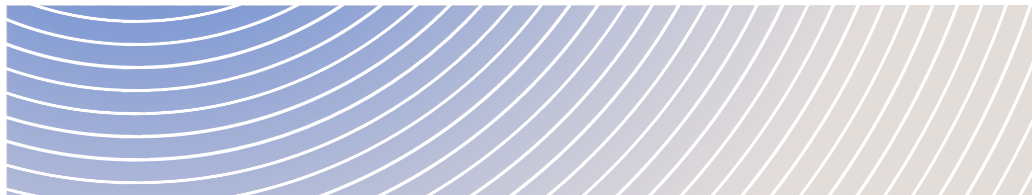


JEANNE D'ARC BASIN EXPLORATION DRILLING PROJECT



Environmental Assessment Report
March 2020



Impact Assessment
Agency of Canada

Agence d'évaluation
d'impact du Canada

Canada



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Projet de forage exploratoire dans le bassin Jeanne D'Arc - Rapport d'évaluation environnementale



Executive Summary

Husky Oil Operations Limited and ExxonMobil Canada Limited (the proponents) propose to conduct exploration drilling activities in an area adjacent to Husky Oil Operations Limited's existing offshore production operations on the Grand Banks. The Jeanne D'Arc Basin Exploration Drilling Project (the Project) is a multi-well exploration drilling program on exploration licences 1151A, 1151B, 1152, and 1155, approximately 350 kilometres east of St. John's, Newfoundland and Labrador. The Project would include up to ten wells to be drilled between 2019 and 2027, which covers the duration of the licence term.

A single mobile offshore drilling unit would be used, along with supply vessels and helicopters that would travel between the drilling areas and existing shore-based facilities or the airport in St. John's, Newfoundland and Labrador.

The Project would require authorization under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*. Authorization under the *Fisheries Act* may also be required and a permit under the *Species at Risk Act* may be required for effects on species that are listed as endangered or threatened on Schedule 1 of that Act.

The Impact Assessment Agency of Canada (the Agency) conducted a federal environmental assessment (EA) of the Project under the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project is subject to CEAA 2012 as it would involve activities that are described in item 10 of the Schedule to the *Regulations Designating Physical Activities* of CEAA 2012 as follows:

The drilling, testing, and abandonment of offshore exploratory wells in the first drilling program in an area set out in one or more exploration licences issued in accordance with the Canada-Newfoundland and Labrador Atlantic Accord Implementation Act or the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act.

On August 28, 2019, the *Impact Assessment Act* (IAA) came into force and CEAA 2012 was repealed. However, in accordance with the transitional provisions of the IAA, the environmental assessment of this Project is being continued under CEAA 2012 as if that Act had not been repealed.

This EA Report provides a summary and the main findings of the federal EA. The Agency prepared the report in consultation with the Canada-Newfoundland and Labrador Offshore Petroleum Board, Fisheries and Oceans Canada, Environment and Climate Change Canada, Health Canada, Natural Resources Canada and Transport Canada following a technical review of the proponents' Environmental Impact Statement and an evaluation of the potential environmental effects of the Project. The Agency also considered the views of Indigenous peoples and the general public.

The EA focused on features of the natural and human environment that may be adversely affected by the Project and that are within federal jurisdiction as described in subsection 5(1) of CEAA 2012 and on changes that may be caused in the environment that are directly linked or necessarily incidental to federal authorizations as described in subsection 5(2) of CEAA 2012. These are referred to as valued components. The proponents selected the following valued components and they are carried through for this EA:

- fish and fish habitat (including marine plants);
- marine mammals and sea turtles;



- migratory birds;
- species at risk;
- special areas;
- commercial fisheries; and
- current use of lands and resources for traditional purposes and socioeconomic conditions of Indigenous peoples.

During the environmental assessment, Indigenous groups and members of the public who submitted comments raised concerns about the Project's potential routine and accidental effects on the marine environment (e.g., marine mammals, fish, birds, special areas), commercial fishing, related effects on Indigenous peoples and communities, and the cumulative effects of the Project.

Notable potential environmental effects of the Project's routine operations include:

- effects on fish and fish habitat caused by the discharge of used drilling mud and cuttings to the marine environment;
- effects on marine mammals, fish and sea turtles caused by underwater sound from operation of the mobile offshore drilling unit and support vessels and from vertical seismic profiling surveys;
- effects on migratory birds caused by lights on the mobile offshore drilling unit and supply vessels and, if well testing is required, flaring; and
- interference with commercial fisheries, Indigenous or otherwise, including effects on fishing activity that may be caused by the need to avoid the 500 metre safety exclusion zone around drilling operations.

The proponents' project planning and design incorporates measures to mitigate the adverse effects of the Project. These include adherence to existing guidelines and regulations and planning to identify, control and monitor environmental risks.

Accidents and malfunctions could occur during exploration drilling and cause adverse environmental effects. These accidents and malfunctions include batch fuel (diesel) spills, batch spills of synthetic-based drilling fluid (also referred to as drilling mud), and subsea hydrocarbon releases (blowouts). Oil spill fate and trajectory modelling and analyses were performed to help evaluate potential effects of accidental spills and to assist in spill response planning.

Historically, the incidence of large oil spills during exploration drilling is extremely low. The proponents proposed design measures, operational procedures, and dedicated resources to prevent and respond to spills of any size from the Project. The proponents stated that in the unlikely event of a subsea hydrocarbon release, response measures would be undertaken in a safe, prompt, and coordinated manner. These response measures could include containment, application of dispersants, mechanical recovery, and shoreline protection operations, as applicable. To minimize response times, the Canada-Newfoundland and Labrador Offshore Petroleum Board would require submission of a Well Capping and Containment Plan that explores options to reduce response times.

The Agency identified key mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of a CEEA 2012 decision statement, in the event the Project is ultimately permitted to proceed. Given the current and potential expansion of activity of the offshore oil and gas sector in the Newfoundland and Labrador offshore area, the Agency is of the view that information gathered through the implementation of these conditions be presented and shared with industry, Indigenous groups, stakeholders and other interested parties. In addition to the Project, there are a number of other offshore exploration drilling projects and related activities being proposed for the Newfoundland and Labrador offshore area, including a regional assessment undertaken under federal impact assessment legislation.

The Project's possible effects on potential or established Aboriginal or treaty rights were also examined. One of the primary concerns raised by Indigenous groups during the environmental assessment for the Project, as well as previous offshore exploration drilling projects, is the potential effects of routine



operations and accidental events on Atlantic Salmon. Atlantic Salmon have significant importance to Indigenous cultures and populations of salmon have experienced declines in recent decades, with some populations classified as endangered or threatened. Recognizing the data gaps in Atlantic Salmon migration, and by extension the potential effects on the species from offshore exploration drilling, in May 2019 the Environmental Studies Research Fund issued a call for proposals for studies related to Atlantic Salmon. The Environmental Studies Research Fund is funded through levies paid by interest holders such as oil and gas companies and is directed by a joint government/industry/public management board. Indigenous groups also raised concerns about the potential effects of large-scale spills on fishing for commercial or traditional purposes and associated socioeconomic and health effects. The Agency is of the opinion that the recommended measures to mitigate potential environmental effects on fish and fish habitat and commercial fisheries, and to prevent or reduce the effects of accidents and malfunctions, are appropriate measures to accommodate for potential impacts on rights.

The Agency concludes that the Jeanne D'Arc Basin Exploration Drilling Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures.



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List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
Agency	Impact Assessment Agency of Canada
CEAA 2012	Canadian Environmental Assessment Act, 2012
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA Report	Environmental Assessment Report
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
EIS guidelines	Guidelines for the Preparation of an Environmental Impact Statement
ESRF	Environmental Studies Research Fund
IAA	Impact Assessment Act
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
MARPOL	International Convention for the Prevention of Pollution from Ships
MMS	Mi'gmawei Mawiomi Secretariat
MODU	Mobile Offshore Drilling Unit
MTI	Mi'gmawe'l Tplu'taqnn Incorporated
NAFO	Northwest Atlantic Fisheries Organization
NRCan	Natural Resources Canada
Offshore Chemical Selection Guidelines	Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands
Project	Jeanne D'Arc Basin Exploration Drilling Project



Abbreviation/Acronym	Definition
Proponents	Husky Oil Operations Limited and ExxonMobil Canada Limited
VSP	Vertical Seismic Profiling
WNNB	Wolastoqey Nation of New Brunswick



Glossary

Term	Definition
Abandonment	The process of securing a drilled well in a manner that allows it to be left indefinitely without further attention, and which prevents movement of petroleum (or potential petroleum) from its reservoir to another subsurface formation or to the environment. ¹
Blowout preventer	An apparatus affixed to the top of a wellhead during drilling operations that contains high-pressure wellhead valves designed to shut off the uncontrolled flow of reservoir fluids to the environment in a case where a loss of well control has been experienced. ¹
Ballast Water	Water that is brought on board a vessel to increase the draft, change the trim, regulate the stability, or to maintain stress loads within acceptable limits. ²
Cuttings	Chips and small fragments of rock produced by drilling that are circulated up from the drill bit to the surface by drilling mud. ¹
Delineation well	Well drilled after a discovery well to determine the areal extent of a reservoir. ¹
Mobile offshore drilling unit (MODU)	A drillship, semi-submersible drilling unit, jack-up drilling unit or other floating or fixed structure used in a drilling program and fitted with a drilling rig, and includes the drilling rig and other facilities and equipment necessary for drilling of wells for petroleum exploration or development. ¹
Ecologically and Biologically Significant Areas ⁴	Ecologically and Biologically Significant Areas are areas within Canada's oceans that have been identified through Fisheries and Oceans Canada's formal scientific assessments. Identifying Ecologically and Biologically Significant Areas is a means of calling attention to areas that have particularly high ecological and biological significance and in which management of some activities may warrant elevated precaution. The identification of Ecologically and Biologically Significant Areas is not enacted under Canadian legislation and therefore no regulatory protections or prohibitions exist within these areas.
Exploratory well	A well in an area where petroleum has not been previously found or one targeted for formations above or below known reservoirs. ¹
Flaring	The burning of unwanted petroleum (gas or liquid) as it is released to the atmosphere through a pipe, which has a burner and ignition system affixed (also called a flare tip). ^{1,3}
Formation	The term for the primary unit in stratigraphy consisting of a succession of strata useful for mapping or description which possesses certain distinctive lithologic and other features. ¹



Term	Definition
Marine Protected Area ⁴	A marine protected area is part of the ocean that is managed to protect and conserve important fish and marine mammal habitats, endangered marine species, unique features, and areas of high biological productivity or biodiversity. These areas are legally protected by regulations developed under the <i>Oceans Act</i> and administered by the Government of Canada. Regulations for individual marine protected areas provide different levels of protection and may allow some current and future activities depending on their impacts to the ecological features being protected. However, in April 2019, the Government of Canada announced new marine protected area standards which prohibit all oil and gas activities, including seismic and exploration drilling within a designated marine protected area.
Marine Refuge ⁴	A marine refuge is an area-based fisheries management measure in Canadian waters intended to protect important species and habitats. These areas are designated by the Government of Canada in response to Canada's marine conservation commitments to protect ten percent of marine and coastal waters by 2020. Marine Refuges are designated under the <i>Fisheries Act</i> , and are legally protected from some types of fishing activity. There are currently no prohibitions on oil and gas related activities within these areas.
Marine Riser	For drilling installations with open water between the drill floor and the seabed, a pipe that extends from the top of the blowout preventer to the bottom of the drill floor. The drill string is operated through the riser, and the riser allows drilling mud circulated down the drill string to return to the installation. It also supports the choke, kill and control lines and may be used as a running string for the blowout preventer. ¹
Produced water	Water associated with formation fluids in petroleum reservoirs that is produced along with oil and gas. ¹
Reservoir	A subsurface body of rock having sufficient porosity and permeability to store and transmit fluids and which contains petroleum. ^{1,3}
Subsea Well	A well where the casing commences below the surface of the sea and above the seabed. ¹
Suspended well	A well in which drilling operations have temporarily ceased - the well has been made secure but measures to permanently abandon the well have not been completed. ¹
Synthetic-based mud	A drilling mud in which the continuous phase is a synthetic fluid that should have a total polycyclic aromatic hydrocarbon concentration of less than ten milligrams per kilogram, be relatively non-toxic in marine environments and have the potential to biodegrade under aerobic conditions. ¹
Vertical seismic profiling	A class of borehole seismic measurements used for correlation with surface seismic data, for obtaining images of higher resolution than surface seismic images and for looking ahead of the drill bit. ³



Term	Definition
Water-based mud	A drilling fluid in which fresh or salt water is the continuous phase as well as the wetting (external) phase whether oil is present or not. ^{1,3}
Wellbore	The hole that would be drilled as part of the exploration drilling activities. ³
Wellhead	During drilling, the location at the top of the surface casing where the blowout preventer connects to the well to provide fluid and pressure containment for drilling activities. ¹

References

¹ Canada-Newfoundland and Labrador Offshore Petroleum Board (n.d.).

² Transport Canada (2019).

³ Schlumberger Limited (2019).

⁴ Fisheries and Oceans Canada (2019).



1. Introduction

Husky Oil Operations Limited and ExxonMobil Canada Limited (the proponents) propose to conduct exploration drilling activities in an area adjacent to Husky Oil Operations Limited's existing offshore production operations on the Grand Banks. The Jeanne D'Arc Basin Exploration Drilling Project (the Project) is a multi-well exploration drilling program on exploration licences 1151A, 1151B, 1152, and 1155, approximately 350 kilometres east of St. John's, Newfoundland and Labrador. The Project would include up to ten wells to be drilled between 2019 and 2027, which covers the duration of the licence term. The purpose of the Project is to determine the presence, nature and quantities of the potential hydrocarbon resources within the exploration licences.

1.1. Purpose of the Environmental Assessment Report

The purpose of the Environmental Assessment (EA) Report is to provide a summary of the analysis conducted by the Impact Assessment Agency of Canada (the Agency) in reaching its conclusion on whether the Project is likely to cause significant adverse environmental effects after taking into account the proposed mitigation measures (Appendix A). The Minister of the Environment and Climate Change will consider this report in making a decision on whether the Project is likely to cause significant adverse environmental effects, following which the Minister will issue an EA decision statement to each proponent for the Project.

1.2. Scope of the Environmental Assessment

1.2.1. Environmental Assessment Requirements

On August 28, 2019, the *Impact Assessment Act (IAA)* came into force and the *Canadian Environmental Assessment Act, 2012 (CEAA 2012)* was repealed. However, in accordance with the transitional provisions of the IAA, the environmental assessment of this Project is being continued under CEAA 2012 as if that Act had not been repealed.

The Project is subject to the CEAA 2012 as it would involve activities that are described in item 10 of the Schedule to the *Regulations Designating Physical Activities* of CEAA 2012:

The drilling, testing, and abandonment of offshore exploratory wells in the first drilling program in an area set out in one or more exploration licences issued in accordance with the Canada-Newfoundland and Labrador Atlantic Accord Implementation Act or the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act.



The key dates for the EA of the Project, up to the release of this EA Report, are as follows:

- September 1, 2016: the project description was submitted by Husky Oil Operations Limited;
- October 28, 2016: the Agency determined that a federal EA was required and the EA commenced;
- October 28, 2016: the Agency issued the draft Guidelines for the Preparation of an Environmental Impact Statement (EIS guidelines) for public comment;
- December 9, 2016: the Agency issued the final EIS guidelines;
- March 27, 2017: following a request from Husky Oil Operations Limited, the Agency determined that exploration licences 1151 and 1152 could be included in the Project, and updated final EIS guidelines were issued to reflect the change;
- April 13, 2017: the Environmental Impact Statement (EIS) and the EIS Summary were received;
- May 16, 2017: the Agency determined that information provided in the EIS did not fully conform with the requirements outlined in the EIS guidelines, and that a revised EIS was required to address deficiencies;
- March 23, 2018: following a request from Husky Oil Operations Limited, the Agency determined that exploration licences 1134 and 1121 could be removed from the Project, and updated final EIS guidelines were issued to reflect the change;
- May 31, 2018: following a request from Husky Oil Operations Limited, the Agency determined that exploration licence 1155 could be included in the Project, and updated final EIS guidelines were issued to reflect the change and to confirm the Project includes exploration licences 1151, 1152 and 1155;
- September 7, 2018: a revised EIS and the EIS Summary were received;
- October 11, 2018: the Agency commenced the comment period on EIS Summary;
- June 19, 2019: a portion of exploration licence 1151 was transferred to ExxonMobil Canada Limited creating exploration licence 1151A and exploration licence 1151B. ExxonMobil Canada is the operator for exploration licence 1151A, Husky Oil Operations Limited remains the operator of exploration licence 1151B;
- September 18, 2019: ExxonMobil Canada Limited confirmed to the Agency that project components and activities, and effects predictions would remain the same; and
- November 25, 2019: the Agency commenced the comment period on the draft EA report.

The Agency co-operated with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) during the technical review of the Project. The C-NLOPB is an independent joint agency of the Governments of Canada and Newfoundland and Labrador and is responsible for regulation of petroleum activities in the Newfoundland and Labrador offshore area. The C-NLOPB also undertakes EAs of petroleum exploration and production works or activities proposed for the Newfoundland and Labrador offshore area. The EA conducted by the Agency is intended to also satisfy the C-NLOPB's EA requirements.

The Project is not subject to Newfoundland and Labrador provincial EA requirements.

1.2.2. Factors Considered in the Environmental Assessment

The Agency issued EIS guidelines which described the information required to support the EA process, including the environmental effects and the factors that must be considered.

The EIS guidelines were updated during the EA process to account for changes to the initial project description, which reflected changes to exploration licences ownership. The final EIS guidelines for the Project can be found on the Impact Assessment Registry internet site at the following link:

<https://iaac-aeic.gc.ca/050/evaluations/document/132303>.



The EIS guidelines focus the environmental assessment by identifying valued components that have particular value or significance and may be affected by the Project. The valued components considered by the Agency and the corresponding valued components defined in the EIS are presented in Table 1.

Table 1: Valued Components Considered by the Agency

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected in the EIS
Effects identified under subsection 5(1) of CEEA 2012			
Fish and Fish Habitat	Yes	Included due to the ecological importance, the legislated protection of fish and fish habitat and species at risk, the socioeconomic importance of fisheries resources, and the nature of potential project-valued component interactions. Includes corals and sponges. There is also a high likelihood of project-valued component interactions.	Fish and Fish Habitat
Marine Plants	Yes	Potential effects on marine plants were included in the Agency's assessment of effects on fish habitat.	Fish and Fish Habitat
Marine Mammals and Sea Turtles	Yes	Included due to the ecological importance, the legislated protection of marine mammals and species at risk. There is also a high likelihood of project-valued component interactions.	Marine Mammals and Sea Turtles
Migratory Birds	Yes	Included due to the ecological importance, the legislated protection of migratory birds, and species at risk. There is also a high likelihood of project-valued component interactions.	Migratory Birds
Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples	Yes	Migratory species of importance to Indigenous communities (e.g., Atlantic Salmon, some species of migratory birds), may pass through the project area before moving to areas subject to traditional harvesting. Indigenous fisheries or harvesting could also be affected by an accident or malfunction associated with the Project. The contamination (or perception thereof) of fish and seafood in the event of a major spill could affect country food consumption in some Indigenous communities.	Indigenous People and Community Values



Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected in the EIS
		Indigenous communal commercial fishing licences overlap with exploration licences included in the Project. These were considered in the Agency's assessment of effects on commercial fishing (below).	
Physical or Cultural Heritage of Indigenous Peoples and Historical, Archaeological, Paleontological or Architectural Sites or Structures of Indigenous Peoples	No	Project activities and components are not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage. Surveys conducted in the project area prior to seabed disturbance (drilling) would allow detection and avoidance of heritage resources, if present.	None
Special Areas (Marine)	Yes	There are several marine special areas that may be affected by the Project.	Special Areas
Air Quality and Greenhouse Gas Emissions	No	While there are direct emissions of greenhouse gases from the Project, there are no upstream emissions (i.e., emissions from other project or industrial activities that could occur earlier in the lifecycle of a resource or other product). The Project would be short-term and routine activities would contribute a relatively small amount to provincial totals (i.e., 0.70 percent of Newfoundland and Labrador's average annual emissions). Additional information on greenhouse gases is provided in Section 2.3 of this report. The Project would adhere to applicable regulations and standards, including the Newfoundland and Labrador <i>Air Pollution Control Regulations</i>; the federal <i>National Ambient Air Quality Objectives</i> and the <i>Canadian Ambient Air Quality Standards</i>; and regulations and emission limits under the International Convention for the Prevention of Pollution from Ships. Given its location	None



Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected in the EIS
		at least 270 kilometres offshore, the project area is not close to permanent receptors sensitive to atmospheric emissions.	
Effects identified under subsection 5(2) of CEAA 2012			
Commercial Fisheries	Yes	The project area overlaps with commercial fishing activity, including Indigenous communal commercial fishing, in the area that could be affected by routine operations (e.g., safety exclusion zones) or by accidental events.	Commercial Fisheries
Recreational Fisheries	No	There is no known recreational fishing activity within the project area. In nearshore and coastal waters, there are recreational fisheries. Routine project activities and components are not expected to interfere with nearshore recreational fisheries beyond current levels because supply vessels would use existing routes and harbour approaches, avoiding interference with nearshore activities outside the approaches. Nearshore recreational fishing may be affected by accidental events associated with the Project. Measures proposed to mitigate effects on fish and fish habitat and commercial fisheries would mitigate similar environmental effects on recreational fisheries.	Commercial Fisheries and Fish and Fish Habitat
Special Areas (Coastal)	Yes	There are several coastal areas of importance in the regional study area. These may be affected by the Project in the event of an unmitigated subsea blowout.	Special Areas
Human Health	No	Other than human presence on the drilling installations, there is intermittent human presence on fishing and other vessels in the exploration licences. Therefore, routine project activities would not expose the general public to a health risk. Similarly, the	None



Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected in the EIS
		distance from land and anticipated spill trajectories in the event of a large-scale spill offshore would have low potential for shoreline oiling and associated effects on coastal communities and human health.	
Effects identified under section 79 (2) of the <i>Species at Risk Act</i>			
Federal Species at Risk and Species of Conservation Concern	Yes	The <i>Species at Risk Act</i> requires consideration of listed species when conducting an EA under CEAA 2012. The Agency examined effects on species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or of special concern.	Applicable species at risk were assessed within the analyses of effects on fish and fish habitat, marine mammals and sea turtles, and migratory birds

1.2.3. Methods and Approach

The proponents assessed the Project's effects based on a structured approach that is consistent with accepted practices for conducting EAs and with the Agency's *Operational Policy Statement: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects under CEAA, 2012*. The application of mitigation measures was considered in the analysis (see Appendix B for a list of the proponents' proposed mitigation and follow-up measures), and the predicted residual environmental effects were characterized based on the following assessment criteria:

- magnitude: the degree of change from baseline conditions or other standards, guideline, or objectives, which may be expressed quantitatively or qualitatively;
- geographic extent: the geographic or spatial area within which the residual effects is expected to occur;
- duration: the period of time over which the residual effect would occur;
- frequency: how often the residual effect would occur;
- reversibility: whether the residual effect on the valued components can be returned to its previous condition once the activity or component causing the disturbance ceases; and
- context: the current degree of anthropogenic disturbance and/or ecological sensitivity in the area in which the residual effect would occur.

The proponents then determined the significance of residual project-related environmental effects based on pre-defined standards or thresholds (i.e., significance rating criteria). It also considered the level of confidence in its environmental effects predictions and identification of mitigation, along with sources of data gaps.

The Agency reviewed various sources of information in conducting its analysis, including:

- the EIS and EIS Summary;



- information received in response to the information requirements issued by the Agency following its review of the EIS;
- advice from expert departments and agencies, including the C-NLOPB;
- comments received from the public; and
- comments received from Indigenous peoples.

The Agency determined the significance of residual effects of routine project operations (Section 6) by taking into account the mitigation measures that it considered necessary. The Agency also considered the effects of accidents and malfunctions that may occur in connection with the Project (Section 7.1), as well as the effects of the environment on the Project (Section 7.2) and cumulative environmental effects (Section 7.3).

The Agency's analysis, including how the Agency incorporated views expressed by Indigenous peoples, the public, and expert departments and agencies, is provided throughout this report.



2. Project Overview

2.1. Project Location and Spatial Boundaries of the Environmental Assessment

The Project is located in the northwest Atlantic Ocean on the Grand Banks adjacent to Husky Oil Operations Limited's existing offshore production operations, within exploration licences 1151A, 1151B, 1152 and 1155. Within the project area water depth ranges from approximately 87 to 211 metres. The exploration licences have a combined area of 3330 square kilometres and are located approximately 350 kilometres east of St. John's, Newfoundland and Labrador. A portion of exploration licence 1151A and 1151B is located on the extended continental shelf outside Canada's 200 nautical mile exclusive economic zone. Exact drilling locations within the exploration licences have not yet been finalized.

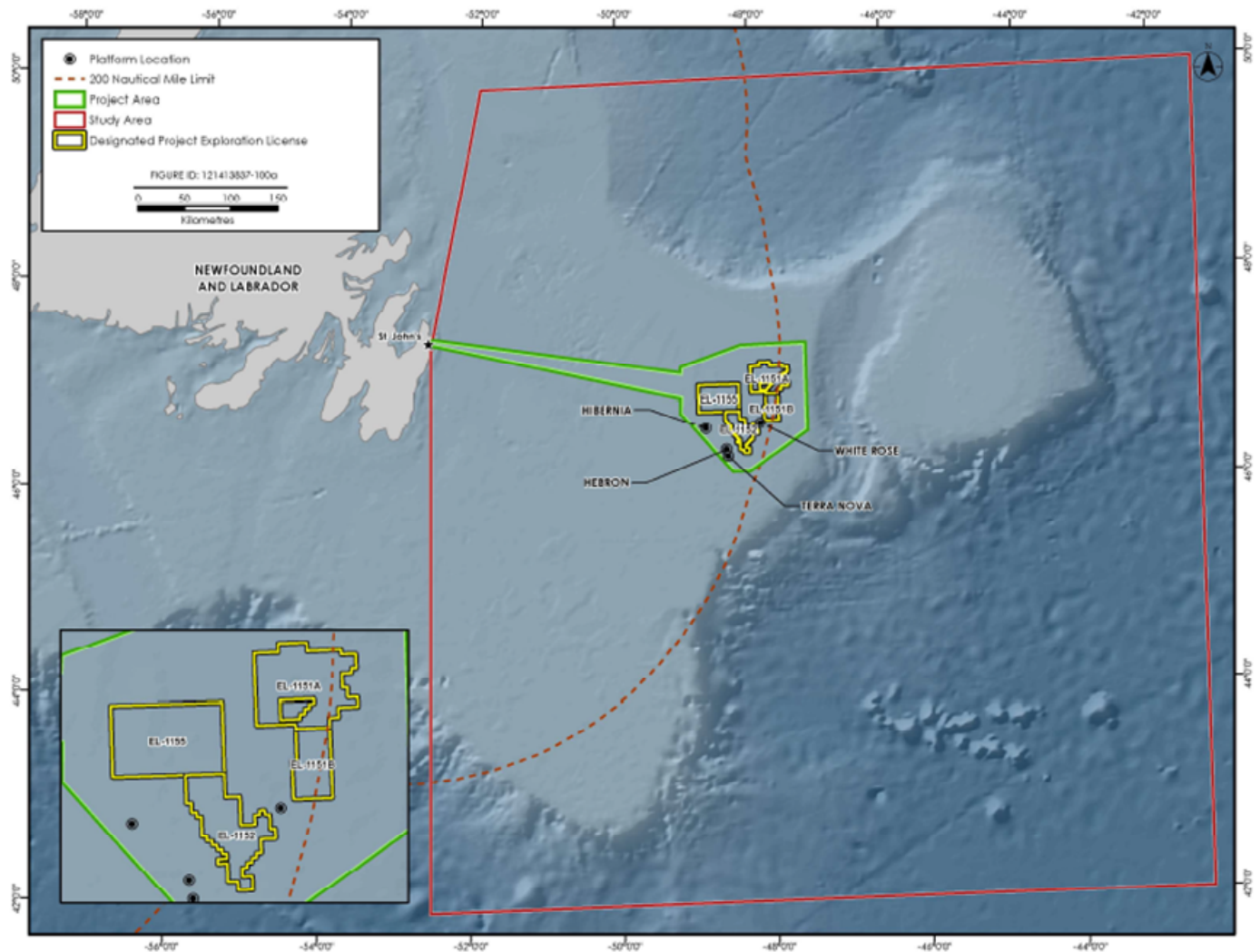
Spatial boundaries of an EA are established to define the area within which a project may interact with the environment and cause environmental effects and may vary among valued components. The proponents defined two types of spatial boundaries for the EA: project area and study area (Figure 1).

Proponents' Project Area: The area encompassing the immediate area within which project activities and components may occur and direct physical disturbance to the marine benthic environment may take place. The project area has been delineated to account for all activities related to drilling a well, including transit of offshore supply vessel and helicopter traffic to and from St. John's and vessel traffic associated with geohazard/environmental surveys, which may originate from Canadian or international waters. The project area has a total area of approximately 19 366 square kilometres.

Note: References to the project area throughout this report are consistent with the proponents' definition. However, project activities for the designated project subject to federal EA would be limited to the exploration licences within which exploration drilling could occur as well as routes to and from these exploration licences to the supply base and airport on the island of Newfoundland.

Proponents' Study Area: The area within which residual environmental effects from operational activities and accidental events may interact cumulatively with the residual environmental effects of other past, present, and future (certain or reasonable foreseeable) physical activities.

Figure 1: Project and Study Areas and Associated Licences



Source: Husky Oil Operations Limited 2019

2.2. Project Components and Activities

The Project would include the drilling, testing, and abandonment or suspension of up to ten offshore wells within exploration licences 1151A, 1151B, 1152, and 1155, as well as associated incidental activities. The key components and activities that comprise the Project include the presence and operation of the mobile offshore drilling unit (MODU), drilling-associated surveys (including vertical seismic profiling [VSP] and wellsite/geohazard surveys, and other geophysical surveys; geotechnical surveys; environmental surveys; diving surveys; remotely operated vehicle surveys), waste management; supply and servicing and well abandonment.



Logistical support components (e.g., shore base) required for the Project would be the same as those that have been used for past and/or ongoing offshore oil and gas projects for the proponents and other operations in the Newfoundland and Labrador offshore. The proponents would contract a third-party service provider for transport services and the MODU.

2.2.1. Mobile Offshore Drilling Unit Mobilization

Once the wellsite is selected, the MODU, either a semi-submersible, drill ship or jack-up rig, would be towed or self-propelled to the wellsite and held in position by either a dynamic positioning system or anchored to the seafloor. With the MODU in place, a safety exclusion zone would be defined, maintained and monitored by a standby support vessel and publicized through Notice to Mariners. The safety exclusion zone usually extends to 500 metres beyond the outermost physical footprint of a dynamic positioning or jack-up installation, or 50 metres beyond the boundaries of the anchor pattern for a semi-submersible.

2.2.2. Offshore Well Drilling

Each exploration well would be drilled in sections, gradually reducing in diameter, over several months. After each section is drilled, steel pipe or casing is installed and cemented into place to stabilize the well bore, isolate pressure/fluids and prevent drilling fluid losses prior to drilling the next section. Drilling an exploration well can be divided into riserless and riser drilling. Riserless drilling occurs for the initial sections of the well where there is no closed-loop circulating system in place (no riser) to return drill cuttings and fluids back to the MODU. As a result, drilling fluids, excess cement, and cuttings are deposited onto the seabed. Typically, seawater and/or water-based mud is used to cool the drill bit and transport the cuttings during the drilling of these riserless hole sections.

Once the initial sections have been drilled, the wellhead and blowout preventer stack installed, and the riser system is in place (referred to as riser drilling), the riser creates a conduit for the circulation of drilling fluids down the drill string and back up to the MODU for treatment prior to release. Treatment typically involves separating the drill cuttings from the drilling fluid. The majority of the drilling fluid would be reconditioned and reused, while any spent synthetic-based mud would be returned to shore for disposal or recycling. Following treatment, a small and permissible portion of the synthetic-based mud may remain in the drill cuttings and be discharged. The remainder of the sections may be drilled with water-based mud or synthetic-based mud.

The proponents have indicated that simultaneous drilling within any one exploration licence is not planned and it is unlikely that simultaneous drilling between exploration licences would occur. Although simultaneous drilling is likely to occur in the project area as it encompasses several production facilities, other exploration licences and significant discovery licences.

2.2.3. Drilling-associated Surveys

Throughout the Project, various surveys may be required to support drill planning and operations. This could include geophysical surveys that use a sound source (e.g., VSP and wellsite/geohazard surveys), other geophysical surveys, geotechnical surveys, environmental surveys, diving surveys, and remotely operated vehicle surveys.

In advance of drilling, surveys are conducted to identify and avoid unstable areas and hazards (e.g., seabed instability, obstacles, shallow gas) in the immediate vicinity of proposed wellsite locations. Wellsite/geohazard surveys (e.g., small seismic surveys) are conducted prior to a MODU moving on location. This ensures that there are no shallow hazards such as shallow pockets of gas that can cause a blowout during the drilling before a blowout preventer can be installed. These surveys typically last between five and seven days, and may include a small sound source (i.e., an air source array) or a sonar in a restricted area for a 12- to 18-hour period. Geotechnical surveys are used to determine seabed stability



and may include drilling of boreholes prior to a MODU moving on location. Depending what is encountered a survey may last from several days to a month.

VSP surveys are conducted during or after drilling and are used to define the geological features and potential petroleum reserves of a well. Measurements are used to correlate drilled geological formations in the well with surface seismic data, for obtaining images of higher resolution than surface seismic images, and may be used for collecting data ahead of the drill bit. VSP surveys are conducted using various configurations of the positioning of the associated sound source and receivers. An imaging toolstring is run in the wellbore and is anchored at successive points as required to cover the entire recording depth. VSP surveys are typically short-term activities (one day per well), with seismic source activation often limited to just a few hours, typically 12 to 18 hours. VSP surveys are much smaller, have a targeted beam and shorter duration than a surface seismic survey.

2.2.4. Well Testing

Wells may be tested by multiple methods to gather additional details such as productivity, volumes, fluid composition, flow rate and pressure on a potential reservoir and to assess the associated commercial potential of a discovery. Flow testing is required by the *Newfoundland Offshore Petroleum Drilling and Production Regulations*, prior to obtaining a significant discovery licence from the C-NLOPB.

The proponents indicated that two drill stem tests, which may be conducted immediately following drilling activities or may occur at a later date, may be expected based on the anticipated ten wells. The standard period for a drill stem test is typically 24 to 36 hours, with a maximum of 48 hours.

Drill stem testing generally requires perforating the casing that has been set across the hydrocarbon-bearing reservoir, allowing reservoir fluids to flow into and up the wellbore to the MODU, which would have a temporary drill stem testing facility installed to handle the flow of any fluids from the wellbore. Hydrocarbons are measured and separated from any produced water and sampled. Gas, oil, and condensate, if present, would be flared on the MODU during drill stem testing, in addition produced water would be flared or transported to shore. Once the drill stem test is complete, the test string is removed from the well and the well is abandoned in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations*.

In addition, wireline tools and logging would be used to collect basic information on the formation properties, including reservoir rock and fluids. Regarding formation flow testing, downhole fluid sampling equipment deployed on pipe (i.e., flow-testing while tripping) or wireline (e.g., modular formation dynamics tester customizable into various operational designs) may be used, which do not require flaring.

2.2.5. Well Abandonment or Suspension

Once drilling and any associated well testing is completed, offshore wells are typically permanently abandoned, or in some cases, suspended. The well abandonment approach for the Project would adhere to the requirements set out under the *Newfoundland Offshore Petroleum Drilling and Production Regulations*.

Abandonment or suspension involves the isolation of the well bore by placing cement plugs, in combination with mechanical devices, at various depths to prevent the influx of formation fluids. Well abandonment involves cutting the wellhead and any applicable casing(s) at a depth below the natural seabed so they do not protrude above the seabed. In the event that the well is suspended, a suspension cap is installed to protect the wellhead connector, which protrudes above the seabed. Notification is made via Navigational Warnings (previously known as Notices to Shipping) to identify the obstruction until it is removed. A remotely operated vehicle or other equipment would be used to inspect the seabed to ensure that no equipment or obstructions remain in place. Proposed methods of suspension or abandonment for each well, as well as the monitoring plans for suspended wells, are provided to the C-NLOPB.



2.2.6. Supply and Servicing

One or more existing facilities in St. John's would provide re-fueling, temporary storage, staging, logistics management and loading of materials and supplies to support offshore exploration activities. The existing shore-based facilities are owned and operated by independent third-party service providers.

Marine vessels are used to transport personnel, equipment and other materials to and from the MODU during an offshore exploration program. As well, a dedicated safety stand-by vessel would attend to the MODU throughout drilling. A third offshore supply vessel may be required for ice management, on occasion. These services would be procured from existing, established third-party suppliers.

Supply vessels would travel directly between an established port facility in St. John's and the MODU. It is anticipated that with a single operating MODU there would be one to three return transits per week by supply vessels.

Helicopters would be used for the transportation of personnel and key materials to and from the MODU, and in the event of emergency medical evacuation. Aircraft support would be supplied by a third-party licensed operator. It is estimated that there would be an average of five helicopter transits per week from St. John's to the MODU.

2.3. Emissions and Waste Management

Potential environmental emissions and discharges associated with offshore exploration drilling programs include noise, light and other atmospheric emissions. As well, discharges of waste include drilling fluids, drill cuttings, cement, blowout preventer fluid, produced water, bilge/deck water, ballast water, grey/black water, cooling water, other non-routine operational liquid discharges, and solid and hazardous wastes associated with the MODU, supply vessels and aircraft.

Any drilling chemicals used would adhere to the C-NLOPB requirements under the *Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands (the Offshore Chemical Selection Guidelines)* and the proponents' chemical management system and chemical screening program. Furthermore, any discharges to the environment would adhere to the *Offshore Waste Treatment Guidelines*, which may involve treatment of discharges prior to release. In addition to these two guidelines, the following existing legislation, regulations, and guidelines also pertain to environmental emissions and waste materials associated with offshore exploration activities:

- *International Convention for the Prevention of Pollution from Ships (MARPOL)*;
- *Environmental Protection Plan Guidelines*;
- *Newfoundland Offshore Drilling and Production Regulations* (and associated Guidelines);
- *Fisheries Act*;
- *Canadian Environmental Protection Act*;
- *Oceans Act*;
- *Canada Shipping Act, 2001*;
- *Newfoundland and Labrador Management of Greenhouse Gas Act*;
- *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act, 1990*;
- *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act, 1987*; and
- *Federal Halocarbon Regulations, 2003*.



Greenhouse Gas Emissions

During offshore exploration drilling, routine and non-routine activities would result in emissions of greenhouse gases. Routine activities contributing to greenhouse gas emissions include exhaust from the MODU, supply vessels and aircrafts, as well as emissions from the flaring of well gases and fluids. Greenhouse gas emissions, including emissions associated with potential flaring during formation well testing, are estimated in Table 2.

Table 2: Representative Greenhouse Gas Emissions from Offshore Exploration Activities

Project Component/Activity	Greenhouse Gas Emissions (tonnes/year)			
	Carbon Dioxide	Methane	Nitrous Oxide	Carbon dioxide equivalent emissions
MODU	14 800	0.83	1.01	15 122
Support Vessel ^A	47 485	0 ^A	0 ^A	47 485
Helicopter	672	0.15	0.07	697
Flaring*	26 155	0.01	0	26 155
Total	89 122	0.92	1.08	89 459

Source: Husky Oil Operations 2012; Equinor Canada Limited 2017

^A Emissions for methane and nitrous oxide have been determined to be minimal

* Emission estimates are based on data from "Equinor Canada Limited 2017" and assumes that one well could be tested in a year, and that short-term flaring could occur for up to five days (5223 tonnes carbon dioxide equivalent emissions per day)

Source: Husky Oil Operations Limited 2019

In addition, using volatile organic compound emission factors, the average annual emissions of volatile organic compounds from the operation of the semi-submersible was estimated to 18.7 tonnes, based on three years of operational data. The estimate assumes the rig operates continuously, as such the estimate is considered highly conservative, given that the project entails up to 80 days to drill to total vertical depth for each of the ten wells drilled over seven years.

The overall greenhouse gas emissions over the Project are estimated to be up to 89 459 tonnes of total carbon dioxide equivalent per year which would represent 0.84 percent of Newfoundland and Labrador's greenhouse gas emission for 2014 and 0.01 percent of Canada's emissions (ECCC 2019). Industrial facilities that emit more than 10 000 tonnes of carbon dioxide equivalent per year are required to quantify and report greenhouse gas emissions to Environment and Climate Change Canada (ECCC) (ECCC 2018). Similarly, facilities emitting 15 000 tonnes of carbon dioxide equivalent per year are required to report and comply with the *Newfoundland and Labrador Management of Greenhouse Gas Act*.



2.4. Schedule

Project activities would be aligned with the exploration licence periods and would end once regulatory obligations and commitments have been met and a licence has either been reverted back to the C-NLOPB or converted to a significant discovery licence. The Project would occur between 2019 to 2027, but drilling activities would not be expected to be continuous over the nine years. Timing of activities would be determined in part by rig availability and previous years' results. Drilling may occur year-round if conducted using a semi-submersible or drill-ship, and during the ice-free season if using a jack-up rig.

Based on historical operation data in the region, it is expected that each well would require up to approximately 80 days to drill to a total vertical depth. The length of time to drill the well may be influenced by several factors including, but not limited to, the measured length of the well, anticipated lithology that would be drilled, anticipated formation pressures, water depth at the spud location, and weather.



3. Alternative Means of Carrying out the Project

CEAA 2012 requires that EAs of designated projects take into account alternative means of carrying out the Project that are considered technically and economically feasible, and consider the environmental effects of any such alternative means. The proponents identified and evaluated alternatives for the following aspects of the Project: drilling fluid selection, drilling unit selection, drilling waste management, and MODU lighting and flaring.

Drilling Fluids Selection

Water-based muds and synthetic-based muds were both identified as technically and economically feasible at different project stages, and are acceptable under current regulatory regimes. Water-based mud would be used during initial drilling when the riser is not in place; synthetic-based mud is likely to be used at deeper well sections, when the riser is installed. The proponents indicated that a combination of water-based muds and synthetic-based muds is preferred depending on different segments of the drilling sequence.

Drilling Unit Selection

Three types of drilling installations are typically used in drilling offshore wells in Atlantic Canada: semi-submersibles, drill ships and jack-up rigs. Feasibility and selection of the MODU is well-specific and based on physical environmental conditions, including water depth, required drilling depth, and expected weather and ice conditions and associated mobility requirements. The specific MODU has not yet been selected, and would depend on suitability and availability, but all three alternatives are being considered and were assessed.

Drilling Waste Management

Three potential options were considered related to the management of drilling waste: offshore disposal, ship-to-shore and reinjection. Reinjection of drilling waste into a dedicated well is not considered economically or technically feasible for exploration drilling activities in Atlantic Canada. Onshore disposal is considered technically and economically feasible and would have less environmental effects on the marine environment; however, results in additional transit emissions and safety exposure along with the potential effects of onshore waste disposal and waste water. Therefore, discharge to the water column, following treatment as per existing applicable guidelines and regulatory requirements, was identified as the preferred option for management of drilling wastes generated from the Project.

Bilge and ballast water/deck drainage/cooling water/fire control system test water would be tested to meet the *Offshore Waste Treatment Guidelines*, and discharged overboard.

MODU Lighting and Flaring

Adequate lighting on the MODU for safe 24-hour operations is required by the C-NLOPB. The proponents considered spectral modified lighting as an alternative to standard lighting. While legally acceptable, spectral modified lighting, has not been proven to be technically or economically feasible. As such, standard lighting was identified as the preferred option.

Flaring is required during formation flow testing to safely and efficiently dispose of hydrocarbons that may come to the surface. As an alternative, the proponents considered timing restrictions on flaring. The



proponents stated that restricting the initiation of flaring activity to daylight hours does reduce night-time flaring, however data could be compromised if the well flow was restricted during the test period, therefore, flaring as required was preferred. Additionally, the proponents indicated that they would aim to avoid flaring from mid-September to mid-October, a period of vulnerability particularly for storm-petrels, the most common species to be stranded on vessels in Atlantic Canada. Further, the proponents indicated that formation testing while tripping is both technically and economically feasible, as an option for reservoir testing which does not require the flaring of reservoir fluids. The proponents indicated that measures may be implemented to minimize potential effects of flaring. Ultimately, the C-NLOPB would determine the required methods of well testing to validate the presence of hydrocarbons.

3.1. Views Expressed

Indigenous Peoples

With consideration of comments from the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), the Agency required the proponents to provide additional information on the feasibility of reduced flaring and clarification on if well testing while tripping or any other type of well tests which would not require a flare were considered. The proponents confirmed that they are continually evaluating alternative well test technologies, including formation testing while tripping, and the approach is assessed on a well-by-well basis. The proponents noted that if flaring was required, high-efficiency burners would be utilized.

Views expressed by Indigenous groups related to alternative means of carrying out the Project were directly linked to potential effects on valued components of the identified alternatives and differences between these predicted effects. These views are outlined in Section 6 (Predicted Effects on Valued Components), as appropriate.

3.2. Agency Analysis and Conclusion

The Agency is satisfied that the proponents adequately assessed alternative means of carrying out the Project.



