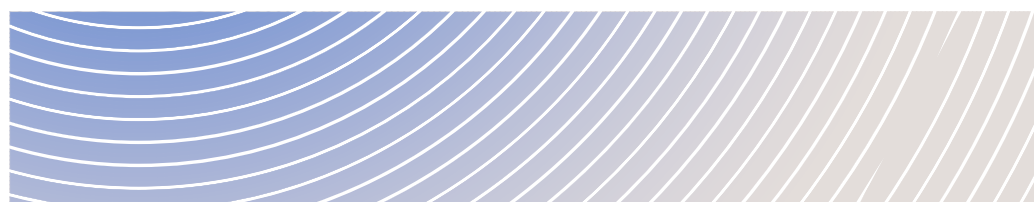


Bay du Nord Development Project



ENVIRONMENTAL ASSESSMENT REPORT

August 2021



Impact Assessment
Agency of Canada

Agence d'évaluation
d'impact du Canada

Canada



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This document has been issued in French under the title:

Projet d'exploitation de Bay du Nord



Executive Summary

Equinor Canada Ltd. (the proponent) proposes to develop two significant discovery licences into an offshore oil production project located in the Flemish Pass Basin of the northwest Atlantic Ocean. Those two significant discovery licenses (Bay du Nord and Baccalieu) comprise the core Bay du Nord (BdN) development area which is located about 500 kilometres east of St. John's, Newfoundland and Labrador. The purpose of the proposed production project is to extract, produce, and transport offshore oil and gas resources to market. The proposed project area is comprised of two temporal components of development: 40 wells within five locations in the core Bay du Nord development area and up to 20 future wells in undefined locations outside of the core area.

The Project would consist of subsea infrastructure including well templates; manifolds; flowlines; umbilicals and a mooring system on the seafloor; a floating production storage and offloading vessel (FPSO); and up to two drilling installations designed for year-round operations in deep water. Support and supply vessels and helicopters would travel between the drilling areas and existing land based facilities in Newfoundland and Labrador. Produced oil would be transported and offloaded by a shuttle tanker to an existing transshipment facility in Whiffen Head on the island of Newfoundland or directly to international markets.

The Impact Assessment Agency of Canada (the Agency) conducted a federal environmental assessment (EA) of the Project based on the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project is subject to CEAA 2012 because it is described in the Schedule to the *Regulations Designating Physical Activities* as follows:

“The construction, installation and operation of a new offshore floating or fixed platform, vessel or artificial island used for the production of oil or gas.”

This EA Report provides a summary and the main findings of the federal EA for the Project. The Agency prepared this 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, Transport Canada, Parks Canada Agency, and Department of National Defence. These government departments participated in a conformity and technical review of the proponent's 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 environments 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. The Agency selected the following valued components of the natural and human environments for this EA:

- fish and fish habitat (including marine plants);
- marine mammal;
- sea turtles;
- migratory birds;
- species at risk;
- special areas;
- commercial fisheries; and



- current use of lands and resources for traditional purposes and health and socio-economic conditions of Indigenous peoples.

During the EA, participants raised concerns about the Project's potential routine and accidental effects on the marine environment, commercial fishing, and on related effects on Indigenous peoples.

The Project's greatest potential for environment effects from routine operations include:

- effects on fish and fish habitat caused by the discharge of drilling waste (drilling fluid and cuttings), installation of seabed infrastructure, and the discharge of produced water;
- effects on marine mammals and fish caused by underwater sound emissions from subsea infrastructure construction, well site surveys, seismic surveys, FPSO, MODUs;
- effects on migratory birds caused by light emissions from the construction vessels, FPSO, MODUs, seismic vessels, tankers, supply vessels, maintenance vessels, and flaring; and effects caused by produced water; and
- interference with domestic commercial, Indigenous, foreign fisheries and related fishery research caused by establishment of safety exclusion zones around the FPSO, MODUs, subsea infrastructure and seismic vessels.

Accidents and malfunctions scenarios such as batch spills of diesel fuel, crude oil and drilling muds as well as subsea blowouts could occur during development drilling and production operation phases causing adverse environmental effects. Oil spill fate and trajectory modelling and analyses were performed to evaluate potential effects of these accidental spills and to assist in spill response planning.

The proponent's project planning and design incorporates measures to mitigate the adverse effects of its Project through implementation of corporate policies and commitments to adhere to regulatory guidelines and authorizations.

Historically, the incidence of large oil spills during production drilling is extremely low. The proponent proposed design measures, operational procedures, and dedicated resources to prevent and respond to spills of any size from the Project. The proponent indicated that in the unlikely event of a blowout, spill response measures would be undertaken in a safe, prompt, and coordinated manner. These response measures could include containment, capping, drilling a relief well, application of dispersants, mechanical recovery and shoreline protection operations, as applicable. The Canada-Newfoundland and Labrador Offshore Petroleum Board will require submission contingency and emergency response plans for review and approval.

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 EA was the potential effects of routine operations and accidental events on fish and fish habitat, migratory birds, marine mammals, and their fisheries.

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 CEAA 2012 decision statements for the Project, in the event that the Project is ultimately permitted to proceed. The Agency is of the opinion that the recommended measures to mitigate potential environmental effects from routine operations and accidents and malfunctions on migratory birds, fish and fish habitat, marine mammals, sea turtles, special areas, and commercial fisheries, are appropriate to also accommodate for potential impacts on rights.



The Agency concludes that the Bay du Nord Development 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	<i>Canadian Environmental Assessment Act, 2012</i>
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CO ₂	Carbon Dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA Report	Environmental Assessment Report
EA	Environmental Assessment
EBSA	Ecologically or Biologically Significant Marine Areas
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ESRF	Environmental Studies Research Fund
Equinor	Equinor Canada Ltd. (formerly Statoil Canada Ltd.)
FPSO	Floating production storage and offloading
GHG	Greenhouse Gas
IAA	<i>Impact Assessment Act</i>
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
MARPOL	<i>International Convention for the Prevention of Pollution from Ships</i>
MMS	Mi'gmawei Mawiomi Secretariat
MODU	Mobile Offshore Drilling Unit
MTI	Mi'gmawe'l Tplu'taqnn Incorporated
NAFO	Northwest Atlantic Fisheries Organization
<i>Offshore Chemical Selection Guidelines</i>	<i>Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands</i>
Project	Bay du Nord Development Project
Proponent	Equinor Canada Ltd.
Section 35 Rights	Potential or established Aboriginal or treaty rights protected under section 35 of the Constitution Act, 1982
VME	Vulnerable Marine Ecosystem
WNNB	Wolastoqey Nation of New Brunswick



Glossary

Term	Definition
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
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
Conductor Casing	The first casing that is installed and cemented in place in a borehole to provide structural support for wellhead equipment and to prevent washout while drilling the hole for the surface casing. ¹
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
Drilling Installation	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
Development Well	A development well is drilled in a proven producing area for the production of oil or gas.
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
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 fluid 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
Petroleum Reservoir	A subsurface body of rock having sufficient porosity and permeability to store and transmit fluids and which contains petroleum. ^{1,3}
Subsea Tieback	An engineering process that connects a new oil and gas discovery to an existing production centre.
Subsea Well	A well where the casing commences below the surface of the sea and above the seabed. 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 10 milligrams per kilogram, be relatively nontoxic in marine environments and have the potential to biodegrade under aerobic conditions. ¹
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 drilling activities. ³
Wellhead	Equipment installed at the surface of a completed oil or a gas well that provides a structural and pressure containing interface for the drilling and production equipment. ³
Well Completion	The surface termination of a wellbore that incorporates facilities for installing casing hangers during the well construction phase. The wellhead also incorporates a means of hanging the production tubing and installing the Christmas tree and surface flow-control facilities in preparation for the production phase of the well. ³

References

¹ Canada-Newfoundland and Labrador Offshore Petroleum Board

² Transport Canada (<https://www.tc.gc.ca/eng/marinesafety/oep-environment-ballastwater-defined-249.htm>)

³ Schlumberger Limited (<https://www.glossary.oilfield.slb.com/>)



1 Introduction

Equinor Canada Ltd. (the proponent) proposes to develop the Bay du Nord field, into an offshore oil production project located in the Flemish Pass Basin of the northwest Atlantic Ocean. The two significant discovery licenses (Bay du Nord and Baccalieu) comprise the core Bay du Nord development area (core development area) which is located about 500 kilometres east of St. John's, Newfoundland and Labrador. The purpose of the proposed Bay du Nord Development Project (the Project) is to extract, produce, and transport offshore oil and gas resources to Canadian or international markets. Over the course of the Project, the proponent would continue to conduct exploration drilling programs outside of the core development area. If the exploration projects result in any future significant discovery, additional production wells may be included into the Project.

1.1 Purpose of the Draft Environmental Assessment Report

The purpose of the Environmental Assessment (EA) Report is to provide a summary of the analysis undertaken 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. The Minister of the Environment and Climate Change will consider this report and comments received from Indigenous groups and the public when issuing the EA decision statement for the Project.

1.2 Scope of Environmental Assessment

1.2.1 Environmental Assessment Requirements

On February 20, 2019, a Memorandum of Understanding between the Agency and the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) was posted on the Impact Assessment Agency of Canada Registry. The Memorandum of Understanding provides for an integrated EA and regulatory review of the Project to satisfy both the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*. The C-NLOPB is an independent joint agency of the Governments of Canada and Newfoundland and Labrador and is responsible for the regulation of petroleum activities in the Newfoundland and Labrador offshore area. The Project would require approval by the C-NLOPB under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*. The Project may also require approval or permits under the *Fisheries Act* and *Species at Risk Act* (Fisheries and Oceans Canada), the *Canadian Environmental Protection Act* (Environment and Climate Change Canada), the *Canadian Navigable Waters Act* (Transport Canada), and the *Radiocommunication Act* (Industry Canada).

The Project is subject to CEAA 2012 as it involves activities that are described in Section 11 of the *Regulations Designating Physical Activities* (the Regulations) under CEAA 2012:

“The construction, installation and operation of a new offshore floating or fixed platform, vessel or artificial island used for the production of oil or gas.”

On June 13, 2018, the proponent submitted a project description for the Project, and on August 9, 2018, the Agency determined that an EA was required under CEAA 2012.



On August 28, 2019, the *Impact Assessment Act* (IAA) came into force and CEAA 2012 was repealed. However, in accordance with subsection 181(1) of IAA (transitional provision), the EA of the Project continued under CEAA 2012 as though it had not been repealed.

1.2.2 *Factors Considered in the Environmental Assessment*

On September 26, 2018, the Agency issued Environmental Impact Statement (EIS) Guidelines to the proponent for the Project (<https://iaac-aeic.gc.ca/050/evaluations/document/132349>). Pursuant to subsection 19(1) of CEAA 2012, the Agency considered the following factors in its environmental assessment:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out;
- the significance of the effects;
- comments from the public;
- mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- the requirements of the follow-up program in respect of the Project;
- the purpose of the Project;
- alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- any change to the project that may be caused by the environment; and
- the results of any relevant study conducted by a committee established by the Minister to study the effects of existing or future physical activities carried out in a region.

In accordance with Section 5 of CEAA 2012, the Agency assessed potential environmental effects on areas of federal jurisdiction (subsection 5(1)) as well as effects related to changes in the environment that are directly linked or necessarily incidental to federal decisions that may be required for the Project (subsection 5(2)). Effects on species at risk were also considered as required by subsection 79(2) of the *Species at Risk Act*. Table 1 describes the Agency's consideration of various environmental components and provides the Agency's rationale for selection of the following valued components:

- fish and fish habitat (including marine plants);
- marine mammals;
- sea turtles;
- migratory birds;
- species at risk;
- special areas;
- commercial fisheries; and
- current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples.

The Agency also considered effects that cross provincial or federal boundaries.



Valued components are environmental and socio-economic features of the environment that may be affected by the Project and that have been identified to be of concern by the proponent, government agencies, Indigenous groups or the public. The valued components considered by the Agency are presented in Table 1 and were used to focus the EA. The Agency limited its assessment to valued components that fall within federal jurisdiction as described in Section 5 of CEAA 2012.

Table 1 Valued Components Considered in the Agency's Analysis

Valued Component	Rationale
Air Quality	The Project would emit air contaminants and result in changes to ambient air quality. Effects on air quality were assessed as a requirement under subsection 5(1) of CEAA 2012 for changes outside of Canada.
Greenhouse Gas Emissions	The Project would result in emissions of greenhouse gases and contribute to atmospheric greenhouse gas levels. Effects on atmospheric greenhouse gas levels were assessed as a requirement under subsection 5(1) of CEAA 2012 for changes outside of Canada.
Fish and Fish Habitat ¹	The Project may result in harmful alteration, disturbance or destruction of fish habitat and may result in behavioural change, injury, and mortality to fish and invertebrates. Effects on marine fish and invertebrates including federal species at risk and special areas were assessed as a requirement under subsection 5(1) of CEAA 2012.
Marine Mammals and Habitat ¹ (included in the definition of fish under the <i>Fisheries Act</i>)	The Project would result in a change of habitat and may result in behavioural changes, injury and mortality of marine mammals from underwater noise and vessel traffic. Effects on marine mammals including federal species at risk and special areas were assessed as a requirement under subsection 5(1) of CEAA 2012.
Sea Turtles and Habitat ¹ (included in the definition of fish under the <i>Fisheries Act</i>)	Sea turtles are not reported to occur in the project area and are therefore not addressed in routine activities in that location. They may occur along the vessel traffic route. The Project may result in habitat changes from spill events and may result in behavioural, injury and mortality effects to sea turtles over a wider regional area. Effects on sea turtles including federal species at risk and special areas were assessed as a requirement under subsection 5(1) of CEAA 2012.
Migratory Birds and Habitat	The Project would result in a change of habitat and may result in behavioural changes, injury and mortality to migratory birds. Effects on migratory birds including federal species at risk and special areas were assessed as a requirement under subsection 5(1) of CEAA 2012.
Marine Plants ² (included in the definition of fish under the <i>Fisheries Act</i> and <i>Species at Risk Act</i>)	Potential effects on marine plants were considered in the Agency's assessment of effects on fish habitat.



Valued Component	Rationale
Changes on Federal Lands, Across Provincial Boundaries, and/or Outside Canada	The extraction of petroleum resources is on the continental shelf extension beyond the Canadian 200 mile Exclusive Economic Zone. The portion of the Project not connected to the seafloor infrastructure and operations above the seafloor is on the high seas within international waters. Accidental release of oil would occur in international waters, with some oil spreading west into Canadian federal and provincial lands and the majority of oil spreading east, potentially resulting in transboundary effects in European territorial waters.
Current Use of Land and Resources for Traditional Purposes; Health and Socio-economic Conditions; and Physical and Cultural Heritage	<p>Certain 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 that could be subject to traditional harvesting. Indigenous fisheries or harvesting could also be affected by an accident 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.</p> <p>Indigenous communal commercial fishing licences overlap with the project area.</p> <p>The Project would be located at least 500 kilometres offshore from St. John's, Newfoundland and Labrador. 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.</p>
Commercial Fisheries	Commercial fishing and scientific research activities could be affected by routine operations (e.g., anti-collision zones) as bottom trawling may be constrained by the subsea infrastructure. Exclusion areas may be established from accidental events. Indigenous communal commercial fishing licences overlap with the project area. Effects on commercial fisheries is therefore assessed as a requirement under subsection 5(2) of CEEA 2012.
Recreational Fisheries	There is no known recreational fishing activity in the vicinity of the exploration licences, which range from approximately 500 kilometres from St. John's, Newfoundland and Labrador. Nearshore recreational fishing may be affected by accidental events associated with the Project.

¹ Fish includes finfish, shellfish, crustaceans, and all marine animals and their life stages (including sea turtles and marine mammals). *Fish habitat* includes spawning grounds and nurseries, rearing, food supply and migration areas for which fish depend directly or indirectly, as defined by the *Fisheries Act*, section 2.1.

² Marine plants includes benthic and detached algae, marine flowering plants, algae (brown, red, green), phytoplankton, as defined by the *Fisheries Act* and *Species at Risk Act*, Section 2(1)

³ Environment includes (i) land, water, air, and all layers of atmosphere, (ii) all organic and inorganic matter and living organisms, and (iii) interacting natural systems, as defined by CEEA 2012.



Spatial boundaries define the areas within which the Project may interact with the environment and cause environmental effects. Temporal boundaries identify when an effect may occur in relation to specific project activities. Generally, these boundaries are based on a single project phase, or a combination of phases, to reflect the timing and duration of project activities that are likely to cause adverse environmental effects on valued components. The six project phases overlap in time as noted below in Section 2.2.

In accordance with the Agency's *Operational Policy Statement: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012*, the Agency assessed the significance of residual adverse Project-related environmental effects (i.e., those effects that remain after the planned mitigation measures have been implemented) of routine Project operations (Section 4) and accidental events (Section 5). The Agency characterized the residual adverse effects on valued components by using the following assessment:

- magnitude: severity of the adverse effects;
- geographic extent: spatial reach of the adverse effect;
- duration: length of time that a valued component would be affected by the adverse effect;
- timing: applied to a valued component when relevant;
- frequency: rate of recurrence of the adverse effects;
- reversibility: degree to which the environmental conditions can recover after the adverse effects occur; and
- resiliency/sensitivity to further change (i.e., ecological/socioeconomic context).

The definitions and limits used to assign the level of effect for each rating criterion are provided in Appendix A. In some cases, the Agency accepted the proponent's criteria and thresholds as adequate for the purposes of assessing environmental effects under CEAA 2012. However, the Agency used different criteria for magnitude and duration for most valued components. In its magnitude criterion, the proponent compared Project induced changes against natural variability; however, measures (or values) of natural variability were not provided in the effects analyses to substantiate the conclusions.

The Agency's key measures to mitigate the Project's effects that considered the mitigation measures proposed by the proponents, expert advice from federal authorities, and comments from Indigenous groups and the public, are provided in Appendix B. A summary of issues raised by Indigenous groups is presented in Appendix C. The species at risk that may occur in the project area are listed in Appendix D.

The Agency also considered the effects of the environment on the Project (Section 5.2) and cumulative environmental effects (Section 5.3).

For preparation of this EA Report, the Agency reviewed various sources of information in conducting its analysis, including:

- the proponent's EIS and EIS Summary;
- additional information received from the proponent in response to the information requirements issued by the Agency following review of the EIS;
- advice from expert departments and agencies, including the C-NLOPB, Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Health Canada, Transport Canada, and Natural Resources Canada, Department of National Defence, and the Parks Canada Agency;



- comments received from the public; and
- comments received from Indigenous groups.



2 Project Overview

2.1 Project Location

The Project is located about 500 kilometres east-northeast of St. John's, Newfoundland and Labrador, in the northwest Atlantic Ocean (Figure 1) and lies outside Canada's 200 mile Exclusive Economic Zone. The area experiences intermittent human activity related to fishing, commercial shipping traffic, research, and petroleum exploration. The project area is comprised of two components, the core Bay du Nord development area as well as the broader project area where subsea tiebacks in future development could occur outside the core Bay du Nord development area. The project area is approximately 4,900 square kilometres, with water depths ranging between 340 to 1,200 metres on the Newfoundland Slope and in the Flemish Pass. It includes a core development area that is approximately 470 square kilometres with water depths ranging from approximately 1,000 to 1,200 metres. See Figure 1.

The preliminary project schedule indicates that site preparation, construction/installation and hookup and commissioning would occur over multiple years, and concurrently to some extent. Drilling programs would occur periodically over the life of the Project, commencing during the construction phase of the Project. Production duration is anticipated to be 20 to 30 years. At the end of the production life, facilities would be decommissioned. The preliminary project schedule extends from as early as 2023 to 2058 over six phases as described below in Section 2.2.

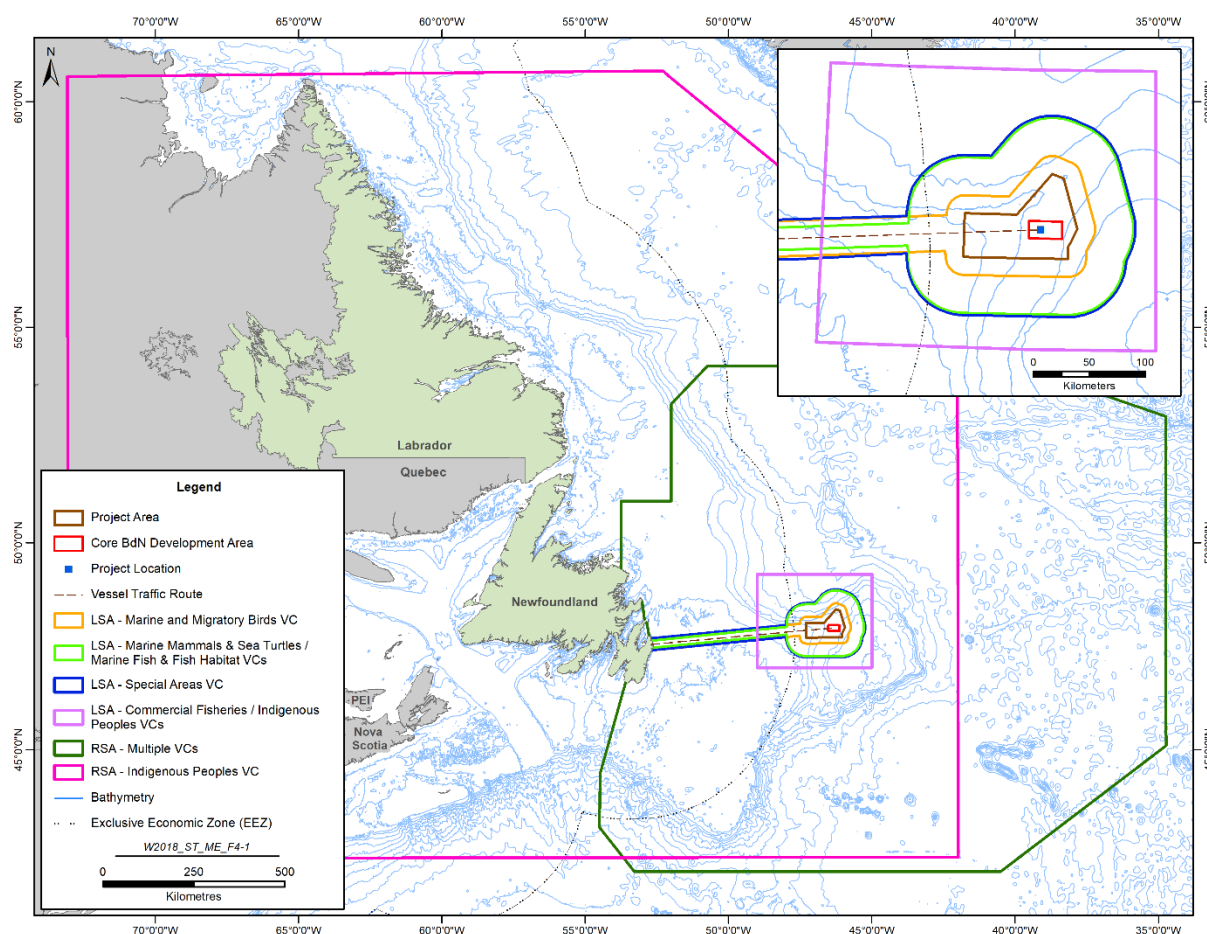


Figure 1 Project Location and Project Environmental Assessment Study Areas

Source: Equinor Canada Ltd. (2020)

There are no land-based activities associated with the Project, other than use of existing shore base support services in St. John's, Newfoundland and Labrador through project vessel and helicopter transits.

