Newfoundland Orphan Basin Exploration Drilling Program

Revised Responses to IRs 48, 49 and 50 (Round 1)

Submitted by:
BP Canada Energy Group ULC
1701 Hollis Street, 10th floor
Halifax, NS B3J 3M8

Prepared by:
Stantec Consulting
141 Kelsey Drive
St. John's, NL A1B 0L2

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Table of Contents

1.0 INFORMATION REQUIREMENTS 1
1.1 Special Areas 1
1.1.1 Information Requirement: IR-48 1
1.1.2 Information Requirement: IR-49 14
1.1.3 Information Requirement: IR-50 25

1.0 INFORMATION REQUIREMENTS

1.1 Special Areas

1.1.1 Information Requirement: IR-48

External Reviewer ID:

DFO-20; DFO-CL-09; DFO-CL-35

Topic:

Special Areas

Reference to EIS:

Section 6.4, Figure 6.30

Context and Rationale:

Section 6.4 of the EIS provides information on several special areas that may occur in the regional assessment area and that overlap with the Project Area. The Agency and Fisheries and Oceans Canada noted that:

- additional Ecologically and Biologically Significant Areas (EBSAs) identified by the Conference of the Parties to the Convention on Biological Diversity located outside Canada's exclusive economic zone in the Northwest Atlantic, some of which overlap the assessment areas, have not been included in the EIS (https://www.cbd.int/ebsa/) (e.g. Seabird Foraging Zone in the Southern Labrador Sea EBSA);
- Table 6.24 gives the distance to the Project Area for the Eastern Avalon Coast EBSAs as 303 kilometers. However, the Eastern Avalon Coast EBSAs is within the Local Assessment Area, which includes the platform supply vessel route. Therefore, routine project activities (platform supply vessels) would be expected to intersect with the special area; and
- the Bonavista Cod Box is not a recognized closure area and should be removed.

Specific Question of Information Requirement:

Update Figure 6.30 with appropriate resolution to include all special areas by type (e.g. Ecologically and Biologically Significant Areas identified by the Conference of the Parties to the Convention of Biological Diversity) that could be affected by the Project. Update Table 6.24 with the distance from each identified special area to nearest ELs and where there is the potential for platform supply vessels to intersect with the special area. The figure should include the following:

- all special areas that occur within the Regional Assessment Area including those previously not identified in the EIS; and
- removal of the Bonavista Cod Box.

With respect to special areas that have not been included in the EIS, provide a description of the ecosystem and conduct an assessment of potential effects of the additional special areas. Identify proposed mitigation and follow-up, for routine activities and potential accidental events, as applicable.

Response:

Section 6.4 of the EIS describes baseline conditions for Special Areas within the Regional Assessment Area (RAA). This description of Special Areas included, but was not limited to, federally protected areas such as Marine Protected Areas (MPAs) designated under the *Oceans Act*, marine refuges and lobster area closures designated under the *Fisheries Act*, as well as Ecologically and Biologically Significant Areas (EBSAs) identified by Fisheries and Oceans Canada (DFO) within the Exclusive Economic Zone (EEZ). The Bonavista Cod Box, a voluntary, experimental closure area designated by the Fisheries Resource Conservation Council, was also included in the scope of Special Areas, but as DFO has noted in their review of the EIS, this is not a recognized closure and should not be considered a Special Area.

The description of EBSAs presented in the EIS focused on those identified by DFO within the Newfoundland and Labrador Shelves Bioregion. This discussion did not include EBSAs that have been recently designated through the Convention on Biological Diversity (CBD). There are five ocean habitat areas identified off Eastern Newfoundland and Labrador that are designated as CBD EBSAs; four of these areas are located within the RAA and are depicted on Figure 1. The Project Area overlaps with the Orphan Spur EBSA (designated by DFO), and two CBD EBSAs: Seabird Foraging Zone in the Southern Labrador Sea; and Slopes of the Flemish Cap and Grand Bank. The Local Assessment Area (LAA) (within which platform supply vessels [PSVs] would transit) overlaps with the Eastern Avalon Coast EBSA (designated by DFO). Descriptions of DFO-designated EBSAs are provided in Table 6.25 of the EIS; descriptions of CBD EBSAs are provided below in Table 1.

In 2015, DFO undertook a process to reassess the EBSAs within the Placentia Bay / Grand Banks Large Ocean Management Area (PB / GB LOMA [now known as an integrated management area, or IMA]). As a result of the reassessment, the PB / GB IMA EBSAs were revised in 2017 but have not yet been publicly released (Figure 2) (DFO 2019 [draft]). Based on available information, five new EBSAs have been delineated within the existing PB / GB IMA and two areas previously designated as EBSAs in the PB / GB IMA are no longer listed as EBSAs. The area of the combined EBSAs has been increased by 26%. PB / GB IMA EBSAs within the RAA are described in Table 2. The original Southeast Shoal EBSA had a large portion outside the EEZ and has been reduced in area. While other areas outside the EEZ are now considered to be beyond DFO EBSA boundaries (including portions of the Northeast Slope and the Lilly Canyon-Carson Canyon EBSAs), the area of these two EBSAs within the EEZ has been increased. The five new EBSAs (Haddock Channel Sponges, South Coast, St. Mary's Bay, Bonavista Bay and Baccalieu Island) do not yet have published descriptive information.