4. Consultation Activities

4.1. Crown Consultation with Indigenous Peoples

The Crown has a duty to consult Indigenous peoples in Canada, and to accommodate where appropriate, when its proposed conduct might adversely impact a potential or established Aboriginal or treaty right. Indigenous consultation is also undertaken more broadly to aid good governance, sound policy development and decision-making. For example, in certain instances there may not be a constitutional duty to consult, but the Agency may decide to engage with Indigenous groups for policy reasons.

4.1.1. Indigenous Consultation Led by the Agency

The Agency served as Crown Consultation Coordinator for a whole-of-government approach to consultation. The Agency consulted all First Nation and Inuit communities and groups located in Atlantic Canada, including (but not limited to) those holding communal commercial fishing licences in Northwest Atlantic Fisheries Organization (NAFO) areas that overlap the project area and study area, or portions of them, or hold licences for species that migrate through the project area such as Swordfish. In addition, the Agency consulted communities located in Quebec that fish for and have an interest in Atlantic Salmon populations, a species which could potentially be affected by the Project. The following communities, were consulted:

- 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; and
- Quebec Innu: Conseil des Innu de Ekuanitshit and Première Nation des Innus de Nutashkuan.

Several groups are represented in consultation by aggregate organizations including:

- KMKNO represents the Nova Scotia Mi'kmaq First Nations with the exception of Millbrook and Sipekne'katik First Nations;
- Wolastoqey Nation of New Brunswick (WNNB) represents the New Brunswick Wolastoqiyik (Maliseet) First Nations. Woodstock First Nation was being consulted separately until the community joined WNNB in March 2019;
- Mi'gmawe'l Tplu'taqnn Incorporated (MTI) represents the New Brunswick Mi'gmaq First Nations with the exception of Elsipogtog First Nation;



- Mi'kmaq Confederacy of Prince Edward Island represents the Prince Edward Island Mi'kmaq First Nations¹; and
- Mi'gmawei Mawiomi Secretariat (MMS) represents the Quebec Mi'gmaq.

The Agency determined that the depth of consultation with these Indigenous groups would be low on the consultation spectrum based on an analysis of potential or established Aboriginal or treaty rights protected under Section 35 of the *Constitution Act, 1982 (Section 35 rights)*, and the potential for adverse effects on these rights from the Project². It provided this analysis to Indigenous groups, along with draft consultation plans, and requested feedback. Comments were received on the plan and the determination of depth of the consultation.

The Agency also contacted the Qalipu First Nation and Miawpukek First Nation, which were being engaged for the purposes of good governance, and provided them with information on the Project and opportunities to submit comments.

The Agency integrated the Crown's consultation and engagement activities into the EA and invited Indigenous groups to review and comment on the documents listed in Table 3.

Table 3 Comment Opportunities during the Environmental Assessment

Document or Subject of Consultation	Dates
Summary of the Project Description	September 13, 2016 – October 3, 2016 (20 days)
Draft EIS Guidelines	October 28, 2016 – November 28, 2016 (31 days)
EIS Summary	October 11, 2018 – November 10, 2018 (31 days)
Draft EA Report and Potential Conditions	November 25, 2019 – January 3, 2020 (39 days)

The Agency considered comments received from Indigenous groups following their reviews of the EIS and associated summary and asked the Husky Oil Operations Limited to provide additional information on a number of topics. Indigenous groups were provided an opportunity to review and comment on the additional information, as applicable.

In addition to opportunities to review and comment on the documents listed above, the Agency organized four information sessions in October 2017 that provided information about the Agency and four proposed offshore exploration drilling projects subject to federal EA, including this Project. The Agency invited feedback on how it could help facilitate participation in the EA, and on the potential environmental effects of the Project and potential impacts to Section 35 rights.

The Agency also organized three workshops in April 2018 to build relationships between Indigenous groups, proponents, and government; provide an overview of offshore drilling projects; and identify and

¹ In October 2019, a new rights-based organization was launched in Prince Edward Island, called L'nuey. This organization is now responsible for rights-based negotiations and consultations processes involving the Mi'kmaq on Prince Edward Island.

² In describing the preliminary determination regarding the depth of consultation, the Agency contacted the above-listed Indigenous groups, with the exception of Qalipu First Nation and Miawpukek First Nation, as the latter groups were being engaged for the purpose of good governance and were contacted separately with a description of engagement opportunities.



address concerns from Indigenous groups. Proponents were invited to participate in workshops to provide information and answer questions about their projects.

The Agency maintained contact with Indigenous groups throughout the EA through general meetings with Indigenous Consultation Coordinators and periodic emails to verify that participants were aware of the EA processes, respond to questions, and discuss comments.

The main areas of concern raised by Indigenous peoples included:

- salmon and potential interactions from routine operations and potential accidents or malfunctions;
- effects on fish and fish habitat;
- effects on fishing for communal commercial and food, social, or ceremonial purposes, including related socioeconomic and health effects;
- effects of accidents and malfunctions, including the use of dispersants in oil spill response;
- effects on migratory birds;
- compensation in the event of- and damages from normal operation or due to accidents and malfunctions;
- jurisdiction beyond the 200 nautical mile exclusive economic zone limit;
- consideration of Indigenous knowledge and the potential involvement of Indigenous groups in Fisheries Communication Plan development;
- monitoring and follow-up programs;
- waste management; and
- cumulative effects.

Appendix C contains a summary of comments provided to date by Indigenous groups, along with the proponents' and Agency's responses. A subset of comments are also discussed in the context of individual valued components throughout Sections 6 and 7.

The Agency supported the participation and consultation of Indigenous groups during the EA through its Participant Funding Program. Funding was made available to assist in reviewing and providing comments on the EIS and EIS Summary, the draft EA Report, and potential EA conditions. In total, the Agency allocated \$229,722.20 to 13 Indigenous communities and aggregate organizations.

4.1.2. The Proponents' Indigenous Engagement Activities

Husky Oil Operations Limited engaged Indigenous groups located in Newfoundland and Labrador, Nova Scotia, New Brunswick, Prince Edward Island and Quebec. Early engagement began in June 2016 with the Nunatsiavut Government, the Labrador Innu Nation, the NunatuKavut Community Council, Qalipu Mi'kmaq Nation Band and Miawpukek First Nation. Engagement methods included phone calls, emails, written letters and reports. The proponents stated that they would continue to provide information and to solicit feedback.

In July 2017, following the Agency's expansion of consultation to include additional Indigenous communities located in Nova Scotia, New Brunswick, Prince Edward Island, and Quebec, Husky Oil Operations Limited sent similar correspondence and Project overview information to the additional Indigenous groups.

The proponents also participated in the three workshops organized by the Agency in April 2018 and organized additional workshops in October 2018, in which the Agency and proponents of other offshore exploratory drilling projects participated.

ExxonMobil Canada Limited confirmed that the Indigenous groups identified and consulted by Husky Oil Operations Limited will be contacted as the project progresses.



The proponents stated that they would continue to provide information and to solicit their feedback.

4.2. Public Participation

4.2.1. Public Participation Led by the Agency

To date the Agency has provided four opportunities for the public to participate in the EA (Table 3). These opportunities were publicised through print, radio, and online advertisements and notifications, and included instruction on how to contact the Agency. Documents were made available online and were also available in hard copy upon request.

In response to the public notice during the comment period on the EIS summary, submissions were received from the following:

- Fish, Food and Allied Workers – Unifor;
- Newfoundland and Labrador Oil & Gas Industries Association; and
- Balaena Institute for Cetacean Conservation Studies.

The Fish, Food and Allied Workers – Unifor provided information on the nature and importance of the fishing industry and traditional knowledge, and raised concerns related to potential effects of the Project on socioeconomics, oil spills, marine conservation, mitigation measures and cumulative effects. The Newfoundland and Labrador Oil & Gas Industries Association stated its support for the Project, suggested consideration of the Eastern Newfoundland Strategic EA Report and highlighted the economic importance of the offshore oil and gas sector. The Balaena Institute for Cetacean Conservation Studies raised concerns related to the availability of information in areas outside Canada's exclusive economic zone, the potential for cumulative effects, and potential effects of the Project on special areas and cetaceans, including the Northern Bottlenose Whale.

The Agency made funding available through its Participant Funding Program to support the public in reviewing and providing comments. Through this program, \$10,897 was allocated to one member of the public.

4.2.2. Public Participation Activities by the Proponents

Husky Oil Operations Limited engaged with groups representing various stakeholders that have historically been engaged in or have an interest in offshore oil and gas operations in Newfoundland and Labrador. This included representatives from the oil and gas industry, fishing industry, environmental non-government organizations and other oil and gas operators participating in exploration or production activities in offshore Newfoundland and Labrador.

Husky Oil Operations Limited has used a variety of engagement methods including face-to-face meetings, telephone conversations, and written correspondence, since March 2016, and will continue to meet with various stakeholders to provide information on the Project and solicit feedback. ExxonMobil Canada Limited commits to engaging stakeholders in the future to provide information and to solicit feedback.

4.3. Participation of Federal Government Experts

Federal departments and agencies with specialist information and expert knowledge relevant to the Project supported the Agency throughout the EA.

The Agency requested information from the C-NLOPB, Department of National Defence, Fisheries and Oceans Canada (DFO), ECCC, Health Canada, Transport Canada, Natural Resources Canada (NRCan), Indigenous Services Canada, and Parks Canada Agency. Their advice and expertise has been incorporated into the sections that follow.

4.4. Consultation on the Draft Environmental Assessment Report

The Agency invited the public and Indigenous groups to comment on a draft version of this EA Report and on the potential EA conditions. The Agency received nine submissions from Indigenous groups. Comments, issues, and recommendations were generally consistent with the same areas of concern identified in earlier phases of the EA (summarized in section 4.1.1 and Appendix C), including effects on fish, marine mammals, sea turtles and birds, as well as species at risk and those species of particular concern to Indigenous groups (such as Atlantic salmon); effects from an accident or malfunction; and cumulative effects.

Within the nine submissions from Indigenous groups, new facets included: potential for effects to the health of the ecosystem and abundance of natural resources available to Indigenous communities; climate change (e.g. international obligations, methane releases, and increased toxicity due to warming); and psychosocial effects of contamination.

Consultation with Indigenous groups during the EA (including across several ongoing EAs), throughout the lifetime of the Project and in the Regional Assessment; adaptive management; the lack of project-specific conditions or conditions other than existing regulatory or legislative requirements; impacts to Rights, and the role of Indigenous groups in follow-up and monitoring were also highlighted in the submissions.

The Agency also received four submissions from the public and two from the proponents. Comments included recommended modifications to the conditions, expressed support for the Project, expressed disapproval for the Project based on concerns related to climate change, and identified concerns regarding the extent of potential effects from the project on fish and fish habitat as it relates to commercial fishing activity.

The Agency considered the submissions in consultation with relevant federal authorities, and is of the view that the analysis of environmental effects and conclusions presented in the draft EA Report remain appropriate. Based on its review of specific comments received, the Agency edited the EA Report for further clarity. The Agency determined that the proposed key mitigations and follow up remained appropriate, with the revision of the following items:

- report annually to the C-NLOPB on whether there have been incidents of lost or damaged fishing gear as result of interactions with Project components, including project-related vessels, and make this information available to Indigenous groups upon request; and
- conduct monitoring for migratory birds at the MODU using a trained observer following ECCC's Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms (Gjerdrum et al. 2012).



5. Existing Marine Ecosystem

CEAA 2012 defines the environment as the components of the earth, including the land, water, and air, all organic and inorganic matter and living organisms, and the interacting natural systems that include these components. Similarly, marine ecosystems include the physical and chemical environment along with varied, complex and naturally dynamic organisms. Human activities can cause changes that affect the health of marine ecosystems.

This section summarizes information on the existing marine ecosystem presented by the proponents and is available online in DFO's report Canada's Oceans Now: Atlantic Ecosystems, 2018 (DFO 2018a).

5.1. Physical and Chemical Environment

5.1.1. Physical Environment

The physical components of the marine ecosystem in the North Atlantic ocean are influenced by seasonal changes in currents, water temperature, sea ice, oxygen levels, acidification, and nutrient levels. Changes in the physical environment may have important impacts on biological systems at different scales, including changes in species growth rates or, at a larger scale, changes in food webs (DFO 2018a).

The project area is located on the northeastern edge of the Grand Banks, including the areas of the Jeanne d'Arc Basin. The predominant ocean current in the study area is the Labrador Current which brings cool sub-polar water to the lower latitudes along the Continental Shelf of eastern Canada. The Labrador Current divides into two branches with the inshore branch flowing through the Avalon Channel. The stronger offshore branch divides resulting in part of the branch flowing to the east around the Flemish Cap and the other flowing south around the eastern edge of the Grand Banks and through the Flemish Pass. The Labrador Current mixes with the Gulf Stream to create an area of high productivity and high species diversity along the tail of the Grand Banks which is located southwest of the project area within the study area.

The North Atlantic ocean is temperate with seasonal changes in ocean temperatures. The proponents indicated that based on data extracted from the Bedford Institute of Oceanography Hydrographic Database (1914 to 2009), the surface water temperatures in the study area vary with mean temperatures ranging between 9.31 to 10.17 degrees Celsius during the months of July to September, and -1.1 and -0.7 degrees Celsius between February and March. An important interaction is the mixing of cooler, fresher water from the Labrador Current with the warmer, saltier waters of the Gulf Stream. Temperature influences both physical processes such as sea ice formation and mixing in the water column and the condition and behaviour of the species inhabiting the area.

Seasonal changes in sea ice and the layers in the water column play important roles in the way the ecosystem in the project area functions. An important feature in the project area is the cold intermediate layer which forms when the cold winter mixed layer is trapped by the warm spring surface water, along with freshwater from sea ice melt and runoff from land, forming a less dense layer at the top of the water column. The cold intermediate layer influences mixing within the water column which affects how nutrients are distributed, having an impact on the productivity of the ecosystem. Seasonal changes in sea ice influence freshwater input and the timing of phytoplankton blooms. Sea ice also provides habitat for organisms that live under and on the ice. The proponents stated that based on analysis of data from the Canadian Ice Service's Frequency of Presence of Sea Ice for the period of 1981 to 2010 the region is primarily affected by sea ice beginning the week of January 15 and lasting until the week beginning May 14. Based on data from the International Ice Patrol Iceberg Sightings databased (1960 to 2015) and the 2003 to 2010 PAL Environmental Services Division annual ice reports for the Grand Banks Joint



Operators, icebergs have been observed in the project area each month of the year, peaking in April and May. The number of icebergs sighted annually for the project area varies ranging from 1140 in 1972 to zero in other years.

The climate of the project area is governed by the passage of high and low-pressure circulation systems. This results in periods with high winds, large wave heights, low visibility and severe weather. With respect to conditions in the region, the proponents indicated that mean wind speeds range from 6.1 meters per second in July to 11.2 meters per second in January. The air temperature varies from a mean monthly temperature of -0.3 degrees Celsius in February to a mean monthly air temperature of 14.6 degrees Celsius in August. Precipitation occurs within the project area approximately 17.9 percent of the time. Winter has the highest frequency of precipitation, 28.3 percent of the time, with snow accounting for the majority of winter precipitation (16 percent), and summer has the lowest frequency of precipitation, 11.1 percent of the time. Fog frequently reduces visibility in the project area with the majority of the fog occurring from April to July. In addition to fog, visibility may be reduced by mist (visibility less than ten kilometres), haze, smoke, liquid precipitation (e.g., drizzle), freezing precipitation (e.g., freezing rain), frozen precipitation (e.g., snow), and blowing snow. While obstructions to visibility can occur in any month, annually, 47.7 percent of the observations had reduced visibility less than ten kilometres.

Underwater sound is an important factor when assessing the potential effects of exploration drilling offshore on certain species, especially marine mammals that rely on sound to communicate, locate food, and detect threats. Contributors to the acoustic environment include biological, anthropogenic and physical sources. Based on the only study of acoustic baseline in the study area, four identifiable sources of sound that may have long-term effects on the soundscape were found: fin whales, oil and gas platforms, geophysical surveys, and ambient sound.

5.1.2. Chemical Environment

The chemical environment includes components such as dissolved oxygen, ocean acidity, and nutrient availability. The amount of dissolved oxygen in seawater is important for the health of marine organisms. In deep water, as in the project area, mixing from surface waters can replace oxygen. When there is little mixing, dissolved oxygen can be depleted by the respiration of organisms and the breakdown of organic matter. If oxygen levels are too low, there may be a serious effect on ecosystems by slowing growth, reducing reproductive success, and effecting the way species are distributed as most species will leave an area before hypoxia can cause potential adverse effects.

Ocean acidity is increasing as the ocean absorbs atmospheric carbon dioxide. An increase in acidity makes the water more corrosive to calcium carbonate, the main element in the skeletons and shells of many organisms including plankton, molluscs, crustaceans, and corals and can also cause increased physiological stress for these organisms. These changes can have implications for food webs and ecosystems as a whole. The acidity of the ocean waters on the Newfoundland Shelf have been increasing steadily since consistent measurements started in 1993. Like plants on land, phytoplankton require light and nutrients to grow. The most important nutrients include nitrogen, phosphorous, and silica. Nitrogen is usually the limiting nutrient for the growth of phytoplankton in the ocean. As a result, nitrogen cycling within the water column is very important.

5.2. Biological Environment

The biological components of the marine ecosystem include phytoplankton, zooplankton, corals and sponges, fish and invertebrate communities, marine mammals, sea turtles and sea birds. The biological environment is changing with species distributions shifting causing changes to the food web.

Phytoplankton are microscopic plants that produce oxygen and organic matter from sunlight, carbon dioxide, and inorganic nutrients. They support many marine food webs as the key food source for



zooplankton, which are in turn food for many fish and marine mammals. Phytoplankton abundance is an indicator of the productivity of an ecosystem. Changes in the timing of the spring bloom can have consequences for many other organisms in the ecosystem. In most areas of the North Atlantic, phytoplankton biomasses have been well below average since 2015.

Zooplankton are small animals that drift in the water column, feeding on phytoplankton, bacteria, and fungi. They are the critical link between phytoplankton and larger marine animals and changes in zooplankton abundance have important consequences for animals that rely on them as their primary food source. In general, zooplankton have been experiencing a shift in community structure with a lower abundance of energy-rich copepod *Calanus finmarchicus* and a higher abundance of small and warm-water copepods as well as non-copepods.

Corals grow mainly on boulders and bedrock but can also anchor in soft sediments. The distribution of deep-water corals is patchy, influenced by the condition of the seabed, temperature, salinity, and currents. Sponges are found along continental shelves, slopes, canyons and deep fjords, at depths down to 3000 metres. Both deep-sea corals and sponges are vulnerable to human activities such as fishing and resource extraction. Corals and sponges may be the only complex habitat-forming features on the seafloor. Their structure provides areas for other species to rest, feed, spawn, avoid predators and provide protection for eggs and juveniles of various species. Sponges contribute significantly to the nitrogen, carbon and silicon cycles in the ocean. This results from their large filter-feeding capacity, a diet mainly composed of dissolved organic matter, and a silicified skeleton.

Marine fish and invertebrates within pelagic, demersal, and benthic communities are part of a complex ecological network. These communities are closely connected to the physical, chemical and biological environment in which they live. An example of this is how climate affects the capelin population. A key factor is the timing of melting sea ice in spring that generates ocean conditions that are favourable to the spring bloom of phytoplankton. If blooms occur too early, due to early ice retreat, zooplankton may miss the maximum peak of phytoplankton production. This creates a mismatch in energy flow, and reduces zooplankton productivity. The result is lower forage fish production. Capelin and herring production are linked directly with the abundance of their zooplankton prey and capelin growth and spawning may be directly impacted by poor zooplankton production. In turn, capelin availability has been shown to be an important driver of the abundance of northern Atlantic cod stock and reproductive rates in harp seals.

Many of the marine mammals present in the project area are summer migrants which come to the Northwest Atlantic to feed mainly on capelin, Atlantic herring, and krill. The role of marine mammals in the Atlantic food web varies widely, from fish-eating grey seals to slow-moving copepod- and fish-eating North Atlantic Right Whales. As many marine mammals species are highly mobile and migratory, their movements can reflect changes in prey or in environmental conditions.

Two species of sea turtle are potentially present in the project area, the Leatherback Sea Turtle and the Loggerhead Sea Turtle. These species are migratory, moving between beaches, nearshore coastal waters, and the open ocean in different life stages. Leatherbacks are typically found from June to December spending most of their time in near-surface waters. Young loggerhead turtles are mainly present during summer and fall in warm offshore waters. Sea turtles transport nutrients and energy between marine and terrestrial ecosystems. Leatherbacks also contribute to ecosystem balance in some areas by consuming jellyfish, which are a major predator of zooplankton and larval fish.

Throughout the year large numbers of breeding marine birds and millions of migrating birds from the southern hemisphere and northeastern Atlantic can be found in the waters off eastern Newfoundland. Seabirds are top predators and can be effective indicators of overall health of marine ecosystems. In Eastern Canada some populations of seabirds have been increasing such as Common Murres and Atlantic Puffins while others have stabilized after a period of increased abundance such as Northern Gannets; however, certain surface-feeding species such as Black-Legged Kittiwakes, Leach's Storm Petrel and herring gulls have experienced population declines. Abundance of seabirds can be indirectly affected by human activities such as commercial fishing and oil and gas exploration and production or by changes in oceanographic conditions. For example, Leach's Storm-petrels are vulnerable to light effects from the Project as they hunt at night for species such as lanternfish. Lanternfish vertically migrate during the day,



spending the daytime in deep water and rising to the surface at night-time (BP Canada Energy Group ULC. 2018; BP Canada Energy Group ULC. 2019). Thus, the effect of the Project's lighting on Leach's Storm-petrel is two-fold; attraction and disorientation of birds to the light and potential effects to the availability of food sources.

5.3. Human Activities

The project area is an open-ocean location, approximately 350 kilometres east of the island of Newfoundland and the closest permanent communities, not including the temporary living accommodations on existing MODUs and supply vessels. Despite the lack of permanent human occupation, the project area and larger Eastern Newfoundland and Labrador offshore area is known to be used for a variety of human activities and to contain infrastructure associated with these activities. These include marine research activities, marine shipping, commercial fisheries, other offshore oil and gas activity, military operations, and marine subsea cables.

Fisheries are an important component of the human environment of Newfoundland and Labrador, especially for communities and regions along the eastern coastline of Newfoundland. Prior to 1992, for decades the primary harvesting activities taking place in the offshore areas of Newfoundland and Labrador targeted groundfish species. With the collapse of groundfish stocks in the early 1990s, a moratorium was declared and commercial harvest of groundfish dropped drastically. Other than for some small directed commercial groundfish fisheries offshore, this moratorium is still in effect. With the reduction of groundfish fisheries offshore Newfoundland and Labrador, shellfish species, such as Snow Crab and Northern Shrimp, have taken on a larger economic role in the area. Although some groundfish and pelagic fish harvesting are still conducted, Snow Crab and Northern Shrimp are now the primary species harvested by fishers in offshore Newfoundland and Labrador by both weight and value. However, for conservation reason, NAFO suspended directed fishing for shrimp in Division 3L (Shrimp Fishing Area 7) in 2015, which overlaps with the project area. Additional information on commercial fisheries can be found in section 6.6.



6. Predicted Effects on Valued Components

Section 6 discusses the potential effects of the Project on the valued components considered by the Agency. Potential effects on special areas and species at risk are specifically considered in Section 6.4 and 6.5 respectively, but also in the other sections where the valued component may include relevant special areas or species at risk (e.g., fish and fish habitat [Section 6.1], marine mammals and sea turtles [Section 6.2], and migratory birds [Section 6.3]). The potential effects of an accident or malfunction on these valued components are discussed in Section 7.1.

A summary of the proponents' mitigation measures, monitoring and follow-up is provided in Appendix B.

As described in the analysis in the sub-sections below and taking into account the implementation of key mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat, marine mammals and sea turtles, migratory birds, special areas, species at risk, commercial fisheries, or the current use, health and socioeconomic conditions of Indigenous peoples.

6.1. Fish and Fish Habitat

6.1.1. Proponents' Assessment of Environmental Effects

Existing Environment

The project area and surrounding marine environments are inhabited by fish and invertebrate species of commercial, cultural, and/or ecological importance and support regionally important areas of biodiversity and marine productivity. Key fish species of commercial, recreational, or cultural importance with the potential to occur in the project area include redfish species, grenadier species and capelin, while key invertebrate species include Propeller Clam, Northern Shrimp and Snow Crab. Species distributions fluctuate as species migrate on daily or seasonal cycles. For example, on an annual cycle, the study area is visited by large pelagics (e.g., tuna species, North Atlantic Swordfish) during the warm water season, while other occupants (e.g., redfish species, Greenland Halibut, Snow Crab) are more resident in nature.

Corals and sponges increase habitat complexity, providing refuge, nursery, foraging, breeding and spawning habitat to a variety of fish and invertebrate species. The coral diversity of the Flemish Pass, Flemish Cap, and northeastern slope of the Grand Banks includes 21 species of alcyonaceans (including soft corals and gorgonian sea fans), 11 species of sea pens, two species of cup corals, and three species of black corals. Sponges are more widely distributed, and high densities can be found along the eastern slope of the Grand Banks and around the Flemish Cap.

There are multiple species at risk that may occur in the project area (see Appendix D for a full list of species at risk that may occur in the project area or surrounding area). These include Spotted Wolffish, for which there is proposed critical habitat overlapping the project area, as well as the following three species which have been highlighted by Indigenous groups as being of particular concern:

- **American Eel** travel from freshwater environments during the fall to the Sargasso Sea to spawn; juveniles (i.e., glass eels) have the potential to occur seasonally on the Grand Banks;



- **Atlantic Bluefin Tuna** enter Canadian waters from June to October and can be found over the continental shelf off Newfoundland; and
- **Atlantic Salmon**³ could pass through the project area en route to and from their maturation and winter feeding grounds in the Labrador Sea and off Greenland.

While there is a general understanding of the spatial and temporal distribution of Atlantic Salmon at sea, the information available is limited which is complicated by evidence of climate-induced alterations to Atlantic Salmon distribution patterns. Atlantic Salmon populations appear to migrate north to feeding areas, with most individuals from a population expected to migrate to the feeding grounds by the most direct path, and the relative incidence of individual salmon from more southerly populations expected to decrease with increasing latitude. Overwintering distribution is not well-defined but is generally believed to encompass an area from the southern Labrador Sea, to the eastern edge of the Scotian Shelf, with the Labrador Sea as the primary overwintering area. Catch rate and survey data also suggest that Atlantic Salmon tend to congregate in spring at the eastern edge of the Grand Banks.

Research vessel surveys have caught salmon within the study area in spring. There is no salmon abundance, relative population composition or overwintering data for the project area.

Predicted Effects

Change in Risk of Mortality, Health or Physical Injury

The planned release of drilling waste is a key potential interaction with marine fish and fish habitat during offshore drilling programs, with potential effects on fish and benthos via smothering, chemical toxicity and contamination. To determine the potential extent of these effects, the proponents relied on drill cuttings dispersion modelling conducted for the White Rose oil and gas field, adjacent to Husky Oil Operations Limited exploration licences in the Project and in similar water depths, oceanographic, and biological environments. Eight wells were modelled, each drilled individually and starting on different dates to illustrate the effect of seasonal variability. Results of the modelling showed that:

- although direction of deposition changed seasonally, the depositional footprints from each well were similar: each consisted of a well-defined cuttings patch covering an area about 30 000 to 60 000 square metres (0.03 to 0.06 square kilometres), located up to 300 metres from the drill centre;
- each cuttings patch modelled was generally in the range of one to ten millimetres thick, with portions as thick as 25 to 50 millimetres;
- cuttings thicknesses were predicted to be below one millimetre beyond 300 metres from the drill centre;
- approximately 500 metres from the well, there were several additional thin patches of cuttings of thicknesses up to 0.1 millimetres, and beyond 500 metres there were additional thin patches of cuttings of thicknesses up to 0.2 millimetres. These patches were all approximately one kilometre in radius; and scattered uniformly out to approximately eight to twelve kilometres from the drill centre.

The proponents stated that in areas of deeper water, drilling mud and cuttings discharged from the MODU would be dispersed more broadly due to the increased length of time it would take for the suspended cuttings to settle. This would cover a larger geographic area, but with a thinner cuttings patch than in shallower waters of the Jeanne d'Arc Basin.

A burial threshold of ten millimetres or more was identified for smothering of benthic communities and sediment quality effects; it was noted that this threshold could be lower for deep-water benthos, and that recent research has indicated cold-water coral species could be affected by burial depths of 6.5 millimetres. In areas with drill cuttings deposition thickness above the ten millimetre threshold, slow-moving benthic

³ Outer Bay of Fundy, Southern Uplands, and Anticosti Island Designated Unites which may occur in the project area are listed as endangered by COSEWIC, Gaspé-Southern St. Lawrence Designated Unit is listed as endangered by COSEWIC.



species could be smothered, resulting in mortality, reduced growth of some species, reduced survival of settling larvae, and a change in fauna composition. There is potential for mortality (albeit low) for coral species within the 100 to 200 metre cuttings dispersion zone, and this change in mortality would be greater than that of natural variability. At the edges of the deposition, although sessile and slow moving species would be smothered, those species capable of burrowing were predicted to resurface and experience little effect from the disposal of cuttings, thereby providing a food source to local benthic predators. The proponents predicted the effects of drill cuttings deposition would subside within one to four years.

Treatment and disposal of drilling mud and cuttings would be in accordance with the *Offshore Waste Treatment Guidelines*, with water-based mud and associated cuttings discharged directly to the seabed, and synthetic-based mud cuttings treated prior to discharge. The main component of water-based mud is fresh water or seawater, while the main component of synthetic-based mud is a synthetic-based oil, which has been shown to be non-toxic (acutely or chronically) through both operator and government testing. Both water-based and synthetic-based muds include bentonite (clay) and/or barite, as well as other chemicals added to control mud properties.

The proponents noted that since 2004, Husky Oil Operations Limited has conducted eight post-drilling environmental effects monitoring programs that included sediment, water and biological (commercial finfish and invertebrate species) components, with results compared to baseline data collected in 2000 and 2001. Results have confirmed predictions of no significant environmental effects from contamination due to operational discharges of approximately 50 development wells. The spatial extent of contamination was consistent with original predictions on the zone of influence of drill cuttings, and the large majority of samples were non-toxic to laboratory test species. In addition, there was little evidence of mortality effects on benthic invertebrate communities as measured by abundance, biomass, and diversity indices. The observed biological changes included reductions in benthic species diversity and abundance and alterations to community structure. The proponents noted that zones of influence have not increased in severity or extent over time. Furthermore, physical recovery of sediment through degradation of the major components of drilling fluids has been shown to occur on the Grand Banks, and environmental effects monitoring has reported recovery of benthic communities beginning once drilling activities were reduced.

Fish, including eggs and larvae, within the project area could be subject to mortality, physical injury, or health effects due to increased underwater sound levels. VSP surveys would be expected to produce the highest levels of underwater sound of the project activities or components; however, these operations would be temporary, lasting only one day per well. Studies on exposure of cod to seismic air gun arrays noted that mortality and tissue damage to juvenile fish occurred only within five metres of the sound source. The majority of mobile fish species would generally avoid underwater sound at levels lower than those at which injury or mortality would occur, and that gradually ramping up the seismic air gun array for VSP surveys would mitigate the risk of mortality and physical injury.

In fish with swim bladders involved in hearing, temporary threshold shifts in hearing and recoverable injuries may occur. Although there was no modelling conducted specific to the Project, it was noted that acoustic modelling for a nearby exploration drilling project, analogous to the Project given similarities in physical and oceanographic environments, was undertaken. That modelling predicted that underwater sound from the operation of the MODU and support vessels would be above the threshold for recoverable injury in fish with swim bladders involved in hearing at distances of up to 150 metres from the source, and above the temporary threshold shift at distances of up to 330 metres. However, the proponents stated it would be unlikely that fish would remain in the immediate area long enough to exceed exposure guidelines. In the event that a fish remained within the potential exposure area, the result would be temporary. The proponents further stated that physical injury to fish from MODU operation would be localized to an area within metres of the thrusters; however, aggregations of fish would be unlikely due to turbulence generated by the thruster propellers.

Change in Habitat Quality and Use

Light and sound from drilling operations may affect the quality of the underwater environment for marine fish, resulting in changes in behaviour of fish close to the site. Increases in light levels and lighting at night



could result in changes in spatial distribution, migration, and reproduction. Light attracts or repels fish species, particularly pelagic fishes and squid, which are known to be attracted to light. Many planktonic species are phototactic, floating toward the surface during the day, and settling in deeper water at night. Artificial light may alter these movements in localized areas. Effects of light would be temporary and reversible, and extraneous lighting would be minimized to reduce the effect of lighting where practical without affecting safety of operations.

Underwater sound has the potential to affect fish and fish habitat in a variety of ways depending on source levels, duration of exposure, proximity of sound source, species sensitivities and environmental conditions. Fish are generally most sensitive to low-frequency sound (ten to 500 hertz), a range that overlaps with the most intense sound produced by vessels. Studies have shown both attraction and avoidance behaviour in fish in response to vessel noise, with most the likely responses being a startle response, a change in swimming pattern, and/or a change in vertical distribution. There is also potential for underwater noise to have effects on communication and environmental sensing by fish, as sound production and hearing may be used in reproduction, prey location and predator avoidance. The proponents stated that effects from underwater sound would be localized and temporary.

Project waste would be discharged in accordance with the *Offshore Waste Treatment Guidelines*, which could have a temporary effect on habitat quality. However, these effects would be expected to be short-term in duration. The ongoing Environmental Effects Monitoring Program for the White Rose oil and gas field has found no significant effects beyond predictions on fish and fish habitat from project-related discharges based on monitoring of sediment, water and fish chemistry, fish health, toxicology and benthic community structure.

The proponents predicted that effects from drilling associated surveys such as VSP and wellsite/geohazard surveys and are generally short-term, infrequent, and could affect a portion of the project area. Fish may also move away from a survey area while related activities are ongoing. Also dropped objects in the marine environment are considered a low probability event and benign.

6.1.2. Views Expressed

Federal Authorities

DFO requested additional information regarding the use and applicability of a drill cuttings deposition model from 2012 within the White Rose oil and gas field. The proponents acknowledged that the data set used for the 2012 White Rose oil and gas field may not be precisely representative of the whole project area, but considered it appropriate as observations better capture time variability resulting from the multiple physical processes, as well water depth in the project area is relatively homogeneous and comparable to the White Rose field. They stated that based on these similarities it was possible to scale the 2012 dispersion results to the stronger or weaker currents that may exist in the project area in order to predict impacts.

The Agency noted inconsistencies in information provided on the thickness and distribution of drill cuttings and requested information on settled drill cuttings depths at various distances from the well. The proponents noted that the 6.5 millimetre threshold was developed in laboratory conditions using species representation dominated by bivalves with a small percentage of polychaetes (a marine ringed worm). It was stated that the list of species would not be a realistic assumption of species sensitivity distributions given that the Grand Banks are dominated by polychaetes, which would be more tolerant to burial from drill cuttings than a community dominated by bivalves. Among other factors, laboratory experiments could overestimate the effect of drill cuttings because water flow is reduced compared to field situations, differences in mud type and cutting could influence results and the resilience of the receiving benthic community is an important factor. Field experiments that indicated a general threshold range of ten to 25 millimeters would be appropriate and were referenced.

DFO and the C-NLOPB requested information to support their effects assessment for supply and servicing activities. The proponents stated based on guidelines for recoverable injuries, and temporary hearing



threshold shift for injury to fish, it is unlikely that fish would remain in the immediate area long enough to be exposed to levels that would result in temporary threshold shifts in hearing. In the event that fish did remain in the area of exposure the result would be temporary and reversible. In addition, the proponents stated that there is no direct evidence that vessels would increase the risk of mortality or potential mortality.

Additional views expressed by federal authorities overlapped with views expressed by Indigenous groups, some of which are discussed below.

Indigenous Peoples

Mi'gmawe'l Tplu'taqnn Incorporated (MTI) stated that Swordfish are a commercially and culturally important species and requested a comprehensive assessment of potential effects, especially given the species only tolerates small environmental changes. The proponents responded that the presence of Swordfish would be limited to months with warm water when adults migrate north to forage. While it is known that Swordfish are attracted to artificial light when they are foraging, there is no scientific literature regarding the effects of sound on Swordfish. The proponents noted that in relation to sound and light, emissions are limited spatially and temporally. Swordfish are highly mobile and with respect to sound, are anticipated to avoid areas where conditions are unfavourable.

KMKNO expressed concerns about potential effects on American Eel, stressing their cultural importance, and requested additional information on potential measures to mitigate effects. The proponents stated that they could not determine the likelihood of American Eel presence in the project area and noted that general mitigation measures for fish and fish habitat would avoid or reduce potential adverse effects on American Eel.

KMKNO, Miawpukek First Nation, and DFO requested additional effects analysis on the probable no-effect threshold for fish and fish habitat including coral and sponge species. The proponents noted that a drill cuttings burial depth of 6.5 millimetres may adversely impact coral species. The drill cuttings dispersion modelling concluded that there would be depositions up to 200 metres from the drill center and portions of the area would have a burial thickness of 25 to 50 millimetres, cuttings thicknesses were predicted to be below one millimetre beyond 300 metres from the drill centre. The proponents concluded that the Project may result in adverse effects that cause a change in risk of mortality, physical injury or health and a change in habitat quality and use for coral and sponge species. The proponents predicted that with the implementation of mitigation measures and adherence to industry standards and regulations, the residual effect to coral and sponge species would be low to moderate in magnitude, short to long-term in duration and reversible.

Several Indigenous groups submitted comments regarding the potential effects on Atlantic Salmon and provided additional information and research for consideration. Submissions raised the potential for the project area to be used as foraging and nursery habitat for Atlantic Salmon in addition to being a migration corridor. Husky Oil Operations Limited noted that in August 2018 and March 2019, it deployed acoustic receivers within and just outside the White Rose oil and gas field to record the presence of any tagged species, including Atlantic Salmon and American Eel. Further, ExxonMobil Canada Limited stated that in July 2019 two acoustic receivers were deployed offshore. Data collected from these receivers would be made public through the Ocean Tracking Network. Furthermore, the proponents noted their required participation in the Environmental Studies Research Fund (ESRF), which funds environmental and social studies pertaining to petroleum exploration, development, and production activities on frontier lands. The proponents and other current offshore operators requested that the ESRF consider Atlantic Salmon as a research priority; subsequently, the ESRF issued a call for proposals in May 2019 for studies related to Atlantic Salmon⁴.

The Agency recognizes that Indigenous communities have raised these concerns across multiple Newfoundland offshore exploration drilling projects, both completed and ongoing. In consultation with DFO, the Agency is satisfied that the information contained in previous EA reports (e.g., Flemish Pass

⁴ Additional information on this most recent call for proposals can be found here: <https://www.esrfunds.org/181>.



Exploration Drilling Project and Eastern Newfoundland Offshore Exploration Drilling Project) adequately addresses these concerns and it has been incorporated in the Agency's analysis below.

A summary of issues raised by Indigenous groups is presented in Appendix C.

6.1.3. Agency Analysis and Conclusion

Analysis of Effects

Fish and fish habitat, including benthic species could be affected by the discharge of drilling mud and cuttings from the Project. The Agency is aware that parts of exploration licence areas included in the Project may support sponges and corals, which provide refuge, nursery and foraging areas for many fish and invertebrate species. Without adequate mitigation, benthic habitat, including corals and sponges, could be affected by the discharge of drilling mud and cuttings from the Project; sedentary or slow moving species may be smothered and the sediment quality may be altered by nutrient enrichment and oxygen depletion at cuttings deposition thicknesses above the threshold for burial effects. Given the importance and sensitivity of corals and sponges, the proponents would be required to conduct surveys at each wellsite and around anchor points prior to drilling to identify any aggregations of habitat-forming corals or sponges or other environmentally sensitive features. Should these be identified, the proponents would be required to relocate the well and/or redirect cuttings discharges to avoid affecting them. If relocation or redirection are not technically feasible, the proponents would be required to conduct a comprehensive assessment of the benthic habitat in consultation with DFO and the C-NLOPB prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* and related options for mitigation to reduce any identified risks.

Fish and fish habitat could also be affected by other marine discharges. The Agency notes that all drilling chemicals would be selected in accordance with the *Offshore Chemical Selection Guidelines* and any discharges would meet or exceed standards set out in the *Offshore Waste Treatment Guidelines* and the MARPOL. The implementation of these measures would limit effects on fish.

Continuous underwater sound from operation of the MODU and support vessels may cause recoverable injury or temporary hearing threshold shift in certain species of fish at distances of up to 150 and 330 metres from the source, respectively (CNOOC 2019). Sound may also result in behavioural responses, including avoidance or attraction, and may mask fish sensory abilities. Sound from VSP and wellsite/geohazard surveys could also affect fish, including potentially causing injury or mortality. Sound levels from these surveys may exceed injury thresholds for some species or life stages in the immediate vicinity of the sound source. Mobile species would likely exhibit avoidance behaviour, and the surveys would begin with a "ramp-up" phase to increase initial avoidance and limit potential effects. Although fish may temporarily avoid the area, it is predicted that they would not be displaced from important habitats or disrupted during key activities over extended areas or periods. Immobile species or life stages may experience injury and mortality, but these effects would be localized.

Certain fish species that could be affected by the Project are of particular importance to Indigenous groups and are used or have been historically used by these groups for traditional purposes, in particular Atlantic Salmon. During the EA, Indigenous groups and the proponents provided information on Atlantic Salmon and its potential interaction with the Project. The Agency notes that in previous offshore oil exploration projects in Newfoundland and Labrador DFO reviewed available information and confirmed the uncertainty regarding the at-sea migration patterns and habitat use of Atlantic Salmon. Given the potential for some Atlantic Salmon to occur in areas that overlap with the project area, effects on the species could occur. DFO has advised that potential effects of the Project are expected to be negligible to low and spatially and temporally limited. This prediction is made with a moderate level of certainty given uncertainties about Atlantic Salmon distributions and reasons for population declines. Based on advice from DFO and the C-NLOPB, the Agency also determined that restricting drilling activities during certain times of year was not warranted and would unnecessarily limit the timing of proponents' drilling activities.



The Agency was provided information by DFO on other offshore exploratory drilling projects on the migration patterns of Atlantic Salmon in the northwest Atlantic and on the potential effects of the Project. It advised that Atlantic Salmon that spawn in rivers of eastern Canada (including New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and Quebec) travel throughout the northwest Atlantic Ocean. As there have been few marine surveys of the species, their oceanic movement is not well understood. Atlantic Salmon in the northwest Atlantic are found most abundantly west of Greenland and in the Labrador Sea in summer and fall, and along the eastern slope of the Grand Banks in spring. Surveys have also detected salmon in waters of the Jeanne d'Arc Basin/Flemish Pass region, but in lower abundances than the areas previously noted, and only in the spring. DFO further advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region, and that salmon are likely to be present in the Jeanne d'Arc Basin/Flemish Pass region at some times of the year as they migrate through the area, to and from natal rivers, but it is not known to be a significant migration route or overwintering area. The department advised that monitoring of finfish for the past 25 to 30 years in the Newfoundland and Labrador offshore has revealed no effects on fish health from ongoing oil and gas operations.

Given the uncertainty regarding the potential effects of the Project on Atlantic Salmon and the importance of the species to Indigenous groups, the proponents have deployed acoustic receivers in the Newfoundland and Labrador offshore to determine the presence of any tagged marine species including Atlantic Salmon. Data collected would be publically available through the Ocean Tracking Network. Additional research on the presence, migration, and distribution of Atlantic Salmon may be supported through the ESRF, an initiative funded through levies on frontier lands⁵ paid by interest holders such as oil and gas companies. The ESRF is directed by a joint government/industry/public management board and administered by a secretariat which resides in NRCan. The Agency notes that, to address knowledge gaps regarding Atlantic Salmon migration identified during this and other EAs of exploration projects in offshore Newfoundland and Labrador, in May 2019 the ESRF issued a call for proposals for Environmental and Social Studies related to Atlantic Salmon.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents (Appendix B), expert advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to mitigate the Project's effects on fish and fish habitat:

- prepare a pre-drill seabed investigation plan for each wellsite and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. The plan should be designed to:
 - collect high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges;
 - identify the equipment used for the surveys, to be operated by a qualified individual; and
 - include information on survey transect length and pattern around each wellsite, which should be based on applicable drill cutting dispersion model results. Transects around anchor sites should extend at least 50 metres from the extent of each structure.
- based on approved plans, undertake a seabed investigation survey at each well location and around each anchor point prior to commencing drilling a well. Retain a qualified independent marine scientist to provide advice in real-time.
- provide the results of the seabed investigation survey to the C-NLOPB and DFO prior to commencing drilling. In addition, provide a description of additional mitigation and monitoring based on the results of

⁵ Frontier lands are defined as those areas where Canada has the right to dispose of or exploit the natural resources, are situated in the offshore areas of Canada's east and west coasts and the areas north of 60 degrees latitude (ESRF, 2016).



the survey and predicted areas of sedimentation and disturbance. Results of the surveys should be provided to Indigenous groups and posted online for public access.