2.2 Project Components and Activities

Project activities include:

- site preparation;
- construction and installation of subsea infrastructure;
- drilling of the production wells;
- installation of the Floating Production Offshore Storage and Loading Platform (FPSO);
- hook-up of the FPSO with the subsea infrastructure and commissioning of the entire system;
- production and maintenance operations;
- supporting surveys; and

- decommissioning.

2.2.1 Site Preparation Phase

Prior to installation activities, pre-clearance surveys may be required to determine the presence of seabed and/or subsurface obstructions. These investigations involve geophysical and/or well site surveys.

Timeline: duration of approximately 1 to 3 years.

2.2.2 Construction and Installation Phase

Offshore construction and installation would consist of the installation of the subsea infrastructure of well templates; wellheads; umbilicals; flowlines; FPSO and shuttle tanker mooring systems; and protection structures for the seabed infrastructure.

Timeline: duration of approximately 2 to 5 years.

2.2.3 Development Drilling of Production Wells Phase

Production wells would be drilled and completed using one or more drilling installations suitable for year-round operations in the environmental conditions of the project area. Drilling activities may be undertaken by either a floating and anchored semi-submersible or a drillship, depending on availability and operability in offshore Newfoundland and Labrador (Figure 2).

For the purposes of the EA Report, including the assessment of cumulative effects, the effects assessment considers the operation of two mobile offshore drilling units (MODUs) actively engaged in drilling activities in the project area at any one time.

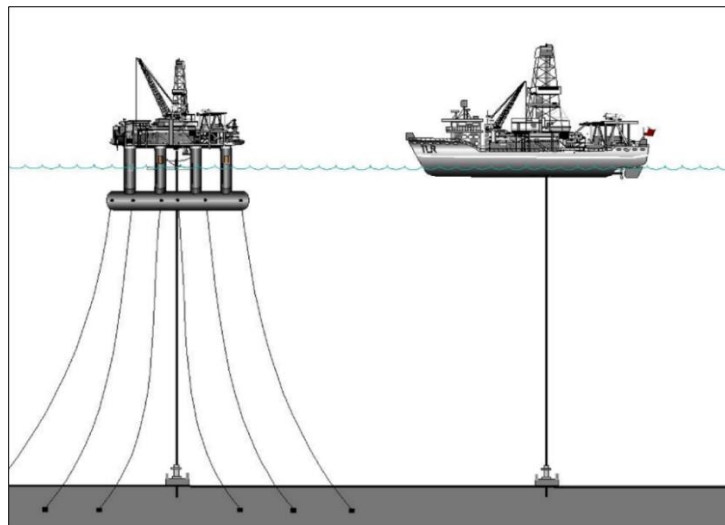


Figure 2 Schematic of an Anchored Semi-submersible and a Drillship

Source: Minerals Management Service. *Gulf of Mexico OCS Region - Minerals Management Service. Gulf of Mexico OCS Region. (May 2000).*



Development Well Drilling – Well Types and Design

Well drilling in the core development area would involve the drilling of up to 40 wells, and future development areas could include the drilling of an additional 20 wells, with a combination of production and injection wells. The most likely scenario is to conduct most or all proposed drilling operations with one MODU (Core BdN and Project Area Tiebacks). A plausible scenario where a second MODU would be simultaneously planned for in the field includes the contingency to safeguard against unforeseen Project delay for the Drilling Activities phase. These scenarios are not predictable and are contingent on external factors such as market conditions, rig availability, characteristics of the drilled wells, well operations and maintenance requirements, among others. Wells will either be drilled using templates (multiple wells drilled in one location) or at individual well locations (satellite wells). Well templates may be four, six, and/or eight-slot templates. The core development area would include between three and 10 well templates. Future development areas could include one to five additional well templates, either connected back to the FPSO or existing well template infrastructure. These activities could occur at any point over the course of the Project in the project area within 40 kilometres of the FPSO, but are most likely to begin no later than 10 years into the Project. The proponent estimated that it will take approximately 45 to 85 days to drill and complete a development well for the Project. The proponent also noted that based on drilling information available from the C-NLOPB, the average duration to drill a single development well for all operators is approximately 81 days.

Timeline: To account for the total well number for the core development area (up to 40 wells) and future development areas (up to 20 wells) drilling may occur at any time over the life of the Project but will not be continuous over the Project life.

Development Well Drilling - Drilling-Fluids Selection

Drilling fluid, also known as drilling muds, is required to lubricate the drill bit; to protect and clean the drill hole; for overbalancing formation pressures; to stabilize the borehole; to reduce friction; and for bringing cuttings to the surface. Water-based mud would be used in the two top sections of the bore hole. Synthetic-based muds may be used for remaining borehole sections.

Drilling fluid selection is part of the well design process and may change as the well borehole is drilled. Drilling fluids are typically a combination of different products including seawater, freshwater, base fluid, viscosifiers, weighting agents and other additives to ensure the well can be drilled safely and efficiently. The selection and use of drilling fluids would meet the proponent's internal requirements, and the C-NLOPB requirements outlined in the *Offshore Chemical Selection Guidelines*.

Timeline: drilling programs will occur periodically at any time through the life of the Project.

2.2.4 *Installation of the FPSO*

The FPSO (Figure 3) travels to the Project site from an international shipyard and is positioned on site via its seabed mooring and a turret system.



Figure 3 Illustration of the Proposed Bay du Nord FPSO

Source: Equinor Canada Ltd. (2020)

2.2.5 Hook-up and Commissioning Phase

Hook-up includes tie-in and connection operations to connect flowlines and umbilicals between subsea templates, between templates and the FPSO, and the connection of the moorings to the FPSO turret system. A diving support vessel may be required to support the hook-up activities.

Flowlines would be flooded, and hydrostatic leak-testing would be performed using seawater, freshwater and chemicals (corrosion inhibitors, oxygen scavengers, biocides, hydrate formation inhibitors, dyes, etc.). A plug of gel (water-soluble mixture of water and chemicals) may be used to establish a viscous barrier to prevent seawater from flowing into the flowlines during subsea connection activities.

Timeline: duration of approximately 1 year.

2.2.6 Production and Maintenance Operations Phase

Production Operations

The well fluids arriving from the reservoir to the FPSO would be a mixture of oil, water and gas, and processing facilities on the FPSO would separate these fluids into oil, water and gas. Oil is the targeted commercial product of the process and would, following the separation process, be routed to the crude oil storage in the hull of the FPSO for subsequent transfer to a shuttle tanker. Shuttle tankers would transport oil to an existing transshipment facility in Whiffen Head on the island of Newfoundland or directly to international markets.



Produced water is treated on the FPSO by removing process sand and remaining oil, prior to discharge into the ocean. Cooling water discharge may be included with the produced water effluent.

All produced gas would be utilized at the producing field. A relatively small portion of the produced gas would be used as fuel for power generation onboard the FPSO. The remaining gas volume (90 to 95 percent) would be re-compressed and reinjected into the reservoir for pressure support. There would be no routine flaring of produced gas from the FPSO. Gas would be flared during start up, shutdown, well clean-up activities, and for safety reasons.

Maintenance Operations

Well maintenance activities can include a well workover or well intervention program if there are issues with a well after initial drilling and completion. Where possible these types of programs are executed by the FPSO, specialized vessels (for example, inspection, maintenance, and repair vessels or light intervention vessels) or a drilling installation.

Maintenance of process and utility systems include regularly scheduled major shutdowns turnarounds in line with established industry/company practice. Marine systems and the hull will be maintained according to the class society and flag state requirements.

Timeline: duration of approximately 20 to 30 years.

2.2.7 Supporting Surveys

The proponent may undertake geophysical or environmental surveys throughout the project life to support ongoing drilling or production activities.

Timeline: may occur any time throughout the life of the Project.

2.2.8 Decommissioning Phase

At end of field-life the proponent would decommission the Project in accordance with regulatory requirements in place at the time of decommissioning. The FPSO and all floating equipment (turret, mooring lines) would be decommissioned and removed from the project location. Subsea infrastructure, including flowlines, umbilicals and well templates may be removed or left in place. Wellheads would be removed or left in place depending on water depth.

Timeline: duration of 1 to 5 years.

2.3 Potential Routine Emissions, Discharges and Wastes and their Management

Potential environmental emissions and discharges associated with the proposed Project include underwater sound, light, atmospheric emissions, liquids, cooling water, produced water, drill mud and cuttings, and solid waste materials. The greenhouse gas (GHG) emissions, liquids and drill cuttings discharges are controlled through compliance with regulatory requirements.



2.4 Alternative Means of Carrying Out the Project

The effects assessment of alternatives considered the following:

- 1) Where one option was likely to have a greater environmental interaction and/or effect, that option was assessed.
- 2) Where options were likely similar in potential environmental effects, effects of the options were considered in the effects assessment analysis, as appropriate.

The proponent identified and evaluated alternatives for the following aspects of the Project.

Production Installation - The production installation options taken into consideration included a FPSO vessel, gravity-based structure, semi-submersible, spar with storage, spar without storage and tension leg platform. The FPSO was chosen by the proponent as the preferred development concept for the Project based on consideration of technical and economic feasibility and low potential for environmental interactions.

Power Generation - Two power sources for the FPSO are under consideration: reciprocating engines and gas turbines. Both alternatives currently meet International Maritime Organization (Tier III) and Canadian regulatory requirements with respect to nitrogen oxides emissions. Both options would include further considerations of maintenance requirements and overall operating costs in determining the best option for the Project. Environment and Climate Change Canada (ECCC) would review the compression equipment emissions at the C-NLOPB Development Plan application stage when the project emission plan is provided.

Flare Gas Management - Two low pressure flare ignition alternatives are under consideration: pilot flare or pilotless flare. The proponent considered a pilot flare which generates minor air emissions compared to the pilotless flare which generates no air emissions.

Produced Water Management - The following options were considered for produced water management:

- discharge produced water to the marine environment;
- reinject produced water into other (disposal) formations; and
- reinject produced water to the reservoir for production pressure maintenance.

The proponent asserted that reinjecting produced water into a disposal formation is not technically feasible as there is no geologic formation capable of accepting the anticipated volumes of produced water and that based on current information there are unacceptable risks with adopting produced water reinjection.

The C-NLOPB indicated that it requires more information from the proponent to determine the technical and economic feasibility of produced water reinjection. The proponent has accordingly indicated that the assessment of alternatives for management of produced water will be further discussed in the Development Application for the Project required under the *Atlantic Accords Acts*.

The EIS considers the potential environmental effects associated with produced water discharge to the marine environment, since this is the proponent's preferred option, and it is considered the worst-case option with respect to potential environmental effects.



FPSO Lighting - Measures to reduce the attraction of seabirds to the FPSO are being investigated and include reducing/turning off major light sources for short periods, and installation of directional/shielded lighting. Multiple sets of lighting with varying intensity with a fail safe or motion sensor-based return to maximum lighting may be considered. The proponent committed to engage ECCC regarding lighting design when additional information and options for lighting design are available. Flaring of gas at the FPSO is another source of lighting that may contribute to the attraction of birds. No routine flaring during normal operations would occur and a pilotless flare ignition system is being evaluated. In the EIS, the proponent assessed potential effects with the use of a pilot flare.

Subsea Flowline Protection - Protection of flowlines from dropped objects or interference with other ocean users include trenching, rock protection and laying of concrete mattresses over the flowlines. Depending on the potential for interference (dropped objects or other users), and design of the flowlines, no additional protection may also be an option.

Drilling Installation Selection - Since the preferred option is not yet chosen, both semi-submersibles and drillships are considered in assessment of potential environmental effects.

Drilling Fluid Selection - The preferred option is a combination of water-based muds and synthetic-based muds as they are both technically and economically feasible. The proponent indicated that it prefers water-based mud for riserless drilling where the cuttings are disposed directly on the seafloor and synthetic-based muds are superior to water-based muds for wellbore stability, gas hydrate inhibition, well casing wear and reusability.

Drilling Waste Management - There are three potential options for the management of drilling waste: disposal at sea, shipping waste to shore, and reinjection of waste. Offshore disposal is the preferred option, with treatment of synthetic-based mud cuttings prior to disposal. Reinjection into a dedicated offshore disposal well was not considered feasible, while disposal on land was not preferred due to technical and economic constraints such as limited storage capacity on the MODU, increased cost and operational delays, and additional safety and environmental risks associated with handling and transportation of waste.

Drilling Installation Lighting - Options for lighting mitigations included no or limited lighting; standard lighting or spectral modified lighting. Other than standard lighting, spectral modified lighting implementation on drilling installations are not feasible because in the offshore oil and gas industry is restricted by commercial availability, limited capability in extreme weather, safety concerns for helicopters and low energy efficiency. In addition, drilling, in comparison to the operation of the FPSO would be a short-term activity. Due to operational and regulatory requirements for lighting, light levels would be maintained at a level that does not impede the safety of the workplace or drilling operations.

Seismic Survey - The proponent is considering four-dimensional seismic surveys to provide data on the reservoir as production continues. Two options are considered (1) permanent reservoir monitoring where ocean bottom cables or ocean bottom nodes are installed on the seafloor for the duration of the project, or (2) conventional seismic using either temporary ocean bottom nodes or towed streamers. Surveys using ocean bottom cables or nodes provide better data and tend to be higher in cost than surveys using towed streamers but may provide greater economic value to the Project overall due to improved resource recovery. While the preferred option is to use fixed hydrophones, the proponent has



not made its final decision regarding which option would be undertaken. Both options are considered in the assessment of environmental effects.

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

Views expressed by federal authorities, Indigenous groups¹ or the public 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 Sections 4 and 5, as appropriate.

¹ In this report, the term “Indigenous groups” refers to all of the following: aggregate organizations and/or tribal councils representing multiple individual First Nation communities; Inuit government organizations/collectives; and individual First Nation communities (i.e., those not represented by an aggregate organization or tribal council).



3 Consultation and Engagement Activities

3.1 Crown Consultation with Indigenous Groups

3.1.1 *Crown Consultation Led by the Agency*

The Government of Canada (“the Crown”) has statutory, contractual and common law obligations to consult with Indigenous peoples, in addition to consulting for the purpose of good governance. The common law duty to consult is based on judicial interpretation of the obligations of the Crown in relation to Section 35 of the *Constitution Act, 1982*, and stems from the honour of the Crown and its unique relationship with Indigenous peoples in Canada. The Crown has a duty to consult, and, where appropriate, accommodate Indigenous peoples when contemplating conduct that might adversely impact asserted or established Aboriginal² or treaty rights.

For this EA, the Agency served as the Crown Consultation Coordinator for a whole-of-government approach. This means the Agency acted as ‘single window’ point of contact for Indigenous groups³ throughout the EA, while coordinating the participation of other federal authorities and the C-NLOPB as appropriate.

During the EAs for a number of exploration drilling projects that were completed prior to the Project, the Agency had considered the location and activities associated with offshore Newfoundland and Labrador oil and gas drilling, to determine the ways in which projects might adversely impact the asserted or established Aboriginal or treaty rights and to identify the Indigenous groups to be included in the consultation.

Because of the similarities in the Project’s location, some of its activities, and the pathways to potential effects on species of cultural and commercial significance, the Agency consulted with the same Indigenous groups that were consulted on the exploration drilling projects. These groups – and (if applicable) the communities they represented in the consultation - are described below.

Inuit:

1. Nunatsiavut Government (an Inuit self-government representing Inuit communities located in Labrador)
2. NunatuKavut Community Council (an Inuit collective representing Inuit people living in southeastern coastal areas of Labrador)

Innu:

3. Innu Nation, representing Sheshatshiu Innu First Nation and Mushuau Innu First Nation (located in Labrador)
4. Les Innus de Ekuanitshit (located in Quebec)

² In this report, the word “Aboriginal” is used when referring to rights as described in section 35 of the Canadian Constitution or when referring to Section 5 of the Canadian Environmental Assessment Act, 2012. The term “Indigenous” is otherwise used in this report to refer to the First Nations and Inuit communities and groups who were consulted or engaged on the Project.

³ In this report, use of Indigenous “groups” refers to all of the following: aggregate organizations and/or tribal councils representing multiple individual First Nation communities; Inuit government organizations/collectives; and individual First Nation communities (i.e., those not represented by an aggregate organization or tribal council).



5. Première Nation des Innus de Nutashkuan (located in Quebec)

Mi'kmaq/Mi'gmaq⁴:

6. Kwikmu'kw Maw-klusuaqn Negotiation Office (KMKNO), representing 11 of 13 Mi'kmaq communities located in Nova Scotia (NS): Acadia First Nation, Annapolis Valley First Nation, Bear River First Nation, Eskasoni First Nation, Glooscap First Nation, Membertou First Nation, Paqtnekek First Nation, Pictou Landing First Nation, Potlotek First Nation, Wagmatcook First Nation, and We'kmoqma'q First Nation
7. Millbrook First Nation (located in Nova Scotia)
8. Sipekne'katik First Nation (located in Nova Scotia)
9. Mi'gmawe'l Tplu'taqnn Incorporated (MTI), representing eight of nine Mi'gmaq communities located in New Brunswick (New Brunswick): Buctouche First Nation, Eel River Bar First Nation, Fort Folly First Nation, Esgenoopetitj First Nation, Indian Island First Nation, Pabineau First Nation, Eel Ground First Nation, and Metepenagiag First Nation
10. Elsipogtog First Nation (located in New Brunswick)
11. L'nuey⁵, representing the two Mi'kmaq communities located in Prince Edward Island: Abegweit First Nation and Lennox Island First Nation
12. Mi'gmawei Mawiomis Secretariat (MMS), representing the three Mi'gmaq communities located in the Gaspé region of Quebec: Micmacs of Gesgapegiag, La Nation Micmac de Gespeg, and Listuguj Mi'gmaq Government

Wolastoqiyik (Maliseet):

13. Wolastoqey Nation of New Brunswick (WNNB), representing the six Wolastoqiyik communities located in NB: Kingsclear First Nation, Madawaska Maliseet First Nation, Oromocto First Nation, St. Mary's First Nation, Tobique First Nation, and Woodstock First Nation⁶

Peskotomuhkati (Passamaquoddy):

14. Peskotomuhkati Nation at Skutik (located in New Brunswick)

The Agency made a determination that the depth of consultation with the above-noted groups (or the communities they represent in consultation matters, where applicable) would be on the low end on the consultation spectrum. This determination was based on a variety of factors (see Section 4.6-Indigenous Peoples-for more information). The Agency provided its analysis to the aforementioned Indigenous groups, along with draft consultation plans, requesting feedback. Comments were received on the plan

⁴ The difference between the spelling of Mi'kmaq and Mi'gmaq is based on the different orthographies used by the communities in the Maritime provinces and Gaspé region of Quebec. The Mi'kmaq communities in NS and PEI, as well as some in NB, have adopted the Smith-Francis orthography in which the "k" is used (i.e., Mi'kmaq). Some communities in NB and the three in the Gaspé region of Quebec have adopted the Listuguj orthography in which the "g" is used (i.e., Mi'gmaq).

⁵ At the outset of the Project, the Mi'kmaq Confederacy of PEI (MCPEI) was coordinating the participation of Abegweit and Lennox Island First Nations in the consultation. In November 2019, MCPEI formed a separate stand alone organization called L'nuey, which now manages all consultations for the two communities.

⁶ At the outset of the Project, Woodstock First Nation was self-represented in consultation matters. In March 2019, they re-joined WNNB.

and the determination of depth of the consultation. See Appendix C for the comments received on the draft consultation plans and the Agency's responses.

The Agency also engaged two additional Mi'kmaq groups on the island of Newfoundland in the EA process:

15. Miawpukek First Nation

16. Qalipu First Nation

These two groups were engaged in the EA for the purpose of good governance, and to reflect the Agency's support for the Government of Canada's commitment to implement the *United Nations Declaration on the Rights of Indigenous Peoples* and to advance reconciliation with Indigenous peoples, based on the principles of respect, cooperation and partnership.

All 16 aforementioned Indigenous groups were invited to apply to the Agency's Participant Funding Program to support their participation in consultation and engagement activities. Twelve Indigenous groups submitted applications and the Agency approved a total of \$325,982 for all groups combined.

3.1.2 Agency- Led Consultation and Engagement Activities with Indigenous Groups

The Agency invited Indigenous groups to review and comment on the summary of the project description, the draft EIS Guidelines, a summary of the EIS, and the draft EA Report (this report) and potential conditions. Table 2 provides the dates and durations of the comment periods, which ran concurrent with the public comment periods.

Table 2 Comment Opportunities during the EA

Document or Subject of Consultation	Dates
Summary of the Project Description	June 25, 2018 - July 16, 2018 (20 days)
Draft EIS Guidelines	August 9, 2018 - September 10, 2018 (31 days)
Summary of the EIS	July 30, 2020 - September 13, 2020 (45 days ⁷)
Draft EA Report and Potential Conditions	August 9 to September 8, 2021 (30 days)

On September 26, 2018, based on submissions from Indigenous groups following their review of the draft EIS Guidelines, the Agency made revisions and sent the final version to the proponent (<https://iaac-aeic.gc.ca/050/evaluations/document/132349>).

On October 25, 2020, based on submissions from Indigenous groups following their review of the EIS and EIS summary, the Agency requested additional information requirements from the proponent (<https://iaac-aeic.gc.ca/050/evaluations/document/136478>).

On August 12, 2020, during the public comment period on the summary of the EIS, the Agency held a virtual engagement and information-sharing session exclusively for Indigenous groups. The Agency's and

⁷ The comment period was extended from the usual 30 days to 45 days, in light of challenges related to the COVID-19 pandemic. In addition, the Agency gave all Indigenous groups who requested an extension, until September 30, 2020 to submit comments on the EIS.



proponent's presentations and the meeting summary report from this session are available on the Impact Assessment Agency of Canada Registry at: <https://iaac-aeic.gc.ca/050/evaluations/document/136169>.

In light of the potential challenges experienced by Indigenous groups as a result of the COVID-19 pandemic, the Agency also offered to meet virtually with individual Indigenous groups during the public comment period on the summary of the EIS, to listen to and document their views on how the Project may adversely impact the asserted or established Aboriginal or treaty rights and to hear their suggestions for how these impacts could be avoided, mitigated or accommodated.

The main areas of concern raised by Indigenous groups throughout the EA⁸ included:

- Atlantic salmon and potential interactions with the Project;
- effects on fish and fish habitat;
- effects on marine mammals (North Atlantic right whale)
- effects on fishing for communal commercial and food, social or ceremonial purposes, including related health and socioeconomic effects;
- effects of accidents and malfunctions, including the use of dispersants in oil spill response;
- effects on migratory birds;
- compensation in the event of damages from routine Project operations or due to accidents and malfunctions; and
- cumulative effects.

See Appendix C for an inventory of comments provided by Indigenous groups during the EA, up to and including their review of the EIS, along with the Agency's responses. A subset of comments from Indigenous groups are also discussed in the context of individual valued components throughout Section 4, under various sub-sections entitled "Views Expressed by Indigenous Groups."