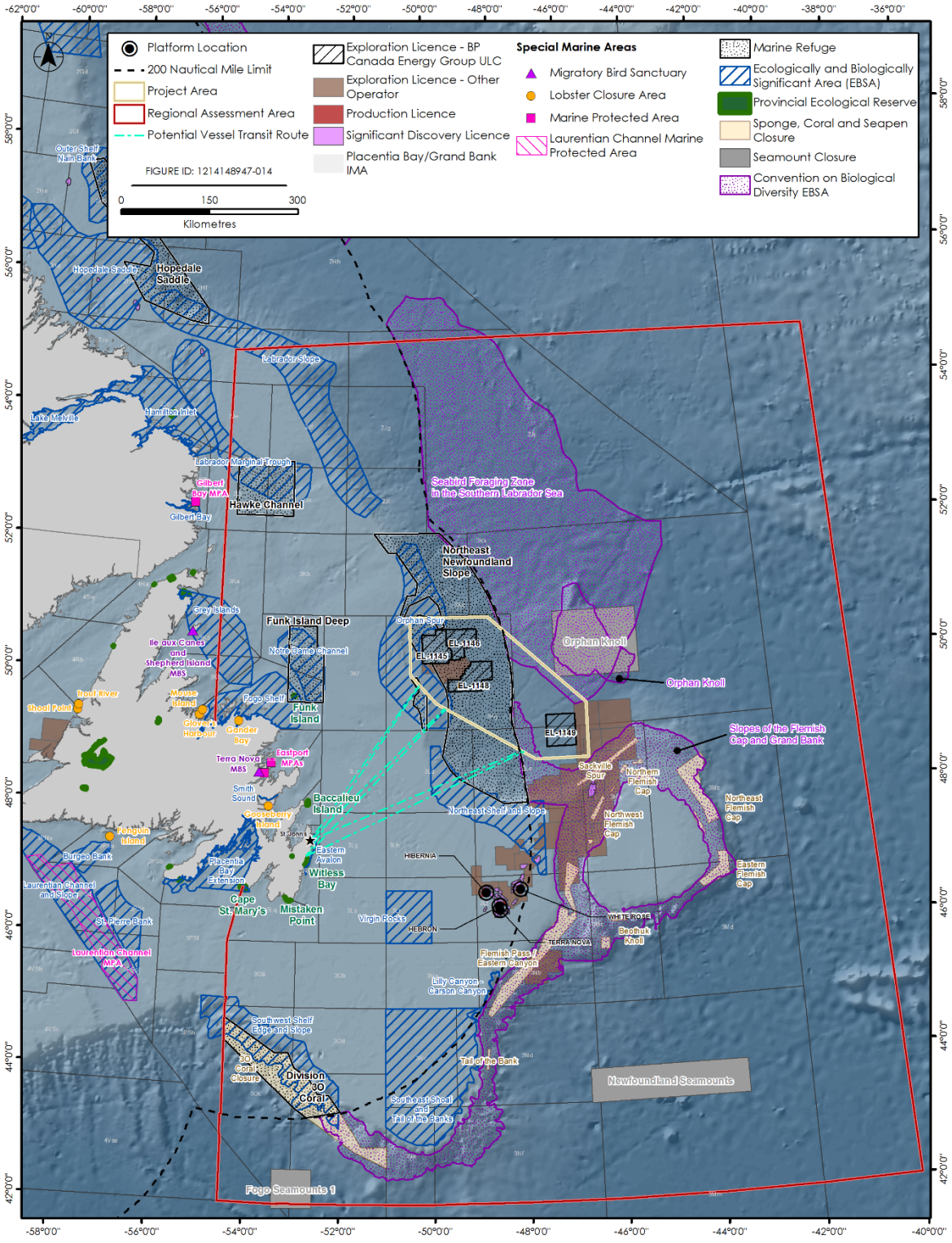


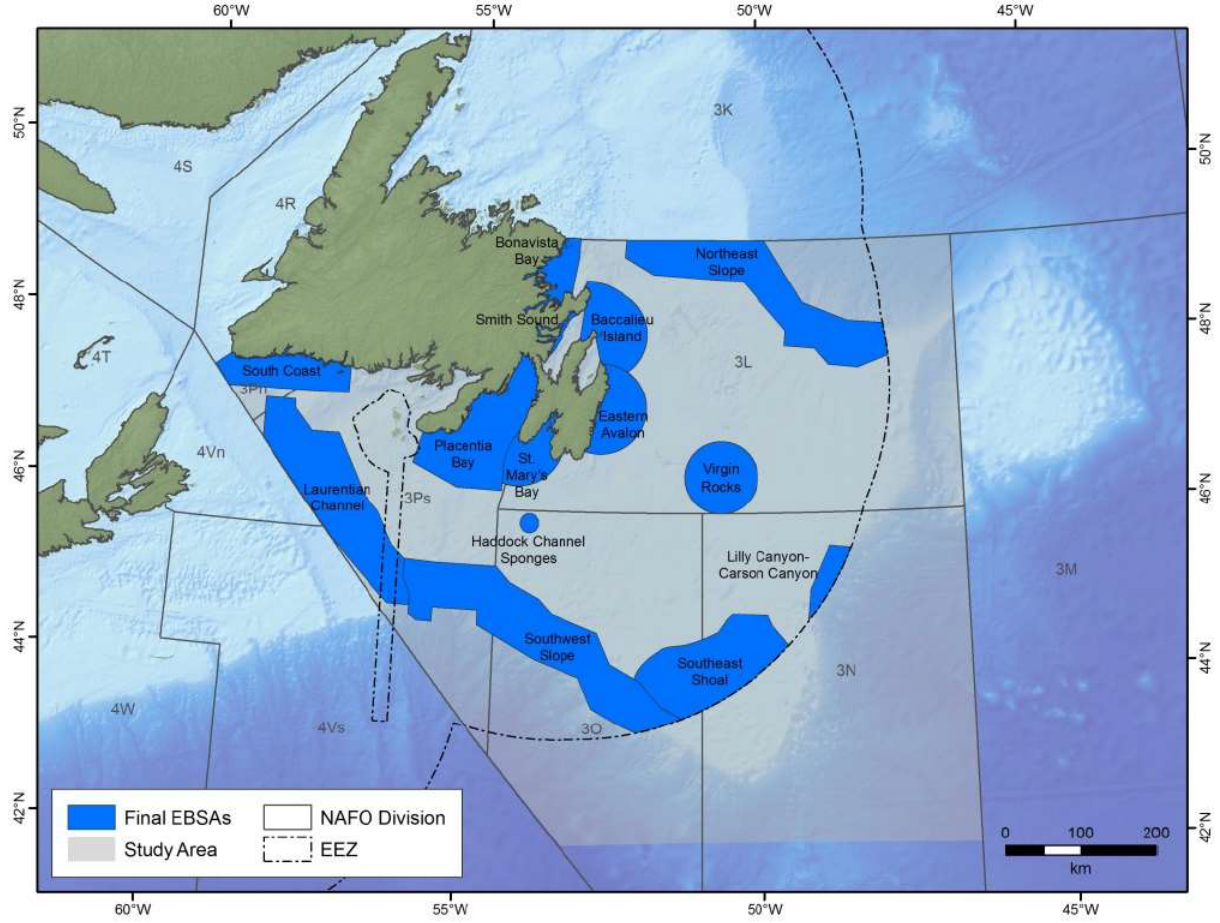
Figure 1 Special Marine Areas in the Regional Assessment Area

Table 1 CBD EBSAs off Newfoundland and Labrador and their Rationale for Designation and Proximity to the Project Area

CBD EBSA	Rationale for Identification / Designation	Total Area (km²)	Nearest Distance to Project Area (km)	Within RAA
Seabird Foraging Zone in the Southern Labrador Sea	Supports globally important populations of marine vertebrates, including an estimated 40 million seabirds annually. Important foraging habitat for seabirds, including 20 populations of over-wintering black-legged kittiwakes (*Rissa tridactyla*), thick-billed murres (*Uria lombia*) and breeding Leach's storm-petrels (*Oceanodroma leucorhoa*). Encompasses the pelagic zone of the Orphan Basin, continental shelf, slope and offshore waters inside and outside the Canadian EEZ.	152,929	Within	Yes
Orphan Knoll	Seamounts typically support endemic populations and unique faunal assemblages. This seamount is an island of hard substratum with uniquely complex habitats that rise from the seafloor of the surrounding deep, soft sediments of the Orphan Basin. Although close to the adjacent continental slopes, Orphan Knoll is much deeper and appears to have distinctive fauna. Fragile and long-lived corals and sponges have been observed and a Taylor Cone circulation provides a mechanism for retention of larvae.	12,776	24	Yes
Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank	The Southeast Shoal is an ancient beach relic that provides a shallow, relatively warm, sandy habitat with a unique offshore capelin-spawning ground. The area supports a nursery ground for yellowtail flounder, as well spawning areas for American plaice, Atlantic cod and Atlantic wolffish (listed as a species of special concern by Canada's federal *Species at Risk Act* – SARA). Unique populations of blue mussels and wedge clams are also found here. The area is an important feeding area for a number of cetaceans, including humpback and fin whales, and is frequented by large numbers of seabirds, including species that travel over 15,000 km from breeding sites in the South Atlantic to feed in the area during the non-breeding season.	16,333	457	Yes
Slopes of the Flemish Cap and Grand Bank	Contains most of the aggregations of indicator species for vulnerable marine ecosystems in the Northwest Atlantic Fisheries Organization (NAFO) Regulatory Area. Includes NAFO closures to protect corals and sponges and a component of Greenland halibut fishery grounds in international waters. A high diversity of marine taxa, including threatened and listed species, are found within the EBSA.	87,932	Within	Yes

Table 1 CBD EBSAs off Newfoundland and Labrador and their Rationale for Designation and Proximity to the Project Area

CBD EBSA	Rationale for Identification / Designation	Total Area (km²)	Nearest Distance to Project Area (km)	Within RAA
Labrador Sea Deep Convection Area	The only Northwest Atlantic site where winter convection exchanges surface and deep ocean waters. Provides mid-water overwintering refuge for pre-adult *Calanus finmarchicus*, a key species for zooplankton populations of the Labrador Shelf and downstream areas. Annual variability in convection results in significant yearly change through ecosystems of the North-West Atlantic.	43,016	650	No
Source: CBD 2019				



Source: DFO 2019 (Draft)

Figure 2: Updated DFO EBSAs in the Placentia Bay Grand Bank Integrated Management Area

Table 2 DFO EBSAs within the RAA and their Proximity to the Project Area

EBSA Name (2017 Draft Name)	Total Area (km²) (2017 total area)	Nearest Distance to Project Area (km)	Within RAA	Rationale for Identification / Designation
Orphan Spur	21,569	Within	Yes	High concentrations of corals. Densities of sharks and species of conservation concern (e.g., northern, spotted, and Atlantic wolffish, skates, roundnose grenadier, American plaice, redfish).
Northeast Shelf and Slope (Northeast Slope)	13,885 (19,731)	60	Yes	High aggregations of Greenland halibut and spotted wolffish, which congregate in spring. Concentrations of cetaceans, pinnipeds, and corals.
Notre Dame Channel	6,222	145	Yes	Recognized for cetacean feeding and migration. Frequented by several species of seabirds. Harp seals feed in the area during winter.
Labrador Slope	29,746	188	Yes	High diversity of corals, sponges, rare or endangered species such as: Atlantic, spotted, and northern wolffish. Significant concentrations of roundnose grenadier, skates, northern shrimp, Greenland halibut, redfish, Atlantic cod, and American plaice.
Fogo Shelf	9,403	191	Yes	Funk Island, the largest common murre colony in the western North Atlantic and the only northern gannet breeding colony in the Newfoundland and Labrador Shelves Bioregion. Other bird species aggregations. Abundance of beach and sub-tidal capelin spawning areas. Important cetacean feeding areas. Several areas of marine mammals' presence.
Grey Islands	11,301	268	Yes	Important for waterfowl and seabirds in coastal areas and on the shelf. Common eider and harlequin duck occur in high concentrations. Important breeding colonies for great black-backed gulls, herring gulls, and terns. High diversity of seabird species that aggregate along the inner shelf area.
Labrador Marginal Trough	16,952	271	Yes	High densities of shrimp, snow crab, Greenland halibut, American plaice, witch flounder, and capelin. Potential corridor for several fish and mammal species. Part of the highest probability of use for harp seal whelping and feeding. Aggregations of plankton piscivores, and small and medium benthivores. Aggregations of cetaceans in summer and fall. Important for seabirds including murres, black-backed kittiwake, great black-backed gull, herring gull, northern fulmar, Atlantic puffin, skuas, jaegers, sooty shearwater, and the SARA-listed ivory gull.
Virgin Rocks	6,843 (5,294)	282	Yes	High aggregations of capelin and other spawning groundfish such as Atlantic cod, American plaice, and yellowtail flounder. Seabird feeding areas. Unique geological features and habitat.
Eastern Avalon	1,683 (5,948)	303	Yes	Seabird feeding areas. Cetaceans, leatherback turtles, and seals feed in the area from spring to fall.
Smith Sound	148 (547)	303	Yes	Atlantic cod use the area for spawning and nursery grounds and as an overwintering refuge.