- if aggregations of habitat-forming corals or sponges or other environmentally sensitive features are identified when undertaking the survey:
 - relocate the well and/or redirect cuttings discharges to ensure that the drilling installation, anchors, or drilling mud and cuttings discharges will not affect them, unless not technically feasible. No drilling should occur before a decision is made by the C-NLOPB and DFO regarding appropriate mitigation and monitoring; or
 - if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the well or redirect cuttings discharges, conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* and related options for mitigation to reduce any identified risk.
- select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines* and use lower toxicity drilling mud and biodegradable and environmentally-friendly additives within muds and cements, where feasible;
- ensure that all discharges from the MODU meet the *Offshore Waste Treatment Guidelines*;
- transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility;
- ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL;
- conduct a pre-drill survey with qualified individual(s) at each wellsite to determine the presence of any unexploded ordnance or other seabed hazards. If any such ordnance or seabed hazard is detected, avoid disturbing or manipulating it, and contact the nearest Joint Rescue Coordination Centre and the C-NLOPB prior to commencing drilling to determine an appropriate course of action; and
- implement mitigations listed in marine mammals and sea turtles (Section 6.2) related to the conduct of VSP and wellsite/geohazard surveys.

Follow-up

The Agency identified the following measures as part of a follow-up program, to be developed in consultation with the C-NLOPB and DFO, to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on fish and fish habitat:

- monitor the concentration of synthetic-based mud on drill cuttings to verify that the discharge meets, at a minimum the performance target specified in the *Offshore Waste Treatment Guidelines*. Report results to the C-NLOPB;
- for the first well on each exploration licence, and for any well where drilling is undertaken in an area determined by the seabed investigation survey to be sensitive benthic habitat, conduct specific follow-up monitoring, including:
 - measurement of sediment deposition extent and thickness (e.g., core samples and/or high definition visual data) post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions;
 - survey of benthic fauna present after drilling has been concluded;
 - reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO;
 - results should be provided to Indigenous groups and posted online for public access;
- participate in or support research on the presence and distribution of Atlantic Salmon in the Eastern Canadian Offshore areas, and update the C-NLOPB and Indigenous groups annually on research



activities. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups; and

- implement the follow-up measures listed in marine mammals and sea turtles (Section 6.2) related to the verification of underwater sound as a result of the Project.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on fish and fish habitat would be low in magnitude, occur locally, would be short to long-term and occur continuously or regularly during drilling operations.

Taking into account the implementation of the mitigation measures described above, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat.

6.2. Marine Mammals and Sea Turtles

6.2.1. Proponents' Assessment of Environmental Effects

Existing Environment

The Project would take place within the Jeanne d'Arc Basin, which supports a diverse array of marine mammals⁶ and sea turtles and contains important feeding areas, migratory routes, and breeding and whelping areas. Twenty-two species of marine mammals may be found in the study area.

Several species have been identified in the study area year-round (e.g., Blue Whale, Fin Whale, Killer Whale, Northern Bottlenose Whale), while others are present seasonally (e.g., North Atlantic Right Whale, Sei Whale). Some of these species, including Northern Bottlenose Whale, Blue Whale, and North Atlantic Right Whale, are considered at risk (see Appendix D for a list of species at risk that may occur in the project area or surrounding area).

Predicted Effects

Change in Risk of Mortality, Health or Physical Injury

The proponents predicted that continuous exposure to sound over a 24-hour period from an operating drilling installation could cause auditory injury⁷ in high frequency hearing group marine mammals as far as

⁶ Marine mammals include cetaceans, commonly known as whales, dolphins, and porpoises, and pinnipeds, commonly known as seals, sea lions and walrus.

Cetaceans include mysticetes (toothless/baleen whales) and odontocetes (toothed whales which are further subdivided into beaked whales, sperm whales, dolphins and porpoises).

⁷ The proponents indicated that it used both the US National Oceanic and Atmospheric Administration's *National Marine Fisheries Service Guidelines* (NMFS) (2016) and Southall et al. (2007) to provide guidance on threshold levels of underwater sound for auditory injury in marine mammals. These both present dual metrics for threshold values [i.e., recommend consideration of both peak sound pressure levels (SPL_{peak}) and cumulative (over 24 hours) sound exposure levels (SEL_{cum})]. The proponents indicated that conclusions were based on whichever metric was first exceeded.



3.3 kilometres from the source and as far as 228 metres from the source for other marine mammal hearing groups. The proponents stated that it is unlikely that marine mammals and sea turtles would be present at proximities that could potentially result in injury.

Impulsive sound, such as that emitted by VSP and wellsite/geohazard surveys, could affect hearing in marine mammals and sea turtles. The proponents estimated that thresholds for auditory injury could be exceeded at distances of up to 9.7 kilometres from a VSP sound source for low-frequency hearing group cetaceans and up to 380 metres for other marine mammal hearing groups (this assumes that a marine mammal or sea turtle occurs within these distances of the VSP sound source for a 24-hour period). However, distances from the VSP sound source at which peak pressure levels (i.e., the maximum instantaneous sound pressure level) could result in injury to marine mammals would not likely extend beyond 140 metres. Thresholds for auditory injury for sea turtles have not been identified; however, it is assumed that these thresholds would not exceed those identified for cetaceans.

Explosives would not be used during wellhead abandonment. Cutting of wellheads would be of short-term duration, restricted to the project area, and removal of the wellhead by mechanical means is not expected to produce underwater sound of an intensity or extent to present a risk of mortality or injury to marine mammals or sea turtles.

Marine mammals and sea turtles could be injured or killed if struck by a supply vessel; species that spend extended periods near the surface would be most vulnerable to vessel collisions. In particular, Fin Whales (listed as special concern under Schedule 1 of the *Species at Risk Act*), and Humpback Whales are especially vulnerable to vessel strikes and both have high potential for occurrence in the study area. The proponents anticipate that the Project would result in a small increase in the number of vessel transits over existing levels and estimates one to three supply vessel return transits per week for a single MODU. They stated that vessel traffic is expected to have a short-term and localized potential for increasing collision risk with marine mammals and sea turtles. Transit speeds of supply vessels would be typically between ten to 12 knots (19 to 22 kilometres per hour) and would not exceed 15 knots (27.8 kilometres per hour).

Change in Habitat Quality and Use

The National Oceanic and Atmospheric Administration's behavioural threshold⁸ for marine mammals exposed to continuous underwater sound from the MODU could be exceeded up to 56.8 kilometres away based on the most conservative estimates. Behavioural disturbances from continuous underwater sound may include attraction or avoidance, masking, and changes in diving, feeding or vocalizations. One of the key changes in habitat quality and use associated with increased underwater sound levels is a potential change in how marine mammals send and receive acoustic signals for communication. Baleen whales vocalize primarily in lower frequencies and therefore these are predicted to be the most susceptible to potential masking associated with sound produced from the MODU.

Sea turtles are also sensitive to low-frequency sounds, such as those from a MODU. The proponents predicted that the effects of a MODU to sea turtle habitat quality or use would be similar to the effects discussed for marine mammals.

The threshold for behavioural disturbance to marine mammals⁹ could be exceeded up to 7.9 kilometres from the sound source during VSP surveys. Overall, the proponents indicated that although geophysical surveys may emit the most intense emissions of Project-related sound sources, they would be short-term (i.e., approximately one day per well for VSP surveys and five to seven days per well for wellsite surveys). Given that marine mammals are widely distributed throughout the study area, and the project area is not a

⁸ 120 dB re 1 μ Pa (decibels relative to a fixed reference pressure of one micropascal) root mean square sound pressure level published by the National Oceanic and Atmospheric Administration.

⁹ 160 dB re 1 μ Pa root mean square sound pressure level published by the National Oceanic and Atmospheric Administration.



known breeding, feeding or sensitive area for sea turtles, it is unlikely to have a significant adverse effect on habitat quality or use.

Helicopter flights over water would introduce sound to the surrounding marine environment and from an altitude of 90 metres, could produce sound levels exceeding behavioural threshold levels up to 61 metres away to a water depth of 128 metres. Single or occasional overflights by helicopters would likely elicit a brief behavioural response by most marine mammals and sea turtles. It is also unlikely that large numbers of marine mammals and sea turtles would be overflown, especially at low altitude as helicopters typically only reduce altitude on approach for landing.

Marine discharges could result in a temporary reduction in water and sediment quality, which are not anticipated to result in measurable changes in habitat quality for marine mammals and sea turtles. Marine discharges would result in minimal to negligible environmental effects and would be unlikely to introduce heavy metals in concentrations harmful to marine mammals and sea turtles. In addition, secondary effects would be expected to be minimal because marine mammals that regularly occur in the study area are not known to feed on benthos.

6.2.2. Views Expressed

Federal Authorities

DFO indicated that it was unclear how the White Rose oil and gas field sound modelling used for the Project is applicable for sound generated from the MODU or from VSP surveys. The proponents responded that the White Rose oil and gas field sound modelling was undertaken for drilling from a concrete gravity structure and is not expected to be comparable for MODU sound source levels but would be comparable for operation of vessels and helicopters. It was indicated that utilizing modelling conducted for the CNOOC Petroleum North America ULC (formerly Nexen Energy ULC) Flemish Pass Exploration Drilling Project and is considered more analogous to the Project given the similarities in physical and oceanographic environments.

DFO indicated the effects of the Project on marine mammals and sea turtles would be limited based on the relatively short duration of noise disturbance, the commitment to adhere to the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*, and because there is no critical habitat for marine mammal species at risk in the project area. While DFO generally agrees with the proponents' analysis related to marine mammals and sea turtles, it advised that there is uncertainty with respect to predictions related to the extent of sound emissions from a MODU. Given this uncertainty, DFO is supportive of a requirement for the proponents to verify sound predictions from the MODU.

DFO advised the Agency that the mitigation measures, monitoring commitments, and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address the potential effects of the Project on marine mammals and sea turtles.

Indigenous Peoples

KMKNO recommended that the proponents use passive acoustic monitoring or equivalent technology to detect marine mammals in the vicinity of the Project given limitations of visual observation particularly in cases of low visibility (e.g., fog, night-time). The proponents responded that water depths within the project area are a maximum of 211 metres which is not considered primary habitat for deep diving cetaceans. The proponents stated that all applicable mitigations from the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* would be implemented, as required, including passive acoustic monitoring.

WNNB requested the safety zone be enlarged to match the behavioural effect threshold for marine mammals. The proponents responded that given the size and duration of the sound source array during VSP surveys, the Project does not warrant an extension of the safety zone beyond 500 metres. However,



the seismic source would be shut down if any marine mammal or sea turtle is observed within the 500-metre safety zone. Multiple Indigenous groups requested information on when project-vessel routes would deviate or speeds would be reduced to avoid an interaction with marine mammals or sea turtles. KMKNO and MTI requested that vessels be required to reduce speeds to ten knots when not in existing shipping lanes and/or when a marine mammal or sea turtle is observed or reported in the vicinity. The proponents responded that project-vessel traffic would avoid concentrations of marine mammals and sea turtles whenever possible. An officer would maintain a lookout to determine risk of collision and the appropriate course of action, which may include deviation from course. Any area known to be sensitive habitat for marine mammals would be avoided and vessels would travel below a maximum speed of 15 knots (27.8 kilometres per hour) in compliance with a Notice to Shipping and the *International Regulations for Preventing Collisions at Sea*.

MTI expressed concern with the proponents' determination that there is a low potential for North Atlantic Right Whales to occur in the study area even though their migration routes are unknown. MTI requested that hydrophones be installed on MODUs to contribute to species occurrence and distribution data, and identify any proposed follow-up measures. The proponents responded that given the low magnitude of the increase of marine traffic associated with the Project and the low likelihood of North Atlantic Right Whales occurring in the study area, additional monitoring is not warranted. The proponents further stated that the project area has not been designated critical habitat for North Atlantic Right Whales and there are no restrictions placed on vessel access or speed in the study area. Seismic surveys would employ the monitoring and mitigation requirements for marine mammals as per the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*. Further, as per the *Geophysical, Geological, Environmental and Geotechnical Program Guidelines*, the proponents would submit a Marine Mammal and Seabird Monitoring Report no later than one year after completion of the survey.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Balaena Institute for Cetacean Conservation Studies raised concerns about potential adverse effects of the Project on Northern Bottlenose Whales and their habitat within the project area. It noted that additional research has been carried out on cetacean species and their habitat in the project area, particularly on the Northern Bottlenose Whale. The proponents reviewed the assessment of the Project effects on the Northern Bottlenose Whale (Scotian Shelf population), given sightings in the project area. It indicated that the potential for individual Northern Bottlenose Whales to overlap geographically and interact with project activities is likely to be highly transient and temporary, especially in consideration of anticipated daily and seasonal fluctuations in their presence within the project area and the short-term nature of project activities of concern. The proponents stated that with the implementation of mitigation measures, the Project is not likely to result in significant effects on the Northern Bottlenose Whale. DFO indicated that it was aware of the research that was carried out by the Balaena Institute for Cetacean Conservation Studies and that no results have yet been published.

6.2.3. Agency Analysis and Conclusion

Analysis of Effects

The Project may adversely affect marine mammals and sea turtles, including species at risk. Several species of marine mammals and sea turtles could be present year-round in the project area, including in the proponents' exploration licences, while others may be present in higher abundance during summer and fall.

Sound from the MODU or VSP and wellsite/geohazard activity may potentially result in injury or mortality to marine mammals and sea turtles or affect the quality and use of their habitats. Notably, the acoustic



environment is of importance to marine mammals as many species emit sound and rely, in part, on their acoustic sense for communication, social interaction, navigation, foraging, and predator avoidance. The Project could result in exceedances of thresholds for both auditory injury and behavioural effects. However, auditory injury would require continuous exposure over a 24-hour period, and it is not expected that marine mammals would remain in areas that could cause permanent auditory injury.

To mitigate the effects of sound emissions from VSP and wellsite/geohazard activities, the proponents would follow the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*. Importantly, the proponents would be required to develop a Marine Mammal and Sea Turtle Monitoring Plan and provide it to DFO for review. The proponents would be required to report on the findings of monitoring to government and Indigenous groups.

The Agency notes that the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* requires the use of cetacean detection technology under certain circumstances and conditions. It states that passive acoustic monitoring or equivalent technology be used if the full extent of a safety zone is not visible or if a survey is in an area where vocalizing cetaceans listed as endangered or threatened in Schedule 1 of the *Species at Risk Act* are likely to be encountered. The Agency notes that the Eastern Newfoundland Offshore area is known to be foggy and to encounter rough sea states, which could hinder visibility. In addition, species at risk, such as Northern Bottlenose Whale, have a high potential to occur in the study area. Based on these considerations, DFO has advised that it supports that the proponents would be required to use passive acoustic monitoring or equivalent technology. It noted that marine mammal species of concern for detection by this technology would include baleen whales (e.g., Blue Whale, Fin Whale, North Atlantic Right Whale), as well as beaked whales (e.g., Northern Bottlenose Whale, Sowerby's Beaked Whale), which may be detected but that could be difficult to differentiate between.

With respect to the size of the safety zone for marine mammal and sea turtle observations during VSP surveys, DFO has advised that the peak threshold for auditory injury would not likely extend beyond 120 metres from the source. Thresholds for auditory injury for 24 hours of sound exposure would be reached at greater distances; however, marine mammals and sea turtles would be expected to move away within a 24-hour period. As such, and given that there is no designated critical habitat for marine mammals or sea turtles within the zone of influence for project-related underwater sound from VSP surveys, DFO has recommended the standard 500-metre minimum safety zone for this project. However, it also advised that as a precautionary measure, it would support extending the requirement for immediate shut-down of air source array(s) to include the observation of any marine mammal or sea turtle species within the 500-metre safety zone, as opposed to the minimum requirement of shut-down if a species at risk is sighted.

Marine mammals and sea turtles may be struck by supply vessels, resulting in injury or mortality. Specifically, in recent years, a number of North Atlantic Right Whale deaths were reported in the Gulf of St. Lawrence. The incident reports for these deaths suggested trauma from vessel collisions as one of the causes. Although there have been no incidents reported off Eastern Newfoundland, the Project may contribute to an increased chance of collisions with species susceptible to strikes. DFO has advised that the Fin Whale, which is regionally abundant and listed as special concern under Schedule 1 of the *Species at Risk Act*, is the most frequently ship-struck whale species in the world. Other species susceptible to ship strike include Humpback Whale, which is also regionally abundant, and the endangered North Atlantic Right Whale, for which there is uncertainty about migration routes and potential presence in the Eastern Newfoundland offshore. Following consultation with DFO, the Agency is of the opinion that the slight increase in shipping traffic due to the Project would be unlikely to substantially increase the probability of collisions. As a precautionary measure, the proponents would be required to limit vessel speeds when a marine mammal or sea turtle is observed or reported in the vicinity of a vessel. DFO has advised that it would support the requirement for vessel speed to be reduced to seven knots (approximately 13 kilometres per hour) when within 400 metres of a marine mammal or sea turtle.

The proponents should determine whether modified or additional mitigation measures are required based on the results of its monitoring programs, including those listed above. Additional mitigation could be also



be prescribed by DFO should it be determined that the proponents require a permit under the *Species at Risk Act*.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents, expert advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to mitigate the Project's effects on marine mammals and sea turtles:

- conduct VSP and wellsite/geohazard surveys in accordance with or exceeding the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*, including:
 - establishing a safety (observation) zone of a minimum of 500 metres around the sound source;
 - implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations;
 - gradually increasing the sound source intensity over a period of at least 20 minutes (ramp-up), adopting a pre-ramp up watch of 30 minutes whenever survey activities are scheduled to occur, and delaying ramp-up if a marine mammal or sea turtle is sighted within the safety zone; and
 - shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500-metre safety zone.
- to reduce risks of collisions with marine mammals and sea turtles (except during an emergency):
 - limit supply vessels movement to established shipping lanes where they are available; and
 - when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a marine mammal or sea turtle is observed or reported within 400 metres of the vessel.
- in consultation with DFO, develop a Marine Mammal and Sea Turtle Monitoring Plan which includes marine mammal observer requirements using qualified individuals. Provide the plan to the C-NLOPB and DFO for review and approval 30 days prior to initiating activities. The plan would describe:
 - monitoring during VSP and wellsite/geohazard surveys, including information on specific passive acoustic or equivalent technology monitoring configuration, to enable verification that species that may occur within the safety zone can be detected and to ensure ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the exploration licences.
- implement certain measures listed in fish and fish habitat (Section 6.1) and migratory birds (Section 6.3) which are also expected to mitigate potential effects on marine mammals and sea turtles.

Follow-up

The Agency identified the following measures as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on marine mammals and sea turtles:

- record and report the activities, observations, and results of the Marine Mammal and Sea Turtle Monitoring Plan to the C-NLOPB and DFO. Results should be provided to Indigenous groups and posted online for public access;
- promptly report any collisions with marine mammals or sea turtles to the C-NLOPB, DFO, and the Canadian Coast Guard Environmental Emergencies Reporting Number (1-800-565-1633) and notify Indigenous groups;
- verify predicted underwater sound levels with field measurements during the first well per exploration licence. Provide the plan on how this would be conducted to the C-NLOPB and DFO in advance of drilling, and the monitoring results after well suspension or abandonment, as directed by C-NLOPB and DFO; and



- follow-up program results should be provided to Indigenous groups and posted online for public access.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on marine mammals and sea turtles would be low to moderate in magnitude and would occur within the project area, or study area. The effects could be both sporadic (e.g., effects from VSP surveys or from vessel collision) or regular (e.g., effects from drilling noise) for the duration of the activity but would cease upon well abandonment.

Taking into account the implementation of the mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on marine mammals and sea turtles.

6.3. Migratory Birds

6.3.1. Proponents' Assessment of Environmental Effects

Existing Environment

The offshore islands and mainland cliffs of Newfoundland and Labrador provide nesting grounds for tens of millions of migratory birds. Seabirds, both pelagic (offshore) and neritic (inshore) (e.g., gannets, phalaropes, gulls, petrels, alcids, and shearwaters) are the group of marine-associated migratory birds most likely to be found in the project area. The eastern and southern coastlines and offshore waters (including the project area) of Newfoundland and Labrador provide important habitat for Leach's Storm-petrels (e.g., the largest colony of Leach's Storm-petrels in the world is located on Baccalieu Island, approximately 64 kilometres north of St. John's). This species travels thousands of kilometres to foraging areas far offshore. Witless Bay Islands, approximately 30 kilometres south of St John's, support a globally significant colony of breeding migratory birds, including more than half of eastern North America's population of Atlantic puffins, as well as large numbers of Leach's Storm-petrels, Common Murres, Black-legged Kittiwakes, and Herring Gulls.

Several bird species at risk listed under Schedule 1 of the *Species at Risk Act* or assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have been identified as potentially occurring in the study area, including the Ivory Gull and the Red-necked Phalarope (see Appendix D for a list of species at risk that may occur in the project area and surrounding area). The proponents also considered the presence of and effects on avian species listed on the International Union for the Conservation of Nature Red List of Threatened Species (e.g., Leach's Storm-petrel).

Predicted Effects

Change in Risk of Mortality, Health or Physical Injury

Of the project activities, the presence and operation of the MODU and offshore supply vessels has the greatest potential to result in mortality or physical injury for migratory birds. In particular, migratory birds are known to aggregate around offshore structures as a result of night lighting, food, and other visual cues. Birds attracted to the MODU may experience injury or mortality through collision or may become disoriented by lights and become stranded. Disoriented birds may fly continuously around lights, depleting energy resources, delaying foraging or migration, and potentially increasing their susceptibility to predation.



Short-duration flaring during well testing may attract migratory birds and result in increased mortality risk through incineration or energy reserve depletion. Residual effects of supply vessel operations are expected to be similar to effects of the MODU, although the lighting on the offshore supply vessels would not be stationary and would be lower in magnitude.

Storm-petrels are the most common species to be stranded on vessels in Atlantic Canada, accounting for approximately 97 percent of stranded birds recorded from offshore platforms and vessels on the Grand Banks. Other stranded species include Wilson's Storm-petrel, Great Shearwater, and Sooty Shearwater. Strandings commonly occur in late August to mid-October when fledglings and adults abandon the nesting colonies to begin their migration.

The proponents note that bird mortality rates recorded from offshore platforms are generally considered to be underreported because birds fall into the ocean and are consumed by scavengers before being detected by observers.

The proponents stated that there is the potential for diving birds near underwater sounds from VSP and wellsite/geohazard surveys to be affected. However, exposure would be limited by the dive depth and length of time underwater, and the mitigating effects of ramp-up procedures.

Discharges from the MODU and offshore support vessels would be treated as per applicable regulations and guidelines prior to discharge, and are therefore unlikely to have a measurable effect on migratory birds as a result of residual hydrocarbons. However, discharges of sanitary and domestic waste may attract birds and prey to the MODU and offshore supply vessels, resulting to a slight increase in risk of mortality or physical injury.

Studies have shown that migratory birds react to low-level helicopter flights; however, the proponents noted that the effects of these responses are limited to short-term avoidance. Collisions between birds and helicopters are not a major source of injury or mortality for migratory birds in the project area.

Change in Habitat Quality and Use

Sound and lighting from the presence and operation of the MODU and offshore supply vessels, as well as surveys and well abandonment, may result in sensory disturbances, leading to behavioural responses such as temporary avoidance or changes in activity state (e.g., feeding, resting, travelling). The presence of approaching vessels or helicopters may alert birds and flush some species from the area. Migratory birds can react to low-level helicopter flights, but their reactions are often temporary in nature. Although migratory birds near the MODU may be disturbed during helicopter take-off and landing, they are likely to become habituated to the activity. However, the proponents predicted the change in habitat quality and use to be low.

The treated discharge of some operational wastes may cause surface sheening, typically under calm conditions. Drilling wastes would be released either at the seafloor or below the surface of the water, and would not likely have an effect on birds. However, small volumes of synthetic-based muds may remain suspended in the upper water column, contributing to increased levels of total suspended solids. This could result in short-term avoidance of a localized area by migratory birds.

Discharges of sanitary and domestic waste could also attract birds, which may increase the risk of predation, collision, exposure to contaminants, or change preferred feeding areas; however, the effect would be short- to medium-term, localized, non-toxic, and subject to high dilution in the open ocean. The implementation of appropriate waste disposal practices would reduce any such effects.

6.3.2. Views Expressed

Federal Authorities

ECCC recommended the proponents revise their assessment of the Project's effects on Leach's Storm-petrels, given the project area overlaps with their core foraging area and their population has declined by



40 to 50 percent over the past 20 to 30 years. In addition, it advised that Leach's Storm-petrel strandings peak on offshore installations from mid-September to mid-October, which coincides with the fledging period. The proponents acknowledged Leach's Storm-petrel population declines and threats associated with disturbance, oil pollution, and offshore oil and gas operations, including artificial lighting and flares. The proponents acknowledged the timing of Leach's Storm-petrel in the project area provided by ECCC; however, they stated that the effects assessment and mitigations provided remained valid.

ECCC advised that the proponents' analysis did not fully consider the episodic nature of mass mortality events of migratory birds from flares and that there was limited discussion of mitigation. ECCC requested the proponents: notify the C-NLOPB 30 days in advance of flaring to determine if flaring would occur during periods of migratory bird vulnerability; provide a plan to prevent harm to migratory birds; and avoid flaring during night-time, during peak Storm-petrel fledging (mid-September to mid-October), and during the day when visibility is low due to fog. The proponents stated that initial flaring would only occur during daylight hours, but subsequent flaring may occur during night-time in accordance with the C-NLOPB's *Drilling and Production Guidelines*. The proponents also committed to the use of a water curtain as a heat shield. The Agency requested additional information regarding options to restrict flaring, the ability to minimize flaring at night, during poor weather and periods of bird vulnerability. The proponents committed to using formation testing while tripping if approved by the C-NLOPB and to aim to avoid flaring from mid-September to mid-October; however, they stated that once a flaring test begins it could be compromised if well flow was restricted during the test period which typically lasts one to two days. The proponents stated that data would be collected on bird stranding and mortality which could be correlated to project activities to determine if stranding or mortality increase during episodic flaring, and that this data would be shared with C-NLOPB and ECCC.

ECCC raised concerns with the proponents' assessment that bird attraction to light is limited to five kilometres and required discussion of the effects and mitigations should the attraction to light extend beyond five kilometers. The proponents committed to ensuring no extraneous lighting would be present and that all lighting other than navigational lighting would be pointed downwards. The proponents also committed to consulting with the ECCC prior to the commencement of project activities to confirm monitoring, documentation and reporting requirements. The proponents revised their estimate of the zone of influence of light to 16 kilometres based on more recent literature (Rodriguez et al. 2014, 2015).

ECCC recommended the proponents prepare and implement a systematic monitoring protocol for stranded migratory birds on the MODU and supply vessels to address the uncertainty related to the number of strandings and mortality caused by offshore infrastructure. The proponents committed to developing the protocol in accordance with ECCC's *Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms* that would be undertaken by trained seabird observers and data would be submitted to the C-NLOPB. The Agency required a discussion of the feasibility of using bird stranding and mortality monitoring as an adaptive management tool and confirmation that this data would be shared with Indigenous groups. Husky Oil Operations Limited stated that they have been collecting similar data at its production facility for several years. The results of this monitoring have identified the period of bird vulnerability (September to October) which is already resulting in adaptive management to avoid flaring to the extent possible during this period. Future data would be submitted to C-NLOPB and ECCC to determine if additional learnings could be incorporated into future mitigation and monitoring.

ECCC advised the Agency that the mitigation measures, monitoring, and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address the potential effects of the Project on migratory birds.

Indigenous Peoples

Several Indigenous communities including the NunatuKavut Community Council, MTI, KMKNO, and WNNB commented on the potential effects of the Project on birds, including: effects of flaring and effects of lighting



on migration patterns and behaviour; effects on habitat from exposure to oil and other discharges and emissions; and interactions with other project components and activities.

MTI and WWNB expressed concern with the type and intensity of lighting being considered for the Project and requested the proponents consider the use of spectral modified lighting. The proponents stated they were not aware of operating vessels and / or MODUs with modified lighting (intensity, spectrum and direction) that have the capability to support the Project.

A summary of issues raised by Indigenous groups is presented in Appendix C.

6.3.3. Agency Analysis and Conclusion

Analysis of Effects

The Agency considers that although lighting and flaring from the Project would have the potential to affect migratory birds, the limited spatial and temporal nature of the Project would limit the potential for extensive effects on migratory birds in general. However, the impact of the addition of light into the environment could result in adverse effects on sensitive nocturnal species such as the Leach's Storm-petrel. The addition of project lighting would result in a cumulative increase in effects on migratory birds.

Bird collisions with lit structures are a known problem, particularly for nocturnal migrants and night-flying birds. This problem is of particular concern for the Leach's Storm-petrel which travels thousands of kilometres to foraging areas far offshore, including the project area. The Project has the potential to impact significant numbers of this and other species of migratory birds, as this area is a significant source of artificial lighting, both from the Project, as well as from the existing production projects nearby. Declines in the populations of Leach's Storm-petrel have also been partially attributed to collisions and strandings and contact with hydrocarbons. The Agency agrees with ECCC that the effects of the Project on birds, and the Leach's Storm-petrel in particular, would not necessarily be of low magnitude and the effects predictions cannot be made with a high level of certainty.

Attraction to lights may also result in disorientation. Disoriented birds are prone to circling a light source and may deplete their energy reserves, delay foraging or migration, and potentially increase susceptibility to predation. To address ECCC's concern related to uncertainty around estimates of strandings and mortality, the proponents would be required to conduct systematic searches for stranded birds on the MODU and supply vessels, and to have trained observers at MODUs to observe and report on marine bird presence. Based on these monitoring results, and in consultation with relevant authorities, the proponents would then determine if mitigation measures are effective and if additional mitigation measures are required.

Flaring could also have an effect on birds, and alternatives should be considered. Alternative formation testing technology, such as formation testing while tripping, could minimize or eliminate the requirement to flare. Several factors would need to be considered to determine if an alternative testing technology is suitable, including the properties of the reservoir, the data to be collected, the availability of technology, and C-NLOPB requirements. The C-NLOPB would ultimately determine the required methods of well testing to validate the presence of hydrocarbons. The C-NLOPB advised that use of a drill pipe conveyed test assembly may be possible depending on site-specific conditions and data requirements.

If flaring is proposed, the C-NLOPB's *Measures to Protect and Monitor Seabirds in Petroleum-Related Activity in the Canada-Newfoundland and Labrador Offshore Area* (2018) require the proponents notify the C-NLOPB of plans to flare including measures to avoid potential effects on migratory birds. The C-NLOPB has indicated that prior to authorizing the flaring, it would consult with ECCC on the plans and appropriateness of proposed mitigation measures, which may include delaying or altering the timing of the flaring activity. This would include aiming to avoid flaring during periods of vulnerability for Leach's Storm-petrel (mid-September to mid-October) and could include additional measures based on the results of future monitoring data.



The Agency notes that the proponents would deploy water curtains during flaring operations to protect the MODU from the generated heat. Water curtains have been required for exploratory drilling projects in offshore Nova Scotia and Newfoundland and Labrador. Although the effectiveness of water curtains in mitigating potential effects from flaring on migratory birds is not fully known, the Agency is of the view that such measures would provide an overall net benefit and would likely keep some birds away from the flare. The proponents would also be required to develop a follow-up program which would include documenting and reporting information on whether the mitigation measures, including the water curtain, were proven effective.

The Agency is of the view that there remain uncertainties regarding the potential effects of project lighting and flaring on migratory birds, including the attraction distance to lighting and flares as well as mortality rates from collisions and strandings and the magnitude of associated effects. Despite these uncertainties and the potential for cumulative effects, the exploration licences, and the drilling area itself, occupy a small portion of the ranges of migratory bird species, many of which span vast portions of the northwest Atlantic Ocean. However, this area overlaps directly with important foraging ranges of a number of migratory birds species, including the Leach's Storm-petrel. There is no critical habitat identified within the proponents' exploration licences, and the Agency notes that key western Atlantic migration routes and flyways are generally closer to the coast than further offshore where the Project would take place. In addition, drilling would take approximately up to 80 days per well, limiting the duration of the potential effects. Nevertheless, it is possible that migratory birds, including species at risk, could encounter and be harmed by the Project; therefore, it is important for the proponents to implement mitigation and verify their predictions.

In addition to effects of project lighting and flaring, drilling wastes and other discharges and emissions may effect migratory birds. For example, the treated discharge of some operational wastes may cause surface sheening under calm conditions and may affect the structure and function of migratory bird feathers. Wastes would be treated in accordance with the *Offshore Waste Treatment Guidelines* and discharged below the water surface, limiting effects on surface water quality in the immediate area of the discharge. With proper management of waste discharge, the likelihood of exposure to surface sheens by migratory birds and any related effects would be low.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents, expert advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to mitigate the Project's effects on migratory birds:

- follow ECCC's (2016) *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada*, which identifies procedures for safe capture and handling of different types of birds;
- control project lighting, including the direction, timing, intensity and glare of light fixtures, while meeting operational, health and safety requirements;
- restrict flaring to the minimum required to characterize a well's hydrocarbon potential, and as necessary for the safety of the operation;
- where acceptable to the C-NLOPB, conduct formation testing using a drill pipe conveyed test assembly, or similar technology, rather than formation testing with flaring;
- if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to:
 - determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC); and
 - identify how adverse environmental effects on migratory birds would be avoided, including opportunities to reduce night-time flaring;
- operate a water-curtain barrier around the flare during flaring; and



- implement all mitigation listed in fish and fish habitat (Section 6.1) related to chemical selection, waste discharge and the disposal of spent synthetic-based muds, as well as those in special areas (Section 6.4) related to the maintenance of buffers for supply and support vessels and helicopters over active bird areas and special areas for birds.

Follow-up

The Agency identified the following measures as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on migratory birds:

- prepare follow-up programs in consultation with ECCC to monitor effects on migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures. The follow up program requires the following two key components:
 - conduct monitoring for migratory birds at the MODU using a trained observer following ECCC's *Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms* (Gjerdrum et al. 2012);
 - develop and implement a protocol for systematic daily monitoring for the presence of stranded birds (live or dead) on the MODU and supply vessels. The protocol would include information on frequency of searches, reporting procedures, and training requirements, including qualifications of those delivering the training;
- if stranded birds are observed, follow ECCC's (2016) Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada;
- document and report the results of any monitoring activities, including information on level of effort when no birds are found and a discussion of whether the mitigation measures (e.g., water curtain) were proven effective and if additional measures are required; and
- provide the monitoring and follow-up program and its results to the C-NLOPB and ECCC. Results should be provided to Indigenous groups and posted online for public access.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on migratory birds would generally be low in magnitude, but could be moderate for certain species, such as Leach's Storm-petrel. Residual adverse effects would either be localized within the immediate vicinity of the project activity or component, or could extend several kilometres for effects such as those from light emissions. The effects would be short-term to medium-term for the presence and operation of the MODU and would occur regularly or intermittently for the duration of the Project, but would cease upon well abandonment.

Taking into account the implementation of the mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on migratory birds.



6.4. Special Areas

6.4.1. Proponents' Assessment of Environmental Effects

Existing Environment

Special areas (designated because of ecologically or biologically sensitive features) that overlap with the exploration licences and/or potential transit routes, as well as those within the zone of influence, are provided in Table 4. A common defining feature of several of these special areas is the presence of species and sensitive habitats for marine fish, birds and/or marine mammals and sea turtles. Appendix E lists special areas in the study area.

Table 4: Special Areas Within the Zone of Influence¹⁰ of Routine Project Activities

Special Area	Distance from Closest Exploration Licence or Transit Route	Features of the Special Area
Ecologically and Biologically Significant Areas¹		
Northeast Slope (3L) [referred to as Northeast Slope in EIS]	43 kilometres from exploration licence 1151A and 77 kilometres from exploration licence 1151B	High aggregations of Greenland Halibut and Spotted Wolfish, which congregate in spring. Concentrations of cetaceans, pinnipeds and corals.
Eastern Avalon	Overlaps with transit route	Capelin spawning beaches, waterfowl areas and fish-eating seabird colonies (Wells et al. 2019). Cetaceans including Killer Whales and mysticetes (Wells et al. 2019), Leatherback Turtles and seals feed in the area from spring to fall.
United Nations Convention on Biological Diversity Ecologically and Biologically Significant Areas²		
Slopes of the Flemish Cap and Grand Bank	27 kilometres from exploration licence 1151A and 39 kilometres from exploration licence 1151B	Contains most of the aggregations of indicator species for Vulnerable Marine Ecosystems in the NAFO regulatory area. Includes NAFO closures to protect corals and sponges and a component of Greenland halibut fishery grounds in international waters. Contains a high diversity of marine taxa, including threatened and listed species.
NAFO Fisheries Closure Areas³		

¹⁰ The zone of influence is defined as a 56.8 kilometre buffer around the exploration licences, and represents the predicted maximum distance at which behavioral effects on marine mammals related to underwater sound may occur. This zone of influence is inclusive of the zones of influence for light (16 kilometres) and drill cuttings dispersion (0.06 square kilometres maximum area with sediment thickness over 1.5 millimetres)



Special Area	Distance from Closest Exploration Licence or Transit Route	Features of the Special Area
Flemish Pass/Eastern Canyon (2)	47 kilometres from exploration licence 1151A and 58 kilometres from exploration licence 1151B	Closed to bottom contact fishing to protect extensive sponge grounds and large gorgonian corals (i.e., marine fish and fish habitat)

¹ Designated under the *Fisheries Act* by the Government of Canada.

² Identified by United Nations Convention on Biological Diversity (n.d.).

³ Under mandate of Food and Agriculture Organization of the United Nations and NAFO (2019).

Predicted Effects

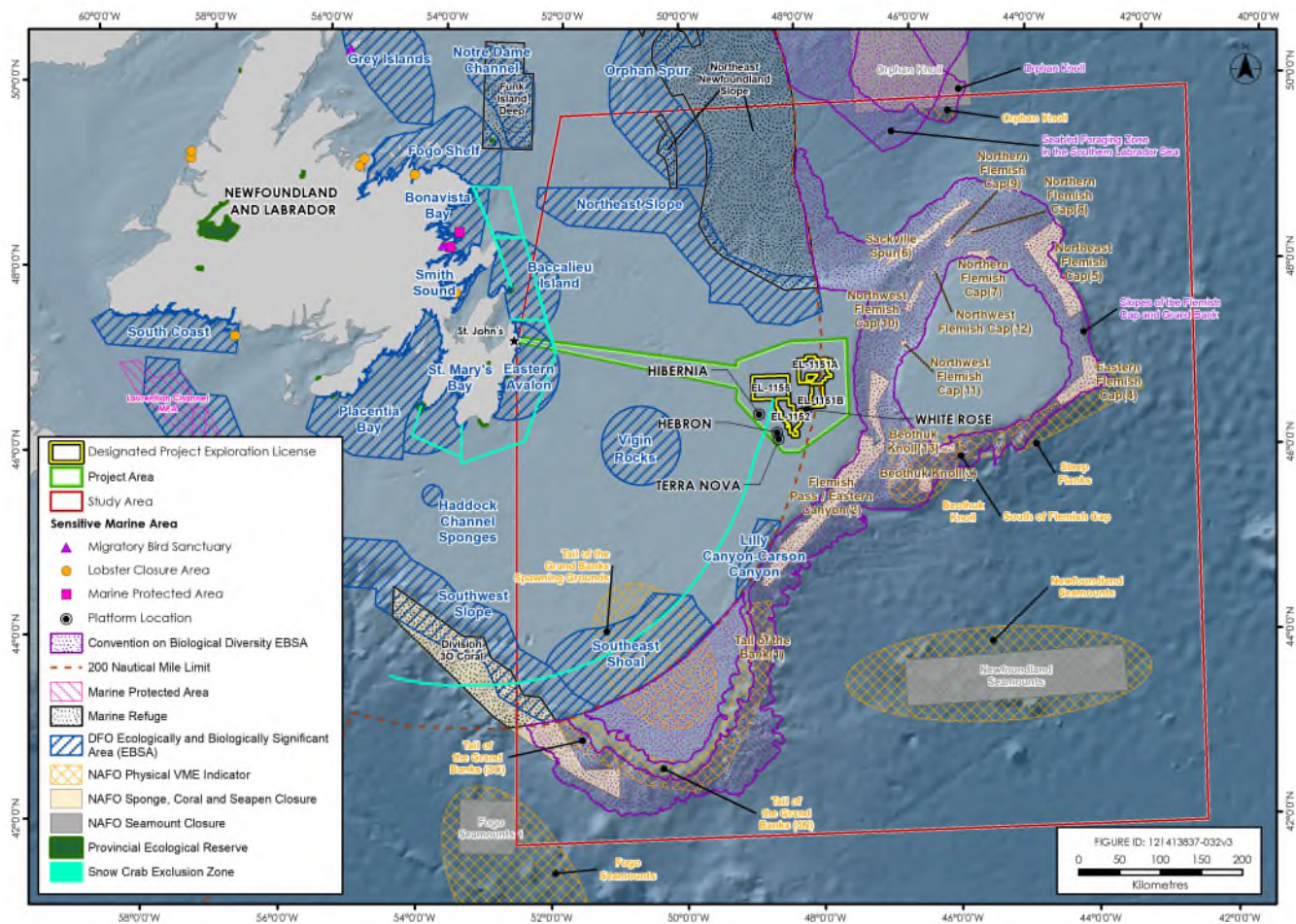
The potential environmental effects of project activities on special areas that overlap with the exploration licences, as well as those within the zones of influence for effects, were assessed (Figure 2). However, it is noted that there are no special areas that overlap with exploration licences. The zone of influence is defined as a 56.8 kilometre buffer around the exploration licences, and represents the predicted maximum distance at which behavioral effects on marine mammals related to underwater sound may occur. This zone of influence is inclusive of the zones of influence for light (16 kilometres) and drill cuttings dispersion (0.06 square kilometres maximum area with sediment thickness over 1.5 millimetres).

Adverse environmental effects on a special area could degrade its ecological integrity such that it no longer protects the components of the ecosystem for which it was designated (e.g., protection of sensitive or commercially important species). The key potential environmental issues and potential environmental changes to special areas as a result of the Project are as follows:

- change in habitat quality and behavioural disturbance related to sound and light (e.g., from drilling operations and dynamic positioning to keep the MODU in place, drilling associated surveys, and supply and servicing);
- alteration of water and sediment quality from discharges from drilling activities such as muds and cuttings and other emissions and discharges;
- the physical disturbance and destruction of benthic habitats from the presence and operation of the MODU (presence of anchors or legs on the sea floor), and well abandonment; and
- increase of underwater sound levels from VSP and wellsites/geohazard surveys, and support vessel activities.

Additional information on the effects of project activities within special areas on associated valued components are provided in fish and fish habitat (Section 6.1), marine mammals and turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6).

Figure 2: Special Areas in Proximity to the Project



Source: Husky Oil Operations Limited 2019; ExxonMobil Canada Limited 2019



6.4.2. Views Expressed

Federal Authorities

The Agency required the proponents to assess potential effects of helicopter flight paths on special areas. The proponents responded that there are no known bird colonies or Important Bird and Biodiversity Areas within the project area and that five bird strikes have been recorded by service providers during helicopter services to offshore operators in the Jeanne d'Arc basin during the period of 2005 to 2011. The proponents determined that helicopters have the potential to cause localized temporary behavioural disturbance which does not warrant mitigation.

ECCC required an updated the effects analysis of operational support vessels and helicopters on Important Bird and Biodiversity Areas and Ecologically and Biologically Significant Areas considering the zone of influence and an update on the mitigation measures based on the ECCC *Guidelines to avoid disturbance to seabird and waterbird colonies in Canada*. The proponents stated that although there is a limited potential for interaction, disturbances may cause birds to flush, abandon their nests, chicks may leave the nest too soon, causing bird mortality or expenditures of energy reserves. The proponents committed to the following mitigations to avoid disturbance:

- Support vessels maintain a minimum distance of at least 300 metres from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas, unless there is an emergency; and
- Helicopters maintain a distance of at least 300 metres vertically and 1000 metres horizontally from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas, except for approach, take-off and landing maneuvers and if not feasible for safety reasons.

Indigenous Peoples

Qalipu First Nation and KMKNO expressed concern about the effects of project related activities on special areas that are adjacent to or overlap with the project area, in particular with respect to sponges and corals as they are easily disturbed and slow to recover. The NunatuKavut Community Council suggested the implementation of buffer zones around protected areas. The proponents recognized the zones of influence for effects from noise, light and drill cuttings disposal from project activities may extend beyond the boundaries of the exploration licences depending on the well location and stated that this possibility was considered throughout the assessment by establishing a 20 kilometre buffer around exploration licences and the transit corridor to St. John's.

KMKNO requested the proponents conduct a monitoring program using seabed video and/or benthic sampling to determine infaunal recolonization rates following drilling. The proponents stated that they are not currently planning to monitor recolonization rates.

A summary of issues raised by Indigenous groups is presented in Appendix C.

6.4.3. Agency Analysis and Conclusion

Analysis of Effects

Seven special areas that have been identified because of ecologically or biologically significant features overlap with the proponents' study area; or are within 56.8 kilometres of the exploration licences (i.e., the predicted zone of influence for behavioral effects on marine mammals related to sound).

As outlined in Section 6.1, the proponents would be required to conduct benthic surveys prior to drilling to determine the presence of aggregations of habitat-forming corals, sponges, sea pens or any other environmentally sensitive features. Should these features be identified, the proponents would be required to relocate the well or redirect discharges to ensure that sensitive features would not be affected, if



technically feasible. If it is determined that it is not technically feasible to relocate the well or redirect cuttings discharges, the proponents would be required to conduct a comprehensive assessment of the benthic habitat in consultation with DFO and the C-NLOPB prior to drilling to determine the potential for serious harm or alteration of coral, sponge and sea pen aggregations and related options for mitigation to reduce any identified risks.

The Agency notes advice from DFO that habitat-forming aggregations of corals and sponges are not limited to designated special areas, and that protections for these features should not be limited to or more robust within special areas. It recommended that coral and sponge surveys and associated site-specific mitigation planning be consistently applied to ensure protection of sensitive benthic habitat at every wellsite, regardless of special area designation. In addition to the mitigation measures that would be consistently applied across all areas of the exploration licences, the proponents would also be required to conduct follow-up monitoring when drilling in or adjacent to a special area. Taking into account the mitigation measures, DFO has advised that potential effects to benthic habitat, fish and fish habitat, including within special areas, would likely be negligible.