3.1.3 Consultation with Indigenous Groups and Engagement Activities Organized by the Proponent

The proponent indicated it engaged with all the Indigenous groups listed in Section 3.1 of this EA Report. Section 5 of the EIS Guidelines required the proponent to engage with these groups specifically, to obtain their views on the Project and the effects of changes to the environment on Aboriginal peoples (including health and socioeconomic conditions; physical and cultural heritage including any structure, site or thing of historical, archaeological, paleontological or architectural significance- and current use of lands and resources for traditional purposes). Additionally, for the Indigenous groups the Agency identified as having a duty to consult⁹, the proponent was required to seek their views on potential

⁸ Feedback received from Indigenous groups up to and including their review of the EIS, has been included in this report, in Appendix C and in various subsections entitled "Views Expressed by Indigenous Groups." Feedback received after the EIS phase will be considered in the final versions of the EA Report and conditions for the Project. The Agency will also respond in writing to all Indigenous groups who provided comments on the draft EA Report and proposed conditions, after the EA is complete and the Minister has issued their decision on the Project.

⁹ This includes all Indigenous groups engaged in the EA except for Miawpukek and Qalipu First Nations, who were engaged on the Project for good governance purposes.



adverse impacts of the Project on asserted or established Aboriginal or treaty rights, as well as their views on options for avoiding, mitigating, or accommodating any adverse impacts.

The proponent noted its engagement with Indigenous groups began in June 2018 with initial outreach via e-mail to inform them that the Project Description had been submitted to the Agency. The proponent sent follow up letters to each group, offering to meet with them in person or virtually to discuss the aforementioned areas for feedback. In-person meetings were held with various groups in 2018 to discuss the Project and any issues of concern. Additionally, the proponent held three half-day workshops (one in St. John's, one in Quebec City and one in Moncton) in October 2018, to discuss potential environmental effects and proposed mitigation measures for the Project. In advance of these workshops, the proponent provided Indigenous groups with relevant community baseline health and socio-economic information for their review and comment.

During the development of the EIS and in subsequent phases of the EA process, the proponent primarily utilized e-mails and phone calls to keep Indigenous groups up to date on the Project and to seek their input on the areas required by the EIS guidelines. A detailed list of engagement activities undertaken by the proponent with each Indigenous group is provided in Chapter 3 of the Environmental Impact Statement (Equinor Canada Ltd, 2020).

As per Section 2.3 of the EIS Guidelines, the proponent was also required to make reasonable efforts to collaborate with the Indigenous groups to collect Indigenous knowledge. The proponent commissioned a desktop study, which was completed in October 2018 in the early phases of the EA and is provided in the EIS as Appendix H. The proponent also stated it used information from an August 2018 Indigenous knowledge study conducted for a previous exploration drilling project in its assessment of environmental effects for the Project.

See Appendix C, for comments from Indigenous groups on the proponent's engagement activities, and the Agency's responses.

3.2 Public Participation

3.2.1 *Public Participation Led by the Agency*

To date the Agency provided four opportunities for the public to participate in the EA, as outlined in Table 2. Additionally, on August 11, 2020, during the public comment period on the summary of the EIS, the Agency held a virtual information-sharing session. The Agency's and proponent's presentations and the summary report from this session are available on the Impact Assessment Agency of Canada Registry at: <https://iaac-aeic.gc.ca/050/evaluations/document/136125>.

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 (FFAW-Unifor);
- Sierra Club Canada Foundation;
- World Wildlife Fund-Canada;
- Nature Newfoundland and Labrador;
- Newfoundland and Labrador Oil and Gas Industry Association; and
- Trades Newfoundland and Labrador.



Fish, Food and Allied Workers-Unifor provided information on the nature and importance of the fishing industry. It provided comments related to potential effects of the Project on fishing activity, consultation, marine conservation in fishery closure areas, mitigation measures, effects monitoring, marine cable installation, and provided corrections in some fish stock management information. Sierra Club Canada Foundation commented on GHGs, spill prevention and response, and special areas. The World Wildlife Fund-Canada provided comments on economic benefits, GHG emissions, blowout probability calculations, spill prevention and response, cumulative effects, assessment methodology, conservation of special areas, mitigation and seismic surveys. Nature Newfoundland and Labrador commented on Indigenous participation, decommissioning, effects analysis, cumulative effects, mitigation, lighting and spills. The Newfoundland and Labrador Oil & Gas Industries Association stated its support for the Project, and highlighted the economic importance of the offshore oil and gas sector. Trades Newfoundland and Labrador expressed concern that the Project was not maximizing economic benefits to the province.

The Agency supported public participation through its Participant Funding Program. A total of \$72,697.65 was allocated to the following: Balaena Institute for Cetacean Conservation Studies, one member of the public, Ecology Action Centre, Fish, Food and Allied Workers-Unifor, Sierra Club Canada Foundation World Wildlife Fund-Canada and the Northern Peninsula (Mekap'sk) Mi'kmaq Band.

3.2.2 Public Participation Activities Organized by the Proponent

As detailed in Section 3.4 of the proponent's EIS, the proponent indicated it engaged fish harvesters, public stakeholders, and environmental non-government organizations that have been traditionally engaged or expressed an interest in offshore oil and gas operations in Newfoundland and Labrador. The proponent consulted with fish harvesters who are represented by the Fish, Food and Allied Workers-Unifor and One Ocean, and fish processors including Ocean Choice International, Association of Seafood Producers, Groundfish Enterprise Allocation Council and One Ocean. The key stakeholders consulted included Nature Newfoundland and Labrador, World Wildlife Fund, Canadian Parks and Wilderness Society, Protected Areas Association of Newfoundland, and Sierra Club Newfoundland and Labrador Chapter. The proponent noted it used a variety of engagement methods including face-to-face meetings, telephone conversations, email and written correspondence and committed to continue to meet with stakeholders to provide information on the Project and solicit feedback.

Public concerns were raised on the following key subjects: marine fish and habitat; changes in dissolved oxygen concentration associated with drill cuttings and measurement during environmental effects monitoring; marine and migratory birds; marine mammals; environmental effects monitoring; commercial fisheries; cumulative effects; accidental events; and use of dispersants.



4 Predicted Effects on Valued Components

This section discusses the potential effects of the Project on the valued components considered by the Agency. These effects are further described in the proponent's EIS and associated information, which can be accessed at: [Final Environmental Impact Statement - Canada.ca \(iaac-aeic.gc.ca\)](https://www.iaac-aeic.gc.ca)

4.1 Fish and Fish Habitat

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following potential effects on fish and fish habitat from routine project activities:

- drill waste deposited on the seabed and released into the water column could cause alteration, disruption or destruction of fish habitat and associated mortality, health and behaviour effects on fish and benthic organisms;
- installation and presence of subsea infrastructure could cause alteration, disruption or destruction of fish habitat and associated mortality and health effects on fish and benthic organisms; and
- sound emissions from MODUs; the FPSO; supply vessels; geophysical surveys could result in fish injury, mortality and behavioural effects (e.g., avoidance).

4.1.1 Existing Environment

The majority of the project activities occur in the deep water of the Flemish Pass.

Water column and seafloor habitats in the project area are used by fish and invertebrates of commercial, cultural, and/or ecological value. Deep water living habitat-forming sea pens, sponges and cold water corals support diverse finfish and invertebrate benthic communities by providing important refuges, nursery, and foraging areas.

The proponent listed numerous species of finfish occurring in the project area. Common deep sea benthic species include lanternfish, deepwater redfish, grenadiers, longnose eel, Greenland halibut (turbot), witch flounder, skates, blue hake, black dogfish and rabbitfish. Finfish species associated with sponge communities include deepsea cat shark, eelpouts, spinytail skate, white skate, chimera, grenadiers, blue hake, longnose eel, and black dogfish. Migratory pelagic species (American eel and Atlantic salmon) are of social, cultural and traditional importance, however, their presence and use of the project area is not well understood.

The proponent noted 27 finfish species that may potentially occur within the project area that are listed under the *Newfoundland and Labrador Endangered Species Act*, the Committee on the Status of Endangered Wildlife in Canada, the *Species at Risk Act* (SARA) or International Union for Conservation of Nature and Natural Resources legislation. Deep-sea sponge aggregations, sea pen communities and coral gardens are included on the Oslo Paris (OSPAR) Convention List of Threatened and/or Declining Species and Habitats (OSPAR 2008). Appendix D lists species at risk that may occur in the project area.



4.1.2 *Proponent's Assessment of Environmental Effects*

Predicted Effects of Drill Waste Discharge

The proponent predicted that about two thirds of material from drill cuttings would settle within 16 kilometres of the well templates with most settling within two kilometres. The remainder of this material would remain in suspension and settle within 60 kilometres.

The proponent predicted that cuttings deposition above 1.5 millimetres would be mostly within 200metres (0.055 square kilometres) of the well template in deep water and within two kilometres (13 square kilometres) in shallow water. Beyond these distance cuttings deposition above 1.5 millimetres would be patchy. Deposition of cuttings above 1.5 millimetres may cause burial effects and may result in a change in the physical and chemical nature of seafloor habitat leading to injury and/or mortality effects. With changes in fish habitat characteristics, benthic finfish and mobile invertebrates may be displaced from the affected areas, avoid the areas, and may result in localized loss of benthic prey species (e.g., bivalves, polychaetes). The proponent indicated that initial prey losses may be offset by recolonization by pioneer polychaete species.

Suspended particles in the water from drilling muds and cuttings may affect fish and fish habitat, especially suspension feeding organisms such as sensitive deep sea corals and sponges; by potentially interfering with feeding ability, food intake, and ultimately health as a result of ingesting mud particles and clogging of feeding structures. However, the proponent predicted that adult corals and sponges may be resistant to short-term exposure to suspended fine-grained drill cutting particles.

The proponent predicted that there would not likely be an overall effect on fish habitat in the project area and stated that the estimated area of seabed that could be affected by drill cuttings is approximately 42.5 square kilometres, or less than one percent of the project area. The proponent predicted the change in habitat from drill cuttings to be within the range of natural variability with a potentially affected area of less than one square kilometre from the well template for wells drilled in deep water and 13 square kilometres for wells drilled in shallow water.

Predicted Effects of Presence of Subsea Infrastructure

The proponent noted that installation of subsea infrastructure in the project area would cover up to 22 square kilometres of the seabed. The proponent predicted that site preparation and construction of subsea infrastructure including dredging, suction pile driving, trenching, and placement of rock protection or concrete mattresses may result in disturbance and direct interaction with the seabed and may result in a change in seabed characteristics and water quality through the introduction of suspended particles in the water column. It further noted that excavation of sediments could affect water and habitat quality and may result in a change in benthic community composition. The proponent predicted the effects would include approximately 0.5 percent of the seafloor of the project area, and be of long-term duration and within the range of natural variability. The proponent indicated if DFO determines that a *Fisheries Act Authorization* is required for the placement of subsea infrastructure, including the requirement for habitat offsetting measures, the proponent considered that these measures would mitigate changes in fish habitat associated with the presence of subsea infrastructure.

The proponent predicted that recolonization of finfish and invertebrates to the subsea structures may counterbalance initial losses in species and habitat. The proponent stated that recovery of benthic

communities in deep water is not well understood. It did note, however, that anthropogenic objects (e.g., fishing nets) in the project area were observed to be colonized by sponges, sea anemones, and soft corals. Based on studies in shallower marine waters, the proponent predicted that recovery and recolonization timescales would likely be longer in deeper waters. The proponent predicted that while individual finfish, coral, or sponge mortality is not directly reversible, the overall effect to these populations is considered reversible, as similar communities would recolonize the area.

The proponent stated that decommissioning options for subsea infrastructure would be further examined at that time in consultation with C-NLOPB, DFO, and other regulatory authorities. The proponent predicted that over time, and depending on potential protection measures, infrastructure may become fish habitat and the effects of removing them would have to be assessed.

Predicted Effects of Underwater Sound

The proponent described two types of project sound emissions: continuous (e.g., vessels, FPSO and MODUs) and impulsive (e.g., geophysical and seismic equipment). The proponent stated that sound emitted by all project sources, except some very high frequency geophysical tools, may be detected by all fish and invertebrates in the project area. Fish and invertebrates detect vibration as sound pressure and/or as particle motion. The proponent indicated that it focused its assessment on fish species that are able to detect sound pressure using swim bladders.

The proponent noted that continuous underwater sound emissions from project vessels, MODUs, and FPSO would occur for the duration of all project phases, changing fish habitat throughout the water column and possibly at the seafloor within a localized area (predicted to be less than one square kilometre). The proponent concluded there is no direct evidence of mortality to finfish and invertebrates as a result of exposure to continuous underwater sound from the types of proposed project activities. The proponent predicted that fish injury or mortality due to sound would be long term but unlikely as fish would avoid the sound source. Behavioural responses to continuous sound by marine fishes and invertebrates vary, and include both temporary responses (e.g., startle/avoidance responses) and longer-term responses (e.g., larger-scale redistribution, masked communication).

The proponent stated that egg and larval stages of fishes and invertebrates are more susceptible to lethal injury or mortality as a result of impulsive seismic survey sound emissions than are juveniles and adults. It further noted that there is no research evidence to support lethal injury or mortality to juvenile and adult fishes and invertebrates that are able to move away from a seismic sound source. The proponent predicted that changes in fish behavior may occur as distant as 50 kilometres from 2-dimensional, 3-dimensional or 4-dimensional surveys that could occur at any time of the year. The 4-dimensional seismic surveys could occur annually over a two to four week survey period. The proponent predicted that the change in behaviour would be within the range of natural variability, temporary, and not affect the overall viability of affected fish species.

Other sources of impulsive emissions from types of sonar that could be used during other geophysical surveys include multi-beam echosounder, sidescan sonar, synthetic aperture sonar, and sub bottom profiler. The proponent predicted that behaviour effects would not occur beyond 300 metres from these sources for fish with swim bladders, would be short-term, within the range of natural variability, and not affect the overall viability of fish species. The proponent committed to implementing mitigation



outlined in the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* to reduce potential effects from geophysical surveys.

4.1.3 Views expressed

Federal Authorities

DFO raised concerns related to the proponent's modelling for drill cutting dispersion. DFO stated that a large portion of the drill cuttings would disperse beyond the model domain and that this large volume of sediment should be further assessed and a rationale should be provided to support the conclusion that the effects are negligible. It noted the model approach downplays the extent of the potential effects of smothering and minimized potential cumulative effects.

DFO indicated that it requires details regarding the specific activities and associated benthic habitat and modelling to determine whether a *Fisheries Act* Authorization will be required/issued for the potential death of fish or the harmful alteration disruption or destruction of fish habitat.

DFO raised concerns with the proponent's baseline information related to species identification, size class structure, patchiness, and relative abundance. It raised concerns with the proponent's video surveys and lack of habitat maps to illustrate community structure, abundance and proximity to well sites for large concentrations of sponges, corals and sea pens. It indicated that it would require benthic surveys prior to drilling or placement of infrastructure to determine if any sensitive benthic habitats occur and would require a plan to mitigate any effects.

DFO commented that the proponent should review its conclusion on recovery time and referred to guidance from the Food and Agriculture Organization for a description of temporary impacts in relation to fishing within vulnerable marine ecosystems (VMEs). It considers a timeframe of 5 to 20 years for recovery to be considered a temporary effect and if recovery times are longer than 20 years, the impact should be deemed permanent.

DFO advised that finfish with swim bladders involved in hearing would be more susceptible to effects from sound exposure than finfish with swim bladders not involved in hearing (e.g., Atlantic salmon) or finfish without swim bladders. It also noted that based on its understanding of known Atlantic salmon migration routes and overwintering areas, there is low potential for interaction with the project area.

Indigenous Groups

Several Indigenous groups including Première Nation des Innus de Nutashkuan, MTI, WNNB and KMKNO raised concerns regarding the quantity and quality of baseline information for the marine environment. WNNB were concerned with the information provided in relation to species at risk, specifically with regard to the lack of information to support the proponent's prediction that potential effects would be localized. It also noted that Atlantic salmon, Atlantic bluefin tuna and American eel were not included in the list of "key species in the project area". It further raised concerns with respect to if and where Indigenous Knowledge was incorporated into the fish assessment. KMKNO was also concerned with the lack of information related to American eel migratory behaviour. Miawpukek First Nation noted that baseline data on the migration and behaviour of Atlantic salmon while at sea is insufficient to adequately assess the effects of the project.



Several Indigenous groups raised concerns regarding the potential effects on migratory species, especially Atlantic salmon, and provided additional information and research for consideration. Miawpukek First Nation, NunatuKavut Community Council and WNNB would like a precautionary approach applied. Miawpukek First Nation recommended that the proponent provide funding for tracking studies of Atlantic salmon and that these studies be completed before commencement. MTI commented that the proponent should provide clarity on whether it would be contributing to the Environmental Studies Research Fund (ESRF) for Atlantic salmon research and whether it planned on incorporating the data collected to enhance and update the effects assessment for the Project. It also indicated that the proponent should work directly with MTI and Anqotum on a comprehensive Atlantic salmon research study. MMS noted that fish with air filled swim bladders, such as salmon are known to be impacted by seismic activity. It further noted that there is insufficient research to support the claim that proposed mitigation measures are sufficient, or that the effects of routine activities are low. It requested additional research be completed with regard to seismic testing and negative impacts on marine life.

Several Indigenous groups submitted comments on mitigation measures including Miawpukek First Nation, MTI, KMKNO and Wolastoqey Nation of New Brunswick. In particular, offsetting, especially for benthic habitat from subsea infrastructure; fish monitoring; and mitigation during Atlantic salmon migration. MTI indicated it must be consulted and meaningfully engaged in the development and implementation of habitat offsetting measures. MTI wanted a better understanding of potential options to the current project design to determine which would have the least amount of impacts to fish and fish habitat.

Several Indigenous groups submitted comments on follow-up and monitoring. Miawpukek First Nation requested to be involved in the development of environmental monitoring programs and the development and implementation of additional mitigation measures. MTI commented that there should be a monitoring program that assesses the underwater impacts of light and sound from all project activities, including vessel traffic, drilling and operations. WNNB would like the proponent to acknowledge the uncertainty surrounding potential effects on salmon, and then through further Indigenous consultation explore monitoring options that could inform future species-specific mitigation measures.

Public

Sierra Club of Canada Foundation commented that the EIS relies on information and statistics from existing oil and gas production projects in Newfoundland and Labrador offshore. It indicated that this approach was not appropriate as the Project would involve several firsts, including drilling in deep waters which causes new challenges. It noted the probability of a serious accident, explosion or fire increases by 8.5 percent with: every additional 100 feet of water; the greater distance to equipment if a problem develops; the Project is in a new area (Flemish Pass Basin); and the Project is outside the exclusive economic zone which requires a more careful consideration of requirements under international conventions.

World Wildlife Fund-Canada is of the view that oil and gas activities should not be permitted within protected areas. It recommended that the portions of the project area within protected areas be set aside from development in order to help conserve biodiversity and uphold Canada's commitments to marine conservation under the North Atlantic Fisheries Organization (NAFO).



World Wildlife Fund-Canada cited the *CSAS Proceedings of the National Peer Review Meeting on the Assessment of the Effectiveness of Mitigation Measures in Reducing the Potential Impacts of Oil and Gas Exploration and Production on Areas within Defined Benthic Conservation Objectives* which states “compared to exploration, development and production are generally considered to have increased risk for impacts to benthic species and habitats, greater seabed footprints and longer timeframes.” World Wildlife Fund-Canada further contends that there are few studies on coral and sponges in Canadian waters. Therefore, there are unknowns on how species would respond to oil and gas activities and it is difficult to assess impacts of drill muds and cuttings as most studies are based on laboratories or shallow water environments, which do not necessarily translate to deep water species and environments that would be present in the project area.

World Wildlife Fund – Canada raised concerns with the potential impacts of seismic testing to fish and invertebrates. It noted that current research does not support the proponent’s conclusions and was concerned with the proponent’s lack of mitigation measures related to this.

Nature Newfoundland and Labrador commented that considering the complexity of this multi-year project, it is important to consider the long reaching effects it may have on marine fish and fish habitats. It indicated that while the destruction of habitat may be exclusive to a small area, the impacts on fish and fish populations can be detrimental. It was also concerned with the potential for effects considering the 30 year duration of the Project. Nature Newfoundland and Labrador commented that further investigations into the potential adverse impacts (e.g., reducing habitat, changes to migratory routes, and shifts in the biodiversity of species in surrounding waters) should be actively pursued and monitored.

4.1.4 Agency Analysis and Conclusion

Analysis of Effects

Effects of Drill Waste Discharge

The Agency understands that water-based muds have the potential to harm suspension feeding organisms such as sensitive deep sea corals and sponges from ingestion of mud particles and clogging of feeding structures. The Agency is of the view that the potential project effects from water-based muds are greater than indicated by the proponent taking into account that it did not model the fate or dispersion of water-based muds not adhered to cuttings, nor water-based muds used to clean and maintain integrity of the bore hole¹⁰. The Agency notes the proponent estimated a duration of 36 hours for large volumes of water-based muds from drilling a single well over a five day period. The potential duration of exposure in hours of water-based muds from drilling an eight slot well template was not provided; however, the number of days drilling discharge could be 56. The Agency notes that the proponent proposes to drill up to 60 wells in the project area. The Agency calculated, taking into account the total number of wells to be drilled, the total duration for exposure to suspended water-

¹⁰ 642 cubic metres of whole mud mixed with 428 cubic metres of seawater, equating to 5,470 barrels of whole water-based mud. 500 cubic metres of whole water-based mud to sweep the borehole is the equivalent of 4,260 barrels of weighted whole water-based mud. The total volume of whole water-based mud could be 13,378 barrels per well (Equinor Canada Ltd. Bay du Nord Development Project Environmental Impact Statement, July 2020).

based muds to be 288 hours (12 days), albeit this discharge would occur in intermittent pulses. The Agency understands that the NAFO Scientific Council Report (2018) states that suspended particles¹¹ have the potential to stay in suspension for up to 87 days and get dispersed with oceanic currents over vast distances. The Agency concurs with DFO that the proponent's negligible effect conclusion regarding the effects of suspended water based drill mud and synthetic-based cuttings is unsupported and the geographic extent of the effects is likely greater than predicted. The Agency agrees with the proponent that the concentration of suspended particles in the water would likely be higher closer to the well template, but recognizes that the elevated concentrations of concern and extent are unknown in the absence of natural variability data, species tolerances or distribution.

The Agency understands that the deposition of water-based and synthetic-based cuttings in a layer greater than 1.5 millimetres has the potential to result in burial effects (e.g., smothering of benthic habitat and/or displacement of species). The Agency notes that the proponent calculated the potential zone of influence of deposition for one and eight well scenarios. Based on the proponent's prediction for one and eight well (200 metres or 0.126 square kilometres), the Agency calculated the total area affected by burial for 60 wells (10 templates) to be 1.26 square kilometres. The maximum cuttings thickness of deposition from drilling an eight slot well template was predicted to occur between one to two kilometres radius. The Agency is of the view that the potential burial effects from cuttings deposition are greater than indicated by the proponent.