Table 2 DFO EBSAs within the RAA and their Proximity to the Project Area

EBSA Name (2017 Draft Name)	Total Area (km²) (2017 total area)	Nearest Distance to Project Area (km)	Within RAA	Rationale for Identification / Designation
Placentia Bay Extension (Placentia Bay)	7,693 (13,545)	360	Yes	High level of biodiversity. Supports important seabird breeding areas and a high biomass of birds and mammals. High aggregation of cetaceans and leatherback sea turtles in the spring and summer. Otters and harbour seals use area year-round. Important feeding area from spring to fall for many seabird species and cetaceans (especially humpbacks and porpoises). Important for reproduction of many seabird species, harbour seals and otters. Possible migratory path for leatherback turtles.
Lilly Canyon - Carson Canyon	1,145 (2,180)	367	Yes	Concentration, reproduction and feeding area for Iceland scallop. Aggregation and refuge / overwintering for cetaceans and pinnipeds.
Southeast Shoal and Tail of the Banks (Southeast Shoal)	30,935 (15,402)	434	Yes	Highest benthic biomass in the Grand Banks; aggregation, feeding, breeding, and/or nursery habitats for capelin, yellowtail, American plaice and Atlantic cod and cetaceans and seabirds, Area of reproduction of striped wolffish. Unique populations of species. Unique sandy habitat with important glacial history.
Southwest Shelf Edge and Slope (Southwest Slope)	16,644 (25,181)	602	Yes	Critical to a wide variety of seabirds, providing the highest density of pelagic seabird feeding within the PB / GB IMA. Many marine mammals and leatherback sea turtles aggregate in summer.
Haddock Channel Sponges [NEW]	(490)	Unknown	Yes	Is the largest area identified as a sponge SBA in the entire PB / GB IMA area (Kenchington et al. 2016)
St. Mary's Bay [NEW]	(3,989)	Unknown	Yes	This area is known to be important to several species of seabirds and waterfowl, specifically wintering sea ducks, and it also contains a number of Capelin spawning beaches, eelgrass beds and important salmon rivers. Salmonier River, which drains into this Bay, has been found to contain part of a genetically distinct population of salmon that inhabits rivers on the Avalon and Burin Peninsulas
Bonavista Bay [NEW]	(3,141)	Unknown	Yes	Presence of important seabird colonies, including Atlantic puffin, black-legged kittiwake and common murre. There are also several other key features in surrounding waters including important areas for capelin, shrimp, plank-piscivorous fish, Spotted Wolffish and marine mammals.
Baccalieu Island [NEW]	(6,922)	Unknown	Yes	Important for capelin spawning along beaches throughout the EBSA. Large patches of eelgrass are present. Area around Newman Sound is an important nursery are for demersal fishes. Important areas for sea ducks and most half of all tern species colonies are found in this EBSA.
Source: DFO 2013, 2016, 2019 [draft]); Amec 2014; Wells et al. 2017				

As indicated through the descriptions of rationale for designation (see Table 2), the CBD and PB / GB EBSAs are rarely recognized solely for being important to a single species, rather these areas are ecologically important on an ecosystem level, providing important functions to a variety of marine species or functional groups (Wells et al. 2017). Most of the areas identified are highly productive and important for a large number of species, including highly mobile species (DFO 2019, draft).

In the Newfoundland and Labrador Slope and surrounding areas, including the Orphan Basin, Grand Banks and Flemish Pass, cold water from the Labrador Current converges with the warm waters of the North Atlantic Current, creating a mixing within the water column and an upwelling of nutrients from the bottom layers of the ocean. Strong winds in the area also help contribute to nutrient mixing within the water column (the ocean mixed layer, which is typically tens of metres deep [Kantha and Clayson 2003]). The nutrient mixing triggers a chain reaction in the food web, providing photosynthetic opportunity for micro-algae, which attract smaller invertebrates and their larvae (krill and shrimp), which in turn attract fish species that feed on these organisms, continuing up the food chain to larger mammals (dolphins and whales).

The gravel-like sediment and mid-range depths allow for suitable habitat for sponges, coral, and sea pens to grow; research vessel data along with predictive habitat models indicate that these species are plentiful in the area. These aggregations of corals, sponges, and sea pens provide protection for many species and act as spawning area, breeding grounds, and nurseries.

Each of these mechanisms plays an important role in the ecosystems of the region and helps form a unique area that is rich in biodiversity and supports many types of species at different life stages throughout the water column. Some of these relationships and important habitats are outlined in Table 2 above.

Impacts on Residual Environmental Effects:

Routine Project activities are not expected to interact with Special Areas outside the Project Area or LAA. The effects assessment therefore focuses on the following Special Areas:

- Northeast Newfoundland Slope Closure marine refuge
- Orphan Spur EBSA
- Orphan Knoll Seamount Closures (NAFO Vulnerable Marine Ecosystem)
- Northeast Slope EBSA (previously identified as the Northeast Shelf and Slope EBSA)
- Slopes of the Flemish Cap and Grand Bank (CBD EBSA)
- Seabird Foraging Zone in the Southern Labrador Sea (CBD EBSA)
- Eastern Avalon EBSA

The assessment of effects on Special Areas focuses on changes to habitat quality, with particular attention to key features that may have contributed the area's special designation. Effects on habitat use by marine fish, marine and migratory birds, and marine mammals and sea turtles, are evaluated separately in Chapters 8, 9 and 10 of the EIS. However, with an ecosystem approach in mind, the physical habitat of a Special Area cannot be easily separated from biological features (e.g., species presence and functions). For example, Project effects which result in a change in availability of prey species for foraging seabirds can potentially affect the biological characteristics of a Special Area, contributing to a degradation in habitat

quality and potentially affecting the distribution and abundance of breeding and foraging seabirds in that ecosystem.

Effects from planned Project activities, including effects on habitat quality and use by marine fish, marine and migratory birds, and marine mammals and sea turtles have been assessed in Chapters 8, 9, and 10 of the EIS, respectively. Underwater sound emissions, light emissions, and drilling discharges from planned Project activities are predicted to affect habitat quality and use and/or risk of physical injury or mortality of these functional groups. However, with the implementation of various mitigation and monitoring commitments, these effects are predicted to be low to moderate in magnitude, short-term to medium term in duration, with most effects being immediately reversible upon cessation of the applicable Project activity.

Key mitigation to protect Special Areas, including the physical and biological components that comprise those ecosystems, includes the following:

- BP will conduct an imagery-based seabed survey at the proposed wellsite(s) to confirm the absence of sensitive environmental features, such as habitat-forming corals or species at risk. The survey will be carried out prior to drilling and will encompass an area within a 500-m radius from the wellsite. If any environmental or anthropogenic sensitivities are identified during the survey, BP will notify the C-NLOPB immediately to discuss an appropriate course of action. This may involve further investigation and/or moving the wellsite if it is feasible to do so. This survey will also serve to provide baseline data for coral and sensitive benthic habitat that may be present and be used to inform discussions on potential follow-up and monitoring with respect to drill waste discharges.
- Artificial lighting on the mobile offshore drilling unit (MODU) and PSVs will be reduced to the extent that worker safety and safe operations are not compromised.
- Stranded birds on the MODU and PSVs will be recovered using the methods from *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada* (Environment and Climate Change Canada [ECCC] 2016).
- As required in the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines* (C-NLOPB 2018), mitigation measures applied during geophysical surveys (VSP) will be consistent with those outlined in the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* (DFO 2007).
- Selection and screening of chemicals to be discharged, including drill fluids, will be in accordance with the *Offshore Chemical Selection Guidelines* (National Energy Board [NEB] et al. 2009). Where feasible, lower toxicity drilling muds and biodegradable and environmentally friendly properties activities within muds and cements will be used. The chemical components of drilling fluids, where feasible, will be those that have been rated as being least hazardous under the Offshore Chemical Notification Scheme and Pose Little or No Risk to the Environment by the Convention for the Protection of the Marine Environment of the North-East Atlantic.
- Offshore waste discharges and emissions associated with the Project (i.e., operational discharges and emissions from the MODU and PSVs) will be managed in accordance with relevant regulations and municipal bylaws as applicable, such as the Offshore Waste Treatment Guidelines (NEB et al. 2010) and MARPOL, of which Canada has incorporated provisions under various sections of the *Canada Shipping Act*. Waste discharges not meeting legal requirements will not be discharged to the ocean and will be brought to shore for disposal.

- If flaring is required, BP will discuss flaring plans with the C-NLOPB including steps to reduce adverse effects on migratory birds. This may involve restricting flaring to the minimum required to characterize the wells' hydrocarbon potential and as necessary for the safety of the operation, reducing flaring during periods of migratory bird vulnerability, and the use of a water curtain to deter birds from the general vicinity of the flare.
- Routes of helicopters transiting to and from the MODU will avoid transiting near migratory bird nesting colonies and will comply with the Newfoundland and Labrador *Seabird Ecological Reserve Regulations, 2015*, and, ECCC's *Avoidance Guidelines* for seabird and waterbird colonies. Appropriate flight altitudes and horizontal buffer zones will be established to reduce disturbance to colonies in accordance with the Newfoundland and Labrador *Seabird Ecological Reserve Regulations, 2015* and the ECCC's *Avoidance Guidelines*. Specific details will be provided in the Environmental Protection Plan (EPP) for the Project.
- PSV routes transiting to and from the MODU will be planned to avoid passing within 300 m of migratory bird nesting colonies during the nesting period and will comply with the Newfoundland and Labrador *Seabird Ecological Reserve Regulations, 2015* and federal guidelines to reduce disturbance to colonies. Specific details will be provided in the EPP.
- During transit to/from the Project Area, PSVs will travel at vessel speeds 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. Marine mammal and sea turtle sightings will be recorded opportunistically during PSV transit. In the unlikely event of a vessel collision with a marine mammal or sea turtle, BP will contact the Canadian Coast Guard within 24 hours following the collision.
- BP will implement multiple preventative and response barriers to manage risk of incidents occurring and mitigate potential consequences. As noted in Section 15.3 of the EIS, the Project will operate under an Incident Management Plan (IMP), which will include contingency plans for responding to specific emergency events, including potential spill or well control events. The IMP and supporting specific contingency plans, such as a Spill Response Plan (SRP), will be submitted to the C-NLOPB prior to the start of any drilling activity as part of the Operations Authorizations (OA) process. The SRP will specify tactical response methods, procedures, and strategies for safely responding to different spill scenarios. Tactical response methods that will be considered following a spill incident include but are not limited to: offshore containment and recovery; surveillance and tracking; dispersant application; in-situ burning; shoreline protection; shoreline clean up; and oiled wildlife response. Refer to Section 15.3 of the EIS for details on incident management and spill response.
- BP will undertake a Spill Impact Mitigation Assessment (SIMA) / Net Environmental Benefit Analysis as part of the OA process with the C-NLOPB. The SIMA is a structured process that will qualitatively evaluate the risks and trade-offs of all feasible and effective response options, when compared to no action. The SIMA process will inform the selection of an overall spill response strategy for the Project.

With an ecosystem approach in mind, and taking into consideration conservative predictions for Marine Fish and Fish Habitat, Marine and Migratory Birds, and/or Marine Mammals and Sea Turtles, Table 11.5 from the EIS has been updated as Table 3 below (changes marked in boldface type). No population-level, nor ecosystem-level effects are predicted. No permanent habitat loss is predicted as a result of the Project, including no permanent habitat loss in any Special Area. However, as noted in Table 3, if wellheads are abandoned in place on the seafloor within a Special Area, there may be a permanent change in habitat

quality. Refer to the revised response for IR-49 for more information on the zone of influence and characterization of Project effects, including a more focused evaluation of effects on the Northeast Newfoundland Slope Closure marine refuge.

The changes noted in Table 3 do not affect the proposed mitigation, follow-up or overall effects significance determination for Special Areas as presented in the EIS. Further explanation for these changes are noted in response to IR-54.

Table 3 Updated Table 11.5: Summary of Residual Environmental Effects on Special Areas

Residual Effect	Residual Environmental Effects Characterization						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context**
Change in Habitat Quality							
Presence and operation of a MODU	A	L-M	**RAA**	**ST-MT**	IR	R	D
VSP operations	A	L	PA	ST	IR	R	D
Discharges	A	L-M	PA	**ST-LT**	IR	R	D
Well abandonment and decommissioning	A	L	PA	ST-LT	IR	**I**	D
Supply and servicing operations	A	L	LAA	ST	IR	R	D

KEY:
See Table 11.3 for detailed definitions
N/A: Not Applicable

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term
P: Permanent

Frequency:
UL: Unlikely
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological / Socio-Economic Context:
D: Disturbed
U: Undisturbed

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1.1.2 Information Requirement: IR-49

External Reviewer ID:

KMKNO-27; KMKNO-28

Reference to EIS:

Section 6.4.1.4
Section 11.1.3
Section 11.1.4.2
Section 11.3
Section 11.3.3.1

Context and Rationale:

Section 6.1.9.1 of the EIS Guidelines requires that the EIS describe special areas. Section 6.4 of the EIS identifies various types of special areas within the Project Area and Regional Assessment Area, including marine refuges and lobster closure areas, ecologically and biologically significant areas, and valued marine ecosystems.

Section 6.4.1.4 of the EIS states that 44 percent of the Northeast Newfoundland Slope Closure marine refuge falls within the Project Area. However, 100 percent of Exploration Licences 1145, 1146 and 1148 fall within the marine refuge. Table 6.21 in the EIS provides the rationale for its designation as an area of high density of corals and sponges with high biodiversity and that it is closed to bottom fishing activities.

No further descriptions of the Northeast Newfoundland Slope Closure are provided. Additional information with respect to the ecosystem (e.g. oceanographic patterns, habitats critical to ecological processes, structural complexity, connectivity of habitats, etc.) and how that relates to the Northeast Newfoundland Slope Closure is required to assess the potential effects of Project activities which may occur directly within the Northeast Newfoundland Slope Closure. The potential effects should be assessed for each of the valued components present (fish, fish habitat, migratory birds, marine mammals, sea turtles, and commercial fish).

Figure 11.1 in Section 11.1.4.2 of the EIS illustrates the special area spatial boundaries; however, the potential zone of influence of project effects are not shown. The figure should illustrate the predicted areal extent of habitat degradation and loss resulting from drill muds and cuttings deposition based on Appendix B of the EIS, the extent of sound effects based on Appendix C, and potential spills based on Appendix D as well as the potential area over which light may affect the Northeast Newfoundland Slope Closure. Sections 11.2 and 11.3 of the EIS do not include a discussion of habitat loss or degradation, including a discussion of environmental effects from Project activities (drill cuttings deposition, sound, spills and light) could affect the baseline conditions described above that resulted in the special area being designated. Using this information update the effects analysis and describe how the Project activities could result in habitat loss or degradation to the Northeast Newfoundland Slope Closure.

Section 11.5 of the EIS states that a follow-up program to address the uncertainty regarding residual effects of drill waste discharges on the marine benthic environment is proposed and would consist of a visual survey of the seafloor using a ROV after drilling activities to assesses the visual extent of sediment dispersion and validate drill waste modelling predictions. The KMKNO have suggested a benthic sampling program to determine infaunal recolonization rates following drilling.

Specific Question of Information Requirement:

Provide information regarding the ecosystem (e.g. oceanographic patterns, habitats critical to ecological processes, structural complexity, connectivity of habitats, etc.) within Northeast Newfoundland Slope Closure marine refuge and how it relates to its special area designation. Update the effects analysis for each of the valued components present (fish, fish habitat, migratory birds, marine mammals, sea turtles, and commercial fish) to describe how Project activities could result in habitat loss or degradation to the Northeast Newfoundland Slope Closure.

Revise Figure 11.1 to illustrate the overlap between the Northeast Newfoundland Slope Closure and the zone of influence of project activities. Provide a discussion of habitat degradation and loss resulting from Project activities (drill cuttings deposition, sound, spills and light) that could affect the baseline conditions described above that resulted in the special area being designated.

Discuss the need for and feasibility of a benthic sampling program to determine infaunal recolonization rates following drilling.

Response:

<u>Northeast Newfoundland Slope Closure Marine Refuge</u>

The Northeast Newfoundland Slope Closure marine refuge is a 55,266 km² area that extends along the Outer Shelf of the Newfoundland Slopes. Along the Newfoundland Slopes, the cold Labrador current coming form the north mixes with the warm Gulf Stream coming from the south to create an upwelling of nutrients. This upwelling creates a highly productive area with rich primary productivity and high species diversity, as discussed in Section 5.2.2 of the EIS.

The Northeast Newfoundland Slope Closure marine refuge overlaps with the Orphan Spur and Northeast Shelf and Slopes Ecologically and Biologically Significant Areas (EBSAs) designated by Fisheries and Oceans Canada (DFO) and is adjacent to the Seabird Foraging Zone in the Southern Labrador Sea, and the Significant Benthic Area for sea pens and critical habitat for wolffish. The marine refuge extends from approximately 400 to 2,000 m depth. The area is high in species diversity and contains corals, fish, marine mammals, and seabirds. Several rare or endangered fish species (spotted, northern and Atlantic wolffish, skates, and roundnose grenadier) are found throughout the marine refuge. Several marine mammal and seabird species (e.g., thick-billed murre, storm petrels, black-legged kittiwake, skuas and jaegers, northern fulmar, greater shearwater, dovekie) also frequent this area.

Zone of Influence

Figure 1 shows the predicted zone of influence of Project effects on the Northeast Newfoundland Slope Closure marine refuge (and other special areas intersected by the 40-km underwater sound zone of influence), including light and underwater sound emissions associated with the presence and operation of the mobile offshore drilling unit (MODU), underwater sound from vertical seismic profiling (VSP), and the deposition of drill muds and cuttings. Figure 2 shows the probability of interaction with this special area in the unlikely event of a well blowout. These interactions from planned and unplanned Project activities could potentially affect the quality of habitat of the Northeast Newfoundland Slope Closure marine refuge for the fish, birds and mammals inhabiting the area.

Effects from planned Project activities, including effects on habitat quality and use by marine fish, marine and migratory birds, and marine mammals and sea turtles have been assessed in Sections 8, 9, and 10 of the EIS, respectively. Section 12 of the EIS evaluates effects from planned Project activities on special areas, focusing on changes to habitat quality and the ability of special areas to maintain the value of ecosystem functions they provide. Section 15.5 of the EIS evaluates effects of accidental events (e.g., spills) on all valued components.

Below is a closer look at potential Project effects on the Northeast Newfoundland Slope Closure marine refuge and in particular, the predicted zone of influence of Project activities (planned and unplanned) and resulting effects on habitat quality of the special area.

Underwater Sound

Underwater sound emissions from the presence and operation of the MODU could potentially result in low magnitude effects to the quality of habitat within the Northeast Newfoundland Slope Closure marine refuge for marine fish, marine mammals, sea turtles and to a lesser extent, marine and migratory birds if these species are using the area within the defined zone of influence at the same time as the activity. The estimated broadband source levels associated with the operation of the MODU is approximately 196.7 dB re 1μPa @1 m. Marine mammals are unlikely to be exposed to sound levels from the MODU that would result in auditory injury. Based on transmission loss modelling (refer to Appendix C of the EIS), it is expected that sound levels would dissipate to below 120 dB re 1 μPa rms beyond approximately 40 km of the sound source. This sound pressure level is commonly considered as a generic indicative threshold for the assessment of potential effects of sound on behavioural responses of marine mammals to continuous (non-impulsive) sound and is used in this assessment to represent the zone of influence on habitat quality associated with underwater sound from the operation of the MODU.

VSP activities will generate impulsive sound underwater with an approximate broadside source level of 247.8 dB re 1 μPa @1 m SPL_{peak}, thereby temporarily affecting the underwater soundscape and quality of habitat. Underwater sound generated by the seismic sound source arrays used in VSP may cause mortality and/or sublethal effects to zooplankton or ichthyoplankton in very close proximity (<5 m) of the sound source (refer to Section 8.3.3.1 of the EIS). Although there are no widely accepted threshold guidelines for behavioral effects on fish, based on qualitative guidelines by Popper et al. (2014), there is a high likelihood of behavioural effects occurring for most fish species within tens of metres of the sound source.

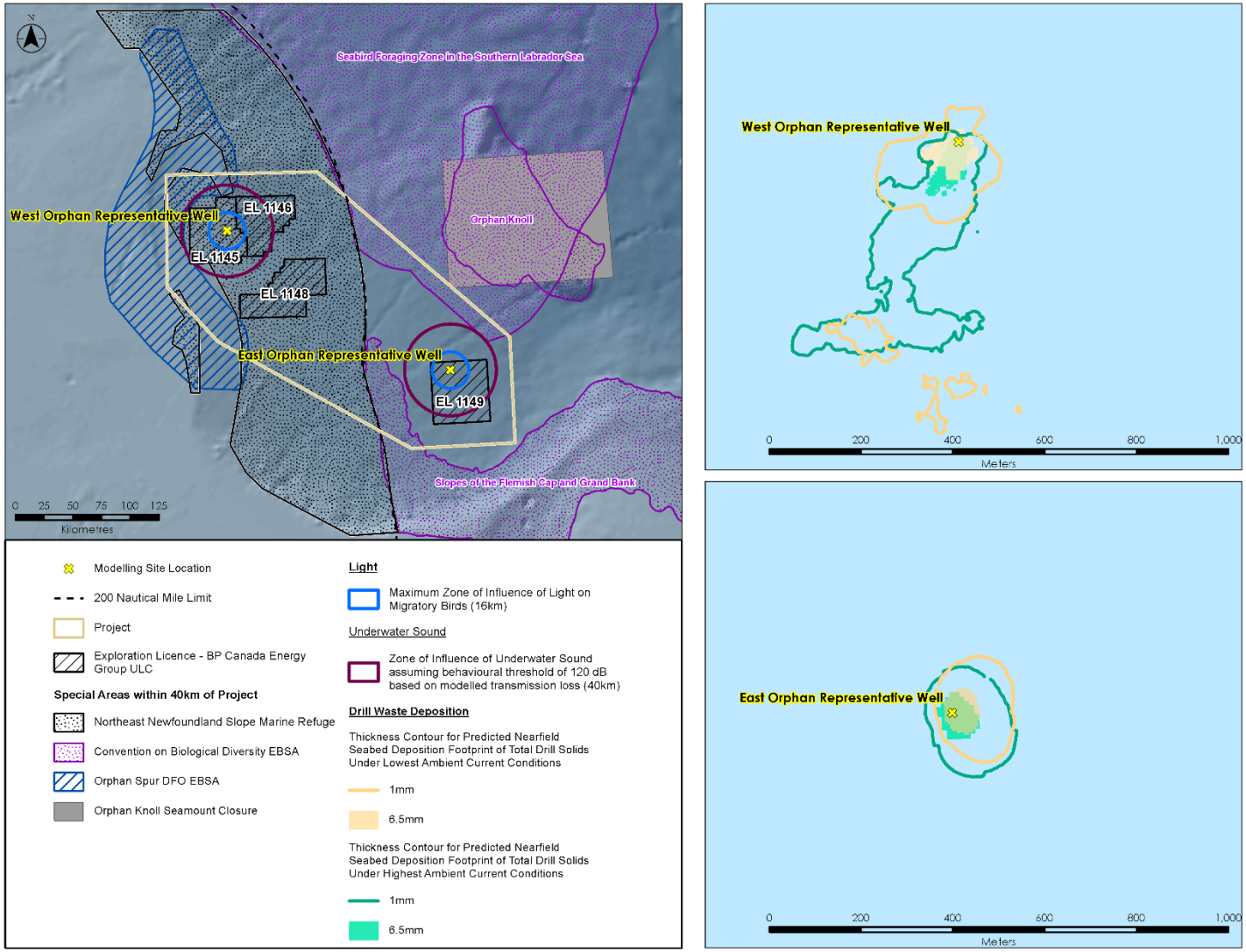


Figure 1 **Predicted Zones of Influence Associated with Underwater Sound, Artificial Light Emissions and Drill Cuttings Deposition**

The United States National Marine Fisheries Service (NMFS) recommends a generic marine mammals behavioral response threshold level of 160 dB re 1 μPa rms SPL for impulsive sounds. The transmission loss modelling results suggest that sound levels would be below this level beyond approximately 3.5 to 9 km radius from the VSP air gun array. As noted in Section 10.3.3.2 of the EIS, marine species would be exposed to lower sound levels in shelf waters from the VSP, which would be conducted in deeper waters.

VSP surveys and the associated underwater sound emissions are expected to be of very short duration (approximately 1 day per well), and the predicted underwater acoustic temporal footprint is expected to be substantially smaller for the operation of the MODU. Therefore the zone of influence for underwater sound is assumed to be the larger of the distances predicted for the MODU operation and VSP activities, which is approximately 40 km radius around each well to be drilled. For each well drilled in the West Orphan Basin (ELs 1145, 1146, 1148), there is predicted to be an effect from underwater sound on habitat quality of the Northeast Newfoundland Slope Closure marine refuge within an approximate 40 km radius of each well to be drilled. Although underwater sound from Project activities may temporarily affect individual species if they are present within the zone of influence at the same time as the activity, these effects are not expected to result in population-level effects and the effect of a change in habitat quality within the Northeast Newfoundland Slope Closure marine refuge is predicted to be low to moderate in magnitude, short-term to medium-term in duration, occur irregularly, and be reversible (once Project activities cease).

Light

As discussed in Section 2.8.6. of the EIS, light emissions will be generated from sources on the MODU and platform supply vessel (PSV), which operate 24 hours per day. A typical, fully lit offshore production platform emits 30 kW of artificial lighting (Poot et al. 2008). Lighting sources include pilot warning and obstruction avoidance lighting, navigation lights, strobe lights, and lighting for the safety of the employees. Light (and heat) is also generated during flaring. Lighting attraction effects are anticipated to be confined to within approximately 5 km (Poot et al. 2008) to 16 km (Rodríguez et al. 2014, 2015) from the source. For the purpose of this assessment, it is assumed conservatively that habitat quality could be reduced due to artificial light emissions within a 16 km radius of the MODU (see Figure 1).

Section 9.3.3.2 of the EIS evaluates the effect of artificial lighting on marine and migratory birds with respect to changes in risk or mortality or physical injury, and habitat quality and use. Changes in ambient lighting in the Northeast Newfoundland Slope Closure marine refuge due to Project activities may result in the attraction of marine and migratory birds, potentially resulting in physical injury or mortality. However, based on previous monitoring results from other projects and the implementation of mitigation and monitoring (including routine systematic checks for stranded birds and proper handling of stranded birds [refer to Section 9.3 of the EIS and the response provided for IR-39]), Project effects are not predicted to result in a detectable decline in overall bird abundance or changes in the spatial and temporal distributions of bird populations within the affected area.

Drill Cuttings Discharges

Drill waste dispersion modelling (refer to Appendix B of the EIS) predicted, for a representative well drilled in West Orphan Basin, that the maximum extent deposition at a visible threshold (1 mm deposition thickness) would be approximately 577 to 625 m radial distance from the discharge point. Considering an effects threshold of 6.5 mm deposition thickness, the zone of influence is reduced to approximately 128 m radial distance from the discharge point. Figure 1 shows an overlay of these drill waste deposition contours under high and low ambient current conditions. The deposition is not predicted to occur uniformly within these radii, but instead is predicted to occur primarily south and southeast of the well drilled in West Orphan Basin. This results in a 1 mm cumulative deposition footprint of approximately 5.7 to 8.0 hectares per well and a 6.5 mm cumulative deposition footprint of approximately 0.69 hectares per well. Section 8.3 of the EIS evaluates the effects of drilling waste discharges on marine fish and fish habitat. Marine organisms in the water column are less likely to be affected than benthic organisms due to the rapid dilution and dispersal of drill cuttings, although zooplankton, larvae, and pelagic invertebrates may experience temporary physical effects associated with elevated concentrations of total suspended solids and increased turbidity. Decreased light penetration caused by turbidity may temporarily decrease primary production of phytoplankton (IOGP 2016).

Of particular interest is the accumulation of drill solids on the seafloor, which can cause stress and disturbance to benthic fauna through direct toxicity from drilling muds and cuttings, burial (smothering), changes due to sediment grain size, nutrient enrichment, and oxygen depletion (Neff et al. 2004; Smit et al. 2008; Neff 2010). The Northeast Newfoundland Slope Closure was designated a marine refuge to protect corals and sponges from bottom-contact fishing. Drill waste deposition modelling predicts a localized footprint of effects that may include physical injury or mortality to fish and degradation of habitat quality including adverse effects on corals and sponges. These effects are predicted to be low in magnitude and spatially and temporally limited; however, the uncertainty regarding effects and recovery of deep-water corals and sponges is recognized (refer to Section 8.4 of the EIS).

One of the key mitigation measures to prevent or reduce adverse environmental effects of drilling waste discharges on corals and sponges in the Northeast Newfoundland Slope Closure marine refuge is BP's plan to conduct an imagery-based seabed survey at the proposed wellsite(s) to confirm the absence of sensitive environmental features, such as habitat-forming corals or species at risk. The survey will be carried out prior to drilling and will encompass an area within a 500-m radius from the wellsite. If any environmental or anthropogenic sensitivities are identified during the survey, BP will notify the C-NLOPB immediately to discuss an appropriate course of action. This may involve further investigation and/or moving the wellsite if it is feasible to do so. This survey will also provide baseline data for coral and sensitive benthic habitat that may be present and be used to inform discussions on potential follow-up and monitoring with respect to drill waste discharges.

Accidental Spills

Oil spill trajectory modelling was conducted for various spill scenarios that could potentially occur during Project activities as a result of an accidental event (refer to Appendix D of the EIS for the oil spill trajectory modelling report or Section 15.4 of the EIS for a summary). The worst case scenario for stochastic modelling was identified as a subsea blowout of crude oil occurring for 120 days in a steady state of uncontrolled well discharge (relief well scenario). Stochastic modelling illustrates the probabilistic locations of surface oiling, water column dispersed and dissolved oil concentration, and shoreline oiling. It does not represent the extent of any one spill event (which would be substantially smaller) but rather provides a summary of the total individual simulations for a given scenario. The probabilistic contours of surface oiling and water column dispersed and dissolved oil concentration from a 120-day unmitigated blowout, from representative well locations in the West Orphan and East Orphan regions of the Project Area relative to the Northeast Newfoundland Slope Closure marine refuge, are shown in Figure 2 (West Orphan) and Figure 3 (East Orphan). Although these contours do not represent a spatial footprint of effects or "zone of influence" such as depicted in Figure 1 for planned Project activities, they do give an indication of probability of spatial extent in the event of an unmitigated spill scenario. Tables 15.10, 15.11, 15.14, and 15.15 of the EIS summarize stochastic modelling results for an unmitigated 120-day blowout (using pre-established sensitivity thresholds), including but not limited to the sum of the intersect area, percentage of area contacted by oil and arrival, and exposure times relative to special areas including the Northeast Newfoundland Slope Closure marine refuge, thereby providing further context on these modelling results.

The probability of oil (surface oil or in-water column oiling) intersecting the Northeast Newfoundland Slope Closure marine refuge in the event of an unmitigated spill is relatively high, although the potential for sponges and corals on the seafloor to be exposed to surface or in-water oil, particularly at the water depths in the West Orphan basin, are low. Effects on marine fish, marine and migratory birds, and marine mammals and sea turtles from accidental spills are assessed in EIS Sections 15.5.1, 15.5.2, and 15.5.3, respectively.

Summary

Figure 1 shows the predicted areal extent of habitat quality effects on the Northeast Newfoundland Slope Closure marine refuge associated with underwater sound, light emissions, and dispersion of drill cuttings from routine, planned Project activities. Assuming a zone of influence of 40 km for underwater sound, this is the largest predicted zone of influence from planned Project activities. Planned Project activities occurring in the East Orphan basin (Exploration Licence [EL] 1148) are not predicted to interact with the Northeast Newfoundland Slope Closure marine refuge and depending on the specific location of a well in BP's ELs, most effects would be contained within the Project Area.

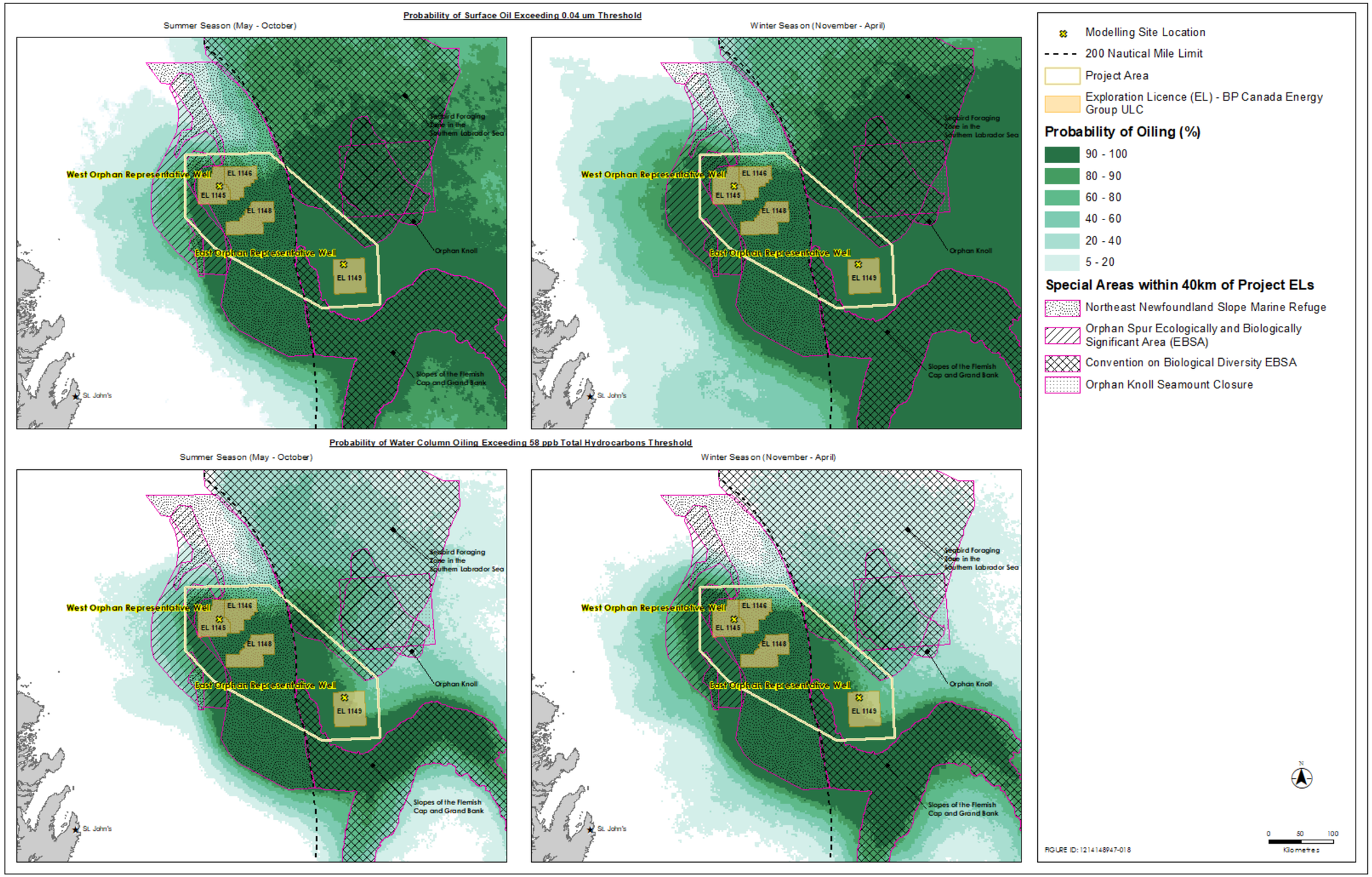


Figure 2 **West Orphan Basin Well Blowout (Unmitigated 120-day Relief Well) – Probability of Surface and Water Column Oiling in Special Areas within 40 km of BP Exploration Licences**

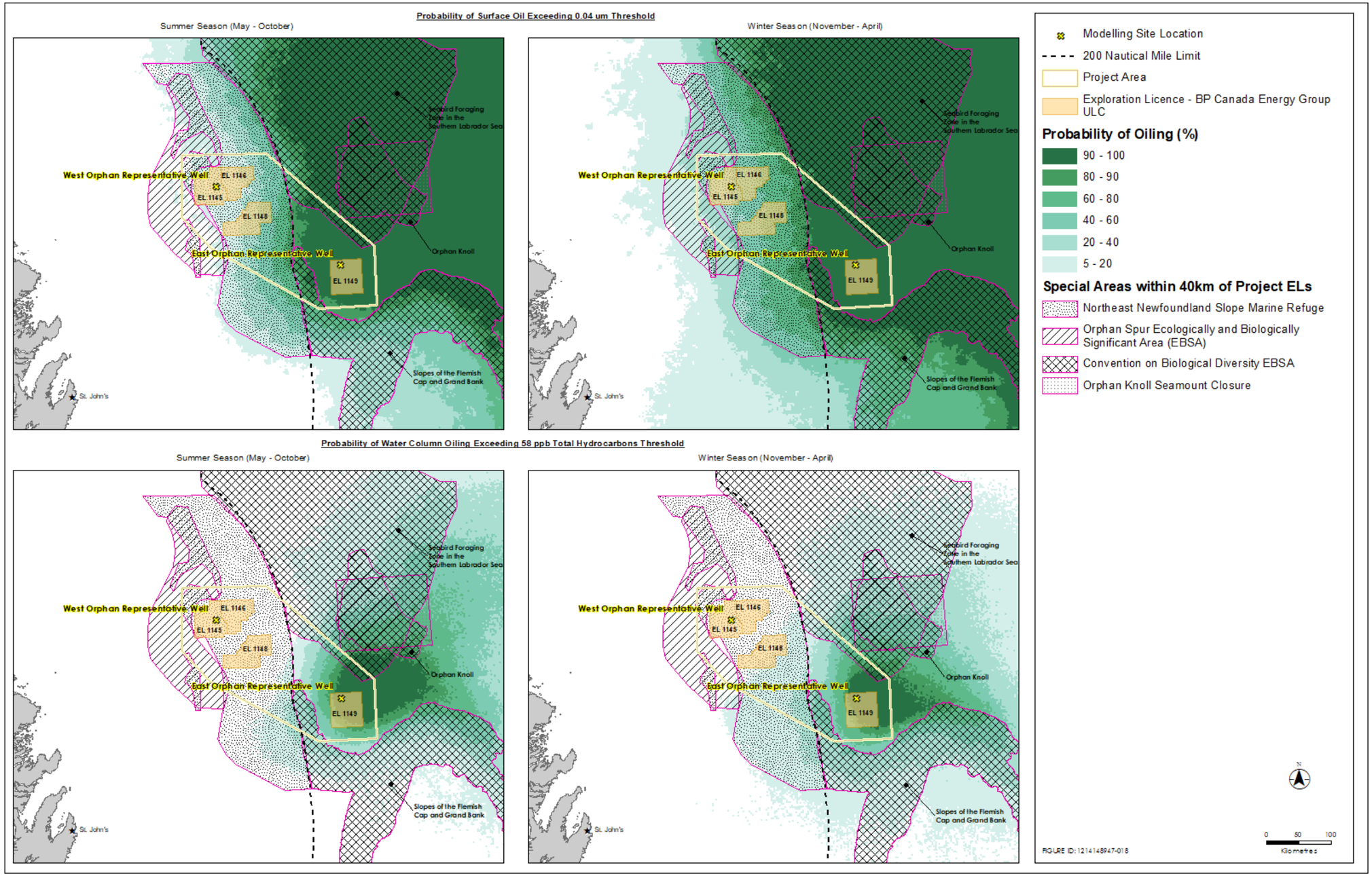


Figure 3 **East Orphan Basin Well Blowout (Unmitigated 120-day Relief Well) – Probability of Surface and Water Column Oiling in Special Areas within 40 km of BP Exploration Licences**

There is no permanent habitat loss predicted to occur in the Northeast Newfoundland Slope Closure marine refuge due to Project activities, although as discussed in the response to IR-54 and the revised response to IR-48, there may be a permanent change in habitat quality if wellheads are abandoned on the seafloor at the end of the drilling program. Residual environmental effects resulting in a change in habitat quality within the Northeast Newfoundland Slope Closure marine refuge are predicted to be reversible (with the exception of well abandonment), with effects from underwater sound and light emissions ceasing once Project activities that generate these emissions stop. Effects from drill waste discharges are also expected to be reversible, but due to the slower recovery rate of corals and sponges, recovery is expected to take longer. Drill cuttings sedimentation is estimated to be relatively low for this Project. This, combined with mitigation to reduce potential effects on corals / sponges (see response to IR-12 for details), indicates that effects will not likely result in permanent habitat loss. This is supported by the environmental effects monitoring (EEM) programs conducted in the Newfoundland offshore area (Hibernia Management and Development Company Limited 2017; Suncor Energy 2017; Husky Energy 2019). Biological recovery (biodegradation by the microbial community) is typically complete in a matter of a few years. Lab-based studies suggest that modern water-based mud and synthetic-based mud have low toxicity to benthic organisms due in part to low bioavailability (Trannum et al. 2011). This information suggests that beyond the pre-drill and post-drill wellsite surveys to be conducted, EEM for recovery rates for infaunal organisms is typically not conducted for exploration drilling programs.

As noted in the response to IR-22, for the first well in an EL, and for any well where drilling is undertaken in an area determined by coral and sponge surveys to be sensitive benthic habitat, or adjacent to a special area designated as such due to the presence of corals and sponges, BP is proposing to conduct a visual survey using a remotely operated vehicle to assess the extent of sediment deposition relative to predictive modelling. This survey may or may not be conducted concurrently with the post-drilling survey required by the C-NLOPB to confirm clearance of debris. The extent of sediment deposition will be assessed qualitatively, noting changes in visual appearance of the seafloor, including animal tracks if present. This visual approach to determine relative extent of sediment deposition relative to modelling predictions has been used successfully in two recent exploration drilling programs offshore Nova Scotia (the Shelburne Basin Venture Exploration Drilling Project and the Scotian Basin Exploration Project) (Stantec Consulting Ltd. 2016, 2017, 2019). The specific details of the follow-up program will be determined in consultation with the C-NLOPB and DFO in consideration of the pre-drill survey results.

In the unlikely event of a well blowout, the zone of influence of water quality effects (and subsequent effects on various marine life) could extend throughout the Northeast Newfoundland Slope Closure marine refuge, regardless of whether the source of the blowout was located in the East Orphan basin or West Orphan basin. However, preventative and response barriers will be implemented to reduce probability of incidents occurring and mitigate potential consequences.

References:

Hibernia Management and Development Company Limited. 2017. Hibernia Production Phase Environmental Effects Monitoring Program – Year Nine (2014) Volume 1 – Interpretation. Prepared by Stantec Consulting Ltd. for Hibernia Management and Development Company Limited, St. John's, NL.

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Rodríguez, A., B. Rodríguez and J.J. Negro. 2015. GPS tracking for mapping seabird mortality induced by light pollution. Scientific Reports (Nature), 5: 10670. https://doi.org/10.1038/srep10670

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1.1.3 Information Requirement: IR-50

External Reviewer ID:

KMKNO-16

Reference to EIS:

Section 6.4.1.6
Section 6.4.3.2
Section 11.3.3.1

Context and Rationale:

Section 6.4.1.6 and Section 6.4.3.2 of the EIS states that 22 percent of the total area of the Orphan Spur Ecologically and Biologically Significant Area and 0.5 percent of the Orphan Knoll Seamount Closure Vulnerable Marine Ecosystem falls within the Project Area, respectively. However, no additional information is provided on the Orphan Knoll Seamount Closure Vulnerable Marine Ecosystem.

Table 6.25 in the EIS states that the rationale for the designation of the Orphan Spur Ecologically and Biologically Significant Area relates to high concentrations of corals, densities of sharks and species of conservation concern (e.g. Northern, Spotted and Striped Wolffish, skates, Roundnose Grenadier, American Plaice, Redfish). However, based on Fisheries and Oceans Canada (2013) referenced below, the information provided in the EIS is incomplete and does not discuss the Orphan Spur's importance to marine mammals and sea birds. Therefore, additional details are required in order to assess the potential effects from Project Activities.

The environmental effects assessment for each valued component should be updated based on the additional information above to describe how Project activities could affect the Ecologically and Biologically Significant Areas and Vulnerable Marine Ecosystems within the predicted zones of influence from various project activities such as drill cuttings deposition, sound, and light.

Tables 6.24 and 6.29 of the EIS indicate the proximity of several special areas to the Project Area. However, the EIS does not indicate which special areas are within the predicted zones of influence from various project activities such as drill cuttings deposition, sound, and light.

As with the IR above, Figure 11.1 in Section 11.1.4.2 of the EIS should be updated to illustrate the overlap of the potential zone of influence from Project activities (e.g. drill cuttings deposition, sound, spills and light) with the special areas. The EIS does not contain a discussion of the potential degradation and loss of habitat for the specific valued components that resulted in the special area designation.

<u>Reference</u>

Department of Fisheries and Oceans Canada (2013). Identification of Additional Ecologically and Biologically Significant Areas (EBSAs) within the Newfoundland and Labrador Shelves Bioregion. Canadian Science Advisory Secretariat Science Advisory Report 2013/048.

Specific Question of Information Requirement:

Provide additional information on the importance of the Orphan Spur Ecologically and Biologically Significant Area to marine mammals and seabirds.

Provide information on why Orphan Knoll was designated as a vulnerable marine ecosystem.

Provide an updated environmental effects assessment for each valued component to describe how Project activities such as drill cuttings deposition, sound, and light could affect the following:

- the Orphan Spur Ecologically and Biologically Significant Area;
- the Orphan Knoll Seamount Closure Vulnerable Marine Ecosystem; and
- special areas that are within the predicted zones of influence from various project activities such as drill cuttings deposition, sound, and light.

Update Figure 11.1 to illustrate the overlap between special areas and the zone of influence of project activities. Provide a discussion of potential degradation and loss of habitat for the specific valued components that resulted in the special area designation.

Response:

Additional information on the importance of the Orphan Spur Ecologically and Biologically Significant Area (EBSA) and surrounding environment, including the Northeast Newfoundland Slopes Closure marine refuge, is discussed in the revised responses to IR-48 and IR-49. It is acknowledged that the importance of these areas and their reasons for designation would also apply to marine mammals and seabirds. Additional Convention on Biological Diversity (CBD) EBSAs have been added to Figure 1 in the revised response to IR-48 and their descriptions are provided in Table 1 in that revised response.

The Orphan Knoll is a single peak, with no depths shallower than 1,800 m. Mounds are found at depths of between 1,800 to 2,300 m. Physical properties indicate that mid-depth waters above Orphan Knoll are in a boundary region between outflow from the Labrador Sea (subpolar gyre) and northward flow of the North Atlantic Current (subtropical gyre). Near-bottom current measurements provide evidence for anti-cyclonic (clockwise) circulation around the knoll. A west-east gradient in nutrients was observed and is likely related to water mass differences between Orphan Basin and the region east of Orphan Knoll. The Orphan Basin-Orphan Knoll region is biologically rich and complex, and strongly influenced by local current regimes, as discussed above. Coral, including stony coral, and sponges have been observed on the flanks using a remote operated vehicle and near-bottom anti-cyclonic circulation could have important implications for the benthic community (Food and Agriculture Organization of the United Nations [FAO] 2017). Under the authority of the Northwest Atlantic Fisheries Organization (NAFO), the Orphan Knoll Seamount is closed to bottom-contact fishing until at least December 31, 2020 (FAO 2019).

In addition to being recognized as a vulnerable marine ecosystem (VME), the Orphan Knoll is also designated as an EBSA under the CBD. As described in the revised response to IR-48, this CBD EBSA designation was made in recognition of its uniquely complex habitats that rise from the seafloor of the surrounding deep, soft sediments of the Orphan Basin and distinctive fauna, including fragile and long-lived corals and sponges (CBD 2019).

As discussed in the revised response to IR-49, the predicted zone of influence for drill cuttings is less than 1 km, the predicted zone of influence for artificial light emissions is approximately 16 km, and the predicted zone of influence for underwater sound is approximately 40 km. Special Areas that occur within approximately 40 km of one of BP's exploration licences, or occur within the proposed vessel transit route (Local Assessment Area) are listed below in Table 1.

Table 1 Special Areas that Overlap with the Predicted Zone of Influence of Predicted Effects of Underwater Sound, Light, and Drill Cuttings Deposition

Special Area	Potential Interaction with Predicted Zone of Influence
Northeast Newfoundland Slope Closure Marine Refuge	ELs 1145, 1146, and 1148 are located within this Special Area, so portions of this Special Area may experience temporary effects on habitat quality due to underwater sound, artificial light, and drill cuttings (refer to revised response to IR-49).
Seabird Foraging Zone in the Southern Labrador Sea EBSA (CBD)	No predicted effect from light emissions or drill cuttings deposition. Could potentially be subject to underwater sound from Project activities if wells are drilled in the northeast portion of EL 1148 or EL 1149. No predicted interaction with Project activities occurring in ELs 1145 or 1146.
Slopes of the Flemish Cap and Grand Bank EBSA (CBD)	No predicted effect from light emissions or drill cuttings deposition. Could potentially be subject to underwater sound from Project activities if wells are drilled in the southwest portion of EL 1149. No predicted interaction with Project activities occurring in ELs 1145, 1146, and 1148.
Orphan Spur EBSA (DFO-designated)	Potential predicted effect on habitat quality from underwater sound and light emissions, depending on specific location of wells within ELs 1145, 1146, and 1148. Effects on habitat quality from drill cuttings deposition are unlikely but could occur depending on specific well location within EL 1145 or 1148. No predicted interaction with Project activities occurring in EL 1149.
Eastern Avalon EBSA (DFO-designated)	Platform supply vessels [PSVs] will likely transit through this Special Area so there are potential effects on habitat quality due to intermittent and transient underwater sound from PSVs. No predicted effects on habitat quality due to Project activities occurring in ELs 1145, 1146, 1148 or 1149.

The Orphan Knoll Seamount Closure and VME and Orphan Knoll CBD EBSA are unlikely to experience changes in habitat quality due to underwater sound, light emissions, or drill cuttings deposition from the Project due to their relative distance from the Project ELs and predicted zone of influence.

References:

CBD (Convention on Biological Diversity). 2019. Ecological and Biologically Significant Area. Available at: https://www.cbd.int/ebsa/

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