Other special areas that could be affected by the Project are protected, at least in part, based on the important habitat they provide for migratory birds. For instance, ECCC advised that the colonies of greatest concern are the coastal Important Bird and Biodiversity Areas in closest proximity to St. John's, specifically Cape St. Francis and Witless Bay Islands. Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas, located within the Eastern Avalon Ecologically and Biologically Significant Area, are approximately 23 and 32 kilometres, respectively, from St. John's, the terminus of the transit route. As described in Section 6.3, helicopters and supply vessels may disrupt birds along transit routes or coastal seabird colonies. The Agency is of the view that key mitigation measures for migratory birds (Section 6.3) would also mitigate the effects on special areas. ECCC guidelines state that helicopters and other aircraft should keep a minimum distance of 300 metres from colonies. The proponents would meet the requirements of Newfoundland and Labrador's *Seabird Ecological Reserve Regulations, 2015*, and would be prohibited from operating aircrafts over the Witless Bay Islands Important Bird and Biodiversity Area at an altitude of less than 300 metres or motorized vessels within 20 to 100 metres of the area during the nesting season. Supply vessels would use common vessel travel routes where they exist and would not be in the immediate vicinity of either the Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents, expert advice from federal authorities, and comments from Indigenous groups. The Agency expects that mitigation measures proposed for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) would also mitigate potential effects on special areas. The Agency identified the following additional key measures to mitigate the Project's effects on special areas:

- restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) over active bird colonies and to a lateral distance of 1000 metres from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation); and
- ensure supply and other support vessels maintain a 300-metre buffer from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation).

Follow-up

The Agency identified the following measures as part of a follow-up program, to be developed in consultation with C-NLOPB and DFO, to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on special areas:



- conduct follow-up monitoring when drilling in special areas, or adjacent to or near a special area, such that drill cuttings dispersion modelling predicts that cuttings deposition could occur within the special area at level above the biological effects threshold. Monitoring would include:
 - measurement of sediment deposition extent and thickness post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions;
 - survey of benthic fauna present after drilling has been concluded;
 - reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and
 - results should be provided to Indigenous groups and posted online for public access; and
- implement all mitigation listed in fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3) and commercial fisheries (Section 6.6).

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on special areas would be low-magnitude, occur locally, and occur continuously or regularly during drilling operations.

Taking into account the implementation of the mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on special areas.



6.5. Species at Risk

6.5.1. Proponents' Assessment of Environmental Effects

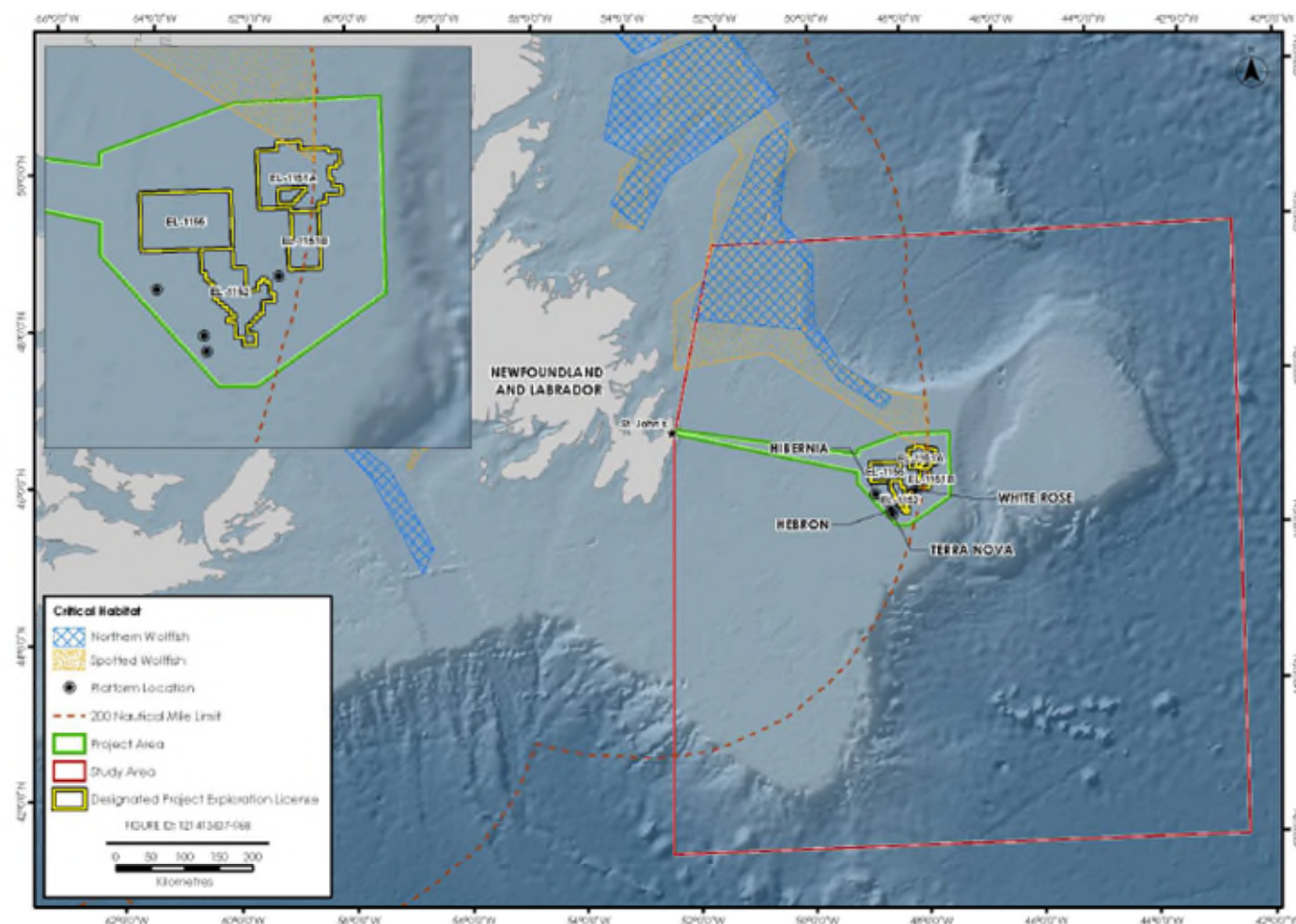
Several fish, marine mammal, sea turtle, and bird species at risk protected by the *Species at Risk Act* or by COSEWIC have been identified as potentially occurring in the study area (see Appendix D for a list of species at risk that may occur in the project area and surrounding area)¹¹. The proponents also considered species listed by the International Union for the Conservation of Nature. Several of these species may be found in the project area year-round, while others may be present only during certain times of year, or may be unlikely visitors.

The *Species at Risk Act* requires the implementation of management plans, recovery strategies and/or action plans, depending on the category of risk, for species listed as at risk on Schedule 1 of the *Species at Risk Act*. The proponents identified recovery strategies, action and management plans for species at risk that may occur in the study area, taking into consideration the identified threats to the species and the contribution of the Project to these threats.

There is no critical habitat for fish, birds, marine mammals or sea turtles within the study area. Critical habitat has been proposed for the Northern and Spotted Wolffish and with approximately 0.067 percent of the proposed Spotted Wolffish critical habitat overlapping with a exploration licence 1151A (Figure 3). The proponents indicated that based on DFO's research trawl surveys, Spotted Wolffish are more abundant on the continental shelf northeast of Newfoundland and on the Labrador Shelf, than in the waters in and around the project area. The critical habitat is not predicted to be impacted by routine project activities.

¹¹ For this EA, and as a matter of good practice, the Agency also considered species that have been identified by the COSEWIC as being endangered, threatened or of special concern. Collectively, these are referred to as species at risk for the purposes of the Agency analysis in this EA.

Figure 3: Proposed Critical Habitat for Northern and Spotted Wolffish



Source: Husky Oil Operations Limited 2019; ExxonMobil Canada Limited 2019

The proponents predicted that the type and nature of the potential effects of the Project on species at risk would be the same as those effects which were assessed in previous sections of the report (i.e., fish and fish habitat [Section 6.1], marine mammals and sea turtles [Section 6.2], and migratory birds [Section 6.3]).

6.5.2. Views Expressed

Federal Authorities

DFO required information on the Northern Bottlenose Whale, Scotian Shelf population, and its potential presence in the study area, in order to differentiate between the two populations potentially present in the study area (i.e., the Davis Strait-Baffin Bay-Labrador Sea population and Scotian Shelf population). The proponents stated that although there are occurrences of Northern Bottlenose Whale in eastern Newfoundland and in the study area, observations are frequently not identified/attributed to a particular population. Available literature and data suggest that Northern Bottlenose Whales (of any population) likely occur at low densities, possibly year-round, in the deeper waters of the study area. The proponents stated that the potential for individual Northern Bottlenose Whales to overlap geographically, and interact with the



Project, is likely to be highly transient and temporary in consideration of anticipated daily and seasonal fluctuations in their presence within the project area, and the short-term nature of project activities.

DFO required information on the link between the habitat characteristics of the Project exploration licences and the life history requirements or stages of the fish and marine mammal species at risk found in the project and study areas. The proponents provided further information on habitat characteristics of the exploration licences and considered life history requirements or stages of fish and marine mammal species at risk.

ECCC and DFO reviewed the assessments of effects on species at risk and critical habitat provided by the proponents. The departments confirmed that the potential effects on species at risk would be the same as those effects described for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) and that the information provided satisfies requirements under Subsection 79(2) of the *Species at Risk Act*. ECCC and DFO advised the Agency that the mitigation measures, monitoring, and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address the potential effects of the Project on species at risk.

Indigenous Peoples

Select comments from Indigenous groups related to marine fish (including Atlantic Salmon), marine mammals and sea turtles, and migratory birds, including applicable species at risk, are included in Sections 6.1, 6.2, and 6.3.

A summary of issues raised by Indigenous groups is presented in Appendix C.

6.5.3. Agency Analysis and Conclusion

Analysis of Effects

The Agency examined the Project's potential effects on species listed under Schedule 1 of the *Species at Risk Act* and species identified by COSEWIC (Appendix D), with advice from DFO and ECCC, the lead federal agencies responsible for administering the *Species at Risk Act*. Based on this input, the Agency is in agreement with the proponents that potential effects on species at risk would be the same as those effects described for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3).

While there is no critical habitat for any species at risk within the project area, the amended *Recovery Strategy for Northern Wolffish and Spotted Wolffish and Management Plan for Atlantic Wolffish* (Fisheries and Oceans Canada 2018b) identifies proposed critical habitats for Northern and Spotted Wolffish. The Recovery Strategy identifies proposed critical habitats for Northern and Spotted Wolffish based on attributes necessary for wolffish recovery, i.e., water temperatures and depths. Further, the proposed critical habitat has been identified based on an Area of Occurrence Approach, which recognizes that the entire area is not comprised of critical habitat but identifies that within the boundaries, the functions and features necessary for the species survival or recovery exist.¹²

Approximately 5.12 percent of the northern portion of exploration licence 1151A overlaps with the proposed critical habitat; this is approximately 0.067 percent of the proposed critical habitat area. The proposed critical habitat could overlap with the predicted zones of influence for drill cuttings dispersion and sound effects on fish (refer to Section 6.1 for more information). In general, total water-based and synthetic-based mud drill cuttings accumulations above the predicted no-effect would extend from approximately 100 metres to 200 metres from the drill centre with accumulations varying in thickness from one to ten

¹² 2018 Recovery Strategy [Proposed] <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery/wolffish-northern-spotted-atlantic-strategy-management-plan.html>



millimetres, with some portions resulting in burial thickness of 25 to 50 millimetres. Potential for mortality and injury from noise effects on fish are expected to extend to less than five metres from the source of seismic sound.

It is recognized that operational discharges would cause some biological effects over relatively short time periods and small distances from the discharge point. However, due to a large degree of spatial and temporal variability in natural populations and limitations of current sampling methods, it is anticipated that a net result of any impact at the population level as a result of oil and gas operations offshore would be difficult to detect. DFO noted that any potential effects would be insignificant on the population due to the nature and temporal variability, and would be highly localized and insignificant to the population as a whole.

DFO advised that the mitigation measures, monitoring and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address potential effects on wolffish and its proposed critical habitat.

Key Mitigation Measures to Avoid Significant Effects

The Agency determined that the measures to mitigate potential effects on fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) would also mitigate potential effects on species at risk and critical habitat.

Follow-up

The Agency determined that the proposed follow-up measures for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3.) are also appropriate for species at risk and critical habitat.

Agency Conclusion

Taking into account the implementation of the mitigation measures described for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3), the Agency concludes that the Project is not likely to cause significant adverse environmental effects on federal species at risk.



6.6. Commercial Fisheries

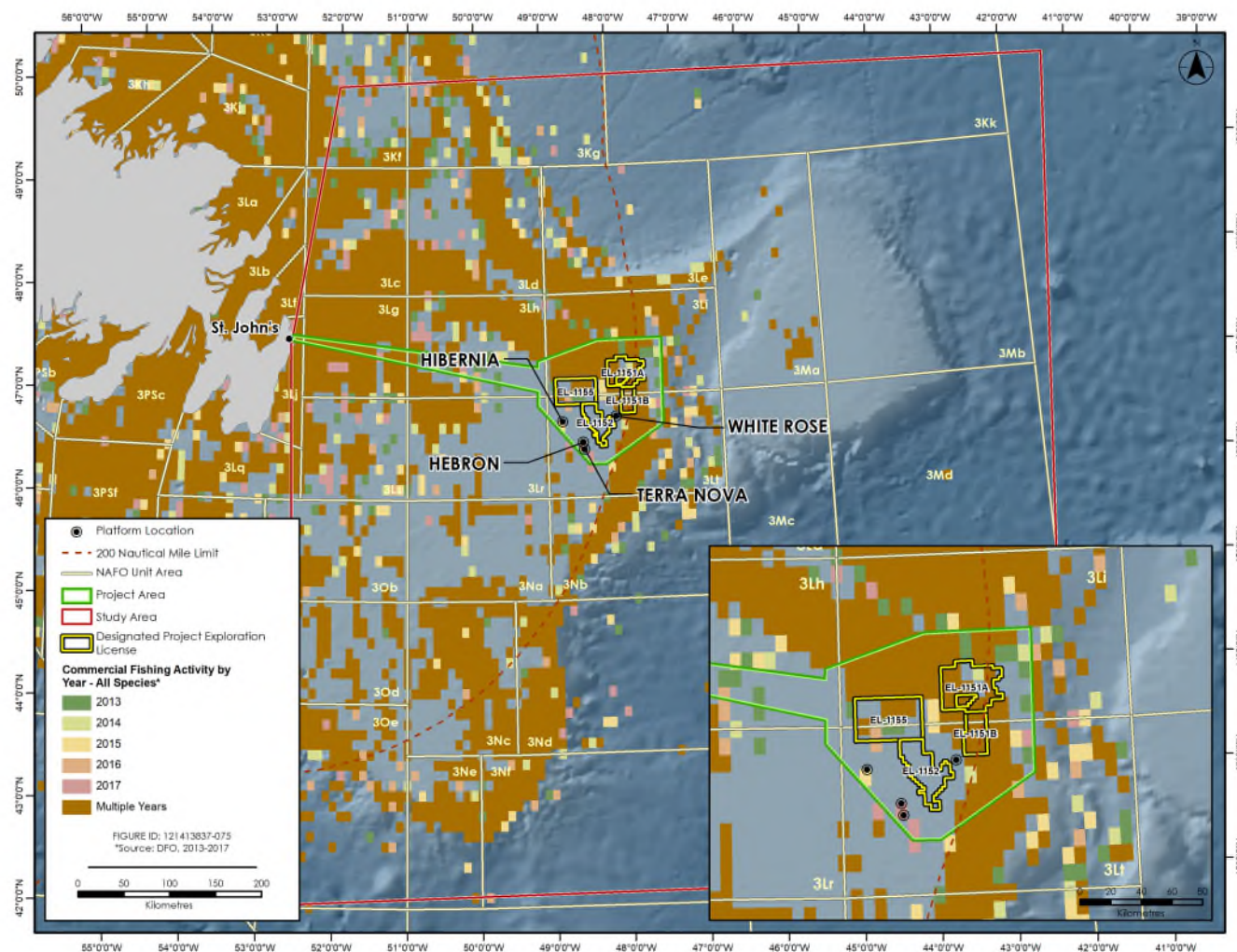
6.6.1. Proponents' Assessment of Environmental Effects

Existing Environment

Commercial fishing is an important component of the socioeconomic environment in Newfoundland and Labrador. Fishing activity and locations vary throughout the year, with a large portion of harvest taking place between April and August. Domestic fisheries occurring in the offshore of Newfoundland and Labrador concentrate on or near the shelf edge or slope in water depths between 200 and 500 metres (Figure 4) and include those targeting groundfish, pelagics, shellfish and other invertebrates. In the project area, Northern Shrimp and Snow Crab (Queen Crab) have been the dominant, commercially harvested species since the collapse of the groundfish stocks. Within the study area Northern Shrimp and Snow Crab have collectively contributed to approximately 92 percent of all landings by weight, with the remaining fisheries being primarily groundfish (i.e., flounder and Greenland Turbot), smaller amounts of large pelagics (e.g., Swordfish and tunas), and some deep-sea clams and bivalves. For conservation reasons, there was no commercial fishery for Northern Shrimp in the project area in 2015 and 2016 due to the closure of the commercial shrimp fishery in NAFO Divisions 3L. DFO has confirmed that there has been no commercial shrimp fishery in NAFO Division 3L since 2015. Additionally, there is a fishing moratorium on American Plaice in NAFO Divisions 3LNO and 3M. While currently under moratorium, it is possible that some level of harvest for these species in these areas might be reinstated within the temporal scope of the Project.

Figure 4 illustrates domestic commercial harvesting locations off the coast of Newfoundland and Labrador between 2013 and 2017.

Figure 4: Domestic (Canadian) Harvesting Locations, All Species, 2013 to 2017



Source: Husky Oil Operations Limited 2019; ExxonMobil Canada Limited 2019



Five Indigenous groups in Newfoundland and Labrador hold communal commercial fishing licences for a variety of species that overlap with the project area and study area. Licences include those for inshore and midshore groundfish, seal, shrimp, tuna, Swordfish, Snow Crab, and pelagic fishery access (herring, mackerel, and capelin).

Fifteen Indigenous groups in Nova Scotia, New Brunswick, and Prince Edward Island hold communal commercial licences for Swordfish and tuna that overlap with the project area and study area. However, the proponents noted that between 2011 and 2015 the majority of landings of Swordfish and tunas, including landings from the communal commercial fishery, have been outside the project area.

The landings and harvest information presented above is inclusive of fishing from Indigenous communities.

Predicted Effects

A change in the availability of fisheries resources may occur as a result of the presence and operation of the MODU, discharge of drilling mud and cuttings, VSP and wellsite/geohazard surveys, waste management, supply and servicing operations, and well abandonment.

Access to fishing areas can be restricted during exploration drilling with a safety exclusion zone. During drilling, a safety exclusion zone would be established around the MODU within which commercial fishing and non-project-related vessels and activities would be excluded. The geographic extent of the area lost to fishing would depend on the type of MODU; the safety exclusion zone for an anchored MODU would extend up to 1500 metres depending on water depth and the number of anchors, and a non-anchored MODU would require a 500 metre radius safety exclusion zone. In addition, while there is no safety exclusion zone around suspended wells, fishers may exercise precaution and reduce the use of mobile gear in the area.

As described in fish and fish habitat (Section 6.1), underwater sound from the MODU and from VSP or wellsite/geohazard surveys could potentially startle fish, causing them to avoid the area and thereby reduce catchability. Underwater sound does not appear to have the same avoidance effect on invertebrate species, such as Snow Crab which have been the primary commercial harvest in the project area in recent years.

The discharge of drilling mud and cuttings, as well as other discharges and emissions from the MODU and offshore supply vessels have the potential to result in a change in sedimentation and water quality. However, the proponents indicated that results from environmental effects monitoring programs conducted for offshore drilling and production programs have concluded that there have been negligible effects on commercial species, with respect to body burden (the accumulation of toxins in the body), or taint, as a result of discharge of drill cuttings.

Drilling associated surveys could interact with commercial fishing through damage to fishing gear and the resulting loss of catch. The proponents predicted that residual effects of drilling-associated surveys on change in availability of fisheries resources for commercial fisheries is predicted to be low in magnitude, within the project area, short-term and irregular.

Following drilling and testing at each site, wells would be abandoned or suspended. Wellheads that are left in place may protrude approximately five metres above the seafloor and could interact with bottom contact fishing gear, which could result in damage and lost time or catch. In addition, there could be superficial damage to the wellhead infrastructure; however, the proponents stated that this would not compromise the integrity of the well or result in the release of hydrocarbons. Supply vessels may negatively interact with fishing gear, however contact would likely be limited to transit routes.



6.6.2. Views Expressed

Federal Authorities

DFO requested information related to the frequency of reporting of vessel transit activities, possible communication mechanisms and the parties that would be involved and notified through the proponents' Vessel Traffic Management Standard. The proponents stated that all vessels under contract would abide by the *Canada Shipping Act*, the *International Regulations for Preventing Collisions at Sea*, and all other applicable legislation and regulations. In addition, the proponents stated that plans for exploration drilling would be provided to regulators and the fishing industry (through One Ocean, a liaison organization for the fishing and petroleum sectors in Newfoundland and Labrador) annually, and that participation in One Ocean provides an opportunity to discuss upcoming plans with the fishing industry throughout the year.

DFO advised the Agency that the mitigation measures, monitoring, and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address the potential effects of the Project on commercial fishing.

Indigenous Peoples

KMKNO and Nunastivut Government asked about the involvement of Indigenous groups in the development of the proposed compensation programs for damaged or lost fishing gear. The proponents confirmed that there is an internal compensation process for reviewing claims related to damaged gear and or vessels which would be implemented. The proponents regularly review their compensation program in consultation with the C-NLOPB and fisheries stakeholders.

The Elsipogtog Mi'kmaq First Nation requested information related to the Indigenous Communities Fisheries Communication Plan. The proponents stated that the plan would include a process for regular operational updates as well as a process for communication in the event of an emergency. It was noted that the frequency of updates would be discussed during engagement on the plan, and that the plan would include an appropriate feedback mechanism to address ongoing concerns of Indigenous groups, fishers and other ocean users.

Additional comments from Indigenous groups related to the need for research on fish and fish habitat, including species targeted by commercial fisheries. Comments about the potential effects on fish and fish habitat are discussed in Section 6.1.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Fish, Food and Allied Workers - Unifor union requested information with respect to the proponents' compensation program and the C-NLOPB/CNSOPB *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity* (C-NLOPB 2017a) related to the timeframes and procedures required to compensate affected parties adequately. The proponents detailed the options available and provided an outline of the process to recover damages. It was stated that timelines would depend on the nature of the claim.

The Fish, Food and Allied Workers - Unifor union commented on the potential physical and socioeconomic effects of the Project on commercial fisheries, including consideration of cumulative effects. Concerns included restricted access to fishing areas and the need to alter fishing to mitigate issues related to increased traffic.



6.6.3. Agency Analysis and Conclusion

Analysis of the Effects

Commercial fishing is a key economic activity offshore Newfoundland and Labrador, including domestic fisheries for groundfish, pelagics, and shellfish and other invertebrates. The extent of commercial fishing varies between areas in the Newfoundland and Labrador offshore; there has been limited domestic harvest recorded within the project area, and within the exploration licence boundaries, as illustrated in Figure 3. In addition, there is limited international harvest within the project area or exploration licences. However, it should be noted that harvest locations are influenced by a variety of factors, and could occur in different areas in future.

Potential effects of the Project on commercial fisheries include loss of access to fishing grounds, and damage to fishing gear, vessels, or equipment, as well as potential effects on fish and fish habitat affecting commercial fisheries. The potential effects of the Project on fish and fish habitat are described in Section 6.1; these are predicted to be low in magnitude, temporary, and localized.

Loss of access to fishing grounds could occur if fishers were displaced by safety exclusion zones around project MODUs. Only a fraction of NAFO Division 3L overlaps with the exploration licences included in the Project, and only a fraction of this overlapping area would be affected by a safety exclusion zone (Table 5). The Agency recognizes that based on data available, fishing activity is not uniform throughout NAFO Division 3L and that several factors may influence the degree of overlap with any given fishery. However, activity in the exploration licences will be short term.

Table 5: Interaction between Exploration Licences 1151A, 1151B, 1152 and 1155, NAFO Divisions, and Safety Exclusion Zones

Area and Overlap		Jeanne D'Arc Basin Oil Operations Limited Exploration Drilling Project
Total Area of Project Exploration Licences (1151A, 1151B, 1152 and 1155)		3330 kilometres square
NAFO Division overlapping with Project Exploration Licences	3L	
Size of NAFO Division that overlaps with Exploration Licences		195 393.15 kilometres square
Size of Safety Exclusion Zone for Single MODU (not anchored)		0.785 kilometres square
Size of Safety Exclusion Zone for Single MODU (anchored)		6.601 kilometres square
Percentage of NAFO Division that would Overlap with Exploration Licences		1.70 percent
Percentage of NAFO Division that would Overlap with Safety (not anchored)		0.000402 percent
Percentage of NAFO Division that would Overlap with Safety Zone (anchored)		0.003378 percent

Area and Overlap

Jeanne D'Arc Basin Oil Operations Limited Exploration Drilling Project

Calculation ranges are based on a minimum safety exclusion zone with a 500 metre radius, and a maximum radius of 1450 metres.

The risk of supply and servicing operations to interact with commercial fishers operating in transit routes is greater than the potential for fishing gear to interact with drilling-associated activities within the safety exclusion zone. Fishing gear, in particular crab pots, set in the transit route areas are weighted to the bottom with an attached buoy(s) at the surface, which creates potential for entanglement; however, the service and supply vessels would not be towing sub-surface equipment thereby reducing the potential effect. The proponents would utilize shipping lanes where they exist and follow direct routes to wellsite, and implement safety exclusion zones. Effective communication between the proponents and fishers would reduce the potential for interactions and a compensation program would be available in case of incident.

Damage to fishing gear, in particular mobile trawl gear, may also occur as a result of interactions with suspended wells or wellheads that are left after abandonment. The C-NLOPB would review the proponents' *Application for Approval to Drill a Well* and consider the appropriateness of the planned approach to well termination, including the potential for the wellhead to interfere with fisheries. The C-NLOPB would require the proponents to engage fishers on their abandonment strategy in case of potential interference. If the C-NLOPB approves the suspension or abandonment with a portion of the wellhead above the mudline, commercial fishers, including Indigenous fishers, would be notified of the wellhead abandonment strategy and location of the abandoned wellhead.

The C-NLOPB has advised the Agency that it is not aware of interference of suspended or abandoned wellhead infrastructure with fishing gear. In the event that damage or loss of fishing gear was caused by contact with wellhead infrastructure, the proponents would provide compensation to the party involved consistent with their obligations in civil law.

C-NLOPB approval of a well termination in which all or a portion of the wellhead is left in place above the seabed does not extinguish the proponents' liability for any damage to fishing gear caused by contact between the wellhead and such gear during fishing activities. The Agency is of the view that potential effects on commercial fishing, including effects on communal commercial fisheries, could be mitigated through early identification and proper communication of restricted zones (e.g., safety exclusion zones) and information about the location of suspended or abandoned wellheads. The proponents would be required to develop a Fisheries Communication Plan. The plan would be developed in consultation with Indigenous and commercial fishers and the C-NLOPB, and would include but not be limited to communication objectives, participants and key contacts, and would provide guidance and instruction related to ensuring interested parties are kept up to date with respect to operational activities and accidental events and have the ability to provide feedback.

The Agency notes that the proponents have an internal process in place to review claims received with respect to the recovery of damages to fishing gear or vessels as a result of project activities. In all cases where spills, debris, dropped objects, or other project related activities, including authorized activities, cause damage to fishers, the C-NLOPB would expect the proponents to consider claims in a manner that meets the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and the spirit of the *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity*, and to act in good faith to resolve claims from fishers. If the proponents and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB (if applicable) or through the court. Claims for compensation may be made by domestic fishers as well as international fishers with legal authorization to be undertaking fishing activities in the area. Each claim, whether by a domestic or international fisher, would be evaluated by the C-NLOPB on a case-by-case basis to determine eligibility and the value of compensation.



Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents, expert advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to mitigate the Project effects on commercial fisheries:

- in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include:
 - regular updates to provide specific information on plans for project activities and an opportunity for feedback and further exchange of information on specific aspects of interest;
 - information on safety exclusion zones and suspended and abandoned wellheads;
 - procedures to notify fishers a minimum of two weeks prior to the start of drilling each well;
 - information on vessels travelling between Newfoundland and Labrador and exploration licences (e.g., number per week, general routes); and
 - procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during MODU movement and the use of a Fisheries Liaison Officer during geophysical programs;
- prepare a well abandonment plan, including a wellhead abandonment strategy and submit it to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with potentially affected Indigenous groups and commercial fishers;
- ensure that details of safety exclusion zones and the locations of abandoned wellheads, if left on the seafloor, are published in Notices to Mariners, provided in Navigational Warnings, and communicated to fishers;
- provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning;
- ensure ongoing communication with the NAFO Secretariat, regarding planned project activities, including timely communication of drilling locations, safety exclusion zones, and suspended or abandoned wellheads; and
- implement all mitigation listed in fish and fish habitat (Section 6.1) related to providing the results of the seabed investigation survey, wellhead abandonment procedures, selection of chemicals, disposal of spent synthetic-based muds, and the discharge of waste.

Follow-up

The Agency identified the following measure as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on commercial fisheries:

- report annually to the C-NLOPB on whether there have been incidents of lost or damaged fishing gear as a result of interactions with Project components, including project-related vessels, and make this information available to Indigenous groups upon request.

In addition, the Fisheries Communication Plan would provide a means of identifying potential issues should they arise.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on commercial fishing, including communal commercial fishing, are predicted to be low in magnitude, localized, and short-term.



Taking into account the implementation of the mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on commercial fisheries.

6.7. Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples

6.7.1. Proponents' Assessment of Environmental Effects

Existing Environment

Fishing for food, social, and ceremonial purposes is an important activity for all Indigenous communities who were included in the EIS. DFO issues fishing licences to communities to authorize fishing activities for food, social, and ceremonial purposes, and all Indigenous communities included in the EIS hold these types of licences. Multiple species of fish that could occur in the study area are or have been harvested for food, social, and ceremonial purposes, including Atlantic Salmon and American Eel. The preference for certain species varies across communities and is based on regional differences. Many communities also harvest aquatic birds and marine mammals for traditional purposes within their traditional territory. Most Indigenous communities place an important value on these country foods, and are of the view that they cannot be replaced or substituted by other sources or through compensation because of the cultural, social, and nutritional qualities of these country foods and harvesting activities.

Through interactions with participating communities and a review of available resources (see Section 4.1.2 for an overview of the proponents' engagement activities), the proponents concluded that no food, social, or ceremonial fishing or harvesting of marine mammals or aquatic birds is taking place in the study area or within the potential zones of influence of the Project. Since there is unlikely to be direct geographical overlap between routine project activities and most Indigenous communities' activities, the proponents' assessment focused on marine migratory species of interest that may have potential to interact with the Project and have connections to important areas or activities associated with the traditional use of lands and resources by Indigenous communities.

In addition to food, social, or ceremonial fishing, Indigenous communities also hold communal commercial fishing licences. In certain cases, these communal commercial licences would overlap with the project area. The potential effects of the Project on these licences is discussed in commercial fisheries (Section 6.6).

Predicted Effects

The proponents stated that there is no known use for traditional purposes including food, social, or ceremonial fishing taking place within the project area. Therefore, the proponents predicted that fishing for food, social, or ceremonial purposes would not be disrupted as a result of the Project. More broadly, the proponents found that the potential biophysical effects of the Project would not translate into a decrease in the overall nature, intensity, distribution, quality, or cultural value of any traditional activities by any Indigenous communities.



The proponents acknowledged that Atlantic Salmon are of particular importance to Indigenous communities in Atlantic Canada. Due to their migratory nature, individuals of this species may migrate through the project area before moving to an area that is subject to traditional harvesting activities. The proponents predicted that there would be a very low likelihood of interactions between project activities and Atlantic Salmon (see Section 6.1 for additional detail on effects to fish and fish habitat), and that there would be no potential for any interactions to result in a decrease in the overall nature, intensity, distribution, quality, or cultural value of salmon fishing by Indigenous communities.

Given the importance of the species to Indigenous groups, the proponents support research on the presence and distribution of Atlantic Salmon which includes proposed Atlantic Salmon environmental and social studies through the ESRF. The proponents have expressed an interest in this or other research being undertaken collaboratively with Indigenous organizations, and recommended the results should be available to existing or future regional databases and proactively shared with the government, Indigenous groups, and the public.

In general, the proponents predicted that effects from routine operations on Indigenous communities and activities would likely be negligible or low due to:

- the localized nature of Project activities;
- the short duration of Project activities;
- the low probability of species interaction with Project discharges and emissions; and
- the limited potential for biological effects if individuals were exposed to discharges.

6.7.2. Views Expressed

KMKNO, Miawpukek First Nation, MTI, and Nunatukavut Community Council, have indicated that the proponents did not use Indigenous knowledge in the valued components baseline information or environmental effects analysis (i.e., in conclusions on interactions with Atlantic Salmon, Bluefin Tuna, and Swordfish in the project area). Indigenous groups advised that traditional knowledge be used to assist in developing mitigation, environmental protection plans, and Project monitoring. The proponents noted Indigenous groups were invited to share knowledge related to the Project. The proponents have also committed to continue to accept and consider knowledge, inputs, and perspectives as part of ongoing engagement initiatives. However, given the location of the Project and absence of potential impacts to human health, socioeconomic conditions or resource use, the proponents are of the view that the use of secondary sources of information are sufficient. The proponents stated that information received from Indigenous groups was integrated into the effects assessment. Despite the proponents' response, KMKNO maintained that, without gathering primary sources of information from Indigenous groups, the proponents' assessment of effects on Indigenous groups, such as health impacts of a spill, is insufficient.

Potential effects to Atlantic Salmon populations was a key concern for several Indigenous groups. Analysis of the potential effects to salmon is included in Section 6.1 of this report. The Agency notes that on other offshore exploratory drilling projects in Newfoundland and Labrador, Indigenous groups have expressed concerns with the linkage of Atlantic Salmon to current use.

Several Indigenous groups were dissatisfied with the proponents' lack of follow-up and monitoring measures for effects on species of cultural importance, and by extension Indigenous communities, and recommended that follow-up or monitoring measures be developed in consultation with all communities. Several groups including KMKNO and MTI specified that Indigenous knowledge should be considered in the design and implementation of follow-up and monitoring plans. The proponents noted that there would be an appropriate mechanism for sharing the result of environmental monitoring with Indigenous groups as part of the Fisheries Communication Plan.

The proponents committed to continued engagement with Indigenous groups. The proponents in collaboration with other operators of exploratory drilling projects in the Newfoundland and Labrador offshore have developed an Indigenous Fisheries Communications Plan with all Indigenous groups which



incorporates feedback from Indigenous groups. It outlines how to share information about spill response, consider concerns and issues, and share results and learning from response exercises with Indigenous groups, if requested.

A summary of issues raised by Indigenous groups is presented in Appendix C.

6.7.3. Agency Analysis and Conclusion

Analysis of the Effects

The most likely interaction between Indigenous communities and the Project's operations would be related to potential effects on communal commercial fishing activities that could occur in the project area. These potential effects are discussed in commercial fisheries (Section 6.6).

No food, social, or ceremonial fishing was reported in the project area. It is unlikely that Indigenous peoples fishing or harvesting for food, social, or ceremonial purposes would come in contact with any project components or realize any adverse impacts in their traditional territories from routine project operations. The proponents would also be required to implement measures to mitigate effects to fish and fish habitat, marine mammals, and migratory birds (refer to Sections 6.1, 6.2, and 6.3) such that there would not be a perceptible change to the current use of traditionally valued species (e.g., Atlantic Salmon) or a change in the health and socioeconomic conditions of Indigenous peoples as a result of routine project operations.

The Agency acknowledges that the potential effects from a worst-case accident or malfunction (e.g., an unmitigated subsea blowout event) would be more severe. These are discussed in effects of accidents and malfunctions (Section 7.1).

Key Mitigation Measures to Avoid Significant Effects

The Agency determined that measures to mitigate effects on fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6) would also mitigate effects on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples.

Follow-up

The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples and notes that there are related measures proposed for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6).

Agency Conclusion

The Agency concludes that the adverse residual environmental effects of the Project on current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples throughout the study area would be low/negligible in magnitude.

Taking into account the implementation of the mitigation measures described for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6), the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples.



7. Other Effects Considered

7.1. Effects of Accidents and Malfunctions

Paragraph 19(1)(a) of CEEA 2012 requires that a federal EA take into account the environmental effects of malfunctions and accidents that may occur in connection with a Project.

7.1.1. Proponents' Assessment of Environmental Effects

A number of potential accident scenarios, including loss of well control, platform spills of small discharges, riser flex joint failure, blowout preventer disconnect and supply vessel collision were identified. Although the causes and consequences of these scenarios can vary, the proponents' assessment focused on the potential effects of an unplanned release of hydrocarbons or synthetic-based muds as a result of one of these events. To inform their effects assessment, the proponents estimated the probabilities of an accidental event occurring and conducted and used previously-conducted spill fate and behaviour modelling.

Probability of Hydrocarbon Releases

A blowout is an incident where all barriers are non-functional and hydrocarbons flow from the well in an uncontrolled event.

The proponents calculated the probability and potential frequency of hydrocarbon releases based on a review of national and international records of historical offshore spills (Table 6).

Table 6: Probability of Hydrocarbon Releases

Hydrocarbon Release Scenario	Spill Probability (Spills per Well Drilled)	Spill Frequency
Blowout, all types		
Extremely Large (greater than 150 000 barrels)	0.000047	one per 21 277 wells
Very Large (greater than 10 000 barrels)	0.000095	one per 10 526 wells
Deep-well Blowout		
All volumes, based on 20 year spill records	0.000048	one per 20 833 wells

Source: Husky Oil Operations Limited 2018

The probability of a deep-well blowout for a drilling program involving ten wells is estimated to be approximately 0.048 percent (Table 6).

Small batch spills are the most probable spill events that could occur during a drilling program. These spills could involve the release of crude oil, hydraulic oil, synthetic-based muds, diesel, formation fluids or mixed



oil. Using data recorded since 1997 from the C-NLOPB, the proponents calculated an average spill frequency of 1.65 spills per year of less than 159 litres (one barrel) and 13.1 spills per year of less than one litre, but noted that spill frequency and spill volume has generally decreased over this period.

Methods for Spill Modelling

Modelling of blowouts and batch spills of diesel and synthetic-based muds was used to predict the fate and behaviour of spills and to inform the assessment of potential effects. In the event of a spill, the trajectory, fate, and resultant environmental effects would be determined by the specific location, timing, and nature of the release, as well as the environmental conditions and species present at the time of the event.

For a nearshore marine diesel spill from an offshore supply vessel, the proponents conducted a new project specific spill modelling exercise. For blowouts, additional batch spills (limited volume, instantaneous spills) and offshore synthetic-based mud spills, the proponents referred to previously-conducted modelling for Husky Oil Operations Limited White Rose Extension Project (an offshore oil production project), located in the project area at distances ranging from 23 to 49 kilometres to the centre points of its exploration licences. The proponents stated that water depths and oceanography were comparable between the White Rose oil and gas field and the adjacent exploration licences, and shifting the spill source by these distances would not demonstrably affect the spill trajectories or weathering behavior.

For the previously conducted modelling, hypothetical release scenarios including release locations were selected based on criteria such as subsurface features, seabed features, water depth, drilling depth, and environmental features within the project area. Blowouts were modelled for 120 days (the estimated time to drill a relief well) or until the oil evaporated and dispersed from the surface or the average oil concentration on the surface dropped below one gram per 25 square metres (i.e., the level of contamination of highly weathered crude considered innocuous to wildlife). Oil properties for model inputs were determined from laboratory analysis of crude samples from the White Rose oil and gas field; the proponents stated that the oil data were relevant for expected oil characteristics in the Project exploration licences. The modelled scenarios assumed that no response measures would be undertaken to mitigate effects; however in an actual incident, spill response measures would likely have some effect on limiting the magnitude and duration of the spill thereby limiting the geographic extent and potential environmental effects.

Fate and Behaviour of Subsea and Surface Crude Blowouts

The modelling predicted that a crude oil blowout, whether subsea or at the surface, would have a slick survival time of more than 30 days. Slick formation and persistence would be dependant on seasonal factors such as water temperature and winds. A subsea blowout would have a thinner but wider initial slick (up to one millimetre thick and up to 2.8 kilometres wide) than a surface blowout (up to 3.4 millimetres thick and 160 metres wide). Sample winter and summer trajectories for a subsea blowout indicated that oil would generally move eastward from the release point. The proponents stated that trajectories for surface blowouts (modelled as a blowout on the MODU 43 metres above the water surface) would be identical to those from the subsea discharges because oil from both types of blowouts would be very persistent. The winter zone of influence was predicted to be smaller than in summer due to strong, persistent westerly winds in the winter, which would create a tighter trajectory. Summer wind direction is more variable and the model predicted the slick would move over a wider area. Overall, the proponents stated that a release of crude oil from the project area would persist and surface slicks would remain for several weeks, with little natural dispersion. In-water oil concentrations from blowouts were predicted to remain below 0.001 parts per million.

The modelling predicted that oil would be highly unlikely to reach shore if a spill were to occur in the project area. The probability of a crude oil spill reaching shore was zero for December through February and April through September. A small number of modelled slicks, representing only 0.04 percent of the modelled trajectories, were predicted to reach the shoreline of the island of Newfoundland in the months of March, October and November. The slicks were predicted to arrive at shore between 45 and 92 days after release.



Potential Effects of Blowouts on Valued Components

Modelling results were used to inform the assessment of potential environmental effects of blowouts on valued components.

(i) Fish and Fish Habitat

While adult finfish would most likely be able to avoid exposure to released hydrocarbons, there would be risk of potential mortality or sub-lethal effects in phytoplankton, zooplankton, larval and juvenile fish species. Among other potential effects, exposure to oil, either naturally or chemically dispersed, has the potential to affect fish embryo cardiac system development, structure and function, leading to impaired swimming stamina.

The quality of benthic habitat and health of invertebrates may be affected following the release of hydrocarbons. Hydrocarbons may persist in the sediment resulting in sub-lethal effects on invertebrates, but effects would be expected to be confined to the immediate vicinity of the well. However, the proponents predicted that discharges from a subsea blowout released in shallow water (i.e., less than 400 metres) would rapidly progress to the surface, and that any portion of oil that did not disperse, evaporate, or biodegrade would be largely biologically inert and of low toxicity. While some of these compounds may eventually be deposited on the seabed, concentrations would be low and pose no risk to marine life. It is predicted that resident species would be affected, but that the affected population or community could return to its former level through natural recruitment.

(ii) Marine Mammals and Sea Turtles

A blowout incident may increase the risk of mortality or physical injury of marine mammals and sea turtles and result in a change in their habitat quality and use. Prolonged exposure to heavy doses of hydrocarbons may result in mortality, whereas chronic exposure as a result of oil fouling, ingestion, or absorption through the respiratory tract could result in physiological effects such as lesions and effects on blood and enzyme chemistry. A blowout may also reduce habitat availability; however, shorelines are not predicted to be affected.

Despite the potential for adverse effects, the proponents predicted only a small proportion of marine mammal and sea turtle populations would be at risk. These effects would be further reduced with the implementation of mitigation measures.

(iii) Migratory Birds

Accidental spill scenarios may result in a change in risk of mortality or physical injury, and change in habitat quality and use for migratory birds. Risk of mortality or physical injury to migratory birds can result from direct contact with and ingestion of oil. Diving species and species that feed over wide areas and make frequent contact with the water's surface are considered most susceptible to the immediate effects of a surface slick.

Exposure to hydrocarbons frequently leads to hypothermia and death of affected migratory birds. Those that survive the immediate effects may suffer long-term physiological changes that may result in eventual death. Additionally, there may be mortality of embryo or nesting birds as adults that forage offshore to provide for their young may become oiled and bring hydrocarbons back to the nest contaminating eggs or nestlings. In addition, sub-lethal effects, that may persist for several years, as a result of hydrocarbons ingested by migratory birds may affect their reproductive rates or survival rates.

With respect to a change in habitat quality for birds following a blowout, prey availability may be reduced and/or migratory birds may avoid affected habitat.



(iv) Special Areas

The Eastern Avalon Ecologically and Biologically Significant Area overlaps with the project area. In addition, there are several other special areas within the study area (Appendix E). The proponents predicted that an accidental scenario, including a batch spill, subsea or surface blowout, can interact with special areas, potentially causing a degradation of the ecological components for which it is valued.

The nature and extent of the effects of an accidental event on habitat quality of special areas depends on the type and magnitude of the event, the proximity to the special area, the time of the year and the ecological importance of the area. A blowout scenario would pose the greatest potential for environmental effects to special areas. However, modelling indicates low probabilities of an oil spill reaching special areas.

The proponents predicted that the effects of a spill on special areas would be reversible.

(v) Commercial Fisheries

The proponents predicted that an accidental release of hydrocarbons could interact with commercial fisheries through a temporary loss or reduction in access to commercial species, damage to fishing gear, or affect the actual or perceived quality of commercial fish products.