The Agency understands that, based on information provided by the proponent, synthetic-based mud cuttings deposition has been shown to change sediment chemistry and result in toxic effects within two kilometres of a well template. The Agency calculated that, given the predicted locations of the five well template centres, potential adverse environmental effects could occur in a total area of about 48 square kilometres, accounting for overlapping cuttings deposition. The locations of future development areas are unknown, but could include another five well templates, thereby adding an additional 62.5 square kilometres of potentially impacted seafloor (with no overlap consideration). The Agency concludes that the total area of affected benthic habitats and communities could, in a worse-case scenario, be up to 110 square kilometres, although not expected to occur in a continuous pattern from a well template. Therefore, the Agency is of the view that the potential toxicity effects from cuttings deposition could be greater than indicated by the proponent.

In relation to recolonization of benthic habitat and species, the proponent determined the effect to be reversible based on a potential period of recovery of three to ten years. The Agency notes this timeframe was determined to be uncertain as the recovery period was based on a shallow water environment and the Project is in deep water. The Agency notes DFO's view that guidance provided by the Food and Agriculture Organization in relation to fishing impacts on VMEs would be more applicable. The Agency is aware that the structural characteristics, slow growth rates and long-lived nature of these organisms make them very vulnerable to perturbations and they can take decades or longer to recover if they are removed or damaged (Convention of Biological Diversity, 2015). The Agency is of the view that, based on this guidance, the potential recovery time could be longer or the effects could possibly be permanent.

¹¹ With a particle size of two micrometres



The Agency concurs with DFO that additional information on seabed conditions is required, especially given the importance and sensitivity of deep water sea pens, corals and sponges. The Agency recommends that the proponent be required to conduct surveys within and beyond the predicted zones of influence from drill waste plumes and depositional areas once the final layout design is completed and prior to project commencement. The Agency understands that DFO may suggest additional mitigation measure to the C-NLOPB based on the outcome of seabed surveys. The C-NLOPB would determine if the measures are applicable and identify the federal authority responsible for their implementation and enforcement. If a *Fisheries Act* Authorization is required, DFO would implement and enforce additional mitigations, follow-up monitoring and offsetting included in the Authorization.

Effects of Presence of Subsea Infrastructure

The Agency understands that about seven square kilometres of seafloor habitat in the core development area would be affected by the presence of subsea infrastructure (e.g., flowlines, anchors, well templates, umbilicals, riser base) and associated potential protection measures (e.g., rock placement, wellhead protection, concrete mattresses). The Agency also understands that future development may include an additional 15 square kilometres which would result in a total of 22 square kilometres of seafloor impacted by subsea infrastructure. The Agency further notes the timeframe and potential of benthic habitats and communities to recover is uncertain. The Agency is of the view that given the importance and sensitivity of deep water sea pens, corals and sponges in the project area, the proponent would be required to conduct seabed surveys within the predicted zones of influence from all subsea infrastructures once the final layout design is completed and prior to Project commencement to identify environmentally sensitive features. The Agency understands that DFO may suggest additional mitigation measures to the C-NLOPB based on the outcome of seabed surveys. The C-NLOPB would determine if the measures are applicable and identify the federal authority responsible for their implementation and enforcement. If a *Fisheries Act* Authorization is required, DFO would implement and enforce additional mitigations, follow-up monitoring and offsetting included in the Authorization. The Agency is of the view that the mitigation required for drill waste deposition could also mitigate potential effects from subsea infrastructure. Follow-up monitoring would be required to verify the efficacy of mitigation and verify predicted effects.

Effects of Underwater Sound

The Agency notes that sound pressure generated from continuous underwater sound emissions from FPSO, MODU and other project vessels may cause recoverable injury and effects on the sensory abilities in certain species of fish. While many species of fish are able to detect sound pressure, the Agency is aware that the particle motion component of sound is likely to be the major source of sound detection to the majority of fish species. The Agency notes the proponent did not assess the effects of project sources of particle motion. However, based on advice from DFO, the Agency understands that finfish that do not use swim bladders for hearing are less susceptible to effects from sound. The proponent indicated fish would likely aggregate around the MODUs and FPSO if a reef ecosystem develops and or due to attraction to underwater illumination from project lights; however, the proponent also expects the avoidance reaction to sound to dominate fish behaviour, thus injury effects would be limited. The Agency is of the view that, based on the deep water location of the Project and taking into account the proponent's information, some pelagic finfish species could be affected over the long-term.



The Agency understands that impulsive sound emissions from seismic surveys could potentially cause injury or mortality within 40 metres of an airgun array; and that avoidance behavioural effects could occur between 25 to 50 kilometres (8,580 cubic kilometres) from such sound sources. The Agency accepts that other geophysical survey high frequency equipment could potentially result in behavioural reactions out to 300 metres of the sources. The Agency is of the view that if finfish species avoid these areas they could be avoiding important habitat (e.g., VMEs, EBSA, etc.) and the Agency is also uncertain whether the displacement or disruption would happen during key life-history activities. Avoidance of such large areas could cause food availability impacts to animals that rely upon them, such as marine mammals and seabirds. The Agency is of the view that immobile species or life stages may experience injury and mortality.

Effects on Atlantic Salmon and American Eel

The Agency understands that certain finfish 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 and American eel. The Agency notes that DFO reviewed available information on Atlantic salmon and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of Atlantic salmon; however, is of the view that there is a low potential for Atlantic salmon to interact with the project area. Based on this advice, the Agency is of the view that effects on these species are unlikely. 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 is of the view that restricting project activities during certain times of year is not warranted for Atlantic salmon.

Given the uncertainty about Atlantic salmon and the importance of the species to Indigenous groups, the proponent would be required to support research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas, and update the C-NLOPB and Indigenous groups annually on research activities. Atlantic salmon was identified as an area of research interest by the ESRF, an industry levy-funded initiative managed by a joint government/industry/public board. The ESRF recently concluded a selection process for proposals, and a four-year, \$12 million collaborative research project on Atlantic salmon, led by DFO, has been funded. The project has 50 partners and collaborators, including federal and provincial governments and agencies, academic institutions, not for profit organizations, as well as Indigenous groups and organizations. The objective of the project is to determine when, where, and for how long Atlantic salmon from three different life stages (juvenile post-smolt, post-spawned kelt, and multi-sea winter adults) are present in the eastern Canadian offshore regions. The research will inform regulatory decision making in Canada's areas of offshore oil and gas activity.

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 fish and fish habitat:

- Develop and conduct a seabed investigation survey based on the location for all subsea infrastructure (each well template, each flowline, and mooring points) and associated protection features (rock placement, concrete mattresses and/or trenching) in consultation with the C-

NLOPB and DFO prior to conducting any project activities on the seafloor. The plan should be designed to:

- collect data to confirm the presence or absence of fish and fish habitat, including species at-risk, aggregations of habitat-forming corals or sponges (biogenic), species associated with these sensitive biogenic habitats and other sensitive epifauna;
- demonstrate that the survey is designed and conducted using appropriate technology by qualified individuals and appropriate equipment;
- survey areas around well templates should reflect the proponent's drill cutting dispersion modeling and extent of predicted effects on suspended particulate matter from releases of drill mud and drill cuttings; ensure transects around the FPSO mooring system and all subsea infrastructures and associated protection features should extend at least 50 metres from the extent of each structure;
- provide the results of seabed surveys to the C-NLOPB and DFO prior to conducting any activities on the seafloor related to the installation of any subsea infrastructure, including well templates, flowlines and mooring points and associated protection features. The proponent would be required to post the results of the surveys online for public access and notify Indigenous groups of the availability of these documents within 48 hours of their publication;
- if aggregations of habitat-forming corals or sponges or other sensitive fish and fish habitat are identified when undertaking the survey:
 - relocate the mooring system, well template, flowlines, and/or redirect mud and cuttings discharges to ensure that the all project-based sources of elevated suspended particulate material and seabed disturbances will not affect them, unless not technically feasible, as determined in consultation with the C-NLOPB.
 - if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the mooring system, well templates, or flowlines or redirect mud and cuttings discharges, the proponent shall consult with the C-NLOPB and DFO to determine an appropriate course of action, including the implementation of any additional mitigation measures and monitoring (e.g., requirements in accordance with any *Fisheries Act* Authorization for the death of fish or harmful alteration, disruption, and destruction of fish habitat).
- select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands* and use lower toxicity drilling muds and lower toxicity additives within muds and cements;
- treat all discharges into the marine environment from project activities to meet the volumes and concentration limits identified in *the Offshore Waste Treatment Guidelines*, and any other legislative requirements;
- ensure that Project vessels operating in Canadian waters meet the requirements of the *Ballast Water Control and Management Regulations*, of the *Canada Shipping Act*;
- transport spent or excess synthetic-based muds that cannot be re-used during drilling operations to shore for disposal at an approved facility;
- treat all discharges from all project vessels in accordance with MARPOL and other legislative requirements; and
- conduct a pre-installation survey with qualified individual(s) at each well site and flowline 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 any work on the seabed within the project area to determine an appropriate course of action.

Follow-up

The Agency has 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 non-aqueous base fluid on drill cuttings to verify that the discharge meets, at a minimum, the performance target specified in the *Offshore Waste Treatment Guidelines* and report results to the C-NLOPB;
- develop and conduct specific follow-up monitoring, in consultation with the C-NLOPB, DFO, and ECCC, of all subsea infrastructure installation (including well templates, flowlines and mooring points and associated protection features) prior to any project activities related to the installation of this infrastructure, including:
 - provide the follow-up monitoring plan for the C-NLOPB's, DFO's, and ECCC's review based on applicable seabed placement of structures, and predictions of drill cutting and suspended drill mud dispersion.
 - measurement of sediment deposition extent, and quality pre- and post-drilling to verify drill cuttings dispersion modelling predictions;
 - survey benthic fauna post-drilling to verify the effectiveness of mitigation measures;
 - measurement of suspended particulate matter prior to and during drilling to verify drilling muds and cuttings dispersion predictions;
 - monitor recovery of sediment quality and fish and fish habitat determined to be affected, to verify predictions of effects duration;
 - survey colonization of subsea infrastructures by epifauna (sessile organisms) to verify prediction of changes in benthic communities;
- report results, including a comparison of modelling results to *in situ* results, at a frequency determined by the C-NLOPB; and provide results to Indigenous groups and post online for public access;
- develop and implement, in consultation with the C-NLOPB, DFO and Indigenous groups, a monitoring plan of underwater sound to verify the effects predictions of all project sound sources. The plan should be designed to:
 - measure underwater sound levels to verify acoustic modeling results;
 - identify the equipment used for the surveys, to be operated by a qualified individual, and
- contribute to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas and update the C-NLOPB and Indigenous groups annually on research activities. Communicate with Indigenous groups to determine the means by which they will be updated. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects on fish and fish habitat would occur: continuously from sound emissions from the FPSO and drill waste deposition, for 20 plus years; continuously from sound emissions from MODUs while onsite over a five to ten year period; Continuously from sound emissions from construction, installation and decommissioning vessels while onsite over a six month period for two to five years; sporadically from drill mud dispersion over five to ten years; and sporadically from sound emissions from geophysical surveys annually for two to four weeks. The effects to benthic and pelagic finfish would be reversible once the project is completed; however, the effects from sediment deposition and dispersion resulting in burial or smothering effects to sensitive benthic species (e.g., corals, sponges and sea pens) may not be reversible due to the extensive time for recolonization. The geographic extent has been based on the proponent's modelling and will vary depending on the emission and discharge sources and associated effects. Potential behavioural effects on finfish may result in avoidance of up to 8,580 cubic kilometres and potential burial and smothering effects on sensitive benthic species for up to 110 square kilometres. The Agency is of the view that the magnitude of effects is medium because a portion of a population may be affected over one or more generations and this could affect other trophic levels. It is likely that the long-term integrity of any one population would not be adversely affected. Due to the uncertainty of models as well as the lack of information related to species presence, abundance, diversity, and effects on other trophic levels; the magnitude of effects is uncertain. DFO has indicated site specific information would be required to determine if effects would result in the harmful alteration, disruption or destruction of fish and fish habitat.

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

4.2 Marine Mammals and Sea Turtles

Marine mammals and sea turtles are combined in this section because mitigation measures pertaining to avoidance and collision are similar.

The Agency focused its assessment on the habitat change effects on marine mammals from routine project activities associated with the project area and along the traffic route:

- from project sound emissions resulting in potential hearing injury and behaviour; and
- from project vessel traffic resulting in potential behaviour changes and collision injury.

Due to the far distance between the project area and known sightings and distribution of sea turtles around the island of Newfoundland and regionally offshore, the Agency is of the view that effects of the Project on sea turtles are unlikely and therefore excluded from the effects analysis of routine project activities. Encounters with leatherback sea turtles may occur along the vessel traffic route.

4.2.1 Existing Environment

The proponent stated that 15 species of marine mammals have been reported in the project area including eight species of whales, four species of dolphins, one porpoise species and two seal species. A ninth species of whale, Cuvier's beaked whale, was detected in an acoustic monitoring study in the



project area. Of the species observed, four are listed on Schedule 1 of the *Species at Risk Act*: northern bottlenose whale (Scotian Shelf population) and blue whale (Atlantic population) are listed as endangered and fin whales (Atlantic population) and Sowerby's beaked whale are listed as special concern. Killer whale (Northwest Atlantic/Eastern Arctic population) and harbour porpoise (Northwest Atlantic population) are listed as special concern under COSEWIC, but are not currently listed on Schedule 1 of the *Species at Risk Act*. The proponent stated that north Atlantic right whales (endangered on Schedule 1 of the *Species at Risk Act*) have not been reported along the vessel traffic route or in the project area. Appendix D lists species at risk that may occur in the project area. The proponent indicated that while the data used for marine mammal sightings were limited and primarily gathered opportunistically, it can indicate the species that may occur.

The proponent stated that the Flemish Pass is considered important year-round habitat for dolphins, sperm whales, and northern bottlenose whales. Deep water squid species are one of the main prey of deep diving cetaceans; which may be present in the area. There are no direct studies of marine mammal prey preference and foraging strategies in the project area.

The proponent stated, based on sound data collected in the area, that a median sound level of 107.5 dB re 1 μ Pa (minimum 90.5 dB re μ Pa) would be representative of ambient sound levels recorded in the Flemish Pass in a period without any ongoing seismic or drilling and, far from industrial activity. Fin whale mating calls were recorded as the dominant biological sound source between September and March. Blue and fin whale vocalizations can carry across distances between 56 to 200 kilometres. During summer and early fall of 2014 to 2016 acoustic recording studies conducted in and near the project area, found that seismic surveys were a dominant sound source.

4.2.2 *Proponent's Assessment of Environmental Effects*

Predicted Effects of Underwater Sound

The proponent assessed two types of project underwater sound emissions: continuous (e.g., vessels) and impulsive (e.g., geophysical and seismic equipment). Sound is measured by frequency (pitch) and loudness. Sounds generated by the project activities produce dominant or multiple frequencies and the proponent indicated that hearing ranges (of frequency) vary amongst different types of marine mammals. Baleen whales have better hearing sensitivity at low-frequencies, large toothed whales and dolphins have better hearing sensitivity at mid-frequencies, and harbour porpoises are considered high-frequency hearing specialists. To put this in context, baleen whales are likely to hear sound sources with most energy at low-frequencies (e.g., air source pulses from geophysical surveys) farther away than can toothed whales and, at closer distances, air source sounds may seem more prominent to baleen than to toothed whales. In general, marine mammals in the project area are capable of detecting sound from most sources proposed for the project.

The proponent noted the following potential effects on marine mammals from project sound emissions:

- temporary reduction in hearing sensitivity;
- permanent hearing impairment;
- changes in behaviour and distribution of the animals (i.e., disturbance) of sufficient magnitude to be biologically important, (i.e., overt behavioural responses such as avoidance and changes in

migration patterns), or activity state (e.g., sound displaces marine mammals from an important feeding or breeding area for a prolonged period).

- masked communication (the obscuring of sounds of interest by interfering sounds generally at similar frequencies) which could lead to impaired detection of other individuals of the same species and/or prey.

The proponent highlighted that predicting behavioural responses of marine mammals to sound are difficult because responses to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors. Predictions in the EIS were guided by the scientific literature and sound modelling of project activities. The sound modelling was also used to establish the local study area (i.e., a 50 kilometre radius around the project area; over 28,000 square kilometres), which the proponent considered a conservative area where effects on marine mammals may occur and which can be assessed.

The proponent indicated that the distances to acoustic thresholds vary depending on the time of year with greater distances in the colder winter months, peaking in February. Lower distances for sound propagation are expected in the warmer months, peaking in August. Conditions in July, September, October, and November are considered to be the same as in August, and January and March the same as in February. April, May, June, and December are transitional with ranges in between threshold ranges for February and August, likely closer to August. The proponent estimated that about 75% of the year has sound propagation conditions that do not reflect worst-case conditions (i.e., sound spreads farther from the source).

High Frequency Project Sound Sources

The proponent indicated that geophysical surveys may use towed high frequency impulsive sound emitting equipment including side scan sonar, multibeam echosounder, and sub-bottom profilers. It noted zones of influence for marine mammals to multibeam echosounders and sub-bottom profilers were predicted as 150 and 30 metres radii respectively.

The proponent predicted behavioural avoidance responses, during geohazard/wellsite and seabed surveys, to range in area between 10 to 100 square kilometres. It noted the adverse effects would possibly be beyond the range of natural variability, but would not affect the viability of the population. The proponent indicated that it had a moderate to high level of confidence in the prediction based on limited data of marine mammal occurrence in the project area; uncertainty regarding the zone of influence of underwater sound emissions as well as the response criteria; and the modelling's applicability across various marine mammal species.

The proponent noted that the threshold for auditory injury is based on a 24 hour exposure period. High frequency hearing marine mammals are unlikely to experience hearing injuries from geophysical survey equipment as they would need to be within five metres of the multibeam echosounders; or within five to 43 metres of the sub-bottom profilers. The proponent predicted no change relative to baseline conditions.



Broad Bandwidth Frequency Sound Sources

Sound from FPSO

The proponent indicated that continuous broad bandwidth frequency sound would extend outward in all directions from an FPSO (at levels higher than generic behavioural response criterion) located in the core development area ranging between 3.6 to 14 kilometres (areas between 40 to 350 square kilometres) in summer months and winter months respectively, for the lifetime of the Project (20 plus years). The proponent stated that marine mammal responses to sound produced by FPSOs has not been systematically studied to date. However, the proponent used findings of marine mammal responses to other continuous and predominantly low-frequency sound sources like drilling installations, which would be predicted to have similar results.

The proponent predicted short-term behavioural effects in terms of displaced marine mammals from the immediate area around the FPSO based on a review of available information. The proponent predicted that the potential for masking of marine mammal calls and/or important environmental cues is considered limited from the FPSO. It noted that the FPSO emits relatively low source levels. The proponent stated it is difficult to predict with any degree of certainty the geographic extent of potential masking effects given the numerous data gaps associated with the topic. The proponent predicted that if marine mammals are resident in the area, they may habituate to the presence of the FPSO. The proponent predicted, that these behavioural effects are likely beyond the natural variability, but without affecting the viability of the populations. The proponent acknowledged that there is a moderate level of confidence regarding masking effects due to limited data on masking studies. The proponent committed to optimize the thruster design, as the project progresses, for sound output, energy efficiency and as a safety critical system.

With regard to hearing injury, the threshold is based on 24 hour exposure period as guided by the most recent science. The proponent indicated that species such as harbor porpoise could experience injury within 146 metres from the FPSO, and baleen whales within 600 metres from the FPSO. The proponent notes that marine mammals are expected to avoid the immediate area of the FPSO where sound levels are predicted to be high enough to elicit hearing injury: therefore, it is unlikely for a 24-hour exposure to occur. As such, the proponent predicted, based on sound modelling hearing injury is unlikely to occur.

Sound from MODU

Based on scientific literature and acoustic modelling, hearing injury from continuous sound from MODU thrusters to most toothed whale species could be experienced if these species remain within 40 metres of the MODU for 24 hours. Similarly, baleen whales and harbour porpoise could experience hearing injuries if these species remain within 100 and 230 metres from a MODU, respectively for 24 hours. The proponent indicated marine mammals are unlikely to remain within these distances of the MODU for 24 hours and therefore, predicted that hearing injury was unlikely to occur. The proponent indicated that these predictions are made with a moderate to high level of confidence, which is based on limited marine mammal occurrence data in the core development area and data gaps in hearing studies on marine mammals, particularly baleen whales and larger toothed whales. Therefore, there is some uncertainty whether injurious hearing effects can occur from a continuous sound source and as such, there is some uncertainty in the frequency of the effect.



The proponent predicted that sound levels from the MODU thrusters above the behavioural threshold from one MODU, located in the core development area, would extend outward in all directions between six and 25.5 kilometres in radius (about 112 to 1,390 square kilometres), depending on the season.

There would be concurrent drilling and operation of the FPSO, thus the proponent estimated the combined sound sources of a FPSO and a single MODU would extend 31 to 34 kilometres in distance (about 1,380 square kilometres) in February and between 7.2 to 10.5 kilometres (about 133 square kilometres) in August. In the case where two MODUs operate simultaneously in the core development area with the FPSO present, the proponent's modelling predicted the cumulative area of effect could be about 245 to 2,100 square kilometres, depending on season.

The proponent predicted the behavioural responses could be continuous. The proponent noted that the predictions are made with a moderate to high level of confidence, based on limited data of marine mammal presence offshore and some uncertainty regarding the modelling predictions of geographic extent of sound transmission.

Sound from Project Vessels

The proponent stated that sound from vessel operations is generated by propulsion systems and engine noise radiating through vessel hulls. The proponent indicated it used a precautionary 10 kilometre radius zone of influence where marine mammals may exhibit a behavioural response possibly including avoidance when vessels are on location or transiting. It also indicated a limited potential for masking effects.

Low Frequency Project Sound Sources

Geophysical surveys including two-dimensional/three-dimensional/four-dimensional seismic surveys, pre-drilling site surveys, and drilling programs (vertical seismic profiling), produce impulsive and predominantly low frequency sound. These surveys could be conducted throughout the life of the Project at any time of the year and within the project area. However, four-dimensional seismic surveys are anticipated to be carried out over a two to four-week timeframe once to twice a year. The proponent predicted that sound levels above ambient from a two-dimensional/three-dimensional/four-dimensional seismic survey could extend beyond a 150 kilometres radius, over the entire water column to depth before attenuating to background sound levels.

The proponent used scientific literature and acoustic modelling (of a representative seismic air source to assess effects on marine mammal hearing and behavior. The proponent predicted that baleen whales, most toothed whales and seals may experience hearing injuries within 40 to 160 metres if an individual remained within this range for 24 hours. For harbour porpoises, hearing injury could occur within 190 to 360 metres radius of the sound source if they remain within this range for 24 hours. The implementation of mitigation measures, namely those in the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*, would minimize the likelihood of hearing impacts in marine mammals. The proponent predicted that if a marine mammal incurred auditory injury effects due to the underwater sound emissions from seismic surveys, it would be considered long-term for individuals, but not affect the population. The proponent noted uncertainty in the frequency of effects, given the limited information known on marine mammal occurrence in the project area as well

as the data gaps in hearing studies on marine mammals, particularly baleen whales and larger toothed whales.

Based on acoustic modelling and a generic behavioural threshold, the proponent predicted that behavioural responses to impulsive seismic sounds could occur at distances ranging from 7.5 to 20.1 kilometres radius. The proponent predicted behavioural effects associated with underwater sound emissions from equipment used in seismic surveys to be short-term (two to four weeks), and would likely occur in an area less than 1,000 kilometres squared. The proponents modelling indicated that the area could extend between 117 to 209 square kilometres outward from the sound source, depending on the season. The proponent noted that marine mammal response to seismic surveys is quite variable with marine mammals regularly observed within one to two kilometres of active seismic vessels offshore Newfoundland. The proponent indicated that the predictions were made with a moderate to high level of confidence. As discussed above, the proponent noted some uncertainty regarding the zone of influence of underwater sound emissions; the response criteria; and their applicability across various marine mammal species.

The proponent noted that there is limited information on masking effects of underwater sounds, including seismic survey sounds, on marine mammals. The proponent undertook a desktop analysis which indicated that the “listening space” available for baleen whales in the project area may be reduced substantially for at least half of the inter-pulse period when a seismic vessel is within 15 kilometres of a whale, potentially resulting in masking. Because there is limited data on masking effects and the degree to which reverberation of sound in the Flemish Pass would contribute to potential masking in and near the deep-water project area, the proponent indicated it had a moderate level of confidence.

The proponent committed to applying the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*. The proponent also indicated it would undertake several measures which are more protective of marine mammals including the application of ramp up delays for all marine mammals detected within the safety zone and shut downs of the air source arrays for all beaked whale species. The proponent will communicate seismic survey plans to C-NLOPB and geophysical operators as early as possible to reduce concurrent seismic surveys and/or to maximize the separation distance between surveys to the extent possible.

Predicted Effects of Vessel Strike

The proponent stated that project-related vessel traffic has the potential to result in mortality or injury of marine mammals and sea turtles from vessel strikes. Reducing vessel speed has been shown to reduce the number of marine mammal deaths and severe injuries due to vessel strikes. The proponent indicated that unlike the Gulf of St. Lawrence, where recent increases in North Atlantic right whale occurrences have resulted in vessel speed restrictions in certain areas and time of year, the offshore Newfoundland and Labrador area does not have prescribed speed limits or shipping lanes. North Atlantic right whales have not been reported along the project’s vessel traffic route or in the project area. The proponent noted that speed of offshore supply vessels is set based on environmental conditions (e.g., wind and waves), distances and fuel efficiency, and operational best practices for the area. The proponent noted that although there are no known congregating areas of marine mammals along the vessel traffic route to the project area; it is possible that groups of foraging marine mammals



could be encountered along the route particularly during summer months. Since 2002, there have been two reports of supply vessels striking a whale at night on the Grand Banks; however, the reports were not able to be confirmed and such ship strikes are considered rare. The proponent's proposed mitigations measures include: use of common traffic routes and altering course and/or reducing speed if marine mammals and sea turtles are detected. The proponent determined that dedicated onboard marine mammal observers on its vessels are not necessary. Additionally, the proponent noted that the migration measure of avoiding marine mammals (i.e., slowing speed and/or altering course) reduces the risk of ship strikes.

The proponent concluded that the Project would not result in significant adverse effects on marine mammals and sea turtles. Although it predicted short- to long-term effects on marine mammals and possibly sea turtles in the project area (possibly extending to the local study area), the number of individuals that may be affected, and the reversible nature of these effects, would not result in a detectable decline in overall marine mammal and sea turtle abundance or changes in the spatial and temporal distributions of marine mammal and sea turtle populations.

The proponent committed to investigate other project optimization concepts that would reduce sound emissions and improve energy efficiency. Some examples of these concepts include the maintenance excellence program that will reduce support vessel requirements and a shared support vessel approach for FPSO and drilling operations. If implemented this would decrease the number of vessels on site simultaneously.

4.2.3 Views Expressed

Federal Authorities

DFO noted the potential for vessel strikes and commented that there have been several reports of supply or crew vessels striking large whales en route to and from offshore oil installations. It indicated that while rare, such an event could be significant if a ship strikes a listed species.

DFO is of the view that the proponent's information on marine mammal distribution in the project area is likely to be underrepresented as the sighting data are only based on opportunistic observations.

DFO is of the view that given uncertainty in the population(s) of northern bottlenose whale present in or near the project area and whether important habitat exists in or near the project area, the proponent should assume that all observations of northern bottlenose whales are individuals belonging to an endangered population. Given the uncertainty, recent seismic programs have implemented mitigation measures for northern bottlenose whale, i.e., taken a precautionary approach in assuming that whales belong to the Scotian Shelf population, which is listed as endangered on Schedule 1 of the *Species at Risk Act*. The additional mitigation measure to implement shut down for any species of beaked whale would include northern bottlenose whale.

DFO noted that based on the proponent's acoustic modeling, sound propagation above behavioural thresholds is more extensive in the winter months (February) than the summer months (August). It indicated that sensitive life stages of marine mammals, e.g. mating and calving, occur in the summer months. It also noted that fewer species of marine mammals (e.g. migratory species) are anticipated to be in the vicinity of the project during winter months and thus would not be subject to the increased noise propagation during that time. Certain species (e.g. northern bottlenose whale) may be in the



project vicinity year round, including winter months when the geographic extent of sound propagation is predicted to be furthest.

DFO indicated that some marine mammals may habituate to noise levels, while other species may avoid noise, and be temporarily displaced to nearby ecological suitable habitats, avoiding physical, biological, or social impacts. It considered the duration of potential effects from sound to be long term.

DFO is of the view that taking into account the seasonal sound propagation, operational scenarios, and life history stages of marine mammals that may utilize the area, particularly northern bottlenose whale, it would consider the geographic extent to be medium. Consideration has also been given to the limited baseline data pertaining to marine mammal distribution and utilization of the area in the vicinity of the Project and uncertainty with respect to marine mammal behavioral response to Project sound sources.

DFO is of the view that it is difficult to predict the reversibility, given the limited baseline data pertaining to marine mammal distribution and utilization of the area in the vicinity of the Project as well as the uncertainty with respect to marine mammal behavioral response to Project sound sources, as noted previously. In general, DFO anticipates that noise levels are unlikely to result in permanent displacement of marine mammals and that behavioral impacts, if any, are likely to be temporary (less than eight years). Any effects are expected to be reversible once the Project is completed. Given the potential for temporary behavioural change, DFO is of the view that the level of magnitude of effect for all operational scenarios provided is considered to be low.

DFO expressed concern with the proponent's lack of mitigation in relation to noise from the FPSO and other vessels. It indicated that the acoustic modelling should be field tested to ensure that the bathymetric and geological features of this area do not result in higher sound propagation than modelled.

DFO is of the view that given there is some uncertainty due the limited baseline data on marine mammals in the project area, it recommends the collection of additional information to determine if the area is utilized by any marine mammal listed as *Endangered* or *Threatened* on Schedule 1 of the *Species at Risk Act* or any marine mammal during a sensitive life stage, as well as follow-up monitoring to verify the predicted zone of influence as determined by acoustic modelling. DFO is of the view it has a moderate level of confidence in the effects predictions as described by the proponent.

C-NLOPB advised that seismic surveys in the Canada-Newfoundland and Labrador Offshore Area are typically scheduled between May and November to avoid winter weather conditions. Seasonal variability such as poor weather, high sea states, and sea ice can constrain seismic operations.

Indigenous Groups

Miawpukek First Nation expressed concern regarding crew-based detection and avoidance ability of marine mammals in supply and servicing vessels especially under poor visibility conditions. Miawpukek First Nation questioned the absence of mitigation measures during supporting surveys. MFN recommended that the proponent commit to employing dedicated and qualified marine mammal observers to perform effective and accurate detections. Further, Miawpukek First Nation believes that the proponent should voluntarily adopt a full shutdown of seismic surveys if any marine mammal is observed within the 500 metres safety zone. Miawpukek First Nation also suggested that marine mammal observers should be used during the 30 minute window prior to helicopter takeoff from the



FPSO or other vessels and restrict takeoff when mammals are observed within the 500 metres safety zone. Miawpukek First Nation has also requested to review and provide input into the marine mammal monitoring program.

MTI expressed concern regarding the lack of marine mammal visual encounter survey methodology and protocol, marine mammal observer training requirements, and whether alternative methods for detecting marine mammals were considered. MTI also recommended that the proponent voluntarily adopt the speed restrictions required by Transport Canada in other North Atlantic waters for this Project and implement speed reductions of 10 knots (maximum) during the active season for north Atlantic right whales.

Miawpukek First Nation and MTI questioned the absence of baseline data on marine mammals in the project area to determine distribution, occurrence, and abundance of species, with MTI expressing particular concern for north Atlantic right whale and the lack of information on species occurrence and use of the project area. Miawpukek First Nation also recommended the proponent should conduct dedicated marine mammal surveys to better understand species occurrence within the project area prior to development.

Public

World Wildlife Fund – Canada commented that the proponent’s assessment of impacts of seismic testing programs on the marine environment is not substantiated according to the latest research and the estimate given of the geographic extent of impacts is far too small by many orders of magnitude. It expressed concern related to the lack of marine mammal observers on seismic vessels. World Wildlife Fund - Canada questioned the effectiveness of implementing mitigation measures for marine mammals within 500 metres of a seismic air gun as stated in the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*. It noted that such a safeguard is not supported by scientific evidence. It also indicated that detection of marine mammals at 500 metres can be extremely difficult, especially at night or during limited-visibility conditions. World Wildlife Fund - Canada recommended mitigation measures for seismic air gun surveys be strengthened, with the most effective mitigation being: 1) remove the surveys from areas/seasons rich in marine life and sensitive species; 2) lower the source level (quiet the noise); and 3) use air gun alternatives such as marine vibroseis¹². The C-NLOPB advised that the development of marine vibroseis has included testing in transition zones and shallow waters. However, there are limits to the commercial availability of the technology and logistical gaps between the current operational range and the water depth of the project area.

4.2.4 Agency Analysis and Conclusion

Analysis of Effects

The Agency understands that the use of the project area by marine mammals is poorly understood because there are no direct studies of marine mammal species, of their use of the area for migration, mating and calving, of their foraging strategies, or of their specific prey preferences in the project area.

¹² Marine vibroseis is a sound generating system that uses a large oscillating mass to emit a range of frequencies

The presence or absence of important feeding or breeding areas, residency potential and migratory routes have not been determined in the project area. The EIS makes reference to a recent Environmental Studies Research Fund study that found that in general, areas near the northern and southern entrance of the Flemish Pass recorded among the highest and most persistent species diversity (Delarue et al. 2018). The Agency notes that the Project and traffic route intersects two EBSAs that support aggregations of marine mammals, of which some species are listed under the *Species at Risk Act*. The Agency understands the protection of their habitat in the EBSAs is one of the measures recommended to reverse their declining trend¹³. The Agency is aware that Cuvier's and Sowerby's beaked whales occur in the project area and although neither are listed, beaked whales are considered highly sensitive to seismic sound sources. Northern bottlenose whale occur in and around the project area and there is uncertainty whether important habitat exists for this species in or near the project area. DFO advised the Agency that all observations of northern bottlenose whales could be individuals belonging to an endangered population under the *Species at Risk Act*.

The Agency understands that underwater sound emissions from Project sources have the potential to change marine mammal behaviour, mask hearing ability, and also cause hearing injury. Project activities would change the underwater soundscape and habitat for marine mammals above the ambient levels which would fluctuate with the number of sound sources in the project area.

Auditory Injury from Project Sound Sources

The Agency understands that for the project area, incentives for mating or feeding marine mammals to remain for 24 hours and habituate to sound are unknown. However, based on advice from DFO, it agrees with the proponent's view that marine mammals are not likely to occupy in any area within close proximity to sound sources for more than the 24 hours to result in permanent auditory injury.

Behavioural Effects from Project Sound Sources

The Agency considers that intra-project cumulative sound effects could develop from several sound sources concurrently emitted during the Project's simultaneous operations. Cumulative effects resulting from sound from this Project with other projects or activities are discussed in Section 5.3. Based on information provided by the proponent regarding modelled sound associated with various project activities on a seasonal basis (Table 3), along with their relative locations, the Agency understands the area of sound emissions within the Project's core development area as follows:

- In a worst-case scenario with multiple (up to nine) Project-related sources with one MODU, the Agency notes that the proponent estimated potential extent of behavioural effects could be between 31 to 34 kilometres of the core development area about 1380 square kilometres in winter months or about 130 square kilometres in summer months. Many of those sound sources overlap and the condition could occur for a duration of two to four weeks while a seismic vessel is in the project area.
- In a scenario with two vessel sources (e.g., FPSO plus a standby vessel or two construction vessels, with active thruster use) the potential extent of sound above the behavioural effects threshold could be 350 square kilometres in winter or 40 square kilometres in summer.

¹³ (Convention of Biological Diversity 2015 <https://chm.cbd.int/database/record?documentID=204104>)

- In a scenario with two MODUs and the FPSO the proponent estimated that concurrent thruster sound could be between 245 and 2,100 square kilometres depending on the season
- The Agency notes that the proponent did not estimate the extent of sound emissions for project activities outside of the core development area. If two MODUs and the FPSO were concurrently operating within the tieback locations the zone of influence could potentially double to over 4,000 square kilometres.

Table 3 Distance, Area and Volume of Project Sound Sources to Potentially Cause Behavioural Effects as calculated by the Proponent

Project Sound Sources	Season*	Modelled Sound Distance From Source (kilometres) (Behavioural Effect)	Total Area of Sound (square kilometres)	Total Volume of Sound (cubic kilometres)
FPSO Thrusters (50 percent power)	August	4	39	14.5
	February	14	348	21
MODU Thrusters (50 percent power)	August	8	112	49
	February	25	1,320	78
1 MODU + FPSO	August	7-10.5	133	62
	February	31-34	1,380	90
2 MODUs + FPSO	August		245	111
	February		2,100	156
Seismic Array** (5085 cubic inches)	August	10	129	59
	February	20	200	75
Support/Supply Vessel	Year Round	10	314	345
Sub-bottom Profiler	February	4	0.003	0
Multi Beam Echosounder	February	0.9	0.019	0.005

*Model runs were for summer and winter when sound speed profiles differ with change in water temperature and salinity. Geophysical equipment scenarios were modelled only in February.

**The proponent predicted seismic sound source to have an effect at distance to 150 kilometre outward from the seismic array source (70,685 square kilometres)

Assumptions made by the Agency (based on information from the Proponent) in assessing the effects during the different phases of the Project are as follows:

*Pre-installation and Site Preparation*

- There will likely be two to three vessels in the Project area on a seasonal basis for the first three years of site development.

Construction and Installation, Drilling, Hookup and Commissioning

- Construction, installation, hookup and commissioning activities may occur concurrently during the well drilling phase.
- MODUs are expected to be in the project area for nine years. Two MODUs may be used concurrently in the project area from six to 24 months.
- Once the FPSO arrives on site for hookup, there would be constant sound emitted for 12 to 20 plus years.
- Standby vessels would be on site for each MODU and the FPSO as well as a supply vessel servicing all vessels.
- A seismic vessel could be in the project area, adding impulsive sound emissions.

Production Operations and Maintenance

- Seismic surveys would be conducted annually during the production phase.
- The FPSO is a continuous presence.
- Any project support vessels would be included inside the sound envelope of other sources in the project area.
- The shuttle tanker will be a frequent additional sound source.
- Additional vessels or MODUs would be onsite for well maintenance.

Decommissioning

- There will likely be two to three vessels and the FPSO in the project area on a continuous basis for the three years.

The proponent indicated that marine mammals may alter behaviour including change in vocalization, change in feeding and/or avoid areas due to sound; however, it also indicated that marine mammals may habituate to sound if resident in the area. The Agency notes the proponent's conclusions and recommends follow-up monitoring to verify these predictions. The Agency is of the view, based on the presence of deep water marine mammal species and taking into account the proponent's information, presence and abundance of some marine mammals within the project area could be adversely affected.

The Agency notes that modelling shows a greater zone of influence for sound during winter. The Agency further notes that the largest zones of influence for behavioural effects could be from sound emissions from MODU and FPSO thrusters and seismic arrays. DFO indicated that sound propagation is predicted to be lowest during the summer months, which coincides with sensitive life stages of marine mammals, e.g. mating and calving. It is anticipated that fewer species of marine mammals (e.g. migratory species) will be in the vicinity of the project during winter months and will not be subject to the increased noise propagation during that time. Certain species (e.g. northern bottlenose whale) may be in the project vicinity year round, including winter months when the geographic extent of sound propagation is predicted to be furthest. However, there is evidence that some marine mammals may habituate to



noise levels, while other species may avoid noise, and be temporarily displaced to nearby ecological suitable habitats, avoiding physical, biological, or social impacts.

The zone of influence from two MODUs and one FPSO simultaneous thrusters within the core development area could range from 235 square kilometres to 2,100 square kilometres depending on the season. That area could double if MODUs are active at the future tieback fields. The sound disturbance would occur over a five to nine year-period. The zone of influence from a seismic survey concurrently in the project area was considered in the zones of influence. The Agency is of the view that the continuous long term sound from MODUs and FPSO thrusters could potentially displace or cause marine mammals to avoid the area for 12 to 20 plus years about 25 percent of the year in the winter months.

The proponent has indicated four-dimensional seismic activity to be short-term in duration (two to four weeks once or twice per year). The proponent indicated that timing of two-dimensional/three-dimensional/four-dimensional seismic surveys and vertical seismic profiles is unknown, but could be conducted at any time of the year. Although the proponent modelled a larger zone of influence from a seismic source in a February scenario, the C-NLOPB advised the Agency that seismic surveys are typically scheduled between May and November to avoid winter weather conditions. The Agency is therefore of the view that the zones of influence for sound from seismic arrays are likely to be less in the spring to fall months than what is modelled for February. The Agency, with the advice from DFO, does note however, that some marine mammals, including northern bottlenose whales, are expected to occur in the project area year round and thus some short-term effects to these species could occur.

The Agency notes that information related to marine mammal species utilization of the project area is sparse and also notes the proponent's uncertainty in the modelling results and high variability in marine mammal behaviour to the project. The Agency therefore, notes uncertainty with regard to the magnitude of behavioural effects. Therefore, the Agency recommends additional follow-up and monitoring to verify predicted behavioural effects on marine mammals.

Effects from Vessel Strikes

Part of the project vessel route transects through the Northeast Shelf and Slope EBSA which is characterized for marine mammal aggregations. The Agency is aware that ship strikes are not systematically monitored and there are no established mitigations proposed by the shipping industry in this area. It is a requirement that all vessel strikes on marine mammals are reported as required by the *Marine Mammal Regulations (Section 39)* within Canadian waters. Watching for marine mammals and sea turtles is partially effective, but only under high visibility conditions (e.g., during daylight and under relatively fair sea conditions). Following consultation with DFO, the Agency is of the opinion that the increase in vessel traffic due to the Project would be unlikely to substantially increase the probability of collisions. As a precautionary measure, the proponent would be required to limit vessel speeds when a marine mammal 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 proponent 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 also be prescribed by DFO should it be determined that the proponent requires a permit under the *Species at Risk Act*.



Key Mitigation Measures to Avoid Significant Effects

The Agency considered mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project's effects from routine activities on marine mammals:

- conduct applicable geophysical surveys in accordance with the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment;
 - shut-down or delay ramp up of air source arrays for all marine mammals and sea turtles when observed within the safety zone;
 - establish a safety (observation) zone of a minimum of 500 metres around the sound source;
 - for survey activities scheduled to occur in areas where beaked and other deep-diving whales, such as the northern bottlenose whale, may be present, conduct a 60 minute pre-watch for marine mammals prior to ramp-up of the air source. If passive acoustic monitoring is being used prior to ramp-up, it would be for the same duration as visual monitoring.
- The proponent shall ensure that it does not undertake seismic testing concurrently with any planned seismic testing occurring within 30 kilometres of the Designated Project. The proponent shall consult with the C-NLOPB in respect of planned seismic testing and, if the Board indicates that seismic testing will be occurring within 30 kilometres of the Designated Project, the proponent shall alter its seismic testing schedule to avoid testing concurrently with that planned seismic testing.
- the energy output of the thrusters on the floating production storage and offloading vessel(s) and mobile offshore drilling unit(s) does not exceed 50% of their maximum energy output, unless not feasible for safety reasons
- to prevent and reduce risks of collisions between all project vessels with marine mammals and sea turtles (when and where such speeds do not present a risk to safety of navigation) require all project vessels to use established shipping lanes, where they exist; and 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; and
- in consultation with the C-NLOPB and DFO, develop a marine mammal monitoring plan which includes using marine mammal observer qualified individuals. Provide the plan to the C-NLOPB for review and approval at least 30 days prior to initiating activities. The plan would describe:
 - monitoring during applicable geophysical surveys, including information on visual monitoring and specific passive acoustic or equivalent technology monitoring configuration that would be implemented, to enable verification that species that may occur within the safety zone can be detected and to ensure the ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the project area, and
- 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.



Follow-up

The Agency has 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 of routine activities on marine mammals and sea turtles:

- monitor marine mammals to verify effects predictions related to underwater sound levels with field measurements before and during the project activities taking into account multiple project sources:
 - measure project underwater sound levels to verify acoustic modeling results;
 - surveys of marine mammal presence, distribution, important habitat areas, and behavior within the zones of influence for behavior predicted by modelling prior to installing subsea infrastructure and during drilling, production and seismic activities.
 - identify qualified individuals trained in marine mammal observation to implement surveys;
- record and report the activities, observations and results of marine mammal and sea turtle monitoring to the C-NLOPB, DFO, and Indigenous groups and post online for public access;
- submit a report on all north Atlantic right whale observations annually and submit to Indigenous groups, and
- contribute to research on the behaviour, presence, distribution, and important habitat areas of cetaceans in 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.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects on marine mammals would occur continuously (e.g., sound emissions from the FPSO), and sporadically (e.g., sound emissions from seismic surveys) for 12 to 20 plus years. Sound emissions from MODUs would occur continuously while onsite which could be over a nine year period. Sound emissions from construction, installation and decommissioning vessels would be continuous while onsite over a six month period for two to five years. The effects to marine mammals would be reversible once the Project is completed. The Agency considers the potential injury effects on marine mammals to be of low magnitude as individuals would need to be in close proximity to the sound source for 24-hours, which is unlikely. Potential behavioural effects on marine mammals may result in avoidance or displacement between 400 and 4,000 square kilometres, potentially extending outside of the project area. The Agency is of the view that the most extensive zone of influence may be in the winter months which is about 25 percent of the year, when fewer marine mammal and sea turtle species may occur in the project area. DFO noted that there is evidence that some marine mammals may habituate to noise levels, while other species may avoid noise, and be temporarily displaced to nearby ecological suitable habitats, avoiding physical, biological, or social impacts. In general, it is anticipated that noise levels are unlikely to result in any measureable change in marine mammal presence, abundance, or distribution, or any impacts on important life processes. The Agency is of the view that the magnitude of effects is low because a measurable change in marine mammal presence/abundance/distribution or in habitat quality or quantity, and behavior is unlikely, and that any change is considered not important for life processes.

Due to the uncertainty of models, the high variability in potential responses, as well as the lack of project area specific information related to species presence, abundance, diversity, and habitat use; these predictions are made with a moderate level of certainty. The Agency is of the view that additional follow-up monitoring would be necessary to verify predicted effects.

The effects of impulsive sound on marine mammals can be mitigated by adhering to practices outlined within the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* (currently under review). The proponent has also committed to implementing mitigations that go beyond those outlined in the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*.

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

4.3 Migratory Birds

The Agency focused its assessment on migratory birds, as defined in the *Migratory Birds Convention Act, 1994*, on the following potential effects of habitat changes from routine Project activities:

- from project lights resulting in potential behaviour, injury and mortality effects; and
- from produced water discharge resulting in potential behaviour and injury effects.

4.3.1 Existing Environment

The proponent stated that offshore and inshore seabirds (e.g., gannets, phalaropes, gulls, petrels, alcids, and shearwaters) are the migratory birds most likely to be found in the project area. Seabirds are long-lived species with low rates of population growth. The offshore islands and mainland cliffs of Newfoundland and Labrador provide nesting grounds for tens of millions of migratory birds. As key components and indicators of ecosystem health, seabirds are considered to be of high ecological importance. Additionally, certain species are of socioeconomic importance in Newfoundland and Labrador both in terms of tourism and as a food source.

The proponent indicated that within the project area, Leach's Storm-Petrel, Northern Fulmar, Great Shearwater, dovkies, murres, Black-legged Kittiwakes, Great Black-Backed and Herring Gulls are the most common seabird species in varying densities according to each species seasonal migration patterns. The project area occurs within an important foraging area for migratory seabirds. Some species are nocturnal feeders requiring darkness to detect their luminesce prey. The various moon phases and starlight influenced by cloud and fog conditions provides the natural night light levels within the project area.

The proponent noted that several bird species either listed under Schedule 1 of the *Species at Risk Act* or assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) potentially occur in the project area, including the Ivory Gull and the Red-Necked Phalarope (Appendix D). The proponent also considered the presence of and effects on avian species identified on the International Union for the Conservation of Nature Red List of Threatened Species (e.g., Leach's Storm-Petrel). The proponent stated that the populations of Leach's Storm-Petrel have declined substantially over the past two decades and for this reason has focused the effects assessment of migratory birds on Leach's



Storm-Petrels as appropriate. The proponent noted that there were no special areas identified for migratory birds within the offshore portion of the project area.

The proponent indicated uncertainties in baseline information in the project area in relation to migratory birds. It noted that the distribution of marine and migratory birds is patchy and ephemeral, and much of the available survey data were not collected in a systematic manner, therefore the data does not provide a complete representation of distribution and abundance. In addition, the proponent stated that the number of surveys conducted may be insufficient at that geographic scale to confidently calculate densities.

4.3.2 *Proponent's Assessment of Environmental Affects*

Predicted Effects from Lights

The proponent indicated that artificial light levels from all project vessels, the FPSO, MODUs and flaring would change night time habitat quality. This effect could result in the potential for attraction to artificial light that could result in injury or mortality of migratory birds.

The proponent stated that from observational evidence collected offshore Newfoundland and Labrador, night foraging marine birds (storm-petrels, shearwaters and fulmars) are considered to be the most susceptible migratory species to stranding and collisions from night lighting from fishing vessels, seismic vessels, drilling installations and production facilities. The proponent's effects assessment focused on the Leach's Storm-Petrel as it is the species with the most stranding and mortality records offshore Newfoundland and Labrador; it is a vulnerable species due to a declining population in the region; and it represents the typical habits of other night foraging marine birds in the region feeding on bioluminescent fish that vertically migrate from deep water to the surface at night (e.g., lanternfish, squid, krill, euphasiids, etc.).

The proponent predicted that the zone of influence from nighttime lighting on migratory birds from any project vessel, FPSO, MODU and flaring could extend to 15 kilometres in radius from the source. The proponent stated that attraction of marine and migratory birds from distances greater than the 15 kilometres could result in a greater number of birds potentially affected by artificial lighting associated with the Project; however, to date, there are no studies demonstrating attraction from such large distances.

The proponent identified uncertainties in quantifying the mortality rate of birds attracted to artificial lighting because the available estimates rely on recovery of birds on platforms and vessels; it is not known how many birds are killed, but not recovered due to scavenging or falling into the sea. The proponent noted that there are no published studies that systematically quantify seabird mortality on offshore platforms and vessels in offshore Newfoundland and Labrador. While accurate assessment of mortality at offshore facilities may be difficult, no mass mortality events have ever been reported at oil and gas operations in offshore Newfoundland and Labrador. The proponent predicted that while attraction effects may be evident out to 15 kilometres from the light source (e.g., MODUs, project vessels, FPSO), the effects on mortality or injury would be localized to the location of the vessel, FPSO or MODU. The proponent predicted that these effects would be outside the range of natural variability without affecting the population. The proponent noted that the predications were made with a

moderate level of confidence based on the uncertainties associated with the extent of injury and/or mortality associated with bird strandings.

The proponent identified mitigations to reduce bird attraction including: reducing overall light emissions from the FPSO, where worker and navigational safety are not compromised; no routine flaring; and evaluating lighting options during project design phases with ECCC.

Predicted Effects from Produced Water Discharge

The proponent would treat produced water prior to discharge in accordance with the Offshore Water Treatment Guidelines. The treated produced water plume modelling predicted the highest concentration would be within 100 metres of the discharge source and within the upper 10 metres of the water column. The proponent noted that although the areal distributions of oil-in-water concentrations were modelled, it did not model the distribution of slicks. However, the proponent noted that despite the removal of free oil from produced water before discharge, surface oil sheening is sometimes associated with treated produced water discharges, and typically occurs under calm conditions. It noted, from 2003 to 2014, there were 290 reports of surface sheens from offshore oil and gas operations. Many of these sightings were associated with reported discharges that had oil-in-water concentrations permitted by the *Offshore Waste Treatment Guidelines* for produced water, whereas others had higher concentrations. However, it indicated that this number may be underestimated since 50 percent of the reported sheens were sighted during the four months of the year when conditions are best for observing sheens. The primary effect associated with produced water discharge is the potential for surface sheening which may lead to oiling of birds and result in injury or mortality. Gulls and storm-petrels would be at greatest risk of encountering a sheen from produced water during autumn because their abundance around production and drilling platforms peaks in the region at this time. The proponent indicated that sheens have the potential to cause mortality but that research studies are inconclusive whether the mortality effects have long-term population effects. It noted several factors contribute to this uncertainty including a lack of data on the occurrence of oiling of seabirds around platforms; a lack of data on the frequency, likelihood, persistence, fate, and thickness of sheens resulting from discharge of produced water; a lack of quantitative studies on the direct effects of sheens on seabirds; and a lack of studies on the effects of sheens on the abundance of pelagic seabirds in Atlantic Canada. The proponent noted that calculating the probability of marine birds encountering sheens is also difficult due to the patchy and ephemeral nature of marine bird distributions at small geographic scales.

The proponent predicted that the occurrence of highest oil-in-water concentrations would range from not likely to sporadic and in close proximity of the FPSO; therefore, effects would be localized to the FPSO. The proponent further noted it could not predict the probability of exposure of migratory birds to such sheens because it did not model sheen formation and distribution. However, it predicted that the probability of exposure to sheens would increase with decreasing distance from the FPSO. The predictions were made with a moderate to high level of confidence due to the uncertainties associated with prediction of zones of influence from modelling.



4.3.3 Views expressed

Federal Authorities

ECCC advised the Agency that the primary concerns for migratory birds as a result of the Project are light attraction from artificial light sources and/or flaring operations on platforms, supply and servicing vessels, and/or seismic operations, and exposure to hydrocarbons from sheens and/or accidental events. ECCC anticipates that the Project would have residual effects on migratory birds, in particular Leach's Storm-Petrel from the Western Atlantic population.

ECCC noted that studies have shown that offshore oil and gas activities and light-specific threats are contributing to the decline of Leach's Storm-Petrel. It stated that any portion of an already declining population that are attracted to oil and gas activities or artificial lighting have the potential to be affected (e.g., may be displaced, behaviourally-affected, or killed), and will not be replaced in the population. ECCC commented that currently, Leach's Storm-Petrel are designated "Vulnerable" by the International Union for Conservation of Nature (IUCN), and advised that this species was determined in November 2020 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to be Threatened. It further noted that the COSEWIC assessment has designated offshore oil and gas activities to be a "medium level threat" to Leach's Storm-Petrel, as they are "pervasive" in scope, "moderate" in severity, and "high" in timing (i.e., occur very frequently).

ECCC indicated that there are data and information gaps in overall research knowledge related to: bird visual range inducing light attraction; the mechanism for light attraction being unknown and research being limited; the difficulty to quantify how many dead birds are undetected during searches thus estimates may be under represented; the survivability of released birds is unknown; and the reoccurrence of re-stranding after release is unknown.

ECCC expressed concern as to whether the proponent's proposed mitigation measures would address the residual effects on marine and migratory birds. ECCC stated that in the absence of systematic searches and documentation of stranded birds (live and dead), and a discussion of the selection of mitigation measures, the proponent cannot state with certainty that the Project's activities would not result in significant residual adverse effects or population level effects.

ECCC noted that Leach's Storm-Petrel is attracted to light and vulnerable to strandings and collisions. Given the project area is an important foraging area for Leach's Storm-Petrel, ECCC advised the proponent to work with it on specific mitigation measures for this species, including:

- systematic surveys of birds and appropriate releases and record keeping;
- confirmed means to reduce and adjust lighting;
- scheduling of flaring;
- monitoring of impacts of project vessels and MODUs on birds; and
- research of new technologies to complement the monitoring program.

ECCC advised that a reduction in artificial lighting in the offshore is the preferred mitigation for eliminating or minimizing the effects from bird attraction and strandings. The proponent committed to engage with ECCC regarding lighting options for the FPSO. ECCC recommended it be consulted during



the design phase of construction to assist the operator in designing a platform/vessel that reduces artificial lighting.

ECCC advised the proponent include timing for any planned flaring events to avoid peak migration periods and/or weather conditions that would increase bird attraction. ECCC requested that the proponent follow the C-NLOPB's *Measures to Protect and Monitor Seabirds in Petroleum-Related Activity in the Canada-Newfoundland and Labrador Offshore Area*, and notify the C-NLOPB of any plans to flare. The proponent noted that the C-NLOPB's measures applied only for exploration activities and indicated it would not provide advance notice of safety flaring events as it is not feasible nor practicable, as safety events cannot be scheduled. The proponent committed to submit a flaring and venting plan for approval by the C-NLOPB as per the Operations Authorization approval process. It noted that flaring during safety events or turnaround/maintenance activities cannot be limited to daytime hours and periods of good visibility, but the duration of non-routine flaring would typically be of short duration and it would use best practices to ensure this outcome.

ECCC noted the proponent did not provide specific details for the follow-up and monitoring programs. It advised that the proponent should implement a systematic monitoring program in order to verify the effectiveness of mitigation measures and address any uncertainty in the prediction of residual adverse effects. The proponent stated that the design of the follow-up monitoring program would be undertaken following finalization of project design and would be developed in consultation with the C-NLOPB and relevant government departments (e.g., DFO, ECCC), Indigenous groups and key stakeholders, as appropriate. It committed to working with ECCC to develop the seabird monitoring plan, in part, to assess efficacy of mitigation measures for migratory birds and would also consult with ECCC to include adaptive management.

ECCC noted that research is underway to help reduce the uncertainty related to the effects of light attraction on migratory birds and recommended the proponent take any new information resulting from this research into account in the application of mitigation measures.

ECCC noted that the measurements of oil in water from produced water sheens should demonstrate a correlation to effects on birds. If a correlation between predicted no-effects concentration of oil in water and effects on birds cannot be demonstrated, thresholds of surface oil expressed as a surface thickness should be considered, as is consistent with literature concerning the risk of sheens to birds.

Indigenous Groups

Miawpukek First Nation suggested the proponent should commit to employing dedicated, qualified and trained marine and migratory bird observers that perform surveys daily from the project vessels and drilling installations to better understand the abundance and distribution of marine and migratory birds in the area. MTI expressed similar concern regarding the use of dedicated and qualified marine and migratory bird observers on project vessels, including during transit. MTI also recommended that the proponent use supporting technology/equipment (e.g., bird radar, cameras, acoustic recording/deterrents) to account for limitations of observer-based surveying during poor conditions. Miawpukek First Nation and MTI are also interested in seeing a commitment by the Proponent to communicate annual reports on the impact of construction and operations on sea birds, and the deployment and effectiveness of related mitigation and training measures.



Miawpukek First Nation and MTI expressed concern regarding the absence of water curtains as a measure to mitigate adverse effects of flaring on migratory birds. MFN would like marine and migratory bird observers to observe and document bird behaviour and presence/absence, as well as effectiveness of the water curtains. MTI would like the proponent to consult with ECCC regarding the timing of flaring events and potential impacts during sensitive periods for marine birds.

Miawpukek First Nation questioned the proponent's use of a 15 kilometres zone of influence for the effects of artificial lighting on migratory birds, considering the estimate is based on fledgling shearwaters in Australia and artificial road lighting. Miawpukek First Nation suggested the proponent should discuss with potential drilling installation bidders, options for potential modification of some lights on the drilling installation to decrease attraction to birds, to the extent that worker safety, third-party safety, and safe operations are not compromised. MTI noted similar concerns regarding artificial light mitigation measures for all vessels, as it is unclear in the EIS whether all vessels would be evaluated in the proponent's engineering study for the FPSO.

KMKNO noted the proponent committed to sending a report to ECCC in the event of a species at risk stranding; however, KMKNO suggested ECCC should be contacted immediately for further guidance on appropriate actions if an injured species at risk is found.

Public

Nature Newfoundland disagreed with the proponent's assertion that using spectral modified lighting is not a technically feasible option. It noted research regarding spectral modified lighting (green light as opposed to red light) can reduce bird strikes due to light attraction on oil platforms. It indicated that this type of lighting can be optimal for safe and comfortable working conditions, with the only issues related to helicopter approach and landings.

4.3.4 Agency Analysis and Conclusion

Analysis of Effects

Effects of Artificial Lights

The Agency understands that behaviour changes, injury and/or mortality of migratory birds may result from project light attraction. The Agency agrees with ECCC that bird attraction effects lead to the potential for reduced fitness or increased mortality as birds become exhausted flying about the light sources, resulting in strandings and/or collisions.

The Agency focused its assessment, due to the potential for effects from project night light emissions over a large area, on night foraging migratory birds, particularly, on the Leach's Storm-Petrel given its high risk potential for strandings and its declining population. The Agency notes that the Leach's Storm-Petrel was reviewed by COSEWIC and the status of the Atlantic population has updated to threatened under COSEWIC in November 2020. Results of the recent review will be considered in the future with respect to potential listing under the *Species at Risk Act*.



The Agency compared ambient night light levels for twilight, full moon and an overcast night (10.8, 1 and 0.0001 lux, respectively)¹⁴. The Agency understands that maritime regulations on lighting require a minimum illumination of 21 to 107 lux¹⁵. The Agency also understands that for navigation safety, the required light visibility distance for large vessels ranges between 4.8 to 9.6 kilometres radius (72 to 289 square kilometres). Additional lighting requirements for drilling installation and production facilities include visibility for 24 kilometres radius (1,810 square kilometres). Consequently, the Agency disagrees with the proponent and is of the view that the change in light levels at night from single and multiple project sources would be above natural variability.

The proponent indicated that light illumination at night from flaring is about 1000 times brighter than light emission from a drill platform, alone. The Agency notes that no visual range was provided by the proponent from night time flaring.

The Agency is aware that the proponent's predicted zone of influence of 15 kilometres from each project vessel is an estimate and is not related to offshore production platforms nor bird behaviour while foraging at sea. Based on this information, the Agency calculated that the potential area of attraction per vessel could be about 706 square kilometres. ECCC noted limited certainty with the predicted zone of influence as there is no information related to light attraction in the offshore and that additional research is needed to determine whether birds are attracted to artificial light from greater distances, as well as the potential for seasonal variation in the zone of influence of artificial light from platforms and vessels.

The Agency notes during pre-construction surveys and during the initial construction and operation phases, vessels would be limited and thus these phases would have the least amount of project change in night light. Following the construction phase, the hook-up and commissioning and operations phase could include up to nine night light sources at one time and based on the various zone of influence for light attraction provided by the proponent, the effects of light emissions on migratory birds could extend out to an estimated 1,448 to 1,540 square kilometres.

The Agency accepts the advice from ECCC that there are knowledge gaps that confound the full understanding of potential effects of lights on birds. However, ECCC notes that research is underway to reduce this uncertainty including its own research initiatives that have the following research goals:

- Increasing research to understand Leach's Storm-Petrel vulnerability to light attraction, quantifying the impact of light attraction on Leach's Storm-Petrel, and determining effective mitigations to reduce potential impacts; and
- Enhancing the offshore observer program and expanding this program to include systematic surveys for stranded birds on platforms and vessels.

¹⁴ lux is an illumination unit of measure

¹⁵ (Canada – Newfoundland and Labrador Offshore Marine Installations and Structures Occupational Health and Safety Transitional Regulations). In accordance with the Collision Regulations SCHEDULE 1 International Regulations for Preventing Collisions at Sea, 1972 with Canadian Modifications, for all vessels over 50 metres in length

Additionally, in December 2020, the ESRF announced a call for research proposals with the objective to develop a program of research aimed to better understand if and how seabirds, in particular Leach's Storm-Petrel, are attracted to light generated by oil and gas activities in the Atlantic offshore environment.

The Agency is of the view that taking into account the potential geographic extent of the effects of lights on migratory birds; as well as knowledge gaps and uncertainty in the proponent's predictions; mitigation measures such as reduction on unnecessary ambient light, avoiding flaring during mid-September to October and reduction in nighttime flaring are required to address the potential significant adverse environmental effects. Furthermore, given ongoing and recently initiated research related to the attraction of seabirds to light, along with the duration of this Project; implementing the findings and recommendations of this research, as it becomes available, into the mitigations and follow-up, will also be important.

Produced Water

The Agency understands that migratory seabirds are vulnerable to oil on water and produced water is a source of surface oil sheen. The Agency is of the view that the potential for lighting and food sources around the Project would attract migratory birds and increase the risk of potential exposure to oiling when they rest or feed on the water surface or while diving. The Agency accepts that the proponent committed to adhering to the *Offshore Waste Treatment Guidelines* for treating produced water. However, the Agency understands that this guideline monitors compliance prior to discharge of produced water and does not account for sheens. The Agency has identified additional follow-up measures to verify predictions, taking into account the advice from ECCC and the uncertainty in the proponent's predictions related to the potential for sheens to have a population effect.

Key Mitigation Measures to Avoid Significant Effects

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

- consult with ECCC when designing lighting configurations for the Project's FPSO, MODU and designated project vessels;
- identify in consultation with ECCC and implement measures to reduce/control all unnecessary project lighting, including its direction, timing, intensity, and glare, where economically and technically feasible and in line with health and occupational safety requirements, to reduce the attraction of migratory birds to the FPSO, MODU and designated project vessels:
 - By removing all sources of lighting that are not required to complete daily operations or compromise worker safety;
 - By reducing the amount of nighttime lighting, where possible; and
 - By evaluating the economic and technical feasibility of lighting mitigations, including spectral modified lighting, shielding lights downwards, changing the type and/or intensity of light, and evaluating how these measures meet health and occupation safety requirements. Provide this evaluation to C-NLOPB and ECCC prior to implementing measures.
- limit the duration of non-routine and safety flaring to the length of time required;



- prior to finalizing the design of the FPSO, conduct an analysis of the feasibility of a pilotless flaring system and submit a report of the results of this analysis subject to review and acceptance by the C-NLOPB;
- start non-routine and safety flaring as early as practicable during daylight hours to limit flaring that occurs during nighttime;
- minimize the number of non-routine and safety flaring events during nighttime and poor weather conditions (i.e., flaring during daylight hours and on clear days, where possible);
- identify the circumstances under which the proponent shall not commence non-routine and safety flaring during conditions of poor visibility including when there is low cloud ceiling or fog and not commencing flaring during these circumstances;
- notify the C-NLOPB at least 30 days in advance of planned flaring to determine whether flaring would occur during a period of migratory bird vulnerability and to determine how the proponent plans to avoid adverse environmental effects on migratory birds, including implementing modified or additional mitigation measures;
- plan any non-routine and safety flaring outside of periods of migratory bird vulnerability where possible (i.e., avoiding mid-September to mid-October);
- include awareness training for all offshore workers associated with the Project regarding migratory bird strandings as part of overall training/orientation, including reporting stranded birds to the relevant personnel tasked with monitoring stranding;
- monitor the species at risk review on Leach's Storm-Petrel which may influence the listing of the species under the *Species at Risk Act* and modification of mitigation measures;
- 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 1,000 metres from known bird colonies within the Baccalieu Island and Eastern Avalon EBSAs (unless there is an emergency situation); and
- implement mitigation measures related to chemical selection, waste discharge, and disposal of spent synthetic-based muds as described in Section 4.1 – Fish and Fish Habitat.

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 of routine activities on migratory birds:

- monitor daily for the presence of migratory birds at the MODU, and other designated project-related vessels, excluding supply and standby vessels, using a trained observer whose primary responsibility is observing migratory birds and following *ECCC's Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms*;
- monitor, during flaring, for the presence of migratory birds using a trained observer whose primary responsibility is observing migratory birds and document migratory bird behavior around the flares;
- undertake daily systematic searches for the presence of stranded and re-stranded migratory birds at the MODU, and other designated project-related vessels, excluding supply and standby vessels by dedicated, trained observers in accordance with the most recent version of *ECCC's Procedures*



for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada.

- consult with ECCC to develop vessel-specific systematic monitoring protocols, in advance of Project commencement to determine:
 - the number of stranded birds;
 - the species of stranded birds;
 - oiling of birds;
 - the number of injuries mortalities;
 - the number of re-stranding incidents;
 - if lighting reduction/adjustment measures are effective to reduce attraction, collisions and strandings;
 - if a different spectrum of light attracts birds more or less than another spectrum of light
 - that survey efforts are conducted during appropriate times; and
 - that survey efforts include all accessible areas of the MODU, and other designated project-related vessels, excluding supply and standby vessels;
- include alternative search efforts and technology (e.g., cameras) considered for inaccessible area of the structures and vessels;
- develop a comprehensive monitoring program that incorporates additional technological methods, where possible (e.g., radar, infrared imaging, high definition aerial surveys, and/or telemetry studies), to complement research on the effectiveness of mitigation of light attraction;
- survey efforts to include bird activities in the vicinity of the vessels;
- contribute to a research program to identify changes in light spectrum, type and/or intensity that may further reduce attraction for storm-petrels and other seabirds;
- participate in research to help reduce the uncertainty related to the effects of light attraction on migratory birds. Ongoing research by ECCC into the effects of light attraction on migratory birds includes:
 - long-term monitoring programs (population and demographic);
 - global positioning system and global location sensor tracking studies to further describe migratory bird foraging and overwintering areas, and to assess threats to migratory birds at sea;
 - research to understand Leach's Storm-Petrel vulnerability to light attraction, quantifying the impact of light attraction on Leach's Storm-Petrel, and determining effective mitigations to reduce potential impacts;
 - enhancing the offshore observer program and expanding this program to include systematic surveys for stranded birds on platforms and vessels;
- develop a systematic monitoring program to document the presence and extent of surface sheens;
- monitor the presence and behavior of seabirds and their encounters with surface oil sheens;
- provide the results of the monitoring data to ECCC annually, using the standard Eastern Canada Seabirds at Sea (ECSAS) Microsoft Access database format;



- take any new information from research, and updates on species at risk and special areas into account when implementing adaptive management;
- update the C-NLOPB and Indigenous groups annually on research activities. Communicate with Indigenous groups to determine the means by which they will be updated. Research initiatives can be explored through organizations such as the Environmental Studies Research Fund and through input from and collaboration with Indigenous groups, 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 is of the view that the adverse residual environmental effects for migratory birds would be of low to medium magnitude because predicted impacts may affect particular populations over more than one generation, but would not affect the long-term integrity of all populations. The Agency notes that for Leach's Storm-Petrel the magnitude of the adverse environmental effects is less certain as the species is already in decline. The Agency is of the view that the geographic extent is at or beyond the regional study area for light effects and within the project area for produced water. The Agency is of the view that the potential distribution of surface oil sheens is unknown, but likely localized. The duration of effects is considered long-term as the project lifespan may extend 20 plus years. The lighting of the FPSO would be continuous during the life of the Project, continuous for MODUs for five to ten years, and continuous for installation, construction and decommissioning vessels for about six months per year for two to five years. However, the effect would occur primarily during night hours, periods of poor weather and periods of species-specific vulnerability (e.g., during the post-fledging period). The Agency is also of the view that the produced water discharge would be continuous for the life of the Project and the volume would increase with production age of the field and thereby increase the risk of bird oiling. The Agency anticipates that the adverse environmental effects on migratory birds from light emissions and produced water be reversible post-decommissioning.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project not likely to cause significant adverse environmental effects on migratory birds. The Agency's conclusion was made taking into account the uncertainties regarding light attraction on migratory birds, particularly Leach's Storm-Petrel. Therefore, the Agency would require follow-up monitoring and additional research to allow for adaptive management by the proponent.

4.4 Special Areas

Special areas have been designated due to their ecological, historical or socio-cultural characteristics and importance. Since special areas overlap the project area, the Agency's assessment of special areas focused on changes in environmental features and/or processes due to routine Project activities, including:

- the effects of installation of subsea infrastructure and drill waste discharges resulting in the alteration, disturbance and destruction of benthic habitat and species assemblages; and
- the effects of Project sound emissions resulting in potential hearing injury and behaviour changes on finfish and marine mammals.

4.4.1 Existing Environment

The proponent identified 23 special areas (designated because of ecologically or biologically sensitive features) that intersect with the project area and/or the local study areas (Table 4)¹⁶. Seven of these special areas, designated for their importance to benthic habitats, directly intersect with the project area, including the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity (UNCBD) Ecologically or Biologically Significant Area (EBSA); the Northwest Flemish Cap (10) Fisheries Closure Area; one VME designated for sea pens; three VMEs designated for sponges; and one VME designated for large gorgonian corals. Parts of these special areas have historically been and are currently subjected to commercial fishing, primarily by foreign fleets, which have resulted in repeated impacts to seafloor habitats and species. The other 16 special areas are located outside the project area and intersect primarily with the zones of influence predicted for underwater sound emissions. The proponent stated there are no designated critical habitats occurring in the project area or along transit routes; and noted that oil and gas production activities are not prohibited within any special area that intersects with the project area or vessel route. Special areas in the regional study area are depicted in Figure 4 and listed in Appendix E.

Table 4 Special Areas within the Zone of Influence of Project Activities

Special Area	Distance to Project Activities ¹	Defining Features of the Special Area
Ecologically and Biologically Significant Areas ^a		
Northeast Slope	• 31 kilometres from project area	Concentrations of corals. High aggregations of Greenland halibut and spotted wolffish (threatened status) in spring. Aggregations of marine mammals particularly harp seals, hooded seals and pilot whales.

¹⁶ The Cape Spear Lighthouse and Signal Hill National Historic Sites, as well as two Snow Crab Stewardship Exclusion Zones, also overlap with the Project's proposed vessel route. These special areas are not discussed herein. The Agency's analysis focused on special areas designed for their ecologically or biologically sensitive features. Project-related effects on social-based special areas are not predicted.



Special Area	Distance to Project Activities ¹	Defining Features of the Special Area
Eastern Avalon	<ul style="list-style-type: none"> • 358 kilometres from project area • Overlaps with transit route zone of influence 	Seabird feeding areas. Whales, porpoises, dolphins, seals and leatherback turtles feed in the area from spring to fall.
Baccalieu Island	<ul style="list-style-type: none"> • 351 kilometres from project area • Overlaps with transit route zone of influence 	The island hosts the world's largest nesting colony of Leach's Storm-Petrel, globally significant populations of other seabirds. Capelin spawning area. Aggregations of killer whales, shrimp, piscivores, spotted wolffish. Foraging area of Atlantic Puffin, Black-Legged Kittiwake and Razorbill.
Marine Refuge ^b		
Northeast Newfoundland Slope Closure	<ul style="list-style-type: none"> • 34 kilometres from project area 	High concentrations of fragile, slow-growing, structure-providing cold-water corals and sponges. Serves as spawning and reproductive grounds, nurseries and refuges for a variety of species including roundnose grenadier.
Newfoundland and Labrador Shelves Bioregion Significant Benthic Areas ^c		
Sea Pens	<ul style="list-style-type: none"> • 32 kilometres from project area • Overlaps with transit route zone of influence 	High probability for significant concentration of sea pens.
Large Gorgonian Corals	<ul style="list-style-type: none"> • 58 kilometres from project area • Overlaps with transit route zone of influence 	High probability for significant concentration of large gorgonian corals.
Representative Marine Area ^d		
East Avalon/Grand Banks	<ul style="list-style-type: none"> • 356 kilometres from project area • Overlaps with transit route zone of influence 	This area contains globally significant concentrations of marine birds and is home to the Eastern Avalon EBSA. Abundant capelin spawning beaches and important habitat areas for American plaice.
United Nations Convention on Biological Diversity Ecologically or Biologically Significant Areas ^e		
Slopes of the Flemish Cap and Grand Bank	<ul style="list-style-type: none"> • Overlaps with project area 	Aggregations of corals and sponges, high diversity of marine taxa including threatened and listed species. Greenland halibut fishery grounds in international waters.
Vulnerable Marine Ecosystems (VMEs) ^f		
Six Sponge	<ul style="list-style-type: none"> • Three of six overlap with project area 	Concentrations of sponges.



Special Area	Distance to Project Activities ¹	Defining Features of the Special Area
Two Sea Pen	<ul style="list-style-type: none"> • One of two overlaps with project area 	Concentrations of sea pens.
Large Gorgonian Coral	<ul style="list-style-type: none"> • One overlaps with project area 	Concentrations of corals.
NAFO Fisheries Closure Areas ^g		
Sackville Spur (6)	<ul style="list-style-type: none"> • 3 kilometres from project area 	High sponge and coral concentration areas where bottom fishing is prohibited.
Northern Flemish Cap (9)	<ul style="list-style-type: none"> • 37 kilometres from project area 	High sponge and coral concentration areas where bottom fishing is prohibited.
Northwest Flemish Cap (10)	<ul style="list-style-type: none"> • Overlaps with project area 	High sponge and coral concentration areas where bottom fishing is prohibited.
Northwest Flemish Cap (11)	<ul style="list-style-type: none"> • 26 kilometres from project area 	High sponge and coral concentration areas where bottom fishing is prohibited.
Northwest Flemish Cap (12)	<ul style="list-style-type: none"> • 10 kilometres from project area 	High sponge and coral concentration areas where bottom fishing is prohibited.
Important Bird Areas (IBAs) ^h		
Quidi Vidi Lake	<ul style="list-style-type: none"> • 404 kilometres from project area • Overlaps with transit route zone of influence 	Daytime resting site for several gull species in late fall to early spring (e.g., Herring Gull, Great Black-Backed Gull, Iceland Gull, Glaucous Gull) and for waterfowl species (e.g., American Black Duck, Mallard and Northern Pintail) common in winter.

¹ Based on proponents EIS Table 12.5. Zone of influence defined as 50 kilometres from the project area and 15 kilometres from the transit route.

^a Identified by DFO through formal scientific assessments.

^b Designated under the *Fisheries Act* by the Government of Canada.

^c Identified by DFO Ecological Risk Framework (2013).

^d Designated by Parks Canada, as part of their National Marine Conservation Areas Program

^e Identified by United Nations Convention on Biological Diversity.

^f Designated by NAFO. Number of Vulnerable Marine Ecosystems for sponges, sea pens and corals provided in parentheses.

^g Under mandate of the Food and Agriculture Organization of the United Nations and NAFO (2020).

^h Designated by Bird Studies Canada.

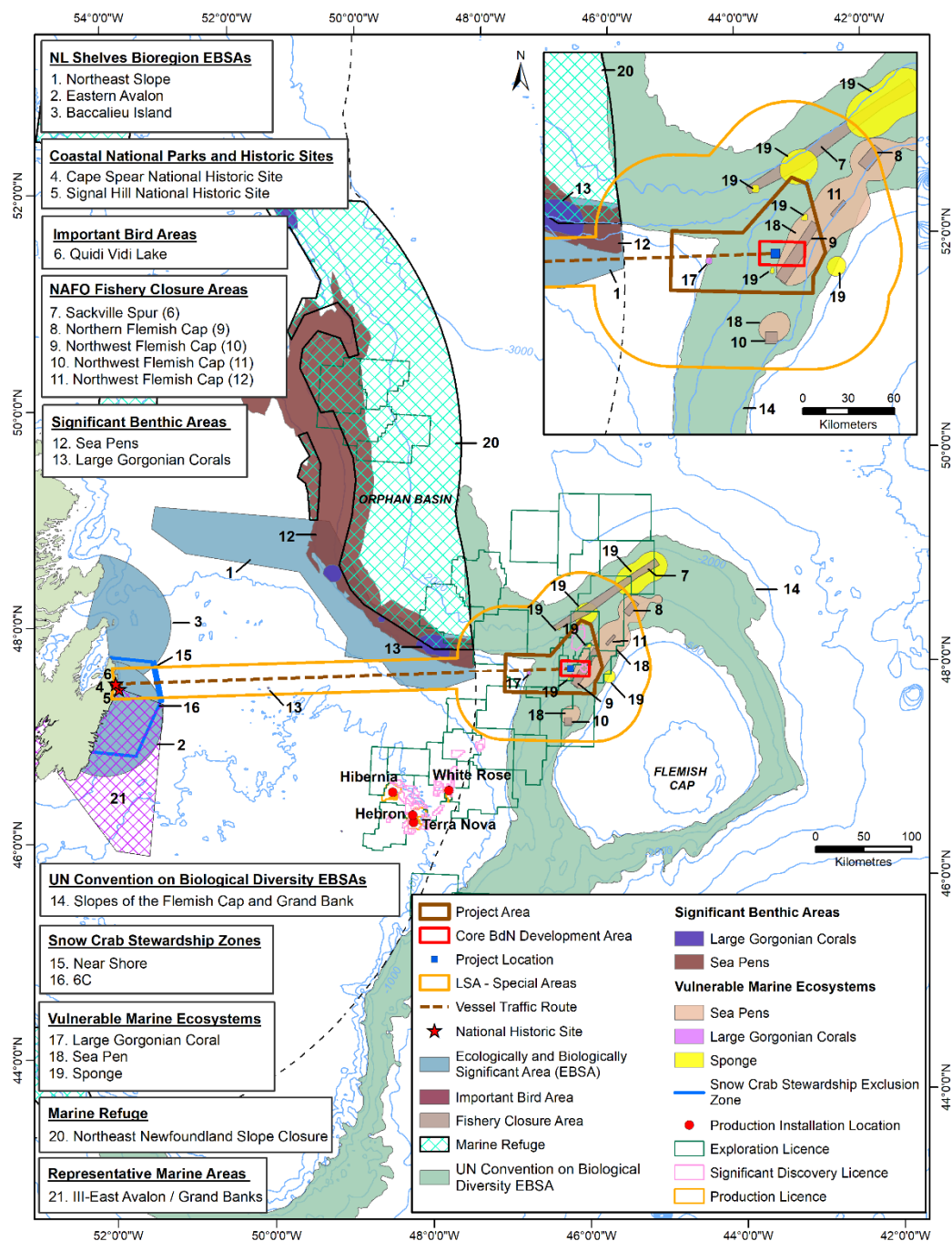


Figure 4 Special Areas Intersecting the Zones of Influence for Environmental Effects

Source: Equinor Canada Ltd.

4.4.2 Proponent's Assessment of Environmental Effects

The proponent stated that mortality or injury to benthic organisms (corals, sponges and sea pens) due to burial, removal or exposure to suspended drill cuttings and sediments may result from the installation and presence of subsea infrastructure. The proponent estimated that the footprint of the subsea

infrastructure is approximately seven square kilometres. For the three special areas that intersect the core development area, the Northwest Flemish Cap (10) Fisheries Closure Area is the smallest, with an area of 316 square kilometres. The proponent focused the assessment on this smaller closure area since an estimate of area affected with the placement of subsea infrastructure can be provided. The proponent estimated that the geographic extent of potential adverse environmental effects associated with subsea infrastructure would be approximately two square kilometres (less than 0.5 percent) of the Northwest Flemish Cap (10) Fisheries Closure Area. The proponent stated that potential project area tieback drilling may affect the four special areas (three sponge VMEs and a gorgonian coral VME) outside the core development area. The proponent estimated the total seabed area potentially affected by drilling to be approximately 42.5 square kilometres, or one percent of the 4,015 square kilometres of special areas within the project area. The proponent indicated that the change in environmental features and/or processes of these special areas is within the range of natural variability and within a very small footprint, but acknowledged that there are uncertainties with the recovery of benthic communities in deeper water habitats. The proponent predicted that recovery would likely be longer than has been noted to occur in shallower waters. The proponent indicated if DFO determines that a *Fisheries Act* Authorization is required for the placement of subsea infrastructure, including the requirement for habitat offsetting measures, these measures would mitigate changes in fish habitat associated with the presence of subsea infrastructure.

The proponent indicated that marine mammals found in the Northeast Slope, Baccalieu Island and Eastern Avalon EBSAs have the potential to interact with supply and servicing vessels along the vessel route. The proponent stated that continuous sounds produced by vessels (as well as dynamic positioning thrusters) do not typically exceed threshold levels for temporary or permanent changes in hearing ability of marine mammals. The proponent noted that vessel thruster sound, through masking, could reduce the effective communication distance of a marine mammal if the sound source is present for a significant amount of time. The proponent predicted that the change in environmental features of these special areas, as it relates to potential adverse effects of sound emissions on marine mammals, are low in magnitude, short to long-term in duration, and reversible. The proponent predicted that underwater sound generated from other project activities would not interact with marine mammals inhabiting these special areas since their location is outside the extent of sound emissions.

The proponent indicated that migratory birds inhabiting the Baccalieu Island and Eastern Avalon EBSAs, as well as the Quidi Vidi Lake Important Bird Area (IBA), may be disturbed by the sound and movement of helicopters that could lead to a temporary loss of useable habitat, disturbance to nesting colonies, deterrence of birds from favourable habitats, alteration of migration paths, and reduce foraging rates. The proponent noted that the effects of helicopter presence depends on a number of factors, including species; previous exposure levels; and the location, altitude, and number of flights. The proponent noted that helicopters in transit will be at altitudes along the transit route which are above those of birds, except long-distance migrant shorebirds and land birds. The proponent committed to helicopters and supply vessels adhering to periods of avoidance and specific set back distances associated with established nesting colonies outlined in the *NL Seabird Ecological Reserve Regulations, 2015*. The proponent predicted that the change in environmental features and/or processes of the special areas for migratory birds due to the presence of helicopters would be adverse, but short-term, intermittent, and reversible, with a limited geographic extent (less than one square kilometre). The proponent stated that while there may be an interaction from helicopters, there would be no change in environmental



features and/or processes relative to baseline conditions for birds, and therefore the magnitude of the change is negligible.

4.4.3 Views Expressed

Federal Authorities

DFO stated that there is potential for most of the project activities to cause adverse environmental effects on special areas. DFO noted that the proponent concluded that none of the waste discharges had been identified as changing the environment for special areas and that discharges would not intersect the benthos and therefore, would not have adverse effects on sensitive benthic areas or species. However, DFO disagreed and indicated that eutrophication and contamination of the pelagic environment directly affects the benthic environment through benthic-pelagic interactions.

DFO questioned why the proponent's conclusions of recolonization are made without consideration of life history (fecundity, growth rates, sexual maturity, etc.); or population dynamics (species distribution, source populations, etc.) of recolonizing marine fauna; and the dynamics to return sediment quality back to natural conditions. DFO was of the view that the proponent's estimates of recolonization appear to be based on shallow water observations in the cited literature.

DFO is of the view that the project area overlaps one United Nations Convention on Biological Diversity (CBD) EBSA, the Slopes of the Flemish Cap and Grand Bank. The Slopes of the Flemish Cap and Grand Bank include the current NAFO closures to protect corals and sponges as well as a component of the Greenland halibut fishery grounds in international waters. The area is also used by several species at risk, including northern and spotted wolffish, as well as northern bottlenose whale, of which the Scotian Shelf Population is listed as *Endangered* on Schedule 1 of the *Species at Risk Act*. EBSAs are areas that have been identified through scientific processes as having important ecological features and characteristics. The EBSA identification process aims to inform marine spatial planning both within and beyond national jurisdiction. There are no prohibitions or other restrictions on oil and gas activity in EBSAs. Relevant aspects of the EBSA, including potential habitat for northern bottlenose whale, are considered in the effects assessment for marine mammals.

Indigenous Groups

Miawpukek First Nation expressed concern regarding potential effects on Leach's Storm-Petrels from collisions with marine vessels, particularly due to the presence of the Baccalieu Island EBSA within the marine vessel transit route.

Public

World Wildlife Fund - Canada pointed out that Canada is a signatory to the Convention on Biological Diversity and the commitment to conserve 10 percent of coastal and marine areas by 2020 through protected areas and other effective area-based conservation measures by 2020. World Wildlife Fund-Canada also noted that the federal government also committed to conserve 25 percent of oceans by 2025 and 30 percent by 2030. World Wildlife Fund - Canada maintains that oil and gas activities should not be permitted within protected areas, including marine refuges and other closures that aim to protect important benthic habitats.



World Wildlife Fund - Canada pointed out that a recent national review on the effectiveness of mitigation measures to reduce potential impacts of exploration and production activities within areas supporting important benthic communities noted that compared to exploration, development and production activities have an increased risk for impacts to benthic species and habitats; greater seabed footprints; and longer timeframes. World Wildlife Fund-Canada further pointed out that few studies on coral and sponges have been undertaken in Canadian waters and therefore, it is difficult to assess the impacts of drill muds and cuttings. World Wildlife Fund-Canada also noted that the Agency's Regional Assessment noted special areas that overlap the project area are highly sensitive to human impact; require additional special mitigations; and should be managed with a higher level of risk aversion.

Sierra Club Canada Foundation expressed concern that the Project is located within an EBSA; Northeast Newfoundland Slope Closure Marine Refuge; and a NAFO Fisheries Closure Area. These special areas support fishing grounds and ecologically rich areas that would be oiled and exposed to dispersants in the event of a spill.

4.4.4 *Agency Analysis and Conclusions*

Analysis of Effects

The Agency considered the analysis of special areas provided by the proponent, advice from DFO, and comments received from the public and Indigenous groups and is of the opinion that the Project may cause adverse environmental effects on special areas.

The Agency understands that the project area overlaps with several special areas designated for their importance to benthic communities, fish, and marine mammal species that depend on these special areas to support their life processes (e.g., feeding, migrating). The Agency notes that the proponent focused on the effects of drill cuttings on the Northwest Flemish Pass (10) Fisheries Closure Area, but did not specifically discuss the effects of deposition on the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA or the sea pen VME. The Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA, in particular, overlap the majority of the project area. Further, the proponent did not consider the project-related effects of sound emissions as it relates to the use of these special areas by fish and marine mammals. NAFO has described the EBSA and VMEs as supporting diverse communities of benthic and pelagic species, in particular several marine mammal and fish species, including species at risk (United Nations Convention of Biological Diversity 2015). The Agency is of the view, therefore, that the potential effects from drill cutting deposition and sound emissions could be greater than indicated by the proponent.

Effects from Drill Waste and Subsea Infrastructure

The Agency notes in Section 4.1 (Fish and Fish Habitat), that the effects of drill waste and subsea infrastructure on benthic communities include burial and loss or destruction of benthic communities, exposure to contaminated sediments, and impediments to filter feeders from water-based muds. Nearly a third of the cuttings could settle as far as 60 kilometres from the well site. The Agency is of the view that drill cutting deposition resulting in burial of benthic habitats would extend up to 200 metres, and that toxic effects may extend up to two kilometres from each well template. The Agency's view took into account that deposition of drill cuttings, muds or other fine sediments from the Project would occur within three special areas that overlap the project area.



The Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA spans 87,817 square kilometres and is known for the occurrence of sponge grounds, deep sea coral aggregations, northern and spotted wolffish, Greenland halibut, roughhead grenadier, northern bottlenose whale, Cuvier's and Sowerby's beaked whales, and hooded seal (United Nations Convention of Biological Diversity 2015). NAFO has identified the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA as having a high uniqueness or rarity, high importance for species at risk, high vulnerability and sensitivity to disturbance, and a high biological diversity (United Nations Convention of Biological Diversity 2015). The Agency notes that all proposed well templates and infrastructure would be located within the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA; taking into account that this special area overlaps the majority of the Project footprint. The Agency is of the view that, with potential effects of drill cutting and associated muds spanning up to 110 square kilometres from the project area (see Section 4.1 Fish and Fish Habitat), the potential adverse effects of drill cuttings within the EBSA would be comparatively limited (0.13 percent of the EBSA), albeit spatially concentrated in the project area.

The Agency noted that the proponent did not assess the zone of influence of drill waste within the sea pen VME. The Agency, therefore, calculated the spatial extent of this special area (about 3,050 square kilometres) in order to characterize the potential adverse environmental effects on the VME¹⁷. The Agency calculated that 19.2 square kilometres of the sea pen VME (taking into account overlapping dispersion) may be affected by drill cuttings and associated muds, which represents a small portion of the VME (less than half of a percent). The Agency's calculation is based on an assumption of two proposed well templates located within the VME. Applying this assumption to the Northwest Flemish Pass (10) Fisheries Closure Area, the Agency is of the view that the drill cuttings deposition may cause adverse environmental effects on approximately six percent of this special area¹⁸. The Agency acknowledges that the four additional VMEs, as well as an extended section of the Northwest Flemish Pass (10) Fisheries Closure Area, could also be affected by drill waste depending on final design and future development.

The Agency is of the view that key mitigation measures for fish and fish habitat (Section 4.1) would mitigate the potential effects within the Slopes of the Flemish Cap and Grand Bank EBSA, the sea pen VME and the Fisheries Closure Area. The Agency is also of the view that additional mitigation measures developed based on the results of seabed surveys must be considered by the proponent during final design to address potential adverse environmental effects on special areas. The Agency acknowledges that the proponent would also be required to relocate the well and/or redirect discharges in the event sensitive benthic features are located in the proposed drill site, if technically feasible. In the event that relocation of well templates or redirection of drill cutting discharges are not technically feasible, the proponent would be required to consult with the C-NLOPB and DFO.

¹⁷ Calculated using the Regional Assessment GIS Mapviewer Tool. <https://nloffshorestudy.iciinnovations.com/mapviewer/>.

¹⁸ It is important to note that the restrictions associated with the Northwest Flemish Pass (10) Fisheries Closure Area expire on December 31, 2020 and it is uncertain as to whether these restrictions will be extended.

Effects of Sound Emissions

The Agency is of the view that underwater sound emissions may affect marine fish and mammal species attracted to special areas that support important benthic habitat features, in particular the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA, the sea pen VME, and the Fisheries Closure Area. The Agency is aware these special areas, in particular the Slopes of the Flemish Cap and Grand Bank UNCDB EBSA, are known to provide shelter and places for feeding and reproduction for many important fish and marine mammal species and may be subjected to several project-related sound emissions. These threats may cause disturbance and injury of marine mammals by anthropogenic sound emissions (United Nations Convention of Biological Diversity, 2015). NAFO also noted that exploration and development activities could affect VME indicator taxa when they overlap in the slope areas such as the Flemish Pass. The Agency is of the view, therefore, that the extent of adverse environmental effects could be greater than predicted by the proponent. The effects of sound emissions on fish and marine mammals are discussed in Section 4.1 and 4.2, respectively.

Three other special areas, described as having important feeding aggregation areas and habitat features for many fish and marine mammal species, are located within the zone of influence of the Project, including the Northeast Slope EBSA, Northeast Newfoundland Slope Closure Marine Refuge, and a sea pen Significant Benthic Area. DFO noted the importance of these special areas to many benthic and pelagic species, including species at risk known to occur in the Northeast Slope EBSA. The Agency recognizes that these special areas are located at least 31 kilometres from the project area, which is outside the predicted extent of seismic sound emissions that may elicit a behavioural response in marine mammals (see Section 4.2 Marine Mammals). However, these special areas are located within the zone of influence for adverse environmental effects of seismic sound emissions on fish (up to 50 kilometres from the source; see Section 4.1 Fish and Fish Habitat). The Agency is of the view that sound emissions are not expected to have an adverse direct effect on marine mammals inhabiting these special areas; however, fish species may be adversely affected by sound emissions through avoidance of these special areas which may have an indirect effect on marine mammals or birds that rely on those affected fish species.

The Agency understands that helicopters and supply vessels may disrupt birds inhabiting the Baccalieu Island and Eastern Avalon EBSAs, as well as the Quidi Vidi Lake IBA that overlaps with the helicopter transit route. The Agency acknowledges that the proponent committed to helicopter flight paths and supply vessel routes adhering to periods of avoidance, and specific set back distances, associated with specific and established migratory bird nesting colonies outlined in the *NL Seabird Ecological Reserve Regulations, 2015*, and in consideration of ECCC guidelines, in order to reduce disturbance. Low-level helicopter operations would also be limited or avoided where it is not required per Transport Canada protocols. The Agency agrees with the proponent's assessment that adverse effects on these special features would be negligible, particularly since helicopters and vessels would follow a straight line between St. John's and the project area. The Agency is of the view that key mitigation and follow-up measures described for migratory birds (see Section 4.3) would help mitigate the effects on these special areas.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public. The Agency is of the view that mitigation measures applied to seismic surveys proposed for fish and marine mammals (Section 4.1 and 4.2, respectively) would mitigate some potential effects on special areas. Due to uncertainty associated with potential effects on the special areas, risk aversion strategies and mitigation measures should also be incorporated into the final design and approved by C-NLOPB and DFO.

The Agency has 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 1,000 metres from Quidi Vidi Lake Important Bird Area and known bird colonies within the Baccalieu Island and Eastern Avalon EBSAs (unless there is an emergency situation); and
- implement mitigation listed in Section 4.1 Fish and Fish Habitat, and Section 4.2 Marine Mammals and Sea Turtles.

Follow-up

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

- Monitoring would include the implementation of follow-up measures listed in Section 4.1 Fish and Fish Habitat and Section 4.2 Marine Mammals as it relates to monitoring of drill mud and drill cutting dispersion and sound emissions.

Agency Conclusion

The Agency is of the view that adverse residual environmental effects on special areas would occur continuously from sound emissions from the FPSO over the long term of 20 plus years; and sporadically from sediment deposition and dispersion for the life of the Project. Sound emissions would occur continuously over a nine year period from one and two MODUs and continuously from installation, construction and decommissioning vessels over six months per year for two to five year period. The duration of the effects is considered long-term since sound emissions with the potential to produce adverse behavioural responses in marine mammals and fish would be produced for the life of the Project. Due to the predicted slow growth and rate of recolonization of benthic species in deep, cold water habitats duration of effects could be permanent. The geographic extent has been based on proponent's modelling and will vary depending on the sound emission and drill wastes and associated effects. However, due to the uncertainty of the models and location of the infrastructure within the project area, the geographic extent of effects on special areas is uncertain. The Agency considers the potential effects on special areas to be reversible once the Project is complete, with the exception of burial and loss of sensitive benthic species. The Agency is of the view that the magnitude of effects related to sediment deposition and sound emission within the special areas is medium because a portion of the deep-water benthic and pelagic populations may be affected over one or more



generations and over multiple trophic levels. Due to the uncertainty of models as well as the limited information of species occurrence, distribution and diversity, the magnitude of effects is uncertain.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on the environmental functions and/or processes of special areas.

4.5 Commercial Fisheries and Other Ocean Users

The Agency focused its assessment on commercial fisheries and other users on the following potential effects of changes from routine Project activities:

- from presence of subsea infrastructure resulting in potential space conflicts with harvesting, research and commercial vessel traffic locations and timing; and
- from presence of surface vessels resulting in potential space conflicts with harvesting, research and commercial vessel traffic locations and timing.

4.5.1 *Existing Environment*

Fisheries in the waters off Newfoundland and Labrador are important socially, culturally and economically and remain the major constituent of the human environment within and near the project area. While the project area is outside Canada's exclusive economic zone (see Figure 5), the vessel transit route spans areas within and outside the exclusive economic zone. As such, both foreign (outside the exclusive economic zone) and Canadian domestic fisheries (inside and outside the exclusive economic zone), including communal commercial¹⁹ fisheries, may interact with project activities. Foreign harvesters operate beyond the exclusive economic zone and primarily around and near the Flemish Cap and southward to the "tail" of the Grand Banks. Foreign and domestic harvest intensity outside the exclusive economic zone varies between areas; for example, the Sackville Spur and Flemish Pass experience higher fishing intensity than other areas (see Figure 5). The project area and vessel transit route overlap with less than one percent of the total geographic area of (NAFO) Divisions 3L and 3M.

¹⁹ Communal commercial licences are issued by the Minister of Fisheries and Oceans to an aboriginal organization to carry on fishing related activities. (Section 4(1) Aboriginal Communal Fishing Licences Regulations, SOR 93-332)

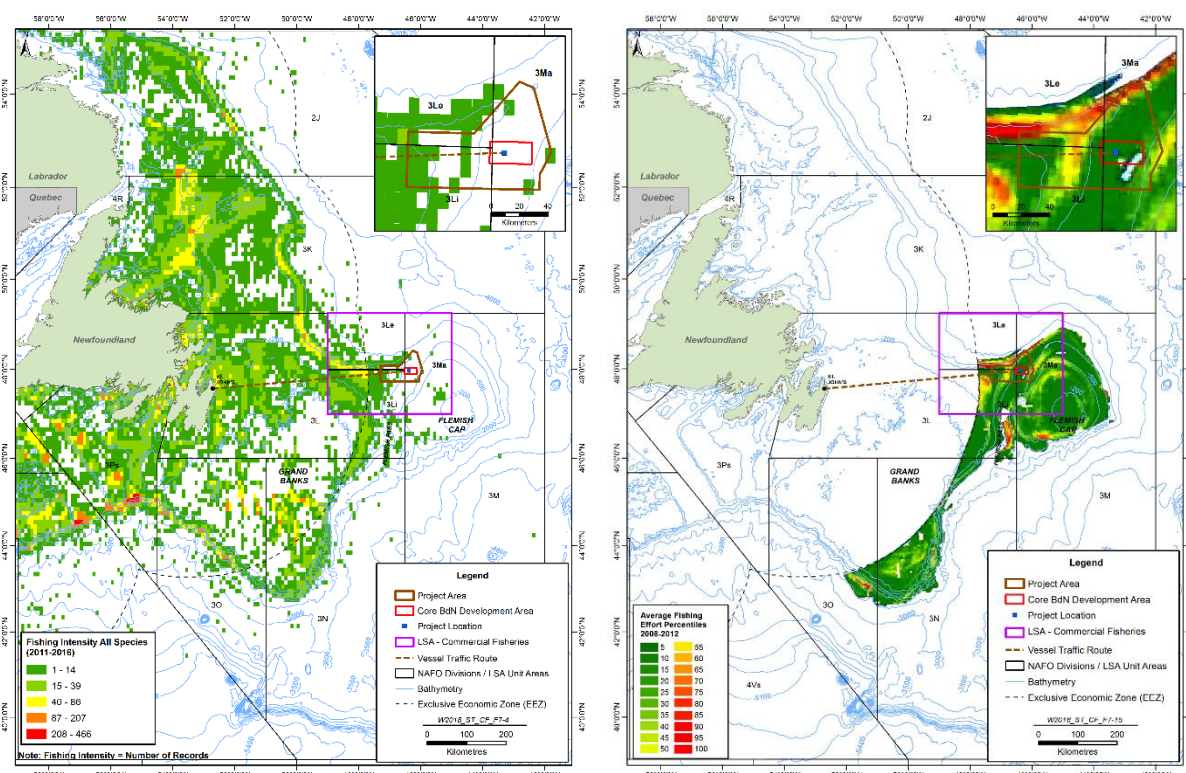


Figure 5 (Left) Domestic Commercial Harvesting Locations and Intensity, All Species, All Gear Types, All Months 2011 to 2016. (Right) NAFOs Regulatory Area Foreign and Domestic Fishing Effort Locations and Intensity 2008 to 2012.

Source: Equinor, 2020

The proponent stated that, within the project area, commercial harvest has primarily targeted groundfish species, including Atlantic redfish, Atlantic cod, Greenland halibut (turbot), yellowtail flounder and American plaice. Foreign harvesters also target swordfish in the project area and nearby waters. Along the transit route there is domestic commercial harvest of snow crab and northern shrimp. The proponent indicated that there has been management measures in place by DFO and NAFO in the project area and along the transit route to restrict the targeted fishery for shrimp in NAFO Divisions 3L and/or 3M.

The proponent stated that harvesting is conducted using a variety of fishing gear, depending on the target species, and may consist of fixed (crab pots, gillnets, longlines) or mobile gear (otter trawls, shrimp trawls, dragnets, seines, and dredges). However, within the project area, mobile gears types are primarily used. Domestic harvest in the project area may occur all year, but is highest between April and August; and harvesting by foreign fleets typically occurs all year.

Five Indigenous groups in Newfoundland and Labrador hold communal commercial fishing licences for several species that overlap with the project area. Most Indigenous groups located in Nova Scotia, New Brunswick and Prince Edward Island also hold communal commercial licences for tuna and swordfish that can be harvested in NAFO Divisions that overlap with the project area. For more information on communal commercial fishing see Section 4.6.

The proponent stated that DFO and fishing industry groups carry out fisheries science programs that support stock assessments and fisheries management decisions in the project area. Additionally, other human activities that may occur in the project area or transit route include marine shipping and transportation, military exercises, other oil and gas exploration and production operations, and subsea infrastructure (e.g., submarine cables, shipwrecks, etc.).

4.5.2 *Proponent's Assessment of Environmental Effects*

Effects on Commercial Fisheries

Project related activities including the presence of subsea infrastructure, FPSO and/or MODU may directly or indirectly interfere with commercial fishing activity. Potential effects may include: restricted access to fishing areas; damage to fishing gear, vessels and other existing subsea infrastructure (e.g., communication cables), and associated loss of catch or income; and potential change in abundance, distribution and quality of marine resources resulting in a change in distribution, intensity, function and/or value of commercial fisheries and other ocean users.

Pursuant to the *Offshore Petroleum Drilling and Production Regulations*, subsea infrastructure would be demarcated by a safety zone to warn of potential hazards from the construction phase through to the end of decommissioning. The safety zone would extend 500 metres around all subsea infrastructure, the FPSO and its moorings, and the MODUs, covering an area of approximately 30 square kilometres. Within the safety zone, all persons operating vessels and aircraft would be warned of facilities and any related hazards: however, the safety zone does not prohibit entry by other ocean users.

The proponent indicated that in addition to, and within the safety zone, there would be an anti-collision zone for the FPSO pursuant to Transport Canada regulations, in place from the hook-up and commissioning phase, continuous through to the end of the decommissioning phase. This zone would extend 50 metres around the FPSO mooring system or approximately 8.5 square kilometres. When the MODU is onsite, a similar anti-collision zone would be established and extends up to 500 metres from the MODU when using a dynamic positioning system, for a total of approximately one kilometre squared for each MODU. Without permission, vessels would not be allowed within the anti-collision zones. The anti-collision zone for the MODUs would be short-term in duration, whereas for the FPSO, it would be long-term in duration. The anti-collision zones would represent less than two percent of the core development area, and should future tiebacks occur in the project area, anti-collision zones would represent less than 0.5 percent of the project area.

The proponent stated that there is little commercial harvest occurring in the core development area (see Figure 5), thus limiting potential interactions. However, it indicated there is potential for increased interactions between future tiebacks and commercial fisheries if tiebacks occur in areas with higher fishing intensity than the core, for instance in the western and northern area of the project area. The proponent concluded that based on the size of the anti-collision zones in the project area, compared to the area available for fish harvesting, potential effects of the Project on commercial fishing would be negligible to low in magnitude, depending on the extent of fish harvesting activity.

The presence of subsea infrastructure installed on the seafloor also has the potential to result in trawl gear damage. The proponent predicted that, based on historical catch in the area, as well as mitigation measures that would be in place, the potential for interaction between fishing activity and subsea



infrastructure would be negligible. It also noted that there is a fisheries closure area that prohibits bottom trawling activities in parts of the project area; therefore, further limiting the potential for interactions between fishing activities and the installation of subsea infrastructure.

Along the transit route, potential effects on fishing vessels, mobile gear, or unattended fixed gear may occur as a result of the presence of project related vessel traffic. Fisheries targeting snow crab and gill net fisheries with unattended fixed gear near St. John's, Newfoundland and Labrador would be most at risk. However, the proponent stated that there have been no reported interactions between supply vessels and commercial fishing or other ocean users along offshore industry routes.

At the time of decommissioning, subsea infrastructure and wellheads may be removed or left in place. If left in place these structures could potentially interfere with trawl gear; however, Navigational Warnings/Notices to Mariners would provide information regarding the presence of subsea infrastructure or wellheads to the commercial fishing industry. The removal of subsea infrastructure at the time of decommissioning would eliminate the potential for gear damage.

Effects on Other Ocean Users

The proponent indicated that the potential impacts of the project on other ocean marine traffic (shipping and military activities) would be similar to those associated with commercial fishing and research surveys. While access would be restricted for these other ocean users, notification would be provided through the Navigational Warnings/Notices to Mariners, to allow for avoidance planning. In addition, the Department of National Defense would be notified of any marine activities associated with the Project. Similarly, the proponent stated that the presence of subsea features (e.g., cables, shipwrecks or unexploded ordnances) would be considered in the layout of subsea infrastructure. The proponent indicated that a submarine cable passes through sections of the project area and there are no known shipwrecks or unexploded ordnances in the project area.

4.5.3 *Views Expressed*

Indigenous Peoples

Several Indigenous groups noted the importance of communal commercial and commercial fishing to their communities, and stated that the proposed drilling site is within fishing grounds that harvesters use. Indigenous groups noted the importance of follow-up monitoring to evaluate the accuracy of predications and mitigation effectiveness.

KMKNO requested to be consulted by the proponent on developing a mutually agreed upon process for communication, and that this would form the basis for an Indigenous Communication Plan. KMKNO requested that the Indigenous Communication Plan be put in place prior to initiating project activities and include both emergency response and marine user interaction protocols.

Public

World Wildlife Fund-Canada expressed concerns with the overlap of geophysical surveys with fishing in the project area and seismic services that have the potential to affect fish behavior and avoidance; therefore, indirectly affecting commercial fishing activity.



Fish, Food and Allied Workers–Unifor union stated that it would be important for the proponent to consider alternatives to the timing and approach of proposed activities should fisheries change over time. It recommended ongoing consultation with the fishing industry over the life of the Project to ensure that changes in the fishing industry are understood and considered at all stages.

The Fish, Food and Allied Workers–Unifor union also expressed concerns with the potential for project activities to occur in marine conservation areas that are currently closed for bottom contact fishing, such as in United Nations EBSAs and VMEs. In addition, it expressed the importance of follow-up programs and the implementation of mitigation measures not only in the project area, but also in the proposed traffic routes.

4.5.4 *Agency Analysis and Conclusion*

Analysis of Effects

The Agency understands that foreign and domestic fishers, NAFO research, commercial shipping traffic, short-term exploration drilling programs, military exercises, and recreational users, currently dominate human presence in the project area and transit route.

The Agency is of the view that the loss of access to areas, and the potential for damage to fishing gear, vessels or equipment would be the primary potential adverse environmental effects of the Project on commercial fisheries and other ocean users. The effects of the Project on fish abundance and distribution are discussed in Section 4.1.

Commercial fishing, including communal commercial fishing, is a key economic activity in offshore Newfoundland and Labrador. As illustrated by Figure 5, intensity of commercial fishing varies between areas. The Agency understands that, based on information provided by the proponent, there is limited commercial fishing in the core development area and as a result there would be limited effects. The Agency further notes; however, that within the project area where future tiebacks could occur, fishing intensity is greater, thus commercial fisheries could potentially be impacted. The Agency also understands that harvest locations are influenced by a variety of factors, and could occur in different areas in the future. For example, the NAFO Commission re-opened the directed shrimp fishery in NAFO Division 3M in 2020. While there is currently still no northern shrimp fishery in NAFO Division 3L, the Agency recognizes that it is possible that the fishery could re-open during the life of the Project.

The Agency notes that fishing vessels would be excluded from anti-collision zones, totaling approximately 10.5 square kilometres for the FPSO and two MODUs. With respect to safety zones the Agency calculated up to an area of approximately 200 square kilometers for the project area, based on up to five tiebacks and the presence of two MODUs. The Agency recognizes that while vessels would not be prohibited from entering the safety zones, it is possible that commercial harvesters and associated research vessels may potentially avoid these areas in order to mitigate fishing gear damage or perceived liability associated with damaging subsea infrastructure.

The Agency considers the potential adverse environmental effects on commercial fisheries would be higher in the western portions of the project area. This view is based on: the loss of access to fishing grounds as a result of fishers displaced by anti-collision zones; the size of NAFO areas which are



harvested and overlap with the project area; and the uneven distribution of harvest throughout the area. The Agency is of the view that effective communication between the proponent and domestic and international fishers would help reduce the potential for interactions.

The Agency understands that damage to fishing gear, vessels or equipment could potentially occur as a result of interactions between project vessels in the project area and transit route, as well as with wellheads or subsea infrastructure. Further, if subsea infrastructure or wellheads were to be left in place post decommissioning, there would be potential for ongoing interaction with commercial fishing activity. The Agency is aware that a decommissioning plan would be developed, reviewed and approved by the C-NLOPB, which would examine options such as the removal of structures or leaving wellheads or subsea infrastructure in place. The C-NLOPB advised the Agency that it would consider the potential for the wellheads and/or subsea infrastructure to interfere with fisheries, considering geographic location and water depth, and would consult with DFO if there was uncertainty regarding the potential for interference. The Agency is also aware that the proponent would be required to engage fishers on their decommissioning plan. If the C-NLOPB did approve leaving the wellheads and/or subsea infrastructure in place, fishers would be notified by the proponent of the decommissioning plan and the location of the well templates and/or subsea infrastructure.

The Agency notes that, in addition to effective communication between proponents and fishers to aid in avoiding potential adverse environmental effects, the proponent has committed to developing and implementing a compensation program for damages or losses in consideration of the C-NLOPB *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities*, and best practices. The Agency accepts that the proponent's compensation program would identify liability for actual loss or damage incurred by 'any person' without limiting the national origin of claimants. The Agency also understands that, if harvesters and the proponent were unable to resolve claims in the event of damages or losses as per the proponent's compensation plan, domestic or international harvesters could seek relief through a compensation claim to the C-NLOPB [if applicable] or through court.

The Agency understands that fisheries science programs use the same gear as is used by harvesters; therefore, the presence of infrastructure as part of the Project has the potential to effect these activities. In relation to the potential for interactions along the transit route the Agency notes that supply and servicing vessels would not be towing sub-surface equipment. The Agency is, therefore, of the view that there is no additional risk of adverse environmental effects on these programs.

The Agency is of the view that early, proper and effective communication between the proponent, commercial harvesters and other ocean users, regarding restricted areas (e.g., safety and anti-collision zones) and information about the location of wellheads and/or subsea infrastructure would mitigate potential effects. The Agency acknowledges that the proponent would be required to develop a Fisheries Communication Plan, in consultation with Indigenous and commercial fishers. The Agency understands that the plan would include, but not be limited to, communication objectives, participants and key contacts, and project activity information.



Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project effects on commercial fisheries and other ocean users:

- in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during all project phases, including future activities. The plan should include:
 - a description of planned project activities;
 - information on anti-collision and/or safety zones and decommissioned and abandoned subsea infrastructure;
 - information on vessels travelling between Newfoundland and Labrador and the project area including number per week, and general route; and
 - procedures to notify fishers a minimum of two months prior to the commencement of the project.
- regular updates to provide specific information on plans for project activities and the movement of the FPSO, MODU and designated project vessels, excluding supply and standby vessels and an opportunity for feedback and further exchange of information on specific aspects of interest;
- procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during FPSO, MODU and designated project vessels, excluding supply and standby vessels movement and the use of a Fisheries Liaison Officer during geophysical programs;
- procedures to notify Indigenous groups and commercial fishers in the event of a spill and communicate the results of monitoring of its potential adverse effects on the environment and human health;
- procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill;²⁰
- in accordance with *the Newfoundland Offshore Petroleum Drilling and Production Regulations* prepare a decommissioning and abandonment plan, that meets or exceeds the requirements of the Drilling and Production Guidelines, and submit it to the C-NLOPB for acceptance prior to the start of the production project. If it is proposed that any subsea infrastructure remains 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 anti-collision zone and/or safety exclusion zones and decommissioned subsea infrastructure, if left on the seafloor, are published in Notice to Mariners, provided in Navigational Warnings and communicated to fