' 56.130" W	50° 20' 59.480" N
M	49° 14' 56.133" W	50° 19' 14.481" N
N	49° 31' 3.657" W	50° 18' 59.578" N
O	49° 31' 26.160" W	50° 15' 59.599" N
P	50° 8' 33.702" W	50° 15' 59.804" N
Study Area		
1	50° 25' 50.871" W	50° 57' 59.173" N
2	48° 33' 51.074" W	50° 57' 45.436" N
3	48° 34' 0.787" W	50° 31' 12.992" N
4	49° 22' 5.211" W	50° 5' 12.188" N
5	50° 25' 42.613" W	50° 5' 10.857" N

2.3 Schedule

The Project is planned to be conducted between May and October 2020 pending authorization from the C-NLOPB. It is estimated that the Project would take approximately 45 days to complete.

2.4 Project Components and Activities

2.4.1 Survey Vessel and Crew

BP will contract Electromagnetic Geoservices ASA (EMGS), a qualified electromagnetic survey operator who has conducted previous CSEM surveys offshore Newfoundland, to perform the Project. The survey vessel will have suitable systems and procedures in place to meet the operational requirements to safely conduct the work. The vessel will be capable of working in

harsh offshore conditions, and will have the necessary equipment, protocols and procedures in place to comply with the *Canada Shipping Act, 2001*, the *International Convention for the Prevention of Pollution from Ships* (MARPOL) and any other applicable standards. The vessel will be inspected by Transport Canada and approved for operation by the C-NLOPB before beginning any Project-related work. The survey vessel will use dynamic positioning to hold on station during the deployment and retrieval of the CSEM receivers.

It is anticipated that the vessel would use shore-based facilities in the St. John's region to mobilize for the Project. Given the length of time to complete the Project (approximately 45 days) it is expected to be completed in a single mobilization, absent inclement weather or mechanical downtime. Offshore resupply and crew changes are not anticipated to be required.

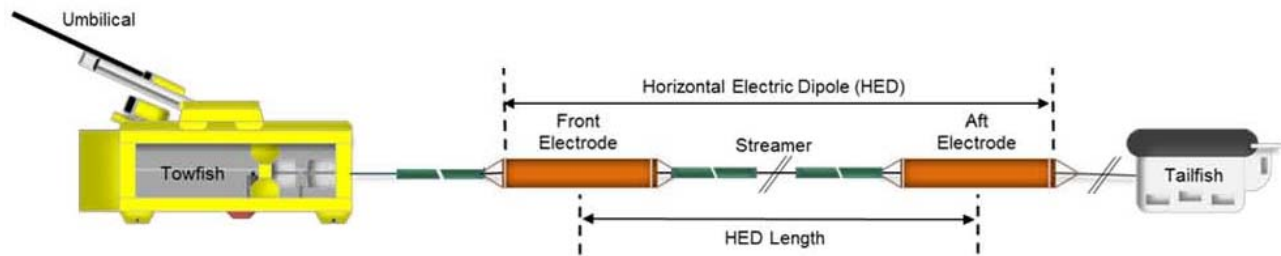
Personnel on the survey vessel will include ship's officers and marine crew as well as technical and scientific personnel. The survey vessel will also have a fisheries liaison officer and marine mammal and seabird observers. The total persons on board would be approximately 50.

2.4.2 CSEM Source

A CSEM survey uses a frequency-domain electromagnetic approach, in which an oscillating current of constant low frequency is generated in a transmitter towed above the seafloor. The oscillating current sets up an oscillating magnetic field at the same frequency (Buchanan et al. 2011). This primary electromagnetic (EM) field penetrates the seafloor and creates secondary electric current and magnetic fields via induction. The secondary magnetic field has the same frequency as the primary field, but the signal varies as a result of the properties of the underlying rock. The primary and secondary fields are detected by the receivers (refer to Section 2.4.3), which are then used to develop a resistivity profile of the surveyed area (Buchanan et al. 2011).

The CSEM source consists of a power supply and control unit at the topside transmitter mounted on towed subsea-frame (tow fish) with a horizontal electric dipole connected to the tow fish (Figure 3). The topside unit controls the power to generate the predefined electromagnetic signal at the electric dipole. The power is transformed to high voltage/low current and transferred via umbilical to the subsea system. At the subsea system the power is transformed back to low voltage/high current. A trailing electric dipole (antenna) is connected to the subsea signal source. This antenna is fed with a periodic current. The waveform and periodic time can be defined and changed at the topside operator station. A separate power supply feeds the instrumentation on the tow fish (LGL 2014).

Figure 3 depicts the general subsea configuration of the CSEM Source. The electrical dipole (antenna) is neutrally balanced for in-line towing operations. A tail fish is designed to stretch the antenna system. Both the tow fish and tail fish can carry additional survey and navigational equipment (LGL 2014).



Source: LGL 2014

Figure 3 Schematic of the CSEM Source

The CSEM towed system includes a single streamer which is comprised of tow and conductor cables and a flotation section. The overall length of the tow package is approximately 1,800 m. The flotation sections of the streamer will be solid (not fluid-filled) which eliminates the risk of an accidental spill should the streamer break.

2.4.3 CSEM Receivers

CSEM receivers are comprised of a data acquisition unit, electrical and magnetic sensors and a positioning transponder. Each receiver is attached to a compacted sand anchor to provide negative buoyancy and deployed to the seabed in a grid pattern. The compacted sand anchor is approximately 920 mm x 810 mm x 102 mm and is composed of ingredients found in natural gravel, limestone and/or seawater. Each receiver has a primary and secondary (back-up) release system which, when an acoustic command is sent from the vessel, the anchor is released from the receiver, allowing the receiver unit to ascend through the water column to the surface for retrieval. The sand anchors are expected to deteriorate on the seabed within approximately one year after submersion in seawater.

The positioning transponder sends acoustic signals back to the vessel which allows tracking of the receiver's location from its descent to the seabed to its ascent back to the surface for retrieval and data download.

2.5 Accidental Events

Although unlikely to occur, a small hydrocarbon release could occur as a result of a small on-deck spill or accidental release of vessel fuel. Solid streamers on the CSEM source eliminate the risk of a spill due to a streamer break. If an on-deck spill was to occur, it would be immediately contained, and the risk of pollution to the marine environment would be very low. In the unlikely event of a hydrocarbon release, the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP) would be implemented.

3 Health, Safety and Environmental Management

BP's health, safety, security, and environment (HSSE) goals are: no accidents, no harm to people, and no damage to the environment. Safety is at the heart of everything BP does as a company, driven by leadership and applied across all operations throughout the operating management

system framework. Everyone who works for BP is responsible for his or her safety and helps to ensure the safety of colleagues, partners, suppliers, and local communities.

BP's ability to be a safe and responsible operator depends, in part, on the capability and performance of its contractors and suppliers. BP's contract for this work will include clear and consistent information, setting out specific details of BP's expectations. Contractors and subcontractors (where applicable) will be required to demonstrate conformance with BP's requirements including HSE standards and mitigative commitments.

Through the operation of the survey vessel, the Project will generate electromagnetic signals, sound emissions (underwater and atmospheric), atmospheric emissions (light emissions and air emissions), and solid and liquid waste discharges. Liquid waste discharges (e.g., grey water, sewage, bilge water, deck drainage) will be managed in accordance with the requirements of MARPOL and the *Canada Shipping Act, 2001*. Solid and domestic waste will be collected onboard the vessel and collected dockside by an approved waste contractor for recycling/disposal at an existing onshore waste management facility in accordance with applicable regulatory requirements.

In addition to adhering to proper waste management procedures, the following mitigation will be implemented to reduce environmental effects associated with the Project:

- BP will communicate timing and location of the Project to Indigenous groups and commercial fisheries stakeholders prior to survey mobilization.
- A fisheries liaison officer (FLO) will be onboard the survey vessel to ensure implementation of communication procedures intended to reduce conflict with the commercial fishery.
- A Notice to Mariners will be issued prior to conducting the survey. The Notice to Mariners will outline the area where operations will be conducted and will also include a request for a minimum safe distance, as required.
- Lighting on the survey vessel will be kept to a minimum at night to the extent that it doesn't affect crew/vessel safety.
- The survey vessel will avoid transiting within 300 m of migratory bird nesting colonies during the nesting period and will comply with provincial *Seabird Ecological Reserve Regulations, 2015* to minimize disturbance to colonies.
- Systematic searches will be conducted daily on the survey vessel for stranded birds. Handling and documentation of stranded birds will be done in accordance with the *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada* (ECCC 2016). A Live Seabird Salvage permit will be acquired from Canada Wildlife Service (CWS) prior to operations and any stranded birds (or mortalities) will be reported to CWS in accordance with the permit.
- During transit to the Project Area, the survey vessel will travel at vessel speed not exceeding 22 km/hour (12 knots), except as needed in the case of an emergency. In the event that a marine mammal or sea turtle is detected in proximity to the vessel, vessel speed will be reduced to avoid collision.

- In the unlikely event of a collision with a marine mammal or sea turtle, BP will contact the Canadian Coast Guard within 24 hours following the collision.
- A Shipboard Oil Pollution Emergency Plan (SOPEP) will be provided to the C-NLOPB as part of the authorization application process and will be implemented in the unlikely event of an accidental release from the survey vessel (e.g., fuel spill).

Additional mitigation measures may be identified through the course of consultation and engagement.

As per the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2019), a seabird and marine mammal observation program will be conducted for the duration of the Project (including transit to and from the Project Area) by a designated observer(s) trained in marine mammal and seabird observations. The marine mammal monitoring protocol will be conducted in accordance with Environmental Studies Research Fund Report #156 *Recommended Seabird and Marine Mammal Observation Protocols for Atlantic Canada* (Moulton and Mactavish 2004). Seabird monitoring will be conducted in accordance with the Canada Wildlife Service *Eastern Canada Seabirds at Sea (ECSAS) Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms* (Gjerdrum et al. 2012).

4 Indigenous and Stakeholder Consultation

Since November 2017, BP has engaged fisheries stakeholder groups and Indigenous groups on the proposed Newfoundland Orphan Basin Exploration Drilling Program. This has included ongoing engagement with the following fisheries stakeholder groups and Indigenous groups:

Fisheries Stakeholders

- One Ocean
- Fish, Food and Allied Workers – Unifor
- Ocean Choice International
- Association of Seafood Producers
- Groundfish Enterprise Allocation Council
- Canadian Association of Prawn Producers

Indigenous Groups

- Labrador Inuit: Nunatsiavut Government, NunatuKavut Community Council
- Labrador Innu: Innu Nation
- Nova Scotia Mi'kmaq First Nations: Acadia, Annapolis Valley, Bear River, Eskasoni, Glooscap, Membertou, Millbrook, Paqtnkek (Afton), Pictou Landing, Potlotek (Chapel Island), Sipekne'katik, Wagmatcook, and We'kmoqma'q (Waycobah)
- New Brunswick Wolastoqiyik (Maliseet) First Nations: Kingsclear, Madawaska Maliseet, Oromocto, St. Mary's, Tobique, and Woodstock
- New Brunswick Mi'gmaq First Nations: Buctouche, Eel River Bar, Fort Folly, Esgenoopetitj, Indian Island, Pabineau, Eel Ground, Metepenagiag, and Elsipogtog
- New Brunswick Peskotomuhkati Nation at Skutik (Passamaquoddy)

- Prince Edward Island Mi'kmaq First Nations: Abegweit and Lennox Island
- Quebec Mi'gmaq: Micmacs of Gespapegiag, Nation Micmac de Gespeg, and Listuguj Mi'gmaq Government
- Quebec Innu: Conseil des Innus de Ekuanitshit and Première Nation des Innus de Nutashkuan

BP is planning to engage the same fisheries stakeholder and Indigenous groups on the Project during survey planning. BP will communicate the proposed survey plan including timing and location to Indigenous groups and commercial fisheries stakeholders prior to mobilization and a FLO will be onboard the survey vessel to ensure implementation of communication procedures intended to minimize conflict with the commercial fishery.

5 Environmental Setting

The eastern Newfoundland offshore area is a highly-productive ecosystem and there are many species of fish, marine mammals, sea turtles, and marine birds that occur, or could potentially occur, in the Project Area. Some of these species are listed as species at risk under the federal *Species at Risk Act* (SARA) and / or are identified as species of conservation interest by the Committee on the Status of Endangered Wildlife in Canada.

There is a high abundance and diversity of structure-forming benthic invertebrate species that occur in the Orphan Basin and in surrounding areas, including corals, sponges, and sea pens (Amec 2014). DFO has defined a large Significant Benthic Area (SBA) for sea pens that encompasses the edge of the Northeast Newfoundland Shelf, including EL 1145 and portions of ELs 1146. There are additional SBAs for small and large gorgonian corals surrounding the Project Area along the Northeast Newfoundland Slope. The Northeast Newfoundland Slope Closure is a marine refuge designated by DFO which is closed to bottom contact fishing to protect corals and sponges in this area and encompasses all of ELs 1145 and 1146.

The most abundant fish species found in the Project Area (based on 2015-2016 DFO research vessel survey data) include: redfish; Greenland halibut; roughhead grenadier; roundnose grenadier; witch flounder; and northern wolffish. These species would be expected to be present in the Project Area year-round. The Northern Grand Banks encompasses an area designated as proposed critical habitat for northern and spotted wolffish; both species are listed under SARA Schedule 1 as threatened. The proposed northern wolffish critical habitat overlaps the Project Area along a portion of the Northeast Newfoundland Slope.

Several million seabirds nest along the coasts of the eastern and northeastern Newfoundland, and forage on the Grand Banks and adjacent areas during and following the nesting season. In the summer, most of the world's population of great shearwater and large numbers of sooty shearwater nesting in the South Atlantic are thought to migrate to Newfoundland waters. Leach's storm-petrels traverse the continental shelf to forage for nestlings in deep waters off the shelf in areas such as the Orphan Basin, which is the nearest deep-water area to the largest nesting colony in the world of this species at Baccalieu Island.

Twenty-four marine mammal species are known to occur within or near the Project Area, including 19 species of cetaceans (whales, dolphins, and porpoises) and five species of pinnipeds (seals). Leatherback, loggerhead and green sea turtles may also potentially occur within or near the Project Area, although their presence would be rare.

The Project Area is located within Northwest Atlantic Fisheries Organization (NAFO) Unit Area 3Kg, where key fisheries species harvested between 2012 and 2016 included Greenland halibut; redfish; greyscale / witch flounder; Atlantic halibut; American plaice; roughhead grenadier; Atlantic cod; skate; snow crab; and northern shrimp. BP is not aware of any food, social or ceremonial (FSC) fishing or harvesting occurring within the Project Area, but is aware of the potential presence of species in the Project Area which may be harvested by Indigenous peoples outside the Project Area including Atlantic salmon, American eel, swordfish and tuna. Birds and seals that could occur in the Project Area may also be harvested by Indigenous peoples for FSC purposes.

6 Summary and Conclusion

To inform planning for the proposed Newfoundland Orphan Basin Drilling Program, BP is planning to undertake a CSEM survey over ELs 1145 and 1146 between May and October in 2020, pending authorization. The Project is expected to take 45 days to complete.

The Project requires an authorization from the C-NLOPB under the Accord Acts. This Project Description has been prepared to initiate an EA process for the Project in accordance with the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2019).

Building on Indigenous and stakeholder engagement efforts associated with the proposed Newfoundland Orphan Basin Drilling Program, BP will liaise with Indigenous groups and commercial fisheries stakeholders about the Project and address any questions and concerns they may have about the Project.

7 References

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