Direct effects from a subsea or surface unmitigated blowout include the potential fouling of fishing gear as well as the temporary suspension of commercial fishing activity if fishing areas are closed. A closure could translate into reduced catches or extra costs associated with relocating gear. Spills or the use of dispersants to respond to a spill could lower consumer perceptions regarding the quality of fish harvested in the surrounding area. However, the effects due to perceptions are difficult to predict, since the physical effects of the spill might have little to do with the perceptions.

(vi) Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples

A hydrocarbon blowout could result in direct effects on Indigenous fishing and indirect effects to the socioeconomic conditions of Indigenous communities due to effects on both communal commercial fishing and food, social, and ceremonial fishing. As with commercial fisheries, a hydrocarbon blowout may result in a fishery closure which could result in potential loss of income, fouling of gear and possibly increased costs associated with relocation of harvesting effort. Additionally, there may be effects due to the market perceptions of poor product quality. Given that communal commercial fisheries may provide funding for certain community programs, an adverse effect to the communal commercial fishery could impact the quality of life within Indigenous communities.

The presence of hydrocarbons may temporarily affect habitat quality and use and risk of mortality or physical injury for migratory birds and seals, animals identified by Indigenous groups as important. In addition, food, social, and ceremonial fishing has been identified as culturally important and important to the diet and food security of Indigenous groups, even though it may represent a small portion of the communities' diet.

Additional Considerations

(i) Fate, Behaviour, and Effects of Batch Diesel Spills and Synthetic-Based Mud Spills

As noted previously, the most probable type of spill would be smaller, operational batch spills, which could include crude oil, hydraulic oil, synthetic-based muds, diesel, formation fluids or mixed oil. These spills can occur during routine discharges as a result of hose ruptures during transfer operations from a supply vessel or from platform storage facilities, and are often considered instantaneous events. A larger diesel spill could occur as a result of a vessel collision. The most probable modes of an accidental release of synthetic-



based mud was determined to be a surface tank discharge, riser flex joint failure, or a blowout preventer disconnect.

Several hypothetical batch spill scenarios of diesel using small and medium sized platform spills were modelled to predict the fate and behaviour of the spill. For the small batch diesel spill scenarios modelled, 25 to 38 percent of the diesel would evaporate from the surface. This evaporation would occur within 13 to 37 hours in the winter and 25 to 62 hours in the summer, depending on the volume spilled. An offshore diesel spill is predicted to have a slick survival time of 48 hours.

A worst-case scenario of a nearshore spill associated with the collision of two offshore supply vessels approximately 18 kilometres from St. John's was also modelled. In this scenario, marine diesel would move in a predominantly eastern direction year-round. Nearshore diesel spills were predicted to dissipate within five days (during the autumn and winter) and ten days (during the spring and summer). Modelling predicted the final measurable amount of hydrocarbon to be approximately 178 kilometers from the original spill location to the east in winter, and as much as 209 kilometres east of the original spill location in the summer.

The effects of a batch diesel spill, whether a small spill or a large nearshore spill, would be similar to those of a hydrocarbon blowout. As with a blowout, a batch diesel spill could potentially result in degradation of habitat quality and use, and a change in risk of mortality, physical injury or health. Fish, marine mammals, sea turtles and migratory birds would be exposed to elevated concentrations of hydrocarbons in the immediate area of the spill. Sessile and early life stages (eggs, larvae) are the most at risk from a diesel batch spill given their inability to actively avoid the diesel and the sensitivities of the life-stage development periods. However, these effects would likely be of smaller scale given the limited and temporary nature of any surface oiling because of a batch spill. A batch spill is not predicted to result in permanent harmful alteration, disruption or destruction of habitat quality for special areas in the study area, and is not likely to result in effects on communal commercial fishing resources.

The proponents applied results from a dispersion study that was conducted for the White Rose Extension Project to assess the fate and dispersion of synthetic-based mud spills. The distance from the release site at which most of the synthetic-based mud droplets would extend is dependent on the height of the release above the sea bottom and the droplet fall velocity, as well as the seasonal currents. Maximum predicted distances from the release site were those for winter surface dispersion, where the maximum distance from the wellsite was found to be approximately one kilometre.

In the event of an unintentional release, synthetic-based mud would settle to the seabed due to its weight, posing a risk of smothering of habitat and to immobile invertebrate species within tens of metres from the release site. There would be potential health effects associated with chronic exposure of marine biota to synthetic-based mud associated cuttings. However, the acute toxicity of synthetic-based muds is considered low and therefore not expected to cause contamination of marine biota or habitats. A spill of synthetic-based mud would not be anticipated to affect marine mammals, migratory birds, sea turtles, or fish in the water column.

(ii) Effects of Dispersants

Dispersants may be used to respond to spills in order to minimize negative effects on the environment. Although use accelerates the degradation of spilled oil, dispersants also have the potential to increase hydrocarbon exposure of plankton and pelagic fish throughout the water column and eventually of the demersal fish and benthic invertebrates. Chemically dispersed oil may reduce dissolved oxygen levels in the affected area, and the dispersants may provide a potential route of exposure along the food chain to higher molecular weight polycyclic aromatic hydrocarbons.

Dispersed oil would have similar effects on birds to those of untreated oil (e.g., reduction in insulation capacity and waterproofing of feathers). Dispersants may potentially decrease exposure to surface oil and decrease the likelihood of oil reaching coastal areas. The proponents noted that dispersant use could lead to decreased overall concentration of oil that birds may be exposed to, resulting in a net environmental benefit to birds.



The proponents noted that the risks to birds, mammals, turtles, and in certain cases commercial fisheries, could be greatly reduced by using dispersants. The proponents acknowledged that dispersant use may increase the exposure of components of finfish and shellfish populations to oil. However, the exposed components of the populations would be small such that the overall effect to the fish and shellfish populations would be correspondingly small. Net benefits of dispersants were predicted in all seasons, with the greatest benefit in winter owing to the seasonal habits of various species (e.g., seals, migratory birds). Fishery disruption due to dispersant use would be less in winter versus summer because catches in area are smaller in winter.

Prevention, Preparedness, and Response Measures

The proponents described a variety of measures to reduce the likelihood of accidents and malfunctions, including those related to: engineering and design standards; standard operating procedures; maintenance, inspection, and monitoring; as well as measures to ensure the proponents would be prepared for a potential accident or malfunction (Appendix B).

Well Capping and Containment

The proponents would have barriers to maintain well control, prevent kicks and to regain well control. In the event that these measures fail and an uncontrolled release occurs, the proponents would immediately commence mobilization of contingency plans. If required, a capping stack would be used, which is a means of source control that prevents hydrocarbons from being released at the wellhead as the relief well is drilled. The proponents stated that there are no limitations to the use of a capping stack in shallow waters, but in the event that vertical access over the well is not possible, the capping stack can be deployed from an offset location.

If required, a capping stack would be sourced from Norway or Brazil and would be transported directly to the wellsite by a specialized vessel. The proponents estimated the mobilization and deployment of the capping stack would range from 13 and 24 days. However, under a worst-case scenario mobilization and capping may extend to 30 days. In addition, the proponents would have access to capping stack systems that could be transported by air. The proponents stated that accelerating the transit of the capping stack to the release site would not expedite the spill response as there are multiple steps required prior to the deployment of the capping stack (Figure 5). The capping stack would be decommissioned once the blowout has been controlled and the well abandoned.

Figure 5: Capping Stack Installation Timeline¹³



Source: Husky Oil Operations Limited 2018

In the event of a subsea blowout, a relief well would be drilled as a response measure to permanently eliminate well flow. The proponents would develop relief well plans as part of the contingency plans required as a component of regulatory authorizations to conduct drilling activities. Initiation of relief well drilling would begin at the time of the release and would be simultaneous with source control responses including survey intervention, debris clearance and capping stack mobilization. To account for the worst-case scenario, in which a MODU would be mobilized from outside the Newfoundland offshore region to drill the relief well, the proponents estimated it could take 120 days to drill a relief well.

Spill Response

As a component of the Contingency Plans, the proponents would implement Oil Spill Response Plans approved by the C-NLOPB. The Oil Spill Response Plans would detail the response actions the proponents would take in the event of an oil spill. The proponents would share the Oil Spill Response Plan with Indigenous groups. In the event of a spill that poses the least threat of impact (Tier One), resources for spill response may be available from the SeaRose Floating Production Storage and Offloading platform operated by the Husky Oil Operations Limited in the White Rose oil and gas field, or from the Hebron and / or Hibernia facilities operated by ExxonMobil Canada Limited. or from offshore support vessels. The proponents would enter contractual arrangements with private response organizations (e.g., Eastern Canada Response Corporation, Oil Spill Response Limited, Global Response Network) and other operators to provide support in the response to an accident, depending on the size and scale of the incident. In addition, government agencies, such as the C-NLOPB, the Canadian Coast Guard, ECCC (Environmental Emergencies), DFO, Joint Rescue Coordination Centre, Transport Canada, and the

¹³ SWZ, Safe Working Zone



Government of Newfoundland and Labrador may provide regulatory oversight, advice, or support in the event of a spill. The C-NLOPB would have an oversight role on all response activities and would manage the relationships and interactions with other government agencies, including other jurisdictions and members of the international community, as required.

The proponents would ensure response capability both within and outside Canada's exclusive economic zone and stated that spill response would achieve the same outcomes whether responding within or outside this zone.

Response measures and activities outlined in the Oil Spill Response Plan would be implemented in the event of a spill, including surveillance and monitoring, mechanical and chemical dispersion, in-situ burning, containment and recovery, shoreline protection and cleanup, and compensation measures. The proponents would develop a Wildlife Response Plan, in addition to the Spill Response Plan, to allow for timely, coordinated and effective protection, rescue, humane treatment, and rehabilitation of wildlife resources to minimize potential impacts that may result from a spill incident. The plans would be activated concurrent with the activation of the Oil Spill Response Plan.

Husky Oil Operations Limited would undertake a net environmental benefit analysis to assess and compare the feasibility and environmental and socioeconomic impacts of employing various oil spill response techniques to prevent or reduce contact of the oil with resources most likely to be affected. The analysis would be conducted at the regional level with key regulatory agencies. In addition, ExxonMobil Canada Limited has conducted a spill impact mitigation assessment for ExxonMobil Canada Limited's Eastern Newfoundland Offshore Drilling Project, 2018-2030. The proponents in cooperation with several other operators in the Newfoundland and Labrador offshore submitted a net environmental benefit analysis to the C-NLOPB in 2013 to evaluate the suitability of dispersant application to spills of crude oil from production and drilling installations on the Grand Banks, taking into consideration comments from the C-NLOPB, a revised dispersant net environmental benefit analysis would be submitted to the C-NLOPB.

The proponents must have the financial requirements to respond to an incident and pay for actual losses or damages incurred as a result of the incident.

The proponents stated that in the event of an accidental event, specific monitoring programs may be required. In such cases, these programs would be developed and implemented in consultation with the appropriate regulatory bodies.

7.1.2. Views Expressed

Federal Authorities

The Agency and DFO requested additional information related to the proponents' synthetic-based muds spill modelling. The proponents provided information related to plausible worst-case scenarios indicating the most likely scenario for a total mud loss spill to occur would be subsurface while smaller spills are most likely to occur at the sea surface as a result of leaks from tanks or hoses. The proponents clarified their use of ocean current data for the model. The data was extracted from a three-year data set collected in the White Rose oil and gas field and considered appropriate for modelling purposes. The proponents stated that the magnitude and spatial variability in current speed and direction within the project area would not alter the impact assessment of a synthetic-based muds spill event.

DFO requested additional information to confirm that the subsea and surface crude blowout model represented a "worst-case" scenario. The response stated that the model used the maximum worst-case flow rate, 40 476 barrels of oil per day, and used oil properties from crude samples taken from the White Rose oil and gas field which have relevant characteristics for modelling oil spill trajectories for the Project. A 120-day duration was selected as this would be the estimated time required to drill a relief well in the event that all other attempts to shut off the well fail.

The Agency requested additional information related to in-situ burning as an oil spill response measure. The proponents stated that in-situ burning is typically used when oil is contained within a fire-resistant



boom and if the oil is approximately two to three millimetres thick. The proponents referenced the findings of the 1993 Newfoundland Offshore Burn Experiment that in-situ burning is an efficient and simple way to remove oil from water under favourable conditions away from sensitive receptors (e.g., human populations, shorelines, wildlife habitat, sensitive areas). The proponents noted that environmental effects associated with in-situ burning include the generation of atmospheric emissions and burn residue, direct temperature effects, water column toxicity and a temporary localized effect on the surface microlayer. The proponents stated that in-situ burning should not be conducted near human populations, shorelines, wildlife areas, or other sensitive receptors. The proponents concluded that in-situ burning would be used as a response measure if weather conditions are favourable and the thickness of the oil supports combustion. Follow-up monitoring of potential effects from a burn would be part of a monitoring program.

NRCan advised that the model does not adequately describe the contents of the persistent portions of the crude oil and that biodegradation rates are therefore over-estimated; however, NRCan agrees that this is indeed an ongoing area of research and has indicated that it will conduct simulations, publish data, and continue ongoing discussions with industry to further advance existing models. Despite the potential shortcoming identified by NRCan, DFO and the C-NLOPB are of the view that the model results provide sufficient information to inform the effects predictions and to recommend mitigation and follow-up measures.

The Agency and DFO requested additional information related to dispersant application methods and its effects on sensitive benthic species. The proponents confirmed that subsea dispersant injection would only occur in the case of a sustained subsea release. Surface application of dispersants could be applied to any incident resulting in oil on the sea surface. Once dispersants are applied, the potential effects would be the same for surface and subsurface applications. The proponents noted that ongoing environmental effects monitoring for the Deepwater Horizon blowout discovered impacted sites for corals six, 13, and 22 kilometres from the wellhead. Overall, recovery of corals from the spill was slow.

Additional views expressed by federal authorities overlapped with views expressed by Indigenous groups. Some of these key views and comments are discussed below.

Indigenous Groups

Première Nation des Innus de Nutashkuan and DFO asked for additional information on the proponents' stochastic model for a blowout. The proponents provided additional information on model parameters (i.e., oil release every six-hours for 57 years, from 1954 to 2010). The resulting 83 220 individual trajectory scenarios were analyzed for spatial coverage and shoreline contact probabilities. The probability of shoreline contact with the island of Newfoundland was determined to be 0.04 percent and no oiling of Sable Island or international lands were predicted based on the modelling results.

KMKNO expressed concerns regarding the potential for contaminated fish and fish habitat following an oil spill and the potential contamination of the food chain. The proponents stated that water quality within the spill footprint would be altered, which could impact marine organisms and productivity. Proximate primary and secondary production would resume once the oil has evaporated, dissipated, or biodegraded. The proponents concluded that it does not predict the effects of a spill would impact higher trophic levels of the food chain given the duration of the effects from a spill, the short generation times for primary producers, and the migratory foraging nature of most fish species.

Several Indigenous groups required information on the role of Indigenous groups in the development of the Oil Spill Response Plan and other contingency plans, including information on the feedback mechanisms that would be in place to address issues and concerns. The proponents indicated that an Oil Spill Response Plan approved by the C-NLOPB would be implemented for this project. The proponents committed to sharing the Oil Spill Response Plan with Indigenous groups.

A summary of issues raised by Indigenous groups is presented in Appendix C.



Public

Concerns from stakeholders with respect to fish and fish habitat were considered by the Agency when conducting their analysis and addressed by the proponents and incorporated into the text above, where appropriate.

7.1.3. Agency Analysis and Conclusion

Analysis of the Effects

Offshore exploratory drilling happens in a dynamic environment and accidental events associated with these activities have occurred in the past; however, the vast majority of these events have been relatively minor. More serious events, such as a large scale blowout, are far less likely to occur, but could have major consequences. The Agency understands that the chance of an extremely large spill (greater than 150 000 barrels) occurring during the drilling of any given well is predicted to be approximately one-in-21 000 while the chance of a very large spill (greater than 10 000 barrels) occurring is estimated as approximately one-in-10 000.

Effects from a blowout may include sub-lethal or lethal effects on fish, marine birds, marine mammals, and sea turtles, including species at risk. Effects may also include impacts on commercial fisheries, special areas, and Indigenous peoples. As such, the proponents would be required to take all reasonable measures to reduce the likelihood of an accidental event and ensure that they are prepared to respond effectively if an accidental event were to occur.

The Agency is aware that the C-NLOPB verifies that proponents have appropriate measures in place for spill prevention and preparedness. The proponents must comply with the requirements of regulations and be able to demonstrate that the C-NLOPB's expectations for facility safety, pollution prevention, and emergency response capability are met. The C-NLOPB has advised the Agency that its authorization of drilling activities would be contingent on its confidence that the proponents have a satisfactory approach to risk management and would take all reasonable measures to minimize the probability of malfunctions and accidents. The proponents would be required to sufficiently demonstrate their preparedness to appropriately respond in the event of an accident or malfunction (e.g., batch spills, subsea releases) including preparation of detailed Oil Spill Response Plans that meet the C-NLOPB's regulatory standards. In addition to the Oil Spill Response Plans, the proponents would develop a Wildlife Response Plan to ensure timely, coordinated, and effective protection, rescue, humane treatment, and rehabilitation of wildlife resources, which would be reviewed by the C-NLOPB. The Agency recognizes that before the project is authorized by the C-NLOPB, the proponents must provide the C-NLOPB with proof of financial ability to respond to an incident and pay for actual losses or damages incurred. The proponents would also be required to undertake a net environmental benefits analysis/spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences. Certain response measures, such as the use of dispersants and in-situ burning, would also require approval from the C-NLOPB, in consultation with other authorities as required, prior to actual implementation.

In the event of a blowout, primary and secondary barriers would be implemented to regain well control and prevent any accidental release of oil, but if those barriers fail, the proponents would be required to begin the immediate mobilization of a capping stack and associated equipment to the release site. Simultaneously to the mobilization of a capping stack, the proponents would be required to commence mobilization of a relief well drilling installation.

The proponents estimated that mobilization of the capping stack generally could take anywhere from 13 to 24 days, however under a worst-case scenario mobilization could take up to 30 days. The C-NLOPB confirmed that capping and containment of a blown out well requires mobilization of equipment to prepare the subsea release site before use of a capping stack. This equipment would be transported by air to begin



site preparation, which would include clearing of the site and cutting away of debris to ready the well for capping stack installation. The C-NLOPB has considered the various activities involved in source control and well capping, and agrees with the assessment of the proponents that the transportation of the capping stack is not the rate determining step in stopping the flow of oil in a subsea blowout scenario. The C-NLOPB would require the Well Capping and Containment Plan to contain a fulsome discussion of any potential options to reduce overall timelines (e.g., detailed accounting of timelines for mobilization and installation of capping stacks from various locations; review of opportunities to conduct preparatory work that may reduce timelines [e.g., permitting requirements, Canadian Customs and Border Services Agency requirements]). The proponents would be required to review environmental conditions at different times of the year to determine potential impacts on the time required to mobilize a capping stack, and to determine whether any additional mitigation is required.

The Well Capping and Containment Plan would include information on options and requirements for relief well drilling, including the locations of potential drilling installations that would be available to the proponents to drill a relief well. The proponents would be required to demonstrate that they have arrangements in place to access the necessary drilling installation in a manner that would minimize the time required to drill a relief well, taking into consideration location and logistics. The C-NLOPB would review the plans as part of its authorization process.

The Agency is aware that there have been a number of spills of synthetic-based mud offshore Newfoundland and Labrador over the past 20 years, including a 28 000 litre spill in April 2018 from a MODU operating in the Terra Nova oil field (C-NLOPB 2019c). The proponents would be required to have appropriate measures in place to prevent batch spills, including spills of synthetic-based mud. Spill prevention and response would be described in the proponents' Contingency Plan, which would be reviewed as part of the C-NLOPB's authorization process.

Despite the measures the proponents would implement to prevent and respond to a spill, the potential effects on fish and fish habitat, marine mammals and sea turtles, and migratory birds could, in a worst-case scenario and under worst-case conditions, result in both individual and population level effects. These effects could be especially detrimental to populations of species that are particularly sensitive to such an event (e.g., seabirds) or are at risk (e.g., endangered North Atlantic Right Whale, Atlantic Salmon [Inner Bay of Fundy population]). Based on modelling results, the special area most likely to be impacted by a spill would be the Slopes of the Flemish Cap and Grand Banks, which is 27 kilometers from the nearest exploration licence. The worst-case scenario modelled predicts an initial slick width of 2.8 kilometers; therefore, oil would evaporate or weather prior to reaching it. Although the proponents predicted that oil would not reach Sable Island or international lands, based on modelling conducted for similar projects the Agency notes the possibility that a large subsea release, although unlikely, could result in oil reaching Sable Island National Park Reserve, and the Gully Marine Protected Area, as well as international special areas and shorelines. If oil were to reach these areas, it would be highly weathered and patchy due to the time it would take to reach the area. Although unlikely, effects would be adverse and could be high in magnitude, depending on factors such as volume of the spill and environmental conditions.

Indigenous and non-Indigenous fishers with commercial and communal commercial fishing licences could also be affected by accidental spills. A large batch spill or subsea release could result in the closure of fishing areas, the fouling of gear and vessels, a reduction in the marketability of commercial fish products, as well as effects on fish and fish habitat. In addition, Indigenous peoples could be affected if a spill effects species that migrate through the spill area to areas where they are harvested for food, social, or ceremonial reasons (e.g., Atlantic Salmon). The Agency agrees with comments from Indigenous groups that, even if effects on these species are relatively minor, perceived contamination may discourage individuals from engaging in certain traditional practices or consuming certain species which may have interacted with a spill. Views provided by Indigenous groups would be considered in the development of the Spill Response Plan, and Indigenous groups would be provided the approved version.

For both Indigenous and non-Indigenous fishers, any damages, including the loss of commercial or food, social, and ceremonial fisheries, would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* (C-NLOPB/CNSOPB 2017a). The



proponents would also be required to develop and implement Fisheries Communication Plans, which would include procedures to communicate with fishers in the event of an accident or malfunction. The Agency understands information is exchanged between Canada and NAFO to avoid overlapping activities and mitigate potential conflicts between fisheries and oil and gas activities. Information that is publically available to NAFO includes weekly offshore activity reports and incident disclosures posted on the C-NLOPB website as well as Canadian Coast Guard Navigational Warnings. Information that Canada provides proactively to the NAFO Secretariat for onward transmission to NAFO Contracting Parties includes forecasts of planned petroleum-related activities in the NAFO Regulatory Area, as well as notifications of program authorizations and approvals, and notifications of environmental incidents, notably significant spills or discharges, in that area.

The proponents stated a precautionary conclusion is drawn that residual adverse environmental effects of an unmitigated blowout incident could be significant for commercial fisheries, migratory birds, and Indigenous people and community values. After considering the views of Indigenous groups and applying a precautionary approach to its own conclusions, the Agency is of the view that, although very unlikely, the potential effects of a worst-case accident could be significant in relation to additional valued components. For fish and marine mammals and sea turtles, the potential for significant effects is linked primarily to the potential presence of species at risk (e.g., endangered population of Atlantic Salmon [Inner Bay of Fundy] or other fish, marine mammals and sea turtles species at risk). While uncertainty exists within these predictions (e.g., presence, abundance, migration patterns), even small impacts to a species at risk may be significant at a population level and affect their potential recovery. The Agency notes that the uncertainty may be addressed through further research supported by the proponents.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponents (Appendix B), expert federal advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to prevent accidents and malfunctions and to mitigate associated effects:

- undertake all reasonable measures to prevent accidents and malfunctions that may cause adverse environmental effects and effectively implement emergency response procedures and contingencies developed for the Project;
- submit a Well Capping and Containment Plan which includes strategies and measures for well capping, containment of fluids lost from the well, and the drilling of relief well(s), as well as options to reduce overall response timelines. The Well Capping and Containment Plan must include procedures to provide up-to-date information to the C-NLOPB prior to drilling and during drilling, related to the availability of appropriate capping stacks and vessels, and appropriate drilling rigs capable of drilling a relief well at the project site;
- prior to drilling submit a Spill Response Plan which must include:
 - procedures to respond to an oil spill (e.g., oil spill containment, oil recovery) and spills of other types (e.g., synthetic-based mud, cuttings spill);
 - reporting thresholds and notification procedures;
 - measures for wildlife response, protection, and rehabilitation (e.g., collection and cleaning of marine mammals, birds, and sea turtles, including species at risk) and for shoreline protection and clean-up, developed in consultation with the C-NLOPB; and
 - specific role and responsibility descriptions for offshore operations and onshore responders.
- provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet prior to drilling;
- conduct an exercise of the Spill Response Plan prior to the commencement of drilling activities and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise to Indigenous groups following its review by the C-NLOPB;



- review and update the Spill Response Plan as required during drilling and before commencing a new well;
- prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the exploration licences and submit to the C-NLOPB for acceptance prior to drilling;
- undertake a net environmental benefits analysis/spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review prior to drilling. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Emergency Science Table. Publish the spill impact mitigation assessment on the Internet;
- in the event of a uncontrolled subsea release from the well, begin the immediate mobilization of a capping stack and associated equipment to the site of the uncontrolled subsea release. Simultaneously, commence the mobilization of a relief well MODU;
- if drilling is anticipated in water depths of 500 metres or less, undertake further analysis to confirm the capping stack technology selected can be deployed and operated safely at the proposed depth and submit this analysis to the C-NLOPB for approval;
- compensate for any damages, including the loss of food, social, and ceremonial fisheries in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*;
- include a procedure to notify Indigenous groups and commercial fishers in the event of an accident or malfunction in the Fisheries Communications Plan and to communicate the results of any associated monitoring and any potential health risk. Information that is provided to Indigenous groups and fishers needs to present a realistic estimation of potential health risks on consuming country foods, such that their consumption is not reduced unless there is a likely health risk from the consumption of these foods or specific quantities of these foods. If there is a potential health risk, consumption advisories should be considered; and
- include procedures in the Fisheries Communications Plan to engage in two-way communication with Indigenous groups and commercial fishers in the event of a spill requiring a tier 2 or tier 3 response.

Follow-Up

The Agency identified the following measures as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify accuracy of predicted effects in the event of a spill:

- as required by and in consultation with the C-NLOPB and ECCC, monitor the environmental effects of a spill on components of the marine environment until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include:
 - sensory testing of seafood for taint, and chemical analysis for oil concentrations;
 - measuring levels of contamination and oiling in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to determine the fishing area closure status;
 - monitoring marine mammals, sea turtles, and birds for signs of contamination and reporting results to the C-NLOPB, DFO, and ECCC; and
 - monitoring benthic organisms and habitats in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment;
- develop a procedure to communicate monitoring results to Indigenous and commercial fishers, as well as Indigenous groups.



Agency Conclusion

In taking a precautionary approach, the Agency concludes that the potential effects of a worst-case accident or malfunction from the Project (i.e., unmitigated subsea release) on migratory birds and special areas could be significant. Similarly, considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction on fish and fish habitat and marine mammals and sea turtles could also be significant. By extension, and particularly considering potential effects on populations of Atlantic Salmon and their recovery, as well as the context provided by Indigenous groups, the Agency concludes that the potential effects on the current (or future, as it pertains to at-risk Atlantic Salmon populations) use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant. With the implementation of mitigation measures, including the requirement to compensate for any damages to commercial fishing caused by an accident or malfunction, the Agency concludes that the potential effects of a worst-case accident or malfunction from the Project on commercial fisheries would not be significant.

However, the Agency recognizes that the probability of occurrence for a major event is very low and thus these effects are unlikely to occur. Taking into account the implementation of key mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions.

7.2. Effects of the Environment on the Project

7.2.1. Proponents' Assessments of Environmental Effects

Extreme environmental conditions or events can increase the probability of an accident or malfunction that could in turn affect the environment. The Project could be affected by environmental phenomena such as weather conditions, oceanographic conditions, sea ice, icebergs, MODU icing, and geological stability and seismicity.

Weather and Oceanographic Conditions

Poor visibility resulting from fog, rain, or snow conditions could increase the potential for accidental events such as a vessel or helicopter collision potentially resulting in a spill. ECCC officially designates the Atlantic hurricane season as occurring from June 1 through to November 30. In the study area, visibility is the most restricted from April through July due to advection fog. During autumn, fog is less prevalent and in the winter, snow restricts visibility. The MODUs would be all-weather semi-submersibles or drillships, specifically designed to operate in deep-water and harsh environments, including during inclement weather. Extreme winds and waves have the potential to increase stress on superstructures and vessels which could result in malfunctions or accidental events; however, MODUs and vessels would be designed to incorporate water current loads and the currents in the study assessment area.

Sea Ice, Icebergs, and Mobile Offshore Drilling Unit Icing

Sea ice and icebergs are navigational hazards and may increase the risk of an accidental event such as a vessel collision or impact with a MODU resulting in a spill. The proponents noted that sea ice is tracked and monitored to identify collision risks, and that mitigation measures, such as breaking up sea ice to assist shipping, are regularly applied in Canadian waters. Iceberg scouring in the White Rose oil and gas field are estimated to be 1×10^{-3} scours per square kilometer per year. Scour marks depth ranged from 0.5 to



1.1 metres, with widths of 20 to 35 metres. Icebergs have been observed within the offshore region from January to September, with the highest frequency in April.

MODU and vessel icing is a potential risk in the winter with the highest potential for icing occurring in February. The proponents noted that it has no record of ice accumulation on the SeaRose production vessel operating in the White Rose oil and gas field or from other MODUs under contract. Drilling installation and vessel icing could result in a raised centre of gravity, slower vessel speed, and maneuvering difficulty, as well as problems with cargo-handling equipment.

Geological Stability and Seismicity

A tectonic event could cause an earthquake of a significant size to result in seafloor instability. Subsequently, landslides could damage subsea infrastructure, disrupt project activities and increase the risk of an accident or malfunction. The proponents stated the project area has been classified as having a low tectonic hazard and since project activities are of short duration, the probability of an earthquake of sufficient magnitude to cause structural damage occurring during the life of the Project is low. The MODU would be designed to accommodate potential environmental loads imposed by earthquakes and other naturally occurring phenomena.

The proponents indicated that a tsunami from a tectonic event is unlikely to occur. Offshore, a passing tsunami would have a small wave height, and a long wave period. If necessary, MODU would have the capability to disconnect the riser from a well quickly (i.e., a few hours), reducing the risk of damage to the well, riser, and MODU. Support vessels and helicopter transits would likely be delayed in the event of a tsunami.

7.2.2. Views Expressed

Federal Authorities

NRCan asked the proponents to provide additional information regarding slope stability. The proponents clarified that the exploration licences are located in a relatively flat area (approximately 0.2 to 0.5 degree slope angle) and that areas of slope stability risk within the project area are the south side of Orphan Basin and the northern Flemish Pass, outside of the exploration licences. The proponents committed to conducting a site survey for each wellsite in advance to address shallow hazards, including bathymetry and potential for seabed instability. The C-NLOPB advised that the level of uncertainty with respect to geohazards would be addressed through a risk assessment as part of the Approval to Drill a Well process as required by the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and that the C-NLOPB can require additional mitigations based on the assessment of risk. The C-NLOPB will not issue a drilling approval until geohazards have been assessed and adequately mitigated.

ECCC advised that the proponents considered appropriate information on weather/climate. The C-NLOPB, NRCan, and DFO advised the Agency that, as applicable to their respective mandates and areas of expertise, the proponents' analyses were adequate for the purpose of the EA. The C-NLOPB advised that the proposed mitigation measures are appropriate in the context of the Accord Act and associated regulations.

Indigenous Peoples

Première Nation des Innus de Nutashkuan asked about icebergs, including the risk of a collision between an iceberg and the MODU, how collisions can be avoided and what actions can be taken when an iceberg is too close to a MODU. Noting a March 2017 event in which an iceberg came within 180 metres of Husky Oil Operations Limited's SeaRose production platform, the Agency required information on any changes made to Husky's ice management and emergency response plans. Husky Oil Operations Limited noted that it completed a comprehensive review of its plans and implemented several improvements. It has been



reinforced that there are no exceptions to the required disconnection of the production platform when an iceberg enters the 0.25 nautical mile exclusion area (approximately 450 metres). The updated ice management plan for the production project includes a new threat assessment flowchart with when to activate the regional response management team, as well as clear delineation of staff authority. Research and development work was undertaken, including the development of a Geographic Information System software module with ice flight information and pack ice drift model runs. Husky Oil Operations Limited has a dedicated ice management room which mirrors the offshore and allows real-time monitoring of field operations. Husky Oil Operations Limited noted it would apply all learnings from the 2017 ice near miss and subsequent updates to technology and procedures to future exploration drilling activities. The C-NLOPB advised that the proponents would be required to submit a safety plan, including an Ice Management Plan, to the C-NLOPB for approval, which addresses the possibility of pack sea ice or drifting icebergs at the wellsite and the measures to protect the installation, including systems for ice detection, surveillance, data collection, reporting, forecasting and, if appropriate, ice avoidance or deflection. Through the C-NLOPB's incident disclosure policy, information on iceberg collisions would be posted on the C-NLOPB's website. A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Agency did not receive comments from the general public regarding the effects of the environment on the Project.

7.2.3. Agency Analysis and Conclusion

Analysis of the Effects

Extreme environmental conditions or events can increase the probability of an accident or malfunction that could in turn affect the environment. The C-NLOPB has advised that the Project could be affected by weather conditions, oceanographic conditions, sea ice, icebergs, icing of the MODU and supply vessels, and geological stability and seismicity. These environmental conditions can affect the overall stability and functioning of the MODU or support vessels. In extreme situations these conditions may result in a required evacuation, failure of the MODU, vessel capsizing, a spill or another unplanned event.

The proponents would obtain a Certificate of Fitness for the MODU as required by the *Newfoundland Offshore Certificate of Fitness Regulations* to ensure it is fit for purpose and can function as intended. Meteorological and oceanographic monitoring programs would be implemented over the lifetime of the Project to forecast and respond to extreme environmental conditions. The *Offshore Physical Environmental Guidelines* describe the requirements for monitoring and reporting of environmental conditions. The development and implementation of an Ice Management Plan is required by the *Newfoundland Drilling and Production Regulations* as part of the Safety Plan submitted by the proponents with an application for authorization to the C-NLOPB. The Ice Management Plan would outline methods for monitoring iceberg and pack ice movements and the possibility of pack ice or drifting icebergs at a wellsite and the measures to protect MODUs, including systems for ice detection, surveillance, data collection, reporting, forecasting and potentially ice avoidance or deflection. The proponents would be required to establish and enforce practices and limits for operating in severe environmental conditions and to ensure that the MODU has the ability to quickly disconnect the riser from the well.

With regards to geological stability and seismicity, given the minimal seabed slopes, slope stability is not considered a widespread hazard. The C-NLOPB has advised that the risk of accidents or malfunctions resulting from geological stability or seismic events would be addressed by mitigation measures including pre-drill site-specific geohazard assessments and the use of fit for purpose MODUs.



Key Mitigation Measures to Avoid Significant Effects

The Agency considered measures proposed by the proponents, comments from an Indigenous group, and advice from federal authorities and identified key measures to mitigate the effects of the environment on the Project. The proponents shall:

- in consultation with the C-NLOPB and ECCC, implement a physical environment monitoring program in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and meeting or exceeding the requirements of the *Offshore Physical Environmental Guidelines*;
- in consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, high sea state, or sea ice or iceberg conditions;
- in consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting, and avoidance or deflection of icebergs; and
- in consultation with the C-NLOPB, implement measures to ensure that MODUs have the ability to quickly disconnect the riser from the well in event of an emergency or extreme weather conditions.

Follow-Up

The Agency identified the following measure as part of a follow-up program:

- in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations*, report annually to the C-NLOPB on whether there has been a need to modify operations based on extreme environmental conditions and on the efficacy of the practices and limits established for operating in poor weather, high sea state, or sea ice or iceberg conditions.

The Agency notes that incidents and near misses involving collisions (including iceberg collisions) that result in or could result in a spill or unauthorized discharge or impairment to critical equipment would be posted on the C-NLOPB's website as part of its incident disclosure policy.

Agency Conclusion

Based on commitments made by the proponents and with the implementation of the mitigation and follow-up measures listed above and required by the C-NLOPB, the Agency is satisfied that the effects of the environment on the Project have been adequately considered and are not likely to result in significant adverse environmental effects.

7.3. Cumulative Environmental Effects

7.3.1. Proponents' Assessment of Environmental Effects

The cumulative environmental effects assessment considered the overall effect on valued components as a result of the Project's predicted residual environmental effects and those of other relevant projects and activities. The proponents used the same spatial and temporal boundaries for the cumulative environmental effects assessment as for the project-specific effects assessment of each valued component (Section 2.1 and Figure 1).



Other Physical Activities Considered

Physical activities that were considered in the cumulative environmental effects assessment are listed in Table 7.

Table 7: Projects and Activities Considered in the Cumulative Environmental Effects Assessment

Project / Activity	Overview
Hibernia Oilfield	Located in the project area – south-western section and approximately 18.5 kilometers from the closest exploration licence (1155). Production activities at this oilfield are planned to extend throughout the temporal duration of the Project.
Terra Nova Oilfield	Located in the project area – southern section and approximately 17.1 kilometers from the closest exploration licence (1152). Production activities at this oilfield are planned to extend throughout the temporal duration of the Project.
White Rose oil and gas field and White Rose Extension Project	Located in the project area – central/southern section and approximately 5.0 kilometers from the closest exploration licence (1152). Production activities at this oilfield are planned to extend throughout the temporal duration of the Project.
Hebron Oilfield	Located in the project area – southern section and approximately 13.2 kilometers from the closest exploration licence (1152). Production activities at this oilfield are planned to extend throughout the temporal duration of the Project.
Bay du Nord Development Project (proposed)	Located 113 kilometers northeast of the closest exploration licence (1151A). If the proposed project is carried out, activities at this oilfield could partially overlap temporally with the Project.
Offshore Petroleum Exploration - Drilling	As of October 31, 2019, a total of 251 development wells, 60 exploration wells and 54 delineation wells had been drilled in the Jeanne d'Arc offshore area. The Jeanne d'Arc and eastern Newfoundland offshore area is also subject to ongoing and planned offshore exploration drilling programs which have the potential to temporally overlap with the proposed project including: • Equinor Canada Limited Flemish Pass Exploration Drilling Project 2018-2028 (Equinor's closest exploration licences 1142 is 151 kilometres from Husky Oil Operations Limited's exploration licence 1151A); • ExxonMobil Canada Limited Eastern Newfoundland Offshore Exploration Drilling Project 2018-2030 (ExxonMobil's closest exploration licence 1137 is adjacent to Husky Oil Operations Limited's exploration licence 1155); • CNOOC Petroleum North America ULC (formerly known as Nexen Energy ULC) Flemish Pass Exploration Drilling Project 2018-2028 (CNOOC's closest exploration licences 1144 is 61 kilometres from Husky Oil Operations Limited's exploration licence 1151A); • BP Canada Energy Group ULC Newfoundland Orphan Basin Exploration Drilling Project 2017-2026 (BP Canada's closest exploration



Project / Activity	Overview
	licence 1149 is 181 kilometres from Husky Oil Operations Limited's exploration licence 1151A); • ExxonMobil Canada Limited Southeastern Newfoundland Offshore Exploration Drilling Project 2020-2029 (ExxonMobil's closest exploration licences 1136 is 77 kilometres from Husky Oil Operations Limited's exploration licence 1152); • Chevron Canada Limited West Flemish Pass Exploration Drilling Project 2021-2030 (Chevron's closest exploration licence 1138 is 69 kilometres from Husky Oil Operations Limited's exploration licence 1151A); • BHP Canada Exploration Drilling Project 2019-2028 (BHP's closest exploration licence 1158 is 89 kilometres from Husky Oil Operations Limited's exploration licence 1151A); • Equinor Canada Limited Central Ridge Exploration Drilling Project 2020-2029 (Equinor's exploration licences 1159 and 1160 are adjacent to exploration licence 1151); and • Suncor Energy Offshore Exploration Partnership Tilt Cove Exploration Drilling Project 2019-2018 (Suncor's exploration licence 1161 is 15 kilometres from Husky Oil Operations Limited's exploration licence 1152).
Offshore Petroleum Exploration – Geophysical and Other Exploration Activities	Offshore geophysical surveys may include two-dimensional, three-dimensional, or four-dimensional geophysical data acquisition. There are offshore geophysical programs in the eastern Newfoundland and Jeanne d'Arc offshore areas in various stages of approval which have the potential to temporally overlap with the proposed project: • Husky Energy Jeanne d'Arc Basin/Flemish Pass Regional Seismic Program, 2012-2020; • Suncor Energy's Eastern Newfoundland Offshore Area 2D/3D/4D Seismic Program, 2014-2024; • WesternGeco Canada Southeastern Newfoundland Offshore Seismic Program, 2015 to 2024; • WesternGeco Canada Eastern Newfoundland Offshore Seismic Program, 2015 to 2024; • ExxonMobil Canada Eastern NL Geophysical Program 2015-2024; • CGG Services (Canada) Inc. Newfoundland Offshore 2D 3D 4D Seismic Program 2016-2025; • Seitel's East Coast Offshore 2D 3D 4D Seismic Program 2016-2025; • Fugro GeoSurveys Offshore Seafloor and Seep Sampling Program, 2017-2027; • Polarcus UK Ltd. Eastern Newfoundland Offshore 2D, 3D and 4D Seismic Program 2018-2028; • CNOOC Petroleum North American ULC Newfoundland and Labrador Offshore Geophysical, Geochemical, Environmental and Geotechnical Program, 2018-2023;

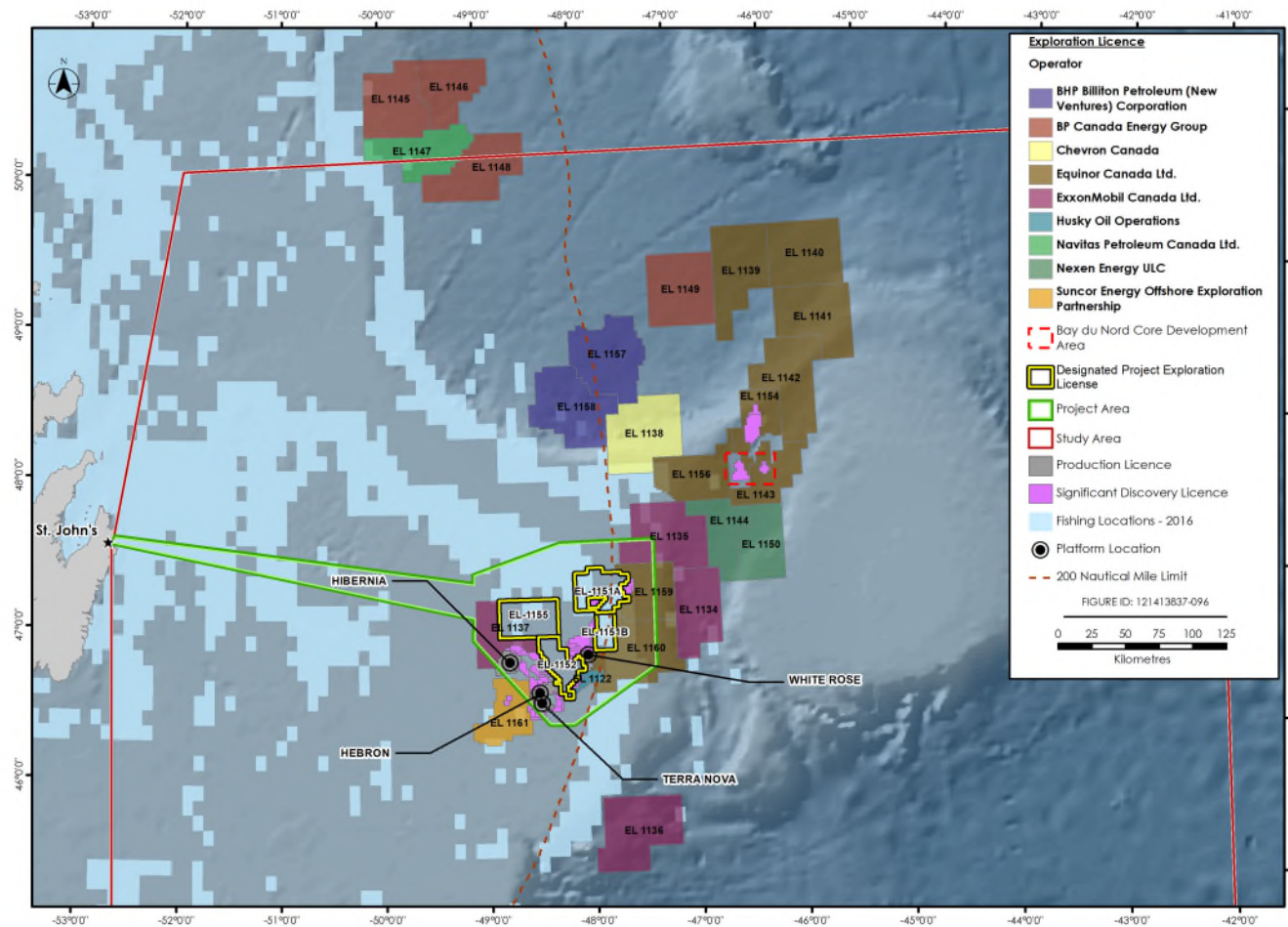


Project / Activity	Overview
	• Multiklient Invest AS Newfoundland Offshore Seismic Program, 2018-2023; • BP Canada Energy Group ULC – Ephesus Prospect ROV Survey 2019-2024; and • Capelin 3D Seismic Survey of EL 1138 Offshore Newfoundland and Labrador (2018-2021);
Fishing Activity	Commercial fisheries within and around the project area are extensive and diverse. Commercial fishing activities are currently ongoing and will continue for the foreseeable future.
Other Marine Vessel Traffic	Vessel traffic includes tanker traffic and supply vessels associated with the existing offshore oil developments, as well as cargo ships, navy ships, and fishing vessel traffic. Occurs through the study area, throughout the year.
Hunting Activity	Wildlife (especially seabird) populations off Newfoundland and Labrador are subject to hunting. Although little or no hunting is expected to occur in the project area, hunting activities do affect the bird and seal populations that occur in the regional study area.

Figure 6 illustrates the exploration projects currently proposed in the offshore of Newfoundland and Labrador.



Figure 6: Other Activities and Exploration Licences in Newfoundland Offshore Area in Relation to the Project Area and Exploration Licences



Source: Husky Oil Operations Limited 2019; ExxonMobil Canada Limited 2019



Potential Cumulative Environmental Effects on Fish and Fish Habitat

Marine fish and their habitats have been and are being affected by a variety of anthropogenic and natural influences including geophysical survey programs, exploration drilling and production projects, commercial fisheries, and other ocean users. The Project may contribute to cumulative effects on fish, including species at risk, and fish habitat as a result of residual changes in mortality or physical injury and residual changes in fish habitat quality and associated use.

The proponents assessed the potential cumulative residual environmental effects on fish and fish habitat from underwater sound emissions generated by the Project, geophysical survey programs, offshore exploration drilling or production projects, commercial fisheries and other ocean users. The presence of vessels or drilling activity could locally displace species from the area around operating VSP surveys, seismic, sounding, profiling, or sonar sound sources. Most species would avoid underwater sound and the implementation of ramp-up procedures of the drilling-associated source array in accordance with the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* would mitigate for underwater sound (refer to marine mammals and sea turtles [Section 6.2] for more information). Project activities and non-project related marine transportation generate underwater sound that has the potential to change habitat quality and use for fish. However, the contribution of a small number of project vessels is not expected to considerably increase the amount of ambient sound in the study area.

There is the potential for cumulative effects from discharges of drill muds and cuttings when considered with other drilling projects. Project-related drilling mud and cuttings above one millimetre thickness may smother marine benthos within a distance of approximately 250 metres from the drill centre. Affected areas from different drilling projects would not likely overlap spatially but could result in additive effects for benthic fish species in the project area, thereby potentially contributing to a cumulative change in risk of mortality or physical injury.

Species whose ranges cover a large extent of the study area may be exposed to various sources of underwater sound and discharges throughout their lifecycle. This cumulative change in habitat quality and use has the potential to disrupt reproductive, foraging and feeding, and migratory behaviour if the availability of important habitat areas is affected. Routine discharges from the Project and other project activities would comply with the *Offshore Waste Treatment Guidelines* and MARPOL (as applicable) at levels that are intended to prevent damage of the marine environment limiting their effect on habitat quality and use.

The change in risk of mortality or physical injury predicted for the Project could also combine with the effects that commercial fishing can have on benthic organisms and fish. However, the current level of commercial fishing within the project area is limited compared to other regions on the Grand Banks and DFO manages commercial fisheries to keep fish populations at sustainable levels.

Potential Cumulative Environmental Effects on Marine Mammals and Sea Turtles

Ongoing and future activities that may affect marine mammals and sea turtles include geophysical surveys, fishing activity, vessel traffic, and other offshore oil and gas exploration and production programs. Project and non-project activities could contribute to underwater sound emissions in the study area, resulting in a cumulative change in the risk of mortality or physical injury. The resultant cumulative increase in ambient underwater sound levels may adversely affect marine mammals through the masking of biologically significant sounds as well as avoidance behaviours (refer to marine mammals and sea turtles [Section 6.2] for more information).

The presence and sound of Project and non-project related helicopters and other aircraft has the potential to elicit temporary diving responses in marine mammals. However, the residual environmental effects of helicopter traffic would be spatially and temporally limited so that potential cumulative interactions are not anticipated to result in a substantial change in habitat quality and use for marine mammals.



Underwater sound from third-party physical activities may interact with the Project and cause a change in habitat quality and use that has the potential to disrupt reproductive, foraging and feeding, and migratory behaviour of marine mammals and sea turtles if the availability of important habitat areas, including designated special areas, are affected.

There is a cumulative change in risk of mortality or physical injury for marine mammals and sea turtles due to increased potential for strikes with vessels or entanglement with seismic or fishing gear. The Project would involve one additional supply vessel per week transiting in support of the Project which would be minimal compared with ongoing shipping activity in the study area as offshore operators employ numerous supply vessels which make more than 1000 transits a year. In general, Project related and non-project vessels would be short-term and transient in nature, thereby limiting opportunities for vessel strikes.

The proponents stated that with the application of proposed mitigation and environmental protection measures, residual cumulative environmental effects on marine mammals and sea turtles are predicted to be not significant. No additional mitigation measures are proposed to mitigate potential cumulative environmental effects on marine mammals and sea turtles and no additional monitoring or follow-up are proposed.

Potential Cumulative Environmental Effects on Migratory Birds

Underwater sound emissions from Project-related activities may interact with sound emissions from third-party physical activities potentially resulting in a cumulative change in risk of mortality or physical injury to diving migratory birds. However, diving migratory birds appear to be less sensitive to underwater sound emissions than fish, marine mammals or sea turtles.

Atmospheric sound emissions generated by the Project, production facilities (e.g., Hibernia Oilfield, Terra Nova Oilfield, White Rose oil and gas field and White Rose Extension Project, Hebron Oilfield), and other third-parties may result in cumulative effects and cause a temporary reduction in the amount of bird habitat available within the study area due to temporary avoidance of multiple areas at once. The cumulative change in habitat quality and use has the potential to disrupt reproductive, foraging and feeding, and migratory behaviour if the availability of important habitat areas, including designated special areas is affected. However, the proponents considered this unlikely due to the lack of special areas of importance for reproduction, foraging and feeding, and/or migration of birds within the project area and that the affected areas represent a small portion of the total amount of bird habitat available in the study area.

Migratory birds with large ranges may be exposed to atmospheric sound emissions and discharges from various Project and non-project related sources throughout their life cycle, potentially resulting in a cumulative change in habitat quality and use. Discharges of cuttings have the potential to affect water quality within a localized area as the discharges migrate through the water column. These discharges may result in small sheens under certain conditions which could affect migratory birds as migratory birds are particularly vulnerable to hydrocarbon contamination. The amount of persistent oil in the marine environment from marine traffic is very high along Newfoundland coastlines. Project activities would comply with the *Offshore Waste Treatment Guidelines* and the MARPOL (as applicable) which are generally not associated with the formation of a slick and therefore unlikely to cause a measurable cumulative change in risk of mortality or physical injury to migratory birds.

It is possible that helicopter traffic from the Project and other non-project related activities could strike flying birds thus contributing to a cumulative change in risk of mortality and injury. Project and non-project related helicopter activity could also cause a change in habitat quality and use for migratory birds. However, the proponents stated that out of 4000 to 5000 flying hours annually providing helicopter services to offshore installations in the Jeanne d'Arc Basin, there was a total of five bird strikes from 2005 to 2011. The proponents stated that project related helicopter activity would represent a small increase in the overall aircraft traffic within the study area. The effects would be minimal and spatially and temporally limited.

Artificial lighting associated with the Project would contribute to the total amount of night lighting from other sources including lighting on survey and support vessels, other offshore exploration and production projects,



fishing vessels, and the vessels of other ocean users. Artificial night lighting or flaring can attract or disorient birds causing a cumulative change in risk of mortality or physical injury due to potential increased stranding, and increased opportunities for predation, collisions, exposure to vessel-based threats and emissions.

The proponents stated that with the proposed mitigation and environmental protection measures, residual cumulative effects on migratory birds is predicted to be not significant. No additional mitigation measures, monitoring or follow-up were proposed for migratory birds (refer to migratory birds [Section 6.3] for more information).

Potential Cumulative Environmental Effects on Special Areas

There are no special areas located in the exploration licences within the Project. However, the Eastern Avalon Ecologically and Biologically Significant Area overlaps the Project's transit route. Given the distance from the project area to other special areas, the potential for cumulative interactions associated with the Project would be limited. Marine discharges from the Project and non-project activities could result in cumulative effects within the Northeast Slope (3L) Ecologically and Biologically Significant Area, the Flemish Pass/Eastern Canyon (2) NAFO Fisheries Closure Area, Northwest Flemish Cap NAFO Fisheries Closure Area, and the Beothuk Knoll Vulnerable Marine Ecosystem, all of which are located within or near the project area (i.e., where the Project would have a residual effect on water quality). Drilling mud and cuttings have the potential to be dispersed up to 12 kilometres at a thickness of 0.1 millimetres from each wellsite; given that the nearest special area is 43 kilometres from the exploration licence no cumulative effects would be anticipated from drilling mud and cuttings.

Underwater sound from Project and non-project related activities has the potential to cause cumulative effects with the Northeast Slope (3L) Ecologically and Biologically Significant Area which supports Spotted Wolffish, Greenland Halibut; contains two important coral areas; and is a known feeding area for marine mammals particularly harp seals. Underwater sound could also cause cumulative effects within the Flemish Pass/Eastern Canyon, Northwest Flemish Cap and Beothuk Knoll NAFO Fisheries Closure Areas which support cold-water corals and sponges that are important habitats for feeding, breeding and spawning areas for numerous species.

Sound from Project and non-project related helicopters could cause cumulative effects within the Northeast Slope (3L) Ecologically and Biologically Significant Area and the Eastern Avalon Ecologically and Biologically Significant Area. Cumulative effects from atmospheric sound is not expected to overlap with special areas.

The proponents stated that with the proposed mitigation and follow-up measures described in fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3) and commercial fisheries (Section 6.6), residual cumulative effects on special areas are predicted to be not significant. No additional mitigation measures, monitoring or follow-up were proposed for special areas.

Potential Cumulative Environmental Effects on Fisheries and Other Ocean Users

Commercial fisheries may experience cumulative effects from the safety exclusion zone established around the MODU. The safety exclusion zone for a MODU ranges from 500 to 1500 metres depending on water depth, design and the number of anchors. The safety zones increase the cumulative area that would be temporarily unavailable to fishers. However, the proponents stated that the project area does not include unique fishing grounds or a concentrated fishing effort that occurs exclusively within the project area, nor is it likely to represent a substantial portion of a customary fishing area for any fisher. The physical activities within the study area have some potential to inadvertently result in damage to fishing gear. Project related damage to fishing gear, if any, would be compensated in accordance with the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity* (refer to commercial fisheries [Section 6.6] for more information). Standard practices for at-sea communication among marine users, including the issuance of Notices to Mariners and Navigational Warnings (as appropriate), is expected to mitigate potential conflicts with fisheries as well as other ocean users.



Potential Cumulative Environmental Effects on the Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples

The proponents stated that cumulative effects could occur with respect to communal commercial fisheries such as: the temporary displacement from fishing grounds due to the establishment of safety exclusion zones by the Project, Hibernia, Terra Nova, White Rose, Hebron and the proposed exploration projects; conflicts between fishing vessels and vessels associated with other activities; increased competition with other displaced fishers over remaining fishing areas; and risk of gear loss or damage caused by the Project and non-project related activities. Project activities may also interact with migratory birds and seal species traditionally and currently hunted by Indigenous communities due to attraction to lights, flares and underwater sound emissions from Project and non-project related activities. The proponents predicted a negligible cumulative change in traditional use for Indigenous people and community values.

The proponents stated that with the proposed mitigation and environmental protection measures, residual cumulative effects on the current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples is predicted to be not significant. No additional mitigation measures, monitoring or follow-up were proposed for the current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples (refer to current use of lands and resources for traditional purposes and health and socioeconomic conditions of indigenous peoples, [Section 6.7] for more information).

7.3.2. Views Expressed

Federal Authorities

The Agency required the proponents to revise the assessment of cumulative effects on marine mammals and sea turtles taking into account factors including the spatial extent of effects from activities and associated cumulative effects of multiple zones of avoidance. The proponents anticipated that the threshold for behavioural effects for marine mammals exposed to continuous sound would be exceeded due to the cumulative sound levels from the Project and other sources including drilling activities, seismic surveys and vessel traffic. The proponents asserted, however, that there is no indication of avoidance behavior by common offshore marine mammals species, associated with the level of activity and associated sound levels in the project area. The proponents concluded that residual cumulative effects could potentially extend beyond the project area if project activities occur less than 56.8 kilometres from the exploration licence boundary. No additional mitigation and follow-up measures were identified as required.

DFO required the proponents provide analysis to support the cumulative effects conclusion for fish and fish habitat. The proponents referenced project-specific drill waste dispersion modelling, the small footprint of the wells within the project area, and findings from ongoing environmental effects monitoring programs conducted by the proponents for other offshore project to support the conclusion that the Project would not have a significant cumulative effect on fish and fish habitat. The proponents would also comply with applicable regulations (e.g., *Offshore Waste Treatment Guidelines*, MARPOL).

ECCC advised the cumulative effects of artificial light have created a significant footprint in the offshore that did not exist a few decades ago, specifically noting that the cumulative effect of multiple artificial light footprints in a previously pristine environment needs to be taken into account. The proponents presented information on the potential change in habitat quality and use from project-related artificial night lighting in combination with that from other physical activities and acknowledged that the Project could have potential cumulative effects on migratory birds. The Project is located within an area with existing production facilities that emit a large amount of artificial light (i.e., the Project is not occurring in a previously pristine/dark



environment), and light pollution is a global-scale problem. Thus, the proponents concluded that the cumulative effect of artificial lighting from the Project would occur in the context of moderate disturbance and represents only a small, incremental increase in artificial lighting in the project area that is temporary, localized and reversible.

DFO and ECCC advised that the mitigation measures, monitoring, and follow-up programs proposed by the proponents as well as those recommended by the Agency would adequately address the potential cumulative environmental effects on migratory birds, fish and fish habitat, and marine mammals and sea turtles, including applicable species at risk, as well as on commercial fishing and special areas.

Indigenous Peoples

Several Indigenous groups, including Première Nation des Innus de Nutashkuan, Conseil des Innus de Ekuanitshit, and Elsipogtog First Nation, expressed concern related to the cumulative effects of the Project, in particular the cumulative effects associated with sediment contamination on fish and fish habitat from multiple projects. DFO asked for rationale to support the prediction of no significant effects with a high level of confidence and the proponents' response is summarized above.

WNNB was concerned that the proponents did not consider potential changes to migratory bird seasonal migrations and that the existing production platforms in close proximity to the project area have the potential to interfere with cues used by migratory birds during migration. The proponents recognized that there is the potential for multiple influences on migratory birds based on the presence of the production platforms in the project area. However, they stated that the distance between the projects would allow birds to pass between projects without being affected. The proponents stated that the cumulative effects summary and conclusion presented in the EIS remained valid.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Fish, Food and Allied Workers – Unifor was also concerned that the cumulative effects assessment did not fully examine the effects of seismic programs, drilling, produced water, and oil spills on fish and fish habitat for projects over the last 60 years of offshore exploration and development.

7.3.3. Agency Analysis and Conclusion

The Agency has considered the analysis of cumulative environmental effects provided by the proponents, advice from federal authorities and comments from Indigenous groups, and is of the opinion that the residual environmental effects of the Project could interact cumulatively with the effects of other projects and activities.

Fish and fish habitat in the study area may be affected by the Project in combination with effects of other projects and activities. While most mobile fish species, including Atlantic Salmon, have higher potential to interact with multiple projects, these species also generally have higher avoidance capabilities and access to alternative habitats. Given the limited zone of influence and short-term nature of project-related disturbances on these species, potential cumulative effects of the Project would be limited.

The Agency noted that the proponents' cumulative effects assessment was generally qualitative in nature, including its analysis of potential accumulation of drill cuttings from multiple wells. Through a review of available information and based on the proponents' modelling of drill cuttings deposition, the Agency conducted a more quantitative assessment of the potential of cumulative effects from accumulation of drill cuttings from multiple Project wells. The drill cuttings dispersion modeling conducted for the White Rose Extension Project used by the proponents to estimate effects for this Project, indicated that drill cuttings would be deposited with a thickness greater than one millimetre to a maximum radius of 250 metres. If it is assumed that drill cuttings are deposited in a roughly circular area this would equate to an area of 0.196 kilometres



squared per well. The Agency calculated that if all ten potential exploration wells were drilled within one exploration licence, the maximum area covered with drill cuttings would be 0.14, 0.27, and 0.16 percent of exploration licences 1151A, 1151 B; 1152; and 1155, respectively.

The Agency also evaluated the potential for overlapping spatial areas of drill cuttings dispersion from exploration drilling projects in the area. Depending on the location of the exploration wells there is the potential that two of the proposed exploration projects (i.e., ExxonMobil Canada Limited Eastern Newfoundland Offshore Exploration Drilling Project and Equinor Canada Limited Central Ridge Exploration Drilling Project) could have cumulative effects on fish habitat from drill cuttings and chemical contaminants as their exploration licences are adjacent to one of the proposed Project's exploration licences. Further, based on a review of the C-NLOPB's Schedule of Wells Summary (as of October 31, 2019), 251 development, 60 exploration and 54 delineation wells were drilled in the Jeanne d'Arc Basin over the past 50 years; some of these, particularly those drilled in more recent years, may have had effects in the Project's exploration licences. Although the drill cutting deposits from all these wells would not overlap with the project area, the individual effects could contribute to the overall effect on benthic species.

However, the Agency also notes that ongoing environmental effects monitoring programs for petroleum production projects have demonstrated localized (i.e., less than ten kilometres) geographic effects on fish habitat from drill cuttings and chemical contaminants, as well as being temporally limited to one to four years. This suggests a potential for limited cumulative environmental effects between the Project and for ongoing petroleum production projects given only the White Rose oil and gas field and White Rose Extension Project is located within ten kilometres of a Project exploration licence. Furthermore, cumulative environmental effects on benthic species are predicted to be unlikely or minimal given the requirement for the proponents to relocate drilling activities or discharges if aggregations of environmentally-sensitive species are identified during pre-drill surveys (refer to fish and fish habitat [Section 6.1] for complete mitigation requirements). As no special areas overlap with exploration licences and only the Eastern Avalon Ecologically and Biologically Significant Area overlaps with the transit route the cumulative environmental effects would similarly be limited. The proponents would be required to implement mitigation measures related to fish and fish habitat (Section 6.1) and special areas (Section 6.4) to reduce the effects of drill cuttings and mud dispersion from the Project as well as follow-up monitoring of drill cuttings extent and thickness.

Marine mammals and sea turtles in the eastern Newfoundland offshore area may be affected by the Project in combination with effects of other exploration and production activities as well as effects of vessels from shipping, fishing, and other activities. The potential cumulative effects of sound on marine mammals are of particular concern; baseline sound levels in the project area measured in 2015 and 2016 exceeded the behavioural effect threshold for marine mammals. Based on the proponents' predicted zone of influence for sound and based on information available for other offshore exploration and production projects in the region, the Agency has identified the four existing production platforms and at least three existing and five proposed exploration drilling projects for which sound estimates are available, could spatially overlap with the Project resulting in cumulative effects. The proponents noted that it is unknown if the current sound levels in the project area are causing behavioural disturbance.

The proponents would be required to implement mitigation measures to reduce the effects of sound from the Project on marine mammals and sea turtles (Section 6.2), as well as potential effects on marine mammals and sea turtles from other potential project interactions, which would in turn reduce the Project contribution to cumulative effects. In addition, given uncertainties about the effects of sound, the proponents would be required to verify sound predictions from drilling installations and provide the results to DFO and the C-NLOPB.

The Project would contribute to an increase in night lighting in the eastern Newfoundland offshore area. Based on the proponents' zone of influence for lighting, it is likely that the Project would result in light effects which overlap with all four of the existing production facilities as the maximum predicted zone of influence is 16 kilometres and the furthest production facility is the Hibernia Oilfield located 18.5 kilometres from the edge of exploration licence 1155. In addition, a MODU in either exploration licence 1151A, 1151B, 1152 or 1155



may have light effects which overlap with the proposed ExxonMobil Canada Limited Eastern Newfoundland Offshore Exploration Drilling Project, Equinor Canada Limited Central Ridge Exploration Drilling Project or Suncor Energy Offshore Exploration Partnership Tilt Cove Exploration Drilling Project which are proposed in exploration licences adjacent to the Project's exploration licences or within 15 kilometres of exploration licence 1152.

Additionally, the Agency notes ECCC's advice on previous exploratory drilling projects in the Newfoundland offshore, that the basis for the cumulative effects analysis should be the presence of artificial lighting along foraging flight paths and not spatially overlapping light sources. In this context, the Project has a greater potential to act cumulatively with the effects of other offshore projects and activities on migratory birds by contributing to a small increase in the total amount of artificial lighting in the southwestern portion of the study area, which overlaps directly with the foraging flight paths of many species of migratory birds, including the Leach's Storm-Petrel. However, the Agency notes that the presence of the MODU would be short-term (up to 80 days for drilling); and the effects of light would be spatially limited relative to the overall study area. In addition, the proponents would be required to implement mitigation to reduce light attraction and implement a protocol for daily monitoring for the presence of stranded birds. The results of monitoring would also be shared and would increase the level of information regarding potential effects and inform the need for additional mitigation, if applicable.

Commercial fishing could be affected by the Project and other petroleum activities given that additional safety exclusion zones would be created as part of the Project. However, the contribution of the Project to cumulative environmental effects is predicted to be minor given the small size and short-term duration of safety exclusion zones.

The potential for cumulative environmental effects in the eastern Newfoundland offshore area have been raised as a concern by Indigenous groups, due to the number of potential projects that could occur. Given these potential activities, the Government of Canada is working with the Province of Newfoundland and Labrador and the C-NLOPB on a Regional Assessment for offshore exploratory drilling in the offshore area of eastern Newfoundland¹⁴, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects. In advance of the Regional Assessment, operators are working together in conducting effects analyses (including for this Project), engaging Indigenous groups, and identifying research needs (e.g., migration and effects to Atlantic Salmon).

In conducting the review of this Project, the Agency has identified mitigation measures, as well as follow-up and monitoring, related to fish and fish habitat, marine mammals and sea turtles, migratory birds. These measures would reduce Project-specific effects, reducing their contribution to cumulative effects; and verify the accuracy of the predictions made during the environmental assessment. The proposed monitoring and follow-up would also enhance the understanding, and reduce the uncertainty, with respect to the potential effects from offshore exploratory activities, potentially contributing to the wider analysis of cumulative effects as part of the Regional Assessment.

Key Mitigation Measures to Avoid Significant Effects

Mitigation, follow-up, and monitoring for this Project would contribute to the mitigation or monitoring of cumulative environmental effects. Additional measures have not been identified at this time but could be recommended for future projects following completion of the regional assessment.

¹⁴ Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador: <https://iaac-aeic.gc.ca/050/evaluations/proj/80156>



Agency Conclusion

Taking into account the implementation of the mitigation measures proposed for the Project, the Agency concludes that the Project is not likely to cause significant adverse cumulative environmental effects.



8. Impacts on Potential or Established Aboriginal or Treaty Rights

8.1. Potential or Established Aboriginal or Treaty Rights

The Project would be located in the northwest Atlantic Ocean, with the nearest potential drilling location approximately 350 kilometers from land and roughly 800 kilometres from the nearest Indigenous community on the island of Newfoundland. There are no recognized treaties overlapping the exploration licences or the larger project area. Since there are no Aboriginal or treaty rights in the project area, the pathways for potential impacts to rights of Indigenous groups are through impacts from project activities to migratory species that are harvested or fished within Indigenous groups' traditional territories. The potential impacts were examined considering project operations and accidents or malfunctions.

Migratory species of particular concern to Indigenous groups include Atlantic Salmon, seals, whales, migratory birds, Swordfish, Bluefin Tuna, and American Eel. Effects assessments on migratory species are summarized in fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3).

Labrador

The Nunatukavut Community Council asserts an Aboriginal right to hunt, fish, and gather throughout its asserted traditional territory within Labrador and to resources along the offshore area immediately adjacent to the Labrador coast. The NunatuKavut Community Council holds food, social, and ceremonial fishing licences for species that may migrate between the project area and the Labrador coast.

The Innu of Labrador (Innu Nation), who reside primarily on two reserves, Sheshatshiu in central Labrador and Natuashish on the North Coast of Labrador, assert Aboriginal rights to hunt, fish, and gather resources within Labrador and along the Labrador coast. Innu Nation holds food, social, and ceremonial fishing licences for species that may migrate between the project area and the Labrador coast.

The Nunatsiavut Government is an Inuit regional government within Newfoundland and Labrador. In 2005, the *Labrador Inuit Lands Claims Agreement*, a modern-day treaty between the Province of Newfoundland and Labrador, the Government of Canada, and the Inuit of Labrador, was signed. The project area is located greater than 500 kilometres southeast of the Labrador Inuit Settlement Area, however, the Nunatsiavut Government holds food, social, and ceremonial fishing licences for species that may migrate between the project area and the Labrador Inuit Settlement Area.

Nova Scotia, New Brunswick and Prince Edward Island

Nova Scotia, New Brunswick, and Prince Edward Island Indigenous groups (Maritime First Nations) are signatories to Peace and Friendship Treaties, which provide the right to fish for a moderate livelihood. In addition, the Maritime First Nations have an established Aboriginal right to harvest migratory species within their traditional territories for food, social, or ceremonial purposes. This includes on land and in the marine environment. Although the Project is located approximately 1000 kilometres east of Nova Scotia, endangered



Atlantic Salmon populations, which Maritime First Nations have traditionally harvested in their territories, may pass through the project area as they migrate to or from their natal rivers located within these territories.

Quebec

Conseil des Innu de Ekuanitshit and Première Nation des Innus de Nutashkuan, who reside on the north shore of the Gulf of St. Lawrence, assert an Aboriginal right to harvest Atlantic Salmon (and other migratory species) for food, social, or ceremonial purposes in their territories, including on Anticosti Island, Quebec. Atlantic Salmon populations from the Gulf of St. Lawrence may pass through the project area during migration to or from their natal rivers located within the territories of these Innu Nations of Quebec.

Mi'gmaq of Gesgapegiag, Nation Micmac de Gespeg, and Listuguj Mi'gmaq Government (represented by MMS) are part of the Peace and Friendship Treaties, which provide the right to fish for a moderate livelihood. In addition, the Mi'gmaq of Quebec have an established Aboriginal right to harvest migratory species within their traditional territories for food, social, or ceremonial purposes, including Atlantic Salmon that may pass through the project area as they migrate to or from their natal rivers located within these territories.

8.2. Potential Adverse Impacts of the Project on Potential or Established Aboriginal or Treaty Rights

This section summarizes how the Project may impact potential or established Aboriginal or treaty rights. Appendix C provides a summary of concerns identified by Indigenous groups during this EA.

Proponents' Assessment

The proponents stated that most project-related activities would take place in an offshore marine environment, hundreds of kilometres from Indigenous communities. Project-related emissions and discharges and environmental interactions would be localized and short-term in nature, and are unlikely to extend to or affect the physical or social health and well-being or other socioeconomic conditions of an Indigenous community.

The proponents determined through existing documentation and engagement with Indigenous communities, that there are no food, social, or ceremonial licences within or near the project area. Indigenous communities do not otherwise undertake the current use of resources in the marine environment for traditional purposes within or near these areas. This does not mean that those Indigenous communities would not fish in those areas in the future. However, given the nature of the Project, including their limited, localized, and short-term environmental disturbances, and the associated small safety exclusion zone (approximately one square kilometre), it is not anticipated that there would be adverse effects to any such fishing activity, even if it did occur in the project area over the course of the Project.

With regards to migratory marine species, and Atlantic Salmon in particular, the proponents noted that Labrador populations of Atlantic Salmon are unlikely to migrate through the project area, but individuals from the island of Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, and the Gulf of St. Lawrence could pass through the project area to and from their maturation and winter feeding grounds in the Labrador Sea and off Greenland. In addition, individuals appear to congregate south of the project area, near the southern and eastern slopes of the Grand Banks, and east of the Strait of Belle Isle prior to migrating back to natal rivers. The proponents stated that there is little to no data to support the project area being used by Atlantic Salmon as overwintering habitat or as a major feeding area (see fish and fish habitat [Section 6.1] and species at risk [Section 6.5] for additional detail). Furthermore, they stated that the potential effects of



planned project activities and overall risks to Atlantic Salmon is low and would not contribute to or exacerbate declines to salmon populations.

The proponents identified uncertainty in predicting the effect of the Project on Atlantic salmon due to the limited data on their ocean migration behaviour. They stated that the understanding of salmon migration continues to evolve, and additional data on migratory routes of salmon may supplement the broad research ongoing by DFO, Indigenous groups, and the Atlantic Salmon Federation. Consequently, the proponents, in collaboration with research partners (potentially including Indigenous communities), are pursuing additional research to address knowledge gaps regarding Atlantic Salmon migration through organizations such as the Atlantic Salmon tagging program by the Atlantic Salmon Federation and potential initiation of new studies through the ESRF, which sponsors environmental and social studies associated with oil and gas exploration and development. The ESRF is designed to assist in the decision-making process related to oil and gas exploration and development on Canada's frontier lands. In August 2018 and March 2019, Husky Oil Operations Limited deployed an acoustic receiver within its White Rose oil and gas field in offshore Newfoundland to record the presence of any tagged species, including Atlantic Salmon and American Eel. In addition ExxonMobil Canada Limited deployed two acoustic receivers offshore Newfoundland in July 2019. Another is planned to be deployed just outside the White Rose oil and gas field. Data collected from these receivers would be made public through the Ocean Tracking Network, a global aquatic animal tracking network headquartered at Dalhousie University.

For other migratory species of interest to Indigenous groups, such as whales, birds, and American Eel, the proponents found that project activities would not adversely affect populations. Further, there would be no change in ability of Indigenous groups to harvest these species within the study area.

Effects assessments on migratory species of interest to Indigenous groups are summarized in fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3).

Accidental Spill

The proponents indicated that its oil spill modelling showed a limited potential for oil to reach traditional territories of Indigenous communities. Any potential effect from an oil spill would therefore be largely indirect, related to its potential effects on migratory marine species harvested by Indigenous groups. With appropriate mitigation in place, the proponents predicted that accidental events would not be expected to result in significant adverse effects on marine fish, birds or mammals. As such, the proponents stated that there would be little potential for indirect biophysical effects of a spill to decrease the quantity, quality, or health of marine species harvested by Indigenous groups to an extent that would compromise their ability to continue fishing and harvesting activities. Nevertheless, the proponents would implement various spill prevention and response measures to further reduce the likelihood of a spill and any resultant effects. Taking into account the spill response measures, the proponents found there would not be significant adverse effects to fish and Indigenous groups fishing activities from an accident or malfunction. See effects of accidents and malfunctions (Section 7.1) for further analysis and detail.

Views of Indigenous Groups

All participating Indigenous communities expressed concern about the potential for the Project to affect Atlantic Salmon and by extension to adversely impact the Aboriginal right to harvest salmon in their traditional territories. Salmon is a cultural keystone species for Indigenous communities in the Atlantic Region, and Indigenous knowledge demonstrated the vital role that salmon plays in culture and sustenance in communities. Project-related sound from operations, marine shipping associated with the Project, accidents and malfunctions, and cumulative effects were all cited as pathways by which migrating salmon could be adversely affected. Most Indigenous communities requested that the proponents consider the precautionary principle in their assessment owing to the at risk status of certain Atlantic salmon populations, the limited data on migration routes and overwintering locations, the high rates of at-sea mortality, climate change, and the



lack of information on specific effects of offshore drilling on these species. In responding to these concerns, the proponents considered additional research and data related to Atlantic Salmon. Additional information and analysis related to Atlantic Salmon has been summarized above and in fish and fish habitat (Section 6.1).

Several Indigenous communities, were concerned that drilling mud, cuttings, and accidental events may adversely affect breeding and feeding grounds of marine species and could impact food, social, and ceremonial fisheries.

Many groups including MTI, KMKNO, and NunatuKavut Community Council requested that the proponents develop Incident Management Plans, Spill Response Plans, Environmental Protection Plans, Safety Plans, and net environmental benefit analyses/spill impact mitigation assessment in consultation with Indigenous communities. MMS and KMKNO recommended that, in the event of a spill, the proponents be required to compensate for any loss of productivity of species harvested by the Mi'kmaq. The proponents in collaboration with other operators of exploratory drilling projects in the Newfoundland and Labrador offshore have developed an Indigenous Fisheries Communications Plan with all Indigenous groups which incorporates feedback from Indigenous groups. It outlines how to share information about spill response, consider concerns and issues, and share results and learning from response exercises with Indigenous groups, if requested. MTI relayed that it remains concerned about the risk of a spill affecting migration, spawning, or feeding grounds of species of importance to Mi'gmaq culture.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Agency Analysis

In analyzing the Project's impacts on potential or established Aboriginal or treaty rights, the Agency relied on information provided by the proponents and Indigenous groups.

Indigenous groups may fish species in their traditional territories that migrate through the project area. However, the Agency determined that because project activities would likely have limited effects on these fish species (Section 6) it would also likely have a low/negligible impact on the potential or established Aboriginal or treaty rights of Indigenous groups with food, social, and ceremonial licences to harvest migratory species. With respect to Atlantic Salmon, a species of particular concern to many Indigenous communities, DFO reviewed applicable information and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of this species. It advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region, and that salmon are likely to be present at some times of the year as they migrate through, to and from home rivers; however, this is not known to be a significant migration route or overwintering area. DFO has advised that potential effects of the Project on Atlantic Salmon are expected to be negligible to low and limited both spatially and temporally. Based on advice from DFO and the C-NLOPB, the Agency determined that limiting drilling activity to certain times of the year in an attempt to further mitigate potential effects on Atlantic Salmon was not warranted and would unnecessarily limit the timing of the proponents' drilling activities.

Although project activities would likely have limited effects on species that migrate through the project area, in the unlikely event of a major oil spill (discussed in effects of accidents and malfunctions, Section 7.1), there is potential for more serious effects on these species, particularly species at risk, and therefore potential impacts on the potential or established Aboriginal or treaty rights of Indigenous groups. The potential impacts from a spill event may decrease the quantity, quality and health of the fish and migratory birds harvested by Indigenous groups.

The Agency acknowledges the potential consequences of an accidental spill on Indigenous fishers and Indigenous communities. However, the probability of a major subsea blowout is very low and therefore the potential effects would be unlikely to occur. In the unlikely event of a blowout, spill modelling predicts that shoreline oiling would be unlikely, and if it occurred, generally minimal. The Agency notes that the proponents would be required to take all reasonable measures to reduce the probability of an accidental event and ensure it is prepared to respond effectively if an accidental event does occur. In conjunction with spill



response measures, any damages incurred by Indigenous fishers, including the loss of commercial or food, social, and ceremonial fisheries, would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*. The proponents would be required to develop a Fisheries Communication Plan, which would include procedures to communicate with fishers in the event of routine operations and accidental events. Indigenous groups would be notified in the development of spill response plans, and provided with the approved version (see effects of accidents and malfunctions, [Section 7.1] for additional details). The Plan would include sharing results of environmental monitoring and appropriate feedback mechanisms for the concerns of Indigenous groups, fishers and other ocean users.

8.3. Proposed Accommodation Measures

Mitigation measures and follow-up identified for fish and fish habitat (Section 6.1), marine mammal and sea turtles (Section 6.2), migratory birds (Section 6.3), commercial fisheries (Section 6.6), and accidents and malfunctions (Section 7.1) would also function as accommodation measures to minimize or avoid potential adverse impacts on potential or established Aboriginal or treaty rights. Key mitigation and follow-up measures identified by the Agency are provided in Appendix A. Key requirements related to potential impacts on rights include:

- ensure that all waste discharges and emissions from the drilling installation into the marine environment are in accordance with the *Offshore Waste Treatment Guidelines* and the MARPOL;
- plan and conduct VSP and wellsite/geohazard survey activity in consideration of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment;
- prepare follow-up programs for fish and fish habitat, marine mammals and sea turtles, and migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures. Share results of these programs with Indigenous communities;
- in consultation with Indigenous fishers, develop and implement a Fisheries Communication Plan to facilitate and coordinate communication with fishers;
- requiring the proponent to include in its Fisheries Communication Plan procedures to engage in two-way communication with Indigenous groups in the event of a spill requiring a tier 2 or tier 3 response;
- provide Indigenous group with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups prior to drilling. Include a procedure to communicate with all Indigenous fishers in the event of an accident or malfunction in the Fisheries Communication Plan; and
- compensate for any damages, including the loss of food, social, and ceremonial fisheries in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

Given the uncertainty about Atlantic Salmon and the importance of the species to Indigenous groups, the proponents have committed to undertake and contribute to research on the presence and distribution of Atlantic Salmon in the Eastern Canadian offshore areas.

8.4. Issues to be Addressed During the Regulatory Approval Phase

The regulatory approval phase, during which any federal permits or authorizations would be considered, would be completed after the EA is complete. In order to proceed, the Project requires authorization by the



C-NLOPB under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*. The proponents may also require *Fisheries Act* authorization and a *Species at Risk Act* permit from DFO. The federal government would consult Indigenous communities as appropriate prior to making regulatory decisions. The decision to undertake additional Crown consultation would take into consideration the consultation record for the EA.

8.5. Agency Conclusion

After taking into consideration the mitigation measures, the Agency concludes that routine project activities would likely have a low/negligible impact on potential or established Aboriginal or treaty rights of Indigenous groups. The Agency expects that any impacts would likely be low-magnitude, short-term, and reversible. Mitigation measures would ensure that there would be no interruption in the practice of rights and that rights could be practiced in the same or similar manner as before the Project. The Agency acknowledges that a blowout incident could have more serious repercussions, but has a very low probability of occurrence.

Taking into account the analysis of environmental effects of the Project and the related mitigation measures outlined for fish and fish habitat (Section 6.1), marine mammal and sea turtles (Section 6.2), migratory birds (Section 6.3), commercial fisheries (Section 6.6), and accidents and malfunctions (Section 7.1), the Agency concludes that the potential impacts of the Project on potential or established Aboriginal or treaty rights have been adequately identified and appropriately mitigated.

No specific follow-up measures are identified in relation to potential impacts on asserted or established Aboriginal and treaty rights; however, the Agency considers follow-up measures outlined for fish and fish habitat (Section 6.1), commercial fisheries (Section 6.6), and effects of accidents and malfunctions (Section 7.1) would also be effective in confirming potential impacts to potential or established Aboriginal and treaty rights.



9. Agency Conclusion

The Agency considered the proponents' EIS and responses to information requests from the Agency. Information requirements reflected the views of the public, government agencies, and Indigenous peoples. The Agency also considered the measures that would be implemented to mitigate the Project effects, as well as the follow-up (monitoring) measures to be implemented by the proponents.

The environmental effects of the Project and their significance have been determined using assessment methods and analytical tools that reflect current accepted practices of environmental and socioeconomic assessment practitioners, including consideration of the effects of potential accidents and malfunctions.

The Agency concludes that the proposed Jeanne d'Arc Basin Exploration Drilling Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in this EA Report.

The Agency has identified key mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of the decision statements in the event that the Project is permitted to proceed.



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11. Appendices

Appendix A: Key Mitigation and Follow-up Measures Identified by the Agency

Valued Component (VC)	Mitigation	Follow-up
Fish and Fish Habitat (Section 6.1)	• Prepare a pre-drill seabed investigation plan for each wellsite and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. The plan should be designed to: ◦ collect high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges; ◦ identify the equipment used for the surveys, to be operated by a qualified individual; and ◦ include information on survey transect length and pattern around each wellsite, which should be based on applicable drill cutting dispersion model results. Transects around anchor/ sites should extend at least 50 metres from the extent of each structure. • Based on approved plans, undertake a seabed investigation survey at each well location and around each anchor point prior to commencing drilling a well. Retain a qualified independent marine scientist to provide advice in real-time. • Provide the results of the seabed investigation survey to the C-NLOPB and DFO prior to commencing drilling. In addition, provide a description of additional mitigation and monitoring based on the results of the	• Monitor the concentration of synthetic-based mud on drill cuttings to verify that the discharge meets, at a minimum the performance target specified in the <i>Offshore Waste Treatment Guidelines</i>. Report results to the C-NLOPB. • For the first well on each exploration licence, and for any well where drilling is undertaken in an area determined by the seabed investigation survey to be sensitive benthic habitat, conduct specific follow-up monitoring, including: ◦ measurement of sediment deposition extent and thickness (e.g., core samples and/or high definition visual data) post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions; ◦ survey of benthic fauna present after drilling has been concluded; ◦ reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and ◦ results should be provided to Indigenous groups and posted online for public access. • Participate in or support research on the presence and distribution of Atlantic Salmon in the Eastern Canadian Offshore areas, and update the



Valued Component (VC)	Mitigation	Follow-up
	survey and predicted areas of sedimentation and disturbance. Results of the surveys should be provided to Indigenous groups and posted online for public access. • If aggregations of habitat-forming corals or sponges or other environmentally sensitive features are identified when undertaking the survey: ◦ relocate the well and/or redirect cuttings discharges to ensure that the drilling installation, anchors, or drilling mud and cuttings discharges will not affect them, unless not technically feasible. No drilling should occur before a decision is made by the C-NLOPB and DFO regarding appropriate mitigation and monitoring; or ◦ if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the well or redirect cuttings discharges, conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the <i>Fisheries Act</i> and related options for mitigation to reduce any identified risk. • Select chemicals to be used during the Project in accordance with the <i>Offshore Chemical Selection Guidelines</i> and use lower toxicity drilling mud and biodegradable and environmentally-friendly additives within muds and cements, where feasible. • Ensure that all discharges from the MODU meet the <i>Offshore Waste Treatment Guidelines</i>. • Transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility.	C-NLOPB and Indigenous groups annually on research activities. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups. • Implement the follow-up measures listed in marine mammals and sea turtles (Section 6.2) related to the verification of underwater sound as a result of the Project.



Valued Component (VC)	Mitigation	Follow-up
	• Ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL. • Conduct a pre-drill survey with qualified individual(s) at each wellsite to determine the presence of any unexploded ordnance or other seabed hazards. If any such ordnance or seabed hazard is detected, avoid disturbing or manipulating it, and contact the nearest Joint Rescue Coordination Centre and the C-NLOPB prior to commencing drilling to determine an appropriate course of action. • Implement mitigations listed in marine mammals and sea turtles (Section 6.2) related to the conduct of VSP surveys.	
Marine Mammals and Sea Turtles (Section 6.2)	• Conduct VSP and wellsite/geohazard surveys in accordance with or exceeding the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i>, including: ◦ establishing a safety (observation) zone of a minimum of 500 metres around the sound source; ◦ implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations; ◦ gradually increasing the sound source intensity over a period of at least 20 minutes (ramp-up), adopting a pre-ramp up watch of 30 minutes whenever survey activities are scheduled to occur, and delaying ramp-up if a marine mammal or sea turtle is sighted within the safety zone; and ◦ shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500-metre safety zone.	• Record and report the activities, observations, and results of the Marine Mammal and Sea Turtle Monitoring Plan to the C-NLOPB and DFO. Results should be provided to Indigenous groups and posted online for public access. • Promptly report any collisions with marine mammals or sea turtles to the C-NLOPB, DFO, and the Canadian Coast Guard Environmental Emergencies Reporting Number (1 800 565-1633) and notify Indigenous groups. • Verify predicted underwater sound levels with field measurements during the first well per exploration licence. Provide the plan on how this would be conducted to the C-NLOPB and DFO in advance of drilling, and the monitoring results after well suspension or abandonment, as directed by C-NLOPB and DFO. • Follow-up program results should be provided to Indigenous groups and posted online for public access.



Valued Component (VC)	Mitigation	Follow-up
	• To reduce risks of collisions with marine mammals and sea turtles (except during an emergency): ◦ limit supply vessels movement to established shipping lanes where they are available; and ◦ when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a marine mammal or sea turtle is observed or reported within 400 metres of the vessel. • In consultation with DFO, develop a Marine Mammal and Sea Turtle Monitoring Plan which includes marine mammal observer requirements using qualified individuals. Provide the plan to the C-NLOPB and DFO for review and approval 30 days prior to initiating activities. The plan would describe: ◦ monitoring during VSP and wellsite/geohazard surveys, including information on specific passive acoustic or equivalent technology monitoring configuration, to enable verification that species that may occur within the safety zone can be detected and to ensure ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the exploration licences. • Implement certain measures listed in fish and fish habitat (Sections 6.1) and migratory birds (Section 6.3) which are also expected to mitigate potential effects on marine mammals and sea turtles.	
Migratory Birds (6.3)	• Follow ECCC's (2016) <i>Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada</i>, which identifies procedures for safe capture and handling of different types of birds.	• Prepare follow-up programs in consultation with ECCC to monitor effects on migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures. The follow up program requires the following two key components:



Valued Component (VC)	Mitigation	Follow-up
	• Control project lighting, including the direction, timing, intensity and glare of light fixtures, while meeting operational, health and safety requirements. • Restrict flaring to the minimum required to characterize a well's hydrocarbon potential, and as necessary for the safety of the operation. • Where acceptable to the C-NLOPB, conduct formation testing using a drill pipe conveyed test assembly, or similar technology, rather than formation testing with flaring. • If formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to: ◦ determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC); and ◦ identify how adverse environmental effects on migratory birds would be avoided, including opportunities to reduce night-time flaring. • Operate a water-curtain barrier around the flare during flaring. • Implement all mitigation listed in fish and fish habitat (Section 6.1) related to chemical selection, waste discharge and the disposal of spent synthetic-based muds, as well as those in special areas (Section 6.4) related to the maintenance of buffers for supply and support vessels and helicopters over active bird areas and special areas for birds.	◦ conduct monitoring for migratory birds from the MODU using a trained observer following ECCC's <i>Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms</i> (Gjerdrum et al. 2012); ◦ develop and implement a protocol for systematic daily monitoring for the presence of stranded birds (live or dead) on the MODU and supply vessels. The protocol would include information on frequency of searches, reporting procedures, and training requirements, including qualifications of those delivering the training. • If stranded birds are observed, follow ECCC's (2016) Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada. • Document and report the results of any monitoring activities, including information on level of effort when no birds are found and a discussion of whether the mitigation measures (e.g., water curtain) were proven effective and if additional measures are required. • Provide the monitoring and follow-up program and its results to the C-NLOPB and ECCC. Results should be provided to Indigenous groups and posted online for public access.
Special Areas (Section 6.4)	• Restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) over active bird colonies and to a lateral distance of 1000 metres from Cape St. Francis and Witless Bay	• Conduct follow-up monitoring when drilling in special areas, or adjacent to or near a special area, such that drill cuttings dispersion modelling predicts that cuttings deposition could occur within the



Valued Component (VC)	Mitigation	Follow-up
	Islands Important Bird and Biodiversity Areas (unless there is an emergency situation). • Ensure supply and other support vessels maintain a 300-metre buffer from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation).	special area at level above the biological effects threshold. Monitoring would include: ◦ measurement of sediment deposition extent and thickness post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions; ◦ survey of benthic fauna present after drilling has been concluded; ◦ reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and ◦ results should be provided to Indigenous groups and posted online for public access. • Implement all mitigation listed in fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3) and commercial fisheries (Section 6.6).
Federal Species at Risk (Section 6.5)	The Agency determined that the measures to mitigate potential effects on fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) would also mitigate potential effects on species at risk and critical habitat.	The Agency determined that the proposed follow-up measures for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3.) are also appropriate for species at risk and critical habitat.
Commercial Fisheries (Section 6.6)	• In consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include: ◦ regular updates to provide specific information on plans for project activities and an opportunity for feedback and further exchange of information on specific aspects of interest;	• Report annually to the C-NLOPB on whether there have been incidents of lost or damaged fishing gear as a result of interactions with Project components, including project-related vessels, and make this information available to Indigenous groups upon request. In addition, the Fisheries Communication Plan would provide a means of identifying potential issues should they arise.



Valued Component (VC)	Mitigation	Follow-up
	○ information on safety exclusion zones and suspended and abandoned wellheads; ○ procedures to notify fishers a minimum of two weeks prior to the start of drilling each well; ○ information on vessels travelling between Newfoundland and Labrador and exploration licences (e.g., number per week, general routes); and ○ procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during MODU movement and the use of a Fisheries Liaison Officer during geophysical programs. • Prepare a well abandonment plan, including a wellhead abandonment strategy and submit it to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with potentially affected Indigenous groups and commercial fishers. • Ensure that details of safety exclusion zones and the locations of abandoned wellheads, if left on the seafloor, are published in Notices to Mariners, provided in Navigational Warnings, and communicated to fishers. • Provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning. • Ensure ongoing communication with the NAFO Secretariat, using established information exchange mechanisms that are in place with DFO, regarding planned project activities, including timely	



Valued Component (VC)	Mitigation	Follow-up
	communication of drilling locations, safety exclusion zones, and suspended or abandoned wellheads. • Implement all mitigation listed in fish and fish habitat (Section 6.1) related to providing the results of the seabed investigation survey, wellhead abandonment procedures, selection of chemicals, disposal of spent synthetic-based muds, and the discharge of waste.	
Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples (Section 6.7)	The Agency determined that measures to mitigate effects on fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6) would also mitigate effects on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples.	The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples and notes that there are related measures proposed for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3), and commercial fisheries (Section 6.6).
Accidents and Malfunctions (Section 7.1)	• Undertake all reasonable measures to prevent accidents and malfunctions that may cause adverse environmental effects and effectively implement emergency response procedures and contingencies developed for the Project. • Submit a Well Capping and Containment Plan which includes strategies and measures for well capping, containment of fluids lost from the well, and the drilling of relief well(s), as well as options to reduce overall response timelines. The Well Capping and Containment Plan must include procedures to provide up-to-date information to the C-NLOPB prior to drilling and at regular intervals during drilling, related to the availability of appropriate capping stacks and vessels, and appropriate drilling rigs capable of drilling a relief well at the project site.	• As required by and in consultation with the C-NLOPB and ECCC, monitor the environmental effects of a spill on components of the marine environment until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include: ◦ sensory testing of seafood for taint, and chemical analysis for oil concentrations; ◦ measuring levels of contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to determine the fishing area closure status; ◦ monitoring for marine mammals, sea turtles, and birds for signs of contamination and reporting results to the C-NLOPB, DFO and ECCC; and



Valued Component (VC)	Mitigation	Follow-up
	• Prior to drilling, submit a Spill Response Plan which must include: ◦ procedures to respond to an oil spill (e.g., oil spill containment, oil recovery) and spills of other types (e.g., synthetic-based mud, cuttings spill); ◦ reporting thresholds and notification procedures; ◦ measures for wildlife response, protection, and rehabilitation (e.g., collection and cleaning of marine mammals, birds, and sea turtles, including species at risk) and for shoreline protection and clean-up, developed in consultation with the C-NLOPB; and ◦ specific role and responsibility descriptions for offshore operations and onshore responders. • Provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet. • Conduct an exercise of the Spill Response Plan prior to the commencement of project activities and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise to Indigenous groups following its review by the C-NLOPB. • Review and update the Spill Response Plan as required during drilling and before commencing a new well. • Prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the exploration licences and submit to the C-NLOPB for acceptance prior to drilling. • Undertake a net environmental benefit analysis/spill impact mitigation assessment to consider all realistic	◦ monitoring benthic organisms and habitats in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment. • Develop a procedure to communicate monitoring results to Indigenous and commercial fishers, as well as Indigenous groups.



Valued Component (VC)	Mitigation	Follow-up
	and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review prior to drilling. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Emergency Science Table. Publish the spill impact mitigation assessment on the Internet. • In the event of a uncontrolled subsea release from the well, begin the immediate mobilization of a capping stack and associated equipment to the site of the uncontrolled subsea release. Simultaneously, commence the mobilization of a relief well MODU. • If drilling is anticipated in water depths of 500 metres or less, undertake further analysis to confirm the capping stack technology selected can be deployed and operated safely at the proposed depth and submit this analysis to the C-NLOPB for approval. • Compensate for any damages, including the loss of food, social, and ceremonial fisheries in accordance with the <i>Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity</i>. • Include a procedure to notify Indigenous groups and commercial fishers in the event of an accident or malfunction in the Fisheries Communications Plan and to communicate the results of any associated monitoring and any potential health risks. Information that is provided to Indigenous groups and fishers needs to present a realistic estimation of potential health risks on consuming country foods, such that their consumption is not reduced unless there is a likely health risk from the consumption of these foods or specific quantities of these foods. If there is a	



Valued Component (VC)	Mitigation	Follow-up
	potential health risk, consumption advisories should be considered; and • Include procedures in the Fisheries Communications Plan to engage in two-way communication with Indigenous groups and commercial fishers in the event of a spill requiring a tier 2 or tier 3 response.	
Effects of the Environment on the Project (Section 7.2)	• In consultation with the C-NLOPB and ECCC, implement a physical environment monitoring program in accordance with the <i>Newfoundland Offshore Petroleum Drilling and Production Regulations</i> and meeting or exceeding the requirements of the <i>Offshore Physical Environmental Guidelines</i>. • In consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, high sea state, or sea ice or iceberg conditions. • In consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting, and avoidance or deflection of icebergs. • In consultation with the C-NLOPB, implement measures to ensure that drilling installations have the ability to quickly disconnect the riser from the well in event of an emergency or extreme weather conditions.	• In accordance with the <i>Newfoundland Offshore Petroleum Drilling and Production Regulations</i>, report annually to the C-NLOPB on whether there has been a need to modify operations based on extreme environmental conditions and on the efficacy of the practices and limits established for operating in poor weather, high sea state, or sea ice or iceberg conditions. The Agency notes that incidents and near misses involving collisions (including iceberg collisions) that result in or could result in a spill or unauthorized discharge or impairment to critical equipment would be posted on the C-NLOPB's website as part of its incident disclosure policy.
Cumulative Environmental Effects (Section 7.3)	Mitigation, follow-up, and monitoring for this Project would contribute to the mitigation or monitoring of cumulative environmental effects. Additional measures have not been identified at this time, but could be recommended for future projects following completion of the regional assessment.	



Appendix B: Summary of Proponents' Proposed Mitigation Measures and Follow-up

Valued Component	Mitigation	Follow-up
Fish and Fish Habitat (Section 6.1)	• Design lighting on the MODU to comply with requirements stipulated in the <i>Petroleum Occupational Safety and Health Regulations</i> to ensure safe operations. Avoid extraneous lighting, and point all lighting except navigational lighting downward. • Comply with the <i>Fisheries Act</i>, including potential requirements for habitat offsetting, if required Fisheries Act, to mitigate the loss of fish habitat. • Implement an Environmental Protection and Compliance Monitoring Plan based on the following regulations and guidelines: ◦ screen all chemicals as per the <i>Offshore Chemical Selection Guidelines</i> and Husky Oil Operations Limited's chemical management system and chemical screening program; ◦ limit all routine discharges (i.e., deck drainage, bilge water, cooling water) in accordance with the Offshore Waste Treatment Guidelines and the C-NLOPB-approved Environmental Protection Plan, Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals under the Canada Shipping Act, 2001 and the International Conventions for the Prevention of Pollution from Ships (MARPOL); ◦ macerate sewage waste to a particle size of less than six millimetres and discharge as per the <i>Offshore Waste Treatment Guidelines</i>; ◦ transport to shore for disposal or recycle waste discharges and domestic garbage not meeting <i>Offshore Waste Treatment Guidelines</i> requirements, and segregate garbage as required and in compliance with waste disposal requirements and Husky Oil Operations Limited's Waste Management Plan;	• Provide monthly compliance reports to the C-NLOPB, including volumes of liquid wastes discharged to the marine environment. • Conduct compliance monitoring and environmental effects monitoring as required. • Provide annual environmental updates to the C-NLOPB, detailing the specific activities to be conducted within the project area. The update would include changes (if any) to marine fish species at risk or species of conservation concern and critical habitat and discuss the potential effects of Project activities to marine fish species at risk or species of conservation and critical habitat. • Publish annual updates on the C-NLOPB website; and provide notification to Indigenous groups.



Valued Component	Mitigation	Follow-up
	◦ monitor concentration of synthetic-based mud on cuttings on the MODU for compliance with the <i>Offshore Waste Treatment Guidelines</i>; and ◦ comply with the Ballast Water Control and Management Regulations of the Canada Shipping Act, 2001 during ballasting and de-ballasting activities. • Preference for severance of the wellhead will be mechanical means. • Adhere to <i>Canada Shipping Act</i>, industry best practices and marine traffic rules and regulations will be followed by all offshore supply vessels. • Conduct a visual survey (using a remotely operated vehicle) of the seafloor prior the start of drilling to assess the presence of any aggregations of habitat-forming corals or sponges. Move the wellsite if sensitive environmental features are identified during the survey, to avoid affecting them if feasible to do so. If not feasible, consult with the C-NLOPB and DFO to determine an appropriate course of action. • Prohibit the discharge of any substance, wastes, residues or discharges not identified in the EPCMP.	
Marine Mammals and Sea Turtles (Section 6.2)	• Follow all applicable mitigations measures from the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i>, as required in the C-NLOPB's Geophysical, Geological, Environmental and Geotechnical Program Guidelines, during geophysical surveys, including passive acoustic monitoring as required. • Use Marine Mammal Observers to monitor and report on marine mammal and sea turtle sightings during VSP surveys. • Implement a ramp-up procedure (i.e., gradually increasing seismic source elements over a period of approximately 30 minutes until the operating level is achieved) before any VSP activity begins. This measure is aimed at reducing the potential for auditory injury	• Provide copies of the marine mammal and sea turtle observer reports to DFO and C-NLOPB following the marine mammal observer program. • Report any vessel strikes involving marine mammals or sea turtles to the Marine Animal Response Society or the Canadian Coast Guard. • Provide an annual EA update to the C-NLOPB, detailing the specific activities that will be conducted within the Project Area in a given year. Include changes (if any) to marine mammal and sea turtle species at risk/ Species of Conservative Concern and critical habitat and discuss the



Valued Component	Mitigation	Follow-up
	to marine animals near the source at the onset of the activity. It assumes that the gradual increase in emitted sound levels will provide an opportunity for marine animals to move away from the sound source before potentially injurious sound levels are achieved close to the source; • Delay ramp-up if any marine mammal or sea turtle is sighted within the 500 metre safety zone around the wellsite; • Implement shutdown procedures (i.e., shutdown of source array) if any marine mammal or sea turtle is observed within the 500 metre safety zone around the wellsite; • Have project-related vessel traffic avoid concentrations of marine mammals and sea turtles whenever possible; • Maintain a steady vessel course and safe vessel speed whenever possible, and have helicopters typically only reduce altitude on approach for landing; • Contact the Canadian Coast Guard through the nearest Marine Communications and Traffic Services if a vessel strikes a marine mammal or sea turtle; • Inform DFO within 24 hours of marine mammal and sea turtle emergencies; and Mitigation measures that apply to fish and fish habitat (Section 6.1) would also apply to marine mammals and sea turtles.	potential effects of project activities to marine mammal and sea turtle species at risk/ Species of Conservative Concern and critical habitat. • Provide annual updates that would be made public on the C-NLOPB website; and provide notification to Indigenous groups.
Migratory Birds (Section 6.3)	• Utilize lighting on the MODU that is designed to comply with the requirements stipulated in the <i>Petroleum Occupational Safety and Health Regulations</i> to provide safe operations, use no extraneous lighting and all lighting except navigational lighting would be pointed downward. • Aim to avoid flaring from mid-September to mid-October, which has been identified as a period of vulnerability particularly for storm-petrels and plan flaring associated with well testing such that it would not commence during night-time or periods of poor	• Conduct daily stationary platform surveys according to <i>Eastern Canada Seabirds at Sea</i> protocol from the safety stand-by vessel by crew trained in the <i>Eastern Canada Seabirds at Sea</i> protocol. Submit data annually to the C-NLOPB. • As per <i>Newfoundland Offshore Petroleum Drilling and Production Regulations</i> report seabird observations to the C-NLOPB within 90 days of well suspension or abandonment.

Valued Component	Mitigation	Follow-up
	visibility when birds may be more susceptible to attraction to the flare. - Restrict flaring to duration and amount necessary to characterize the well potential and as required maintain safe operations. Conduct flaring in accordance with the <i>Drilling and Production Guidelines</i> (C-NLOPB and CNSOPB) which requires a drill stem test not to start at night. Use a high pressure spray of seawater between the MODU and the flare to act as a deterrent to seabirds in the area. - Treat sanitary and domestic waste in accordance with MARPOL and the <i>Offshore Waste Treatment Guidelines</i> (i.e., to six-millimetre particle size). - Conduct routine searches for stranded birds on the platform and supply vessels and appropriate procedures for release. Use ECCC's <i>Best Practices for Stranded Birds Encountered Offshore Atlantic Canada</i>, and <i>The Leach's Storm Petrel: General Information and Handling Instructions</i> (Williams and Chardine, 1999), including appropriate Canadian Wildlife Services permits when stranded birds are found. Comply with requirements for documenting and reporting any stranded birds or bird mortalities to Canadian Wildlife Services during the drilling program. - Implement ramp-up procedures (i.e., gradually increasing seismic source elements over a period of approximately 30 minutes until the operating level is achieved) before any wellsite and VSP activity begins. - Adhere to the Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada; - For support vessels, maintain a minimum distance of at least 300 m from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity areas, unless there is an emergency. - For helicopters, maintain a minimum distance of at least 300 metres vertically and 1000 metres horizontally from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity	- Include seabird stranding and recovery data in an annual report to the Canadian Wildlife Service, required as a condition of Husky Oil Operations Limited's Seabird Handling Permit. - Comply with requirements for documenting and reporting any stranded (or bird mortalities) to the Canadian Wildlife Service during the drilling program. Photos will be provided to the crew member trained to check for and handle stranded birds to aid in the differentiation between Wilson's Storm-Petrel and Leach's Storm-Petrel. - Provide annual EA updates to the CNLOPB each year, detailing activities that will be conducted in the project area in a given year, and will include changes to migratory bird species at risk/ species of conservation concern and critical habitat and discuss potential effects of the project activities to migratory birds at risk / species of conservation concern and critical habitat; - Provide annual updates to be made public on the C-NLOPB website and notification to Indigenous groups. - Monitor daily the presence of marine birds from the drilling installation using trained observers following ECCC's <i>Eastern Canada Seabird at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms</i> will help determine the effectiveness of these mitigation measures. - Submit to the C-NLOPB and Canadian Wildlife Service bird stranding and mortality data collected to determine if there are any additional learnings



Valued Component	Mitigation	Follow-up
	areas, except for approach, take-off and landing maneuvers and if not feasible for safety reasons. • With respect to exhaust emissions, comply with the Newfoundland and Labrador <i>Air Pollution Control regulations, 2004</i>, Ambient Air Quality Objectives under the Canadian Environmental Protection Act, and any relevant regulations under MARPOL. Conduct flaring in accordance with the Drilling and Production Guidelines. Mitigation measures that apply to fish and fish habitat (above) would also apply to migratory birds.	which may be incorporated into future mitigation and monitoring programs.
Special Areas (Section 6.4)	• Proposed mitigation measures related to fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) (above) would mitigate potential effects on special areas.	• The proponents provide an annual EA Update to the C-NLOPB each year, detailing the specific activities that will be conducted within the Project Area in a given year. In that EA Update the proponents will include changes (if any) to special areas and discuss the potential effects of Project activities to special areas. • Annual updates would be made public on the C-NLOPB website; notification to Indigenous groups would be provided.
Species at Risk (Section 6.5)	• Proposed mitigation measures related to fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3) (above) would mitigate potential effects on species at risk.	• Annual updates would be made public on the C-NLOPB website; notification to Indigenous groups would be provided.
Commercial Fisheries (Section 6.6)	• Publish the details of the safety (exclusion) zone and the location of suspended wellheads in Notices to Shipping/Notice to Mariners; publish Notice to Mariners and Notice to Fishers via the Canadian Broadcasting Corporation radio program Fisheries Broadcast. • Establish a safety zone, typically extending to 500 metres beyond the outermost physical footprint of a dynamically positioned MODU	• Following well abandonment, inspect the seabed using a remotely operated vehicle to confirm no equipment or obstructions are left in place. • Annual updates would be made public on the C-NLOPB website; notification to Indigenous groups would be provided.



Valued Component	Mitigation	Follow-up
	or jack-up rig, or 50 metres around the anchors for a semi-submersible. • Continue annual engagement of Indigenous and commercial fishers regarding project details as applicable and facilitation of coordination of information sharing. • Implement a Vessel Traffic Management Standard, which would include procedures for the management and communication relevant to the movement of offshore supply vessels, survey vessels, and the MODU during project related activities. All communication between the proponents, operators and fishers will adhere to this Standard. • Determine, in accordance with the <i>Risk Management Matrix Guidelines</i> developed by One Ocean, if use of a Fisheries Liaison Officer during certain project activities, such as well site surveys, would be required. The Risk Management Matrix Guidelines provides guidance on the requirements for Fisheries Liaison Officers and/or Fisheries Guide Vessels based on the level of fishing activity in an area and the activity being undertaken by the oil and gas operator. • Compensate any project-related damage to fishing gear in accordance with the Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity. Husky Oil Operations Limited has a gear/vessel damage compensation program, to promptly settle claims for loss and/or damage that may be caused by Project-related activities such as drilling-associated surveys or offshore supply vessel operations. The scope of the compensation program includes replacement costs for loss or damaged gear and any additional financial loss that is demonstrated to be associated with the incident. Procedures are in place so that any incidents of contact with fishing gear are clearly detected and documented (e.g., time, location of contact, loss of contact, and description of any identifying markings observed on affected gear).	• The proponents provide an annual EA Update to the C-NLOPB each year, detailing the specific activities that will be conducted within the Project Area in a given year. In that EA Update the proponents will include changes (if any) to commercial fisheries and discuss the potential effects of Project to commercial fisheries.

Valued Component	Mitigation	Follow-up
	- With respect to offshore supply vessels travelling between the project area and supply base follow established shipping routes. - Directly issue Notice to Shipping to One Ocean, FFAW-Unifor, seafood harvesters operating offshore, the C-NLOPB, the Canadian Coast Guard and the Fisheries Broadcast prior to the tow of any MODU outside the White Rose Field. In addition, proposed mitigation measures related to fish and fish habitat (above) would also mitigate effects on commercial fisheries.	
Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples (Section 6.7)	Develop an Indigenous Fisheries Communications Plan for engagement with Indigenous groups that describes processes for providing regular operational updates throughout the exploration drilling program and for informing Indigenous groups in the case of an emergency. Discuss the details of frequency with Indigenous groups, according to their preference, during engagement on the plan. The plan would also include an appropriate feedback mechanism to address the ongoing concerns of Indigenous groups, fishers, and other ocean users. Proposed mitigation measures related to fish and fish habitat (Section 6.1), migratory birds (Section 6.3) and commercial fisheries (Section 6.6) (above) would also serve to reduce the potential environmental effects of the Project on Indigenous peoples and community values.	No follow-up is proposed to be implemented for routine Project activities.
Effects of accidents and malfunctions (Section 7.1)	- Implement measures and preventative actions into daily operation and maintenance of a MODU to mitigate the risk of a hydrocarbon spill, including frequent maintenance, testing and inspection of all equipment, best practices, good communication, audits of facilities and equipment and regular employee training. - Implement established Incident Coordination and Response Management Plan and Oil Spill Response Procedure - East Coast Oil Spill Response Plan, which include options and contingencies for responding to emergency events, including potential spills and	In the unlikely event of an accidental event such as a large spill or a blowout, specific monitoring programs (e.g., environmental effects monitoring and follow up) may be required for the Project. In such case, these programs will be developed and implemented in consultation with the appropriate regulatory agencies.



Valued Component	Mitigation	Follow-up
	well control events, and response methods and strategies for different levels of oil spills. Response methods considered include offshore containment and recovery, surveillance and tracking of spills, dispersant application, and wildlife response measures. Submit all relevant plans to the C-NLOPB prior to the start of any drilling activities. • Conduct a Net Environmental Benefit Analysis/Spill Impact Mitigation Assessment to assess and compare the feasibility and environmental and socioeconomic impacts of employing different oil spill response techniques (including but not limited to dispersant application) to prevent or reduce contact of the oil with resources most likely to be affected. • In the case of a subsea blowout, mobilize a capping stack from Norway to the wellsite within 13 to 24 days from initiation. • In the event of a risk to shorelines from a spill resulting from Project associated activities, initiate countermeasures to divert hydrocarbons from potentially impacting environmentally sensitive coastal shorelines and socioeconomic sensitive coastal areas. If situations arise where Project associated hydrocarbon reach shorelines, initiate response countermeasures. • During oil spill response operations for all tiers, initiate seabird monitoring from the outset, with assigned, trained personnel on charter vessels conducting seabird surveys and documenting observations to determine population densities in the area and the potential risk. If warranted, engage specialized contractors to support oiled wildlife response efforts. • Compensate for spill-related gear loss or damage (such as fouling) in accordance with <i>Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity</i>. • Conduct frequent maintenance, testing and regular employee training to minimize the likelihood of an accident or malfunction.	



Valued Component	Mitigation	Follow-up
Effects of the environment on the project (Section 7.2)	• Incorporate environmental criteria into engineering designs and sound planning, including testing (and treatment, if necessary) so that the physical conditions of the project area can be tolerated. All engineering design would adhere to national/international standards. • Adhere to regulatory design and fitness standards, including national and international standards which consider physical environmental criteria and the life of the expected design (i.e., choosing materials with sufficient durability and corrosion resistance). • Obtain a Certificate of Fitness from an independent, third-party certifying authority prior to the onset of drilling. The certifying authority may only issue a certificate of fitness in accordance with the <i>Newfoundland Offshore Certificate of Fitness Regulations</i> where it has verified that the installation is fit for purpose, can function as intended, and can remain in compliance with those regulations without compromising safety and polluting at the drill site or in the region in which the particular installation is to be operated. In addition, modifications or repairs to an installation that affect its strength, stability, integrity, operability, safety, or regulatory compliance would require review and acceptance by the certifying authority to ensure the continued validity of the certificate; • Conduct a site survey for each specific wellsite in advance to address shallow hazards, including bathymetry and potential for seabed instability. • Avoid, where possible, extreme weather conditions that are outside the operating limits of support vessels and helicopters. • Equip MODU and vessels with proper obstruction lighting, navigation lighting, and foghorns and maintain these in working condition. • Maintain properly functioning communication systems.	• No follow-up in relation to potential effects of the environment on the Project.



Valued Component	Mitigation	Follow-up
	• Monitor icing conditions on vessels and MODUs. • Conduct physical environment data observations, weather forecasting, and reporting in accordance with the <i>Offshore Physical Environmental Guidelines</i>. • Conduct analyses and model tests or simulations to determine behaviour of soils that support the installation of anchoring systems. • Develop and implement an Ice Management Plan, which would be comprised of: detection, monitoring and assessment, and physical management (e.g., towing or deflecting icebergs; breaking up sea ice). • Require the MODU to have the ability to disconnect the riser from the well in event of emergency in a matter of hours. • Implement, standard operational procedures as appropriate to assist in offshore supply vessel and helicopter navigation during times of poor visibility. This includes reducing vessel or helicopter speed, adjusting flight altitude, and using appropriate sound and light signals. Navigational safety equipment will be kept in working condition at all times. Radio communication systems will be in working order for contacting other marine vessels, if necessary, as well as communication between the MODU, offshore supply vessels and shore. • Mitigate the effects of severe weather through: ◦ Careful and considered design in accordance with factors of safety, best engineering practice and adherence with standards and codes; ◦ Engineering design practices that will consider predictions for climate and climate change; ◦ Inspect and maintain programs that will reduce the deterioration of the infrastructure and will help to maintain compliance with applicable design criteria and reliability of the transmission system;	



Valued Component	Mitigation	Follow-up
	◦ Adopt an Ice Management Plan. • Implement mitigation measures to reduce superstructure icing hazards on the offshore supply vessel including: ◦ reducing vessel speed in heavy seas; ◦ placing gear below deck and covering deck machinery, if possible; ◦ moving objects that may prevent water drainage from the deck; ◦ making the ship as watertight as possible; and ◦ manual removal of ice if required under severe icing conditions.	
Cumulative effects	• No additional mitigation measures were proposed to mitigate potential cumulative environmental effects. • Proposed mitigation measures that apply for fish and fish habitat, marine mammals and sea turtles, migratory birds, special areas, commercial fisheries, accidents and malfunctions, and effects of the environment on the Project (above) would also apply to cumulative effects.	• No monitoring and follow-up requirements was proposed for potential cumulative effects of the Project.



Appendix C: Summary of Indigenous Concerns

The table below provides a summary of concerns raised by Indigenous groups as well as the proponents' and Agency's responses. Most of these concerns were raised during comment periods and other opportunities for input that occurred during the EA. However, the Indigenous groups have been and are being consulted on several offshore exploratory drilling project EAs, and these projects have similar key components, activities, and related potential effects. Although this table is not intended to be a cumulative collection of all concerns raised across all these different projects, there is a significant amount of overlap, and in certain cases comments submitted on other proposed offshore exploratory drilling projects may have been used to identify and characterize concerns which clearly apply across all of these types of projects in the eastern Newfoundland and Labrador offshore area.

Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
Fish and Fish Habitat				
KMKNO	American Eel migration	Concern related to presence of American Eel in the project area during migration.	The proponents provided additional information related to the migration and spawning habits of American Eel. The proponents noted that the specific migration patterns at the scale required to determine the likelihood of presence in the project area currently do not exist. The mitigation measures applicable to marine fish and fish habitat are predicted to be effective for American Eel and as such the proponents predicted the environmental effects to be not significant.	The Agency requested additional information from the proponents regarding the potential effects of the Project on American Eel and relevant mitigation measures. This information has been incorporated into their analysis. The Agency has identified key mitigation measures and proposed EA conditions for fish and fish habitat and marine mammals and sea turtles, which would mitigate effects on American Eel. These are described in Sections 6.1.3, 6.2.3, and Appendix A.
Conseil des Innu de Ekuanitshit	Effects on Atlantic Salmon	Concern about potential impacts of the Project on migrating salmon populations and the Aboriginal right to fish	The proponents considered information related to migration and behaviour of Atlantic Salmon. It stated that there is no	The Agency considered information from the proponents related to potential presence of Atlantic Salmon in the project area



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
Elsipogtog First Nation Innu Nation KMKNO Mi'kmaq Confederacy of Prince Edward Island (Lennox Island First Nation and Abegweit First Nation) Miawpukek First Nation Millbrook First Nation MMS MTI NunatuKavut Community Council Qalipu First Nation WNNB Woodstock First Nation		this species. Effects may include those related to project-related sound, light, increased shipping, and accidents and malfunctions. The precautionary principle should be considered in their assessment owing to the declining status of populations, including several being designated as endangered, the lack of data on migration routes and overwintering locations, the high rates of at-sea mortality, climate change, and the lack of information on specific effects of offshore drilling on this species. Appropriate mitigation and accommodation measures should be outlined. Recommended that no activities take place between January and August so as not to interact with Atlantic Salmon.	specific information for the project area with respect to salmon abundance or the relative designable unit composition of individuals. There is also no information with regards to salmon overwintering in relation to the project area. All chemicals used would be screened per the <i>Offshore Chemical Selection Guidelines</i>. All routine discharge limits would be in accordance with the <i>Offshore Waste Treatment Guidelines</i> and/or other relevant regulations and guidelines, and the proponents would follow the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> during geophysical surveys. Taking into account the mitigation measures, the proponents predicted that the residual effects of the Project on fish, including Atlantic Salmon, would be low in magnitude, restricted to the project area or parts of the study area, short- to long-term in duration, be reversible and would not likely be significant.	and their migratory routes and behaviours. This information has been incorporated into the Agency's analysis. DFO reviewed applicable information and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of this species. It advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region, and that salmon are likely to be present at some times of the year as they migrate through to and from home rivers, but this is not known to be a significant migration route or overwintering area. The Agency is of the view that a complete ban on activities between January and August would be impractical and unnecessary. DFO has advised that potential effects of the Project on Atlantic Salmon are expected to be negligible to low and spatially and temporally limited. The Agency has identified key mitigation measures and proposed EA conditions for fish and fish habitat and marine mammals and sea turtles, which would mitigate effects on Atlantic Salmon. These



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
				are described in Sections 6.1.3, 6.2.3, and Appendix A, and include selecting chemicals to be used in accordance with the <i>Offshore Chemical Selection Guidelines</i> and ensuring that all discharges from a drilling installation meet the <i>Offshore Waste Treatment Guidelines</i> .
Elsipogtog First Nation KMKNO Miawpukek First Nation MMS Nunatsiavut Government Première Nation des Innus de Nutashkuan	Atlantic Salmon - follow-up and monitoring	Given the lack of data on Atlantic Salmon in the project area and their migration, as well as uncertainty with respect to impact predictions, it is recommended that research opportunities and initiatives are supported. The EIS stated that the proponents have supported increases in scientific knowledge through funding for numerous studies. It is not clear whether the proponents would support research to address data gaps, potentially in collaboration with research partners, Indigenous groups, or within the context of regional initiatives.	The proponents provided information related to acoustic receivers deployed in the Newfoundland offshore by the proponents in 2018 and 2019. Data collected from these receivers will be made public through the Ocean Tracking Network. The proponents have made a request to the ESRF to consider Atlantic Salmon as a research priority for 2019.	The Agency requested additional information from the proponents related to the potential presence of Atlantic Salmon in the project area and their migratory routes and behaviours. This information has been incorporated into its analysis. The Agency acknowledges the proponents' commitments to pursuing ongoing research related to Atlantic Salmon migration and behaviour at sea.
KMKNO	Primary and secondary	Concern related to potential effects of the Project on primary and secondary	The proponents considered the effects of the Project on	The Agency was satisfied with the information provided by the proponents related to the potential



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
	productivity of marine ecosystems	productivity of marine ecosystems in the context of accidental events.	phytoplankton, zooplankton and forage fish. The proponents predicted that there may be adverse effects on fish and fish habitat, including primary and secondary producers such as zooplankton, but that with the implementation of mitigation measures, effects would be negligible to low magnitude, short-term, localized and reversible. The proponents predicted the residual environmental effects on fish and fish habitat would not be significant.	effects of the Project on primary and secondary productivity of water bodies, including on phytoplankton, zooplankton and forage fish. The Agency has identified key mitigation measures and proposed EA conditions related to fish and fish habitat. These are described in Section 6.1.3 and Appendix A and include selecting chemicals to be used in accordance with the <i>Offshore Chemical Selection Guidelines</i> , transporting spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility, and ensuring that all discharges from a drilling installation meet the <i>Offshore Waste Treatment Guidelines</i> .
KMKNO Miawpukek First Nation	Effects on corals and sponges	There is no discussion on the probable no-effect threshold for sedimentation on sensitive coral and sponge species. Indigenous groups requested an updated effects analysis, including a discussion of the probably no-effect thresholds for fish, including coral and sponge species).	The proponents provided additional information and updated the effects analysis for fish and fish habitat. The proponents detailed studies conducted on the effects of sedimentation on tropical stony corals and cold water corals. Cold water corals were shown to be tolerant to high levels of short-term sedimentation before mortality occurred. Sub-lethal effects include the loss of	The Agency requested additional information from the proponents related to coral and sponges. This information has been incorporated into its analysis. The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions that would require the proponents to prepare a pre-drill seabed investigation plan for each wellsite and submit to DFO and the C-NLOPB for review prior to



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			tissues, reduced skeletal growth, and reduced larval survival. Studies on the thresholds for sediment burial have shown a probable no net threshold to be 6.5 millimetres. Damage may still occur to species at this depth, however mortality was observed at 0.5 percent. The proponents noted that the studies on thresholds were based on instantaneous and complete burial which would not occur during drilling scenarios. Drill cuttings dispersion modelling conducted within the project area concluded that cuttings could extend to 100 to 200 metres out from the drill center. As a result, there is the low potential for mortality for coral species within the 100 to 200 metre cuttings dispersion zone. The Project may result in adverse effects that cause a change in risk of mortality, physical injury or health and a change in habitat quality and use for fish and fish habitat. With the implementation of mitigation measures, the potential environmental effects are predicted to be not significant.	implementing the survey. The survey would include the collection of high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges, around each well location and anchor/transponder site. If aggregations of habitat-forming corals, sponges, or other environmentally sensitive features are identified, the proponents would be required to relocate the well or redirect cuttings discharges, if technically feasible. No drilling would occur before a decision is made by the C-NLOPB and DFO that mitigation and monitoring are appropriate. If it were determined that it would not be technically feasible to relocate the well or redirect cuttings discharges, the proponents would be required to conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for serious harm or alteration of coral and sponge aggregations and related options for mitigation to reduce any identified risk



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				For the first well on each exploration licence, and for any well where drilling is undertaken in an area determined by the seabed investigation survey to be sensitive benthic habitat, the proponents would also be required to conduct follow-up to verify drill waste deposition modelling predictions.
Elsipogtog First Nation KMKNO	Noise emissions	Concern regarding the extent of impulsive noise from project activities.	The proponents confirmed they would not be blasting for decommissioning or abandonment.	The Agency requested additional information from the proponents related to impulsive noise. This information has been incorporated into its analysis. The Agency has identified key mitigation measures and proposed EA conditions for fish and fish habitat and marine mammals and sea turtles, which would mitigate effects from underwater sound. These are described in Sections 6.1.3, 6.2.3, and Appendix A.
KMKNO WNNB	Effects of noise	Concerns related to the effects of noise on fish. While information is provided on the likelihood of occurrence and timing of reproduction, no clear connection between Project activities and the timing of vulnerable life stages were made for fish species.	The proponents stated that marine fish, when exposed to sound levels of sufficient magnitude, may exhibit behavioural responses, however the effect is expected to be reversible. The proponents reviewed studies of the effects of low-frequency	The Agency requested additional information from the proponents related to the effects of underwater noise on fish. DFO indicated that the response provided by the proponents was sufficient. This information has been incorporated into its analysis.



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			sound on sensitive life history stages of fish such as eggs and larvae. Three studies on marine fish showed results of no responses to sound while two resulted in responses to unrealistic or unknown exposure levels. Four studies on invertebrates showed results of no responses to sound while a single study showed response to unrealistic or unknown exposure levels.	The Agency identified follow-up requirements to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on fish and fish habitat. These are described in Section 6.1.3 and Appendix A.
MTI	Swordfish – effects assessment	Concern that the potential environmental effects of the project were not fully considered with respect to Swordfish.	The proponents provided additional information pertaining to the potential environmental effects on Swordfish. The proponents noted that Swordfish are anticipated to avoid areas with the highest level of underwater noise (i.e., from drilling and vertical seismic profiling). Swordfish are known to be attracted to artificial light while foraging, however project-related lights are not projected into the water column far beyond the physical footprint of the MODU or supply vessel.	The Agency requested additional information from the proponents related to Swordfish. This information has been incorporated into its analysis. The Agency identified follow-up requirements to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on fish and fish habitat. These are described in Section 6.1.3 and Appendix A.
Marine Mammals and Sea Turtles				
KMKNO	Vessel speeds and transit routes	Concern regarding common practice for vessel to follow	The proponents committed to avoiding concentrations of	The Agency requested additional information from the proponents



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MTI		straight line. Vessel route should be altered if there is a potential for an interaction between vessels and marine mammals, sea turtles or migratory birds breeding grounds, feeding areas or migration routes. Project-related vessels should be required to reduce speeds (ten knot limit) when not in existing shipping lanes and/or whenever a marine mammal or sea turtle is observed in the vicinity of the vessel. These speed limits should also be implemented when near a raft of seabirds, and vessels should be required to avoid approaching congregations of marine birds.	marine mammals and sea turtles whenever possible and under the command of the ships Master. Sensitive habitat for marine mammals would be avoided in compliance with a Notice to Shipping or Notice to Mariners detailing to remain clear of a designated area, or to transit at a maximum speed. The proponents stated that safe speed is defined in the <i>International Regulations for Preventing Collisions at Sea</i> and speed and routes are generally designed to optimize fuel economy. The average economical speed would be approximately ten to 12 knots and would not exceed 15 knots. If the Office on Watch observes a concentration of marine mammals or sea turtles in close proximity to the vessel, the vessel would take evasive action to reduce risk of vessel strike. The proponents noted that mitigation for avoiding disturbance to bird colonies located in coastal Important Bird Areas and Ecologically and Biologically Significant Areas are based on ECCC's <i>Seabird and Waterbird Colonies: Avoiding</i>	and incorporated it into its analysis. The Agency has identified key mitigation measures and proposed EA conditions that would mitigate the potential effects of vessels on marine mammals, sea turtles, and migratory birds. These are described in Section 6.2.3 and Appendix A. The proponents would be required, except during an emergency, to: • limit supply vessels movement to established shipping lanes where they are available (i.e., in approaches to harbours); and • when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a whale or sea turtle is observed or reported within 400 metres of the vessel.



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			<i>Disturbance. Mitigation</i> measures include vessels maintaining a minimum distance of at least 300 metres from Cape St. Francis and Witless Bay Islands unless there is an emergency and helicopters maintaining a minimum distance of at least 300 metres vertically and 1000 metres horizontally from Cape St. Francis and Witless Bay Islands, except for approach, take-off and landing maneuvers and if not feasible for safety reasons.	
KKMNO WNNB	Marine Mammals and Sea Turtles - Mitigation	Measures for VSP surveys would be consistent with the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> , while it also stated that mitigation would be conducted in consideration of that practice. Concern with the lack of passive acoustic monitoring in particular during periods of low visibility. Also with the discrepancy between the distance modelled that thresholds for behavioural effects could be exceeded and the 500 metre safety zone.	The proponents noted that the maximum depth of the project area is 211 metres which is not considered primary habitat for deep diving cetaceans. Mitigation measures from the <i>Statement of Canadian practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> would be followed as applicable during geophysical surveys, including passive acoustic monitoring. The proponents committed to submitting a Marine Mammal and Seabird Monitoring Report no later than one year after the completion of a geophysical survey.	The Agency requested additional information from the proponents related to the potential effects of project-related noise on marine species and associated mitigation measures and incorporated it into its analysis. DFO has advised that the peak threshold for auditory injury would not likely extend beyond 120 metres from the source. Thresholds for auditory injury for 24 hours of sound exposure would be reached at greater distances; however, marine mammals and sea turtles would be expected to move away within a 24-hour period. As such, and given that there is no designated critical



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			The proponents stated that given the size and duration of the sound source array, an extension to the 500 metre safety zone is not warranted. If any marine mammal or sea turtle is observed within the 500 metre safety zone, the seismic source would be shut down.	habitat for marine mammals or sea turtles within the zone of influence for project-related underwater sound from VSP, DFO has recommended the standard 500-metre minimum safety zone for this project. The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions that would mitigate the potential effects of sound on marine mammals and sea turtles. These are described in Section 6.2.3 and Appendix A and include: • conducting VSP surveys in accordance with the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i>; • implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations; • implementing a ramp-up procedure; • shutting down the sound source upon observing or detecting any marine mammal



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				or sea turtle within the 500 metre safety zone; • developing a Marine Mammals and Sea Turtle Monitoring Plan; and • verifying predicted underwater sound levels with field measurements during the first well per exploration licence. The proponents would be required to provide monitoring and follow-up program results to Indigenous groups and post online for public access.
MTI	North Atlantic Right Whales	Concern regarding the determination that there is a low potential for North Atlantic Right Whales to occur in the study area. There is still a lack of information in relation to where populations migrate (particularly for males). The proponents completed little specific assessment of project-related activities on North Atlantic Right Whales. MTI is requesting the installation of a hydrophone on MODUs to pick up whale occurrences and contribute to species distribution data, and	The proponents stated that with only one to three vessel trips per week, this level of activity and low likelihood of North Atlantic Right Whales occurring in the area, additional monitoring is not warranted. The project area has not been designated critical habitat nor has there been restrictions placed on vessel access or speed to mitigate potential impacts to whales in this area. Geophysical survey monitoring and mitigation would comply with the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i>. The	The Agency requested additional information related to the potential effects of project-related noise on marine species and associated mitigation measures and incorporated it into its analysis. The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions that would mitigate the potential effects of sound on marine mammals and sea turtles. These are described in Section 6.2.3 and Appendix A and include: • conducting VSP surveys in accordance with the <i>Statement of Canadian</i>



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		to support the assessment of potential interactions and on-going monitoring and recovery efforts. It was noted that this information should be shared with Indigenous groups.	proponents would submit a Marine Mammal and Seabird Monitoring Report no later than one year after completion of the geophysical survey.	<i>Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> ; • implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations; • implementing a ramp-up procedure; • shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500 metre safety zone; • developing a Marine Mammals and Sea Turtle Monitoring Plan; and • verifying predicted underwater sound levels with field measurements during the first well per exploration licence.
Migratory Birds				
Qalipu First Nation	Effects on migratory birds	Concerns related to impacts on marine and migratory birds, including effects from exposure to oil, disruption of migration patterns and behaviour, strandings, and effects on habitats.	The proponents provided information related to the Project's potential effects on migratory birds. The Project has the potential to affect migratory birds through multiple pathways, but the proponents predicted that, with the implementation of	The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions related to migratory birds. These are described in Section 6.3.3 and Appendix A and include following appropriate procedures for safe capture and



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			mitigation measures, these effects would be negligible to moderate in magnitude, restricted to the project area, short to medium term in duration, reversible, and overall not likely to be significant. The proponents committed to the following mitigation and follow-up measures: conducting routine checks for stranded birds on the MODU and platform supply vessels and implement appropriate procedures for release. If stranded birds are found during inspections, handle using the protocol outlined in <i>Best Practices for Stranded Birds Encountered Offshore Atlantic Canada</i> and the <i>Leach's Storm Petrel: General Information and Handling Instructions</i>, including obtaining the associated permit from Canadian Wildlife Services. Comply with the requirements for documenting and reporting any stranded birds (or bird mortalities) to Canadian Wildlife Services during the drilling program.	handling of stranded birds, conducting systematic daily monitoring for stranded birds, restricting flaring, and conducting monitoring for marine birds from the drilling installation using a trained observer and following ECCC's protocol. The proponents would be required to provide monitoring and follow-up program results to Indigenous groups and post online for public access. Key mitigation measures identified by the Agency to reduce the effects on fish and fish habitat (Section 6.1) and marine mammals and sea turtles (Section .2) would also mitigate potential effects on migratory birds.



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			providing an annual EA Update to the C-NLOPB, detailing the specific activities that would be conducted within the project area in a given year. In that EA Update include changes (if any) to migratory bird species at risk/species of conservation concern and critical habitat and discuss the potential effects of project activities to migratory bird species at risk/species of conservation concern and critical habitat.	
KMKNO Nunatukavut Community Council	Flaring	Indigenous groups raised concerns that it is unclear how the frequency and duration of flaring events could be restricted. Avoidance of flaring during periods when birds are more vulnerable (e.g., periods of fog, at night, etc.) and implementation of additional mitigation measures to minimize the chance of episodic mass mortality at flares was recommended. Water-curtain barriers should be requirement around the flare during flaring.	The proponents noted that it continues to evaluate alternative well test technologies including but not limited to formation testing while tripping (which does not involve flaring). During drill stem testing, initial flaring occurs during daylight hours, but subsequent flaring may occur during night-time. This testing is infrequent and of a very short duration. Water spray from the cooling system would be used as a heat shield. The proponents would discuss with the C-NLOPB proposed well testing methods and timing of	The Agency requested additional information from the proponents related to the requirements to flare and the potential effects of flaring on birds. This information has been incorporated into the Agency's analysis. The Agency has identified key mitigation measures, which are described in Section 6.3.3 and Appendix A, and proposed EA conditions including the requirement for the proponents to: restrict flaring to the minimum required to characterize a well's hydrocarbon potential,



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			testing including measures to reduce effects on migratory birds. The proponents stated that it would aim to avoid flaring from mid-September to mid-October. The proponents would also plan flaring so that it would not commence during night-time or periods of poor visibility when birds may be more susceptible to attraction to the flare. The proponents would collect data from bird stranding and mortality monitoring and it would be correlated with project activities to determine if stranding or mortality events increase during episodic flaring. Data collected would be shared with the C-NLOPB and the Canadian Wildlife Service.	as necessary for the safety of the operation; • where acceptable to the C-NLOPB, conduct formation testing formation flow testing while tripping, or similar technology, rather than formation testing with flaring; • if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC) and identify how adverse environmental; • effects on migratory birds would be avoided, including opportunities to reduce night-time flaring (e.g., by starting flaring for shorter periods in the morning as opposed to at night) and avoid flaring during periods of bird vulnerability (mid-September to mid-October); and • operate a water-curtain barrier around the flare during flaring.



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MTI WNNB	Migratory birds – effects of lighting	Alternative means to lighting on vessels or MODUs were not adequately considered. Little evidence is provided to support the claim that bird attraction is limited to five kilometres. Solutions related to the stated increased risk to migratory birds posed by light during inclement weather and fog should be presented. Findings from monitoring programs applied at the Husky Energy White Rose and Extension project in developing the mitigation and monitoring should be considered, and to share the monitoring data.	The proponents noted that the study cited could not rule out that birds were attracted at greater than five kilometres. The proponents stated that attraction greater than five kilometres would result in a greater number of birds potentially affected by artificial lighting, however they are unaware of any studies demonstrating attraction from such large distances. Lighting on the MODUs are designed to comply with requirements stipulated in the <i>Petroleum Occupational Safety and Health Regulations</i>. The proponents noted that vessels and drilling installations with modified lighting (e.g., intensity, spectrum, direction) have the technical capability to support the Project. The proponents stated that it would plan flaring associated with well testing such that it would not commence during night-time or periods of poor visibility when birds may be more susceptible to attraction to the flare. However, once well testing with flaring begins, data gathered during the well test could be	The Agency requested additional information from the proponents related to the effects of lighting on migratory birds. This information has been incorporated it into the Agency's analysis. The Agency has identified key mitigation measures, which are described in Section 6.3.3 and Appendix A including: • restricting flaring to the minimum required to characterize a well's hydrocarbon potential, as necessary for the safety of the operation; • where acceptable to the C-NLOPB, conduct formation flow testing while tripping, or similar technology, rather than formation testing with flaring; • if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to: ◦ determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC); and



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			compromised if the well flow was restricted during the test period. The proponents would adhere to the <i>Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada</i> and would consult with the Canadian Wildlife Services prior to the commencement of project activities. Data collected from bird stranding and mortality monitoring would be correlated with Project activities, to determine if stranding or mortality events increase during episodic flaring. Data collected would be shared with the C-NLOPB as well as with the Canadian Wildlife Service (as a condition of the bird handling permit required to conduct the survey).	identify how adverse environmental effects on migratory birds would be avoided, including opportunities to reduce night-time flaring.
MTI WNNB	Migratory bird stranding and mortality	Concerns related to underreported mortality rates. Additional monitoring and mitigation should be explored. The proponents should verify the accuracy of predictions in the EIS with respect to birds based on monitoring data.	The proponents plans to develop a follow-up program consisting of systematic daily searches for stranded birds on the MODU and supply vessels. Searches would occur at dawn. The proponents would contact ECCC prior to the start of the Project to further develop monitoring protocols. Stranding and recovery data	The Agency requested additional information from the proponents related to stranding and mortality of migratory birds. This information has been incorporated it into the Agency's analysis. The Agency has identified key mitigation measures, which are



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		Whether information related to mortality and stranding and injury would be shared with Indigenous groups, and the involvement of Indigenous groups in the development of the follow up program.	would be included in the annual report to Canadian Wildlife Services. Periods of vulnerability for migratory birds were identified from September to October. The proponents indicated that this finding is already resulting in adaptive management for mitigation procedures such as avoiding flaring to the extent possible during this period of vulnerability. Future data collected for the Project, along with other exploration drilling projects and production projects, would be submitted to the C-NLOPB and Canadian Wildlife Services to determine if there are any additional learnings which may be incorporated into future mitigation and monitoring programs. The proponents have committed to sharing results of monitoring programs when available as part of monthly operational updates to Indigenous groups, including results of bird stranding and mortality monitoring data collected for this Project.	described in Section 6.3.3 and Appendix A.



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WNNB	Migratory birds baseline data	Concern regarding the lack of use of baseline data from the White Rose and White Rose Extension Projects.	The proponents noted that data from the White Rose field were not included as they are considered monitoring data rather than baseline data.	The Agency requested additional information from the proponents related migratory bird baseline data. This information has been incorporated it into the Agency's analysis.
Special Areas				
KMKNO NunatuKavut Community Council Qalipu First Nation	Impacts on Special Areas	Concerns regarding the effects of project related activities on special areas, which are adjacent to or overlap with the project area, in particular with respect to sponges and corals.	The proponents noted the zone of influence from project activities may extend beyond the boundaries of the exploration licences. The assessment recognized and considered this by establishing a 20 kilometre buffer around the exploration licences and transit corridor. The proponents also provided additional information on special areas and updated its assessment to reflect this.	The Agency requested additional information from the proponents regarding potential effects of the Project on special areas. This information has been incorporated into its analysis. The Agency is of the view that key mitigation measures proposed for other valued components, including fish and fish habitat, marine mammals and sea turtles, and migratory birds, would mitigate potential effects on special areas.
Elsipogtog First Nation KMKNO	Special Areas – Follow-up Programs	The Project overlaps with the Northeast Slope, which is recognized for supporting Spotted Wolffish and Greenland Halibut populations. No follow-up program has been proposed for this area. KMKNO is requesting that follow-up studies should be completed via seabed video	The proponents noted that they would conduct a visual survey of the seabed prior to the start of drilling to assess the presence of any aggregations of habitat-forming corals or sponges. If sensitive environmental features are identified during the survey, the proponents would move the wellsite to avoid affecting them if it is feasible to do so. If it not	The Agency requested additional information from the proponents regarding follow-up programs for special areas. This information has been incorporated into its analysis. The Agency identified key follow-up programs and proposed EA conditions that. These are described in Section 6.4.3 and



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		and/or benthic sampling to determine infaunal recolonization rates following drilling.	feasible, the proponents would consult with the C-NLOPB and DFO to determine an appropriate course of action.	Appendix A. The proponents would be required to: conduct follow-up monitoring when drilling in special areas, or adjacent to or near a special area, such that drill cuttings dispersion modelling predicts that cuttings deposition could occur within the special area at level above the biological effects threshold
Commercial Fisheries				
MTI	Impacts on Tuna Fishery	Concern related to the Bluefin Tuna as an important communal and commercial fishery and potential project impacts to the tuna fishing industry.	The proponents acknowledged the importance of the communal commercial tuna fishing industry and that Indigenous groups hold communal commercial licences for tuna within the study area. The proponents stated that given the overall migration range for tuna, it is unlikely that large numbers of these species would interact or be adversely affected by the presence and operation of the MODU. Therefore, the presence of the MODU is not predicted to decrease the availability of tuna as a resource for communal commercial fishing and result in associated adverse socioeconomic impacts to Indigenous communities.	The Agency identified measures to mitigate effects on fishery resources and fishing activity. These are described in Section 6.6.3 and Appendix A. The Agency has identified key mitigation measures for the Project, including: in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. In addition, in all cases where spills, debris, or other project-related activities cause damage to



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				fishers, the C-NLOPB would expect the proponents to consider claims in a manner that meets the requirements of the <i>Canada-Newfoundland and Labrador Atlantic Accord Implementation Act</i> and the spirit of the <i>Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity</i> , and to act in good faith to resolve claims from fishers. If the proponents and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB (if applicable) or through the court.
Elsipogtog First Nation KMKNO MTI	Fisheries Communication Plan	Concern related to the lack of information related to the Fisheries Communication Plan and how feedback would be incorporated. It is unclear how Indigenous groups would be provided annual updates, if at all.	The proponents indicated that an Indigenous Fisheries Communications Plan for engagement with Indigenous groups has already been drafted in consultation with Indigenous groups that describes the process for providing regular operational updates, and describes a process for informing Indigenous groups in the case of an emergency. The proponents plan to continue to engage with Indigenous groups and fisheries stakeholders, including during the development of the	The Agency requested additional information from the proponents and identified measures to mitigate effects on fishery resources and fishing activity. These are described in Section 6.6.3 and Appendix A. The Agency has identified key mitigation measures for the Project, including: • in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to



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			Indigenous Fisheries Communication Plan and the Fisheries Communication Plan. The plan would include appropriate feedback mechanisms for concerns. An annual updated would be provided to the C-NLOPB and would be made available to the public on their website. Indigenous groups would be notified.	address communications prior to and during drilling, testing and abandonment of each well. In addition, in all cases where spills, debris, or other project-related activities cause damage to fishers, the C-NLOPB would expect the proponents to consider claims in a manner that meets the requirements of the <i>Canada-Newfoundland and Labrador Atlantic Accord Implementation Act</i> and the spirit of the <i>Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity</i>, and to act in good faith to resolve claims from fishers. If the proponents and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB (if applicable) or through the court.
KMKNO Nunatsiavut Government	Compensation	Concern regarding the lack of information as to how the compensation program would be developed (or has been developed) in collaboration with potentially impacted partners were raised.	The proponents stated that prior to obtaining an authorization from the C-NLOPB, it must demonstrate it has the ability to pay for all actual losses or damaged incurred as a result of a spill or debris, which includes loss of income, future loss of income and with respect to	The Agency requested additional information from the proponents and identified measures to mitigate effects on fishery resources and fishing activity. These are described in Appendix A and Section 6.6.3 and include



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			Indigenous peoples of Canada, loss of hunting, fishing and gathering opportunities. An outline of the existing process to recover damages is available online at the C-NLOPB website (<i>Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity</i>).	measures such as implementing a Fisheries Communication Plan. In addition, in all cases where spills, debris, or other project-related activities cause damage to fishers, the C-NLOPB would expect the proponents to consider claims in a manner that meets the requirements of the <i>Canada-Newfoundland and Labrador Atlantic Accord Implementation Act</i> and the spirit of the <i>Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity</i>, and to act in good faith to resolve claims from fishers. If the proponents and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB (if applicable) or through the court.
Current Use of Lands and Resources for Traditional Purposes and Potential Impacts on Aboriginal Rights				
KMKNO Miawpukek First Nation MTI NunatuKavut Community Council	Indigenous Knowledge	Indigenous knowledge must be applied in conducting EAs to accurately determine the impacts to Aboriginal rights and to assist in the development of mitigation and monitoring. Indigenous knowledge can also contribute to providing an ecosystem	Indigenous groups were engaged over the course of the EA through face-to-face meetings, phone calls, emails, and reports. It also coordinated a series of workshops for interested communities to discuss the Project, including	The Agency directed the proponents to engage Indigenous communities in the preparation of its EIS and consider Indigenous knowledge in its analysis. The Agency has considered comments received from Indigenous groups following their reviews of the EIS, and asked the



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		perspective in EAs and follow-up. Concerns from Indigenous groups related to the use of secondary sources for information related to current use of lands and resources for traditional purposes. Indigenous knowledge is not used towards baseline information or environmental effects analysis. It should also be applied to assist in developing mitigation and monitoring.	potential impacts and mitigation measures. The proponents stated that it incorporated the community knowledge it had access to or that was acquired through engagement with Indigenous groups. The proponents note that during the EIS review it received helpful scientific literature references that were considered in the effects assessment. The proponents do not view additional studies on traditional land use, socioeconomic surveys or heritage surveys as warranted given the location of the Project and absence of potential impacts to human health, socioeconomic conditions or resource use. The proponents would integrate any Indigenous knowledge provided in the future where appropriate.	proponents to provide additional information on a number of topics. Indigenous groups were provided an opportunity to review and comment on the additional information, as applicable. The Agency also consulted Indigenous groups through phone calls, emails, letters, and in-person meetings. For example, the Agency organized four information sessions with Indigenous groups in October 2017, in which the proponents also participated.
Accidents and Malfunctions				
KMKNO	Capping stack mobilization, installation and decommissioning	Concern about the timelines of mobilization, installation and decommissioning of a capping stack. No information is provided on the lifespan of a capping stack.	The proponents noted that they have access to multiple capping stacks through their capping stack providers. The capping stacks used by the proponents are regularly used on wells lasting 100 days or more. A capping stack system would be decommissioned once the	The Agency requested additional information from the proponents related to capping lifespan. This information was incorporated it into its analysis. The Agency relied on the C-NLOPB's expertise and advice in reviewing the proponents' analyses and proposed approach to spill



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			blowout has been controlled and the well has been abandoned.	response, including the proposed approach to capping stack mobilization and deployment, and the Agency notes that the C-NLOPB was satisfied with the information presented by the proponents. The Agency notes that the C-NLOPB's authorization of drilling activities is contingent on its confidence that the proponents have a satisfactory approach to risk management. The proponents would also be required to demonstrate their preparedness to appropriately respond in the event of an accident or malfunction, including preparation of detailed spill response plans and well capping and containment plans, which would include discussion of any potential options to reduce overall response timelines. The Agency has identified key mitigation measures that would ensure the proponents fulfil these commitments (refer to Section 7.1.3 and Appendix A), which include the requirement to prepare Spill Response Plans and well capping and containment plans, which would be submitted to the C-NLOPB for acceptance prior to drilling, and would establish well



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				control strategies and measures, including the capping of a blowout.
KMKNO Miawpukek First Nation MTI Nunatsiavut Government	Indigenous involvement in emergency response planning	Indigenous groups should be involved in the development and implementation of the Oil Spill Response Plans and other emergency response and contingency plans, including emergency response and preparedness planning, exercises, and training. It should be ensured that information about accidental events would be shared with Indigenous groups, including consultation in relation to the findings of the dispersion modelling and to the scope of emergency preparedness and response planning. Concern was also raised over how issues and concerns raised by Indigenous groups would be taken into account.	The proponents noted that an Oil Spill Response Plan would be approved by the C-NLOPB for the Project. It would be shared with Indigenous groups for their information and review. The proponents would discuss opportunities for involvement where appropriate. The Indigenous Fisheries Communication Plan would describe a process for providing regular operation updates throughout the Project and describe a process for informing Indigenous groups in case of an emergency. The plan would include appropriate feedback mechanism for concerns of Indigenous groups.	The Agency requested additional information from the proponents on the details of their spill response plans and strategies and incorporated this information into its analysis. The Agency has identified key mitigation measures, follow-up programs, and proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A, and include the following: consider views of Indigenous groups during the development of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet.
Conseil des Innu de Ekuanitshit KMKNO MMS MTI	Impact of a spill on species of importance to Indigenous groups	Concern regarding the potential effects of an accidental event or malfunction on species of importance to Indigenous communities (e.g., Atlantic Salmon, Bluefin Tuna, Swordfish).	The proponents provided information about potential effects of a spill, including on species of importance to Indigenous groups such as Atlantic Salmon, Swordfish and Bluefin Tuna.	The Agency notes that the C-NLOPB's authorization of drilling activities is contingent on its confidence that the proponents have a satisfactory approach to risk management. The proponents would also be required to demonstrate their preparedness to



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
Première Nation des Innus de Nutashkuan Sipekne'katik First Nation			The proponents indicated that adult fish would have lower exposure risk because they are highly mobile, and able to detect and avoid oiled surface waters. Also, crude oil is considered relatively non-toxic to adult fish. However, the potential effect of hydrocarbons on fish eggs and larvae would be more of a concern but would be limited to species, which spawn in or around the project area. Should a spill occur, swordfish are expected to limit their exposure to unfavorable conditions. The proponents stated that should accidental oil spills occur as a result of the Project, the emergency spill response plan and mitigation measures would be implemented.	appropriately respond in the event of an accident or malfunction, including preparation of detailed spill response plans that meet the C-NLOPB's regulatory standards. Nonetheless, in taking a precautionary approach, and also in considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction (i.e., unmitigated subsea blowout) on fish and fish habitat and marine mammals and sea turtles could be significant. By extension, and particularly considering potential effects on endangered or threatened populations of Atlantic Salmon and their recovery, as well as the context provided by Indigenous groups, the Agency has concluded that the potential effects of a worst-case accident or malfunction on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant. The Agency also recognizes that the probability of occurrence for a major event is very low and thus these effects are unlikely to occur. On this basis, the Agency concludes that



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
				the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions.
NunatuKavut Community Council KMKNO	Potential contamination of resources and effects on current use and socioeconomic conditions and wellbeing of Indigenous communities	Concerns related to potential contamination of harvested species, including perceived contamination, which could influence dietary changes if country foods were avoided. Concerns were also raised related to the potential negative effects on one component or species that may result in direct or indirect effects on other parts of the ecosystem.	The proponents stated that an accidental spill could result in the closure of current fisheries in the project area. The affected licence holders could be affected by loss of income, fouling of gear, and potential increased cost associated with relocation of harvest effort. Biomagnification of petroleum hydrocarbons does not occur in food webs as vertebrates can readily metabolize them. The proponents noted that there could be an adverse effect to communal commercial fisheries with impacts to the quality of life for Indigenous communities. While traditional food may currently be a small portion of the diets of Indigenous communities, given the potential for food insecurity, it is highly important to their diet. The proponents noted that the extent to which the perception of contamination can persist after an event is difficult to predict. Monitoring results from a spill	In response to this concern, the Agency requested additional information from the proponents related to the Project's potential effects on current use and health and socioeconomic conditions of Indigenous peoples, particularly in the even of a blowout (Sections 6.7 and 7.1). The Agency acknowledges that current use and health and socioeconomic conditions in Indigenous communities could be affected if project-related changes in the marine environment occur as a result of an accidental event or malfunction (e.g., cause decreased catch rates, or a decrease in fish quality for human consumption). The Agency considers that mitigation measures identified for fish and fish habitat, accidents and malfunctions, commercial fishing (e.g., development of Fisheries Communication Plans and compensation for any damages, including loss of food, social, and ceremonial fisheries), would also



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			event would be shared to help alleviate concerns.	mitigate potential effects on the current use and health and socioeconomic conditions of Indigenous peoples. Nonetheless, in taking a precautionary approach, and also in considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction (i.e., unmitigated subsea blowout) on fish and fish habitat and marine mammals and sea turtles could be significant. By extension, and particularly considering potential effects on endangered or threatened populations of Atlantic Salmon and their recovery, as well as the context provided by Indigenous groups, the Agency has concluded that the potential effects of a worst-case accident or malfunction on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant. The Agency also recognizes that the probability of occurrence for a major event is very low and thus these effects are unlikely to occur. On this basis, the Agency concludes that the Project is not likely to cause



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				significant adverse environmental effects as a result of accidents and malfunctions.
Innu Nation Miawpukek First Nation Millbrook First Nation NunatuKavut Community Council Qalipu First Nation WNNB	Effects of Dispersants	Concern related to the potential effects of dispersants on fish, birds and marine mammals.	The proponents provided information on dispersants and on the potential effects of dispersants on marine species. The potential risk of dispersant use is the increased exposure of marine organisms in the water column to dispersed oil droplets and water-soluble oil compounds released from these oil droplets. The smaller oil droplets can facilitate microbial biodegradation, resulting in a potential reduced dissolved oxygen levels to hypoxic conditions harmful to marine life. The proponents stated that during the Deepwater Horizon blowout, both the use of dispersants and the physics of the release resulted in much of the oil remaining at depth, forming a deep-water plume. Also, the surfaced oil contributed to a large marine snow formation event, which may have also been affected by the presence of dispersants. Observations from 2011 to 2017 illustrated that overall recovery of corals from the Deepwater Horizon spill was	The Agency requested additional information from the proponents on dispersants. The Agency relied on the C-NLOPB's advice and input in reviewing this information, and this information has been incorporated into its analysis. The Agency has identified key mitigations and proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include undertaking a net environmental effects analysis to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Emergency Science Table. The spill impact mitigation assessment would be published on the internet



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
			slow. Overall, the results indicated that many more years would be required for moderately to heavily impacted corals to recover, if at all. The proponents acknowledged that some recent studies have shown potential negative effects of dispersants on migratory birds. However, studies also show the net environmental effects of dispersants on birds likely remains positive. Net Environmental Benefit Analysis/Spill Impact Mitigation Assessment demonstrates the conditions under which dispersant application offers net environmental benefit over more other countermeasures. As part of the C-NLOPB's approval process, the proponents would undertake a Net Environmental Benefit Analysis/Spill Impact Mitigation Assessment, which would evaluate benefits and drawbacks of different response measures including whether and how to use dispersants.	for the information of Indigenous groups and the public.
KMKNO Miawpukek First Nation	Vessel routes and collision risks	Concern regarding the potential for collisions between supply vessels and fishing	The proponents responded that existing travel routes are defined as from St. John's to the	The Agency requested additional information related to "safe vessel speed." The Agency relied on



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		vessels and other ocean users. More detail on the level of collision risk should be provided.	exploration licences. The Officer on Watch would maintain a lookout to determine the risk of collision and would determine the appropriate course of action to avoid a collision, which may include deviation from course. The proponents stated that safe speed is defined in the <i>International Regulations for Preventing Collisions at Sea</i> which state: "every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions." There are several factors provided in determining safe speed.	advice and input from the C-NLOPB, Transport Canada, and other federal authorities to review and determine the accuracy and reasonableness of the proponents' information and analyses. This information has been incorporated into the Agency's analysis. The Agency identified key mitigations and proposed EA conditions for the project that would address the risk and potential effects associated with a vessel collision. These are described in Section 6.2.3, Section 7.1.3 and Appendix A. Key mitigation measures include: • prepare a plan for avoidance of collisions with vessels and other hazards and submit to the C-NLOPB for acceptance prior to drilling; • limit supply vessels movement to established shipping lanes where they are available (i.e., in approaches to harbours); and • when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a whale or sea turtle is



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
				observed or reported within 400 metres of the vessel.
Première Nation des Innus de Nutashkuan	Accidents and Malfunctions - Modelling	Concern that if oil was discharging for 120 days, it would require more than 120 days for evaporation and dispersion. Information is lacking for when the ecological thresholds are reached, and for the probability of shoreline oiling.	The proponents stated that instead of a stochastic approach, it used models that showed oil releases every six-hours for 57 years (1954 to 2010). The resulting 83 220 individual trajectory scenarios were analyzed for spatial coverage and shoreline contact, with the Newfoundland shoreline contact probability determined to be 0.04 percent. The proponents noted that the model was run for 120 days after the last spill trajectory.	The Agency requested additional information from the proponents related to spill modelling and incorporated it into its analysis. The Agency has identified key mitigation measures, follow-up programs and proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A.).
Cumulative Effects				
Elsipogtog First Nation	Cumulative effects	Concern regarding the number of projects in the project area that overlap.	Proponents provided additional information regarding cumulative effects of overlapping projects. Updated mapping was provided.	The Agency requested additional information from the proponents regarding cumulative effects from overlapping exploration projects. This information was incorporated into its analysis. The Agency is of the view that the mitigation, follow-up, and monitoring proposed for the Project would contribute to the mitigation or monitoring of cumulative environmental effects.



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
				The Agency is working with the Province of Newfoundland and Labrador and the C-NLOPB on a regional approach for assessing the environmental effects of offshore exploratory drilling in the offshore area of eastern Newfoundland, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects. In advance of the Regional Assessment, operators are working together in conducting effects analysis (including for the Project), engaging Indigenous groups, and identifying research needs (e.g., mitigation and effects to Atlantic Salmon).
NunatuKavut Community Council WNNB	Migratory Birds – Cumulative Effects	Concern regarding the effectiveness of mitigation measures with regard to potential cumulative effects on birds.	The proponents responded that with respect to potential cumulative environmental effects of the Project on migratory birds, routine checks for stranded birds on the MODU and supply vessels and appropriate procedures for release would be implemented to mitigate the environmental effects of Project-related artificial night lighting and flaring on birds. Lighting on project infrastructure would be used as required to comply with	The Agency requested additional information from the proponents regarding the Project's potential cumulative effects on migratory birds. The Agency has identified key mitigation measures, which are described in Section 6.3.3 and Appendix A. The Agency is working with the Province of Newfoundland and Labrador and the C-NLOPB on a regional approach for assessing the environmental effects of



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			regulations and to ensure worker safety. Flaring would only be undertaken during the Project as necessary to characterize the well potential and maintain safe operations and would be carried out in accordance with C-NLOPB <i>Drilling and Production Guidelines</i>. Project lighting and flaring would represent only a small increase over existing levels of lighting and flaring in the study area, would be temporary and localized, and would occur in areas typically away from other light sources. Residual lighting and flaring effects of the Project are therefore not anticipated to contribute to those of other offshore project activities within the study area resulting in mortality or injury of migratory birds. Daily monitoring for the presence of marine birds from the drilling installation using trained observers following ECCC's <i>Eastern Canada Seabird at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms</i> would help determine the effectiveness of mitigation measures.	offshore exploratory drilling in the offshore area of eastern Newfoundland, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects.



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Conseil des Innu de Ekuanitshit Elsipogtog First Nation NunatuKavut Community Council Première Nation des Innus de Nutashkuan	Fish and Fish Habitat - Cumulative Effects	Concern related to the cumulative effects of the Project on fish and fish habitat, in particular the cumulative effects associated with discharges and sediment contamination from multiple projects.	The proponents responded that it has a high level of confidence in the prediction of cumulative environmental effects on fish and fish habitat because of the degree of related research and monitoring that has been conducted. The proponents indicated that environmental effects from exploratory drilling are well understood with nine environmental assessments completed in six years and numerous publications to assess environmental effects from similar drilling activities. Given the distances between the Project and other offshore activities, Project-related discharge footprints would not overlap. While it is acknowledged that each production or exploration well is contributing to a localized effect on marine fish habitat, each of these environmental effects are reversible, once drilling ceases.	The Agency requested additional information from the proponents regarding the Project's potential cumulative effects on fish and fish habitat. The Agency is of the view that the mitigation, follow-up, and monitoring proposed for the Project would contribute to the mitigation or monitoring of cumulative environmental effects. The Agency is working with the Province of Newfoundland and Labrador and the C-NLOPB on a regional approach for assessing the environmental effects of offshore exploratory drilling in the offshore area of eastern Newfoundland, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects.
Conseil des Innu de Ekuanitshit MMS MTI	Regional assessment	A regional EA or a more comprehensive cumulative effects assessment for the Projects as well as other proposed and potentially upcoming exploration and	In advance of the Regional Assessment, operators, including the proponents, are working together in conducting effects analyses (including for this Project), engaging Indigenous	The Agency is working with the Province of Newfoundland and Labrador and the C-NLOPB on a regional approach for assessing the environmental effects of offshore exploratory drilling in the



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
		production projects must be conducted to provide a more accurate assessment of the potential magnitude of cumulative effects on migrating fish species, sea mammals, and migratory birds.	groups, and identifying research needs (e.g., migration and effects to Atlantic Salmon).	offshore area of eastern Newfoundland, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects.
Miscellaneous				
Elsipogtog First Nation KMKNO Miawpukek First Nation MTI Nunatsiavut Government NunatuKavut Community Council	Monitoring and Follow-up	Recommend engagement in additional follow-up monitoring. Detailed information on how Indigenous groups would participate in the development and implementation of monitoring and follow-up measures, including integrating traditional knowledge in these activities should be provided.	The proponents committed to various follow-up measures related to fish and fish habitat (Section 6.1), Marine Mammals and Sea Turtles (Section 6.2), Migratory Birds (Section 6.3), and Special Areas (Section 6.4). The proponents stated that it would develop an appropriate mechanism for sharing the results of environmental monitoring with Indigenous groups as part of a Fisheries Communications Plan. In consultation with interested Indigenous groups, the Fisheries Communications Plan would develop a process for providing regular project updates throughout the exploration drilling program, describe a process for informing Indigenous groups in the case of an accident or malfunction, as well as the	The Agency identified various follow-up programs and proposed EA conditions. These are described throughout Sections 6 and 7 and Appendix A. Results and information from follow-up and monitoring programs would be shared with Indigenous groups.



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
			results of any monitoring required by regulators.	
Elsipogtog First Nation Nunatsiavut Government	Climate change/effects of the environment on the Project	Changes to predicted weather and marine patterns due to climate change, particularly in regards to extreme weather events should be taken into account.	The proponents responded that storm track density projections for the Flemish Pass for 2081 to 2100 suggest that there would be less storms in the region with a likely increase in storm intensity. Climate change has the potential to limit project operations. Offshore infrastructure and vessels are certified to operate in extreme weather however, the frequency of events could result in operational delays. The proponents committed to implementing several measures and preventative actions into the daily operation and maintenance of a MODU to mitigate the risk of a spill and dropped equipment.	The Agency agrees that climate change may lead to changes in predicted weather and marine patterns, including changes to the frequency and severity of extreme weather events. It has proposed key mitigations that take these potential changes into account, including: • in consultation with the C-NLOPB and ECCC, implement a physical environment monitoring program in accordance with the Newfoundland Offshore Petroleum Drilling and Production Regulations and meeting or exceeding the requirements of the <i>Offshore Physical Environmental Guidelines</i>; • in consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, high sea state, or sea ice or iceberg conditions; and • in consultation with the C-NLOPB, implement



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				measures to ensure that drilling installations have the ability to quickly disconnect the riser from the well in event of an emergency or extreme weather conditions. These measures are intended to be adaptive to potential changes to predicted weather and marine patterns due to climate change that could occur over the life of the Project.
Première Nation des Innus de Nutashkuan	Icebergs and emergency response measures	How would iceberg movement be monitored and potential collisions be avoided? Are there emergency evacuation and shut down procedures to reduce some of the effects.	The proponents responded that drilling rigs used offshore Newfoundland and Labrador are designed and certified to operate in the North Atlantic environment and the limits to drilling operation vary depending on the task. Operators have specific adverse weather guidelines to follow in event of weather related events. It is the responsibility of the Offshore Installation Manager to decide if operations would continue whenever the motion limits are reached during extreme weather or based on the prevalence and track of approaching icebergs.	The Agency has identified key mitigation measures and proposed EA conditions for the Project to reduce the potential for iceberg collisions. These are described in Section 7.2.3 and Appendix A. Key mitigation measures include: • in consultation with the C-NLOPB and ECCC, implement a physical environment monitoring program in accordance with the Newfoundland Offshore Petroleum Drilling and Production Regulations and meeting or exceeding the requirements of the <i>Offshore Physical Environmental Guidelines</i>; • in consultation with the C-NLOPB, establish and



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				enforce practices and limits for operating all conditions that may be reasonably expected, including poor weather, high sea state, or sea ice or iceberg conditions ; • in consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting, and avoidance or deflection; and • in consultation with the C-NLOPB, implement measures to ensure the drilling installations have the ability to quickly disconnect the riser from the well in the event of an emergency or extreme weather conditions.
Elsipogtog First Nation KMKNO	Batch Drilling	Concerns regarding multiple wells being drilled simultaneously and lack of an effects assessment on simultaneous drilling.	The proponents noted that simultaneous drilling is not anticipated in any one exploration licence. Simultaneous drilling could occur within the project area due to drilling activities in other exploration licences and significant discovery licences and	The Agency requested additional information from the proponents on the potential for simultaneous drilling. This information was incorporated into its analysis. The Agency is working with the Province of Newfoundland and Labrador and the C-NLOPB on a regional approach for assessing the environmental effects of



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			theses effects have been assessed as cumulative effects.	offshore exploratory drilling in the offshore area of eastern Newfoundland, which would aim to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects.
Elsipogtog First Nation Miawpukek First Nation	Chemical Selection	Concerns regarding lack of discussion on alternative means or use of less-toxic alternatives.	The proponents stated that information contained in the EIS reflects the chemicals and volumes on the MODU currently under contract. The chemicals would undergo screening to reduce potential risk before they are permitted for use and chemicals are substituted regularly for less toxic alternatives.	The Agency requested additional information from the proponents on chemical selection and alternative means for their use. The Agency has identified key mitigation measures and proposed EA conditions related to chemical selection, including: • select chemicals to be used during the Project in accordance with the <i>Offshore Chemical Selection Guidelines</i> and use lower toxicity drilling muds and biodegradable and environmentally-friendly additives within muds and cements, where feasible.
Qalipu First Nation	Drilling wastes and marine discharges	Concerned about impacts of project waste including the type, and amount.	The proponents responded that is has a program to reduce or where possible, eliminate the discharge of waste to the environment with the following objectives: • use of environmentally favourable chemicals for a	The Agency asked for additional information on the alternatives that were examined with respect to waste management. The Agency has identified key mitigation measures and proposed EA conditions that would mitigate the effects of drilling wastes and



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			specific application where possible within all operations; and • use of the Lowest Effective Concentration of a chemical slated for use in a system that is designed to discharge to the sea. These objectives could be achieved through: • annual reviews of material balance of drilling and production chemicals, and on a per well basis; • risk ranking of chemicals that are discharged under the Husky Oil Operations Limited Chemical Management System to evaluate toxicity; • reviews of industry best practices in chemical technology; and • management of key drilling and production contracts and contractors.	marine discharges on the marine environment. These are described in Section 6.1.3 and Appendix A. The proponents would be required to: • select chemicals to be used during the Project in accordance with the <i>Offshore Chemical Selection Guidelines</i> and use lower toxicity drilling muds and biodegradable and environmentally-friendly additives within muds and cements, where feasible • ensure that all discharges meet the <i>Offshore Waste Treatment Guidelines</i>; • transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility; and • ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL.
Miawpukek First Nation NunatuKavut Community Council	Well abandonment	Concerns regarding wellhead abandonment procedures. Specifically if wellheads would be left protruding above the seabed, and the lifespan of the	The proponents provided additional information on abandonment and suspension procedures.	The Agency requested additional information from the proponents on well suspension and abandonment.



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
Première Nation des Innus de Nutashkuan		well abandonment and suspension techniques.	The proponents noted that abandoned wells would be permanently plugged and that labs have rigorously tested their designs. Well abandonment would be in compliance with the <i>Newfoundland Offshore Petroleum Drilling and Production Regulations</i>. As abandonment is permanent, there is no requirement for monitoring. Suspended wells have a cement or mechanical plug installed. Operators are required to provide detailed plans for monitoring suspended wells to the C-NLOPB. Suspension and abandonment methods are also required to be shared with the C-NLOPB.	The Agency has identified key mitigation measures and proposed EA conditions related to well abandonment, including: • prepare a well abandonment plan, including a wellhead abandonment strategy and submit it to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with Indigenous groups and commercial fishers; • ensure that details of safety exclusion zones and the locations of abandoned wellheads, if left on the seafloor, are published in Notices to Mariners, provided in Notices to Shipping, and communicated to fishers; and • provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning.



Source	Subject	Comment or Concern	Summary of Proponents' Responses	Agency Response
Miawpukek First Nation	Port use for vessels	Concerns regarding vessel traffic, port use and potential navigation impacts to harbours on the south shore of Newfoundland.	The proponents confirmed that it would use the port of St. John's whenever it is available. Other ports could be considered should the port of St. John's be unavailable.	The Agency requested additional information from the proponents on port use in Newfoundland. This information was incorporated into its analysis.
KMKNO	Well testing and flaring	Concerns regarding well testing. Specifically that formation testing while tripping as an alternative to flaring was not considered, and no explanation why flaring is the only option to safely and efficiently dispose of hydrocarbons was provided.	The proponents stated that it continues to evaluate alternative well testing technologies including but not limited to formation testing while tripping. The proponents noted that it would endeavor to reduce flaring through program optimization. The burner has an efficiency rating of 99.9 percent as tested by a third-party environmental company in Norway.	The Agency requested additional information on well testing and flaring. The Agency has identified key mitigation measures and proposed EA conditions related to flaring, including: • restrict flaring to the minimum required to characterize a well's hydrocarbon potential, as necessary for the safety of the operation; • where acceptable to the C-NLOPB, conduct formation testing using a drill pipe conveyed test assembly, or similar technology, rather than formation testing with flaring; and • if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring.



Appendix D: Species at Risk and COSEWIC-listed Species that May be Found in the Eastern Newfoundland Offshore Area, Including the Project Area

The Agency has taken a conservative approach to identifying potential species at risk by including all species that were identified by the proponents in the EIS and additional species the Agency believes may occur in the eastern Newfoundland offshore based on other sources, including other EAs and input from federal authorities. The likelihood of a species occurring in the area and the time of year it may be present can vary greatly from one species to another.

Information has been updated in accordance with the Species at Risk Registry and reviewed by DFO and ECCC.

Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment
Fish		
Acadian Redfish (<i>Sebastes fasciatus</i>) – Atlantic population	Not listed	Threatened
American Plaice (<i>Hippoglossoides platessoides</i>)	Not listed	Threatened
Atlantic Cod (<i>Gadus morhua</i>) - Newfoundland and Labrador population	Not listed	Endangered
Lumpfish (<i>Cyclopterus lumpus</i>)	Not listed	Threatened
Atlantic Wolffish (Striped Wolffish) (<i>Anarhichas lupus</i>)	Special concern	Special concern
White Hake (<i>Urophycis tenuis</i>) – Atlantic and Northern Gulf of St. Lawrence population	Not listed	Threatened
Cusk (<i>Brosme brosme</i>)	Not listed	Endangered
Deepwater Redfish (<i>Sebastes mentalla</i>) – Northern population	Not listed	Threatened



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment
Northern Wolffish (<i>Anarhichas denticulatus</i>)	Threatened	Threatened
Roundnose Grenadier (<i>Coryphaenoides rupestris</i>)	Not listed	Endangered
Smooth Skate (<i>Malacoraja senta</i>) - Funk Island Deep population	Not listed	Endangered
Spiny Dogfish (<i>Squalus acanthias</i>) - Atlantic population	Not listed	Special concern
Spotted Wolffish (<i>Anarhichas minor</i>)	Threatened	Threatened
Thorny Skate (<i>Amblyraja radiata</i>)	Not listed	Special concern
American Eel (<i>Anguilla rostrata</i>)	Not listed	Threatened
Atlantic Bluefin Tuna (<i>Thunnus thynnus</i>) – Western Atlantic population	Not listed	Endangered
Winter Skate (<i>Leucoraja ocellata</i>) – Eastern Scotian Shelf - Newfoundland population	Not listed	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - Inner Bay of Fundy population	Endangered	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - Outer Bay of Fundy population	Not listed	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - Eastern Cape Breton population	Not listed	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - Nova Scotia Southern Upland population	Not listed	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - South Newfoundland population	Not listed	Threatened
Atlantic Salmon (<i>Salmo salar</i>) - Quebec Eastern North Shore population	Not listed	Special concern



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment
Atlantic Salmon (<i>Salmo salar</i>) - Quebec Western North Shore population	Not listed	Special Concern
Atlantic Salmon (<i>Salmo salar</i>) - Anticosti Island population	Not listed	Endangered
Atlantic Salmon (<i>Salmo salar</i>) - Inner St. Lawrence population	Not listed	Special concern
Atlantic Salmon (<i>Salmo salar</i>) - Gaspé-Southern Gulf of St. Lawrence population	Not listed	Special concern
Basking Shark (<i>Cetorhinus maximus</i>) – Northeast Atlantic population	Not listed	Special concern
White Shark (<i>Carcharodon carcharias</i>) – Atlantic population	Endangered	Endangered
Porbeagle Shark (<i>Lamna nasus</i>)	Not listed	Endangered
Shortfin Mako Shark (<i>Isurus oxyrinchus</i>) – Atlantic population	Not listed	Special concern
Marine Mammals		
Beluga Whale (<i>Delphinapterus leuca</i>) – St. Lawrence Estuary population	Endangered	Endangered
Blue Whale (<i>Balaenoptera musculus</i>) – Atlantic population	Endangered	Endangered
Bowhead Whale (<i>Balaena mysticetus</i>) – Eastern Canada-West Greenland population	Not listed	Special concern
Fin Whale (<i>Balaenoptera physalus</i>) – Atlantic population	Special concern	Special concern
North Atlantic Right Whale (<i>Eubalaena glacialis</i>)	Endangered	Endangered
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>) - Scotian Shelf population	Endangered	Endangered



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>) - Davis Strait-Baffin Bay-Labrador Sea population	Not listed	Special concern
Harbour Porpoise (<i>Phocoena phocoena</i>) - Northwest Atlantic population	Not listed	Special concern
Killer Whale (<i>Orcinus orca</i>) - Northwest Atlantic/Eastern Arctic population	Not listed	Special concern
Sowerby's Beaked Whale (<i>Mesoplodon bidens</i>)	Special concern	Special concern
Atlantic Walrus	Not listed	Special concern
Sea Turtles		
Leatherback Sea Turtle (<i>Dermochelys coriacea</i>) – Atlantic population	Endangered	Endangered
Loggerhead Sea Turtle (<i>Caretta caretta</i>)	Endangered	Endangered
Birds		
Bank Swallow (<i>Riparia riparia</i>)	Threatened	Threatened
Barrow's Goldeneye (<i>Bucephala islandica</i>)	Special concern	Special concern
Bobolink (<i>Dolichonyx oryzivorus</i>)	Threatened	Threatened
Buff-breasted Sandpiper (<i>Tryngites subruficollis</i>)	Special concern	Special concern
Common Nighthawk (<i>Chordeiles minor</i>)	Threatened	Threatened
Harlequin Duck (<i>Histrionicus histrionicus</i>)	Special concern	Special concern



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment
Ivory Gull (<i>Pagophila eburnea</i>)	Endangered	Endangered
Ross's Gull (<i>Rhodostethia rosea</i>)	Threatened	Threatened
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	Threatened	Special concern
Peregrine Falcon (<i>Falco peregrinus</i>)	Special concern	Not at risk
Piping Plover (<i>Charadrius melodus melodus</i>)	Endangered	Endangered
Red Knot (<i>Calidris canutus rufa</i>) – Rufa subspecies	Endangered	Endangered
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	Not listed	Special concern
Roseate Tern (<i>Sterna dougallii</i>)	Endangered	Endangered
Short-eared Owl (<i>Asio flammeus</i>)	Special concern	Special concern

Source : Equinor Canada Limited 2017; ExxonMobil Canada Limited 2017; CNOOC 2018; BP 2018. Husky Oil Operations 2018, and proponents' IR responses, 2018-2019. Species listings updated as per Canada's Species at Risk Public Registry, accessible at: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>.



Appendix E: Special Areas in the Proponents' Study Area and their Proximity to the Exploration Licences and Proponents' Project Area

Special Area	Distance to Nearest Exploration Licence (kilometres)	Distance to Proposed Transit Route (kilometres)
Canadian Ecologically and Biologically Significant Areas		
Northeast Slope	43	20
Virgin Rocks	100	44
Lilly Canyon - Carson Canyon	104	83
Southeast Shoal	231	208
Orphan Spur	240	209
Eastern Avalon	237	Overlaps
Baccalieu Island	254	11
Southwest Slope	402	284
United Nations Convention on Biological Diversity Ecologically and Biologically Significant Areas		
Slopes of the Flemish Cap and Grand Bank	27	7
Seabird Foraging Zone in the Southern Labrador Sea	263	232
Orphan Knoll	311	282
Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank	199	177
Marine Refuges		
Northeast Newfoundland Slope	83	63
Division 30 Coral Closure (area inside the 200 mile Exclusive Economic Zone)	439	333
Snow Crab Stewardship Exclusion Zones		
Nearshore Exclusion Zone	242	Overlapping
8BX Exclusion Zone	0.1	Overlapping



Special Area	Distance to Nearest Exploration Licence (kilometres)	Distance to Proposed Transit Route (kilometres)
6C Exclusion Zone	242	Overlapping
6B Exclusion Zone	261	26
8A Exclusion Zone	262	64
Northwest Atlantic Fisheries Organization Fisheries Closure Areas		
Flemish Pass / Eastern Canyon (2)	47	23
Northwest Flemish Cap (11)	87	65
Northwest Flemish Cap (10)	108	78
Northwest Flemish Cap (12)	161	129
Sackville Spur (6)	133	100
Beothuk Knoll (13)	140	107
Beothuk Knoll (3)	144	112
Northern Flemish Cap (8)	196	164
Northern Flemish Cap (9)	207	176
Northern Flemish Cap (7)	222	190
Tail of the Bank (1)	242	220
Eastern Flemish Cap (4)	274	252
Northeast Flemish Cap (4)	274	244
Orphan Knoll	300	275
Newfoundland Seamounts	302	284
3O Coral Closure	439	333
Steep Flanks	224	194
South of Flemish Cap	169	136
Tail of Grand Banks Spawning Grounds	246	223
Fogo Seamounts	558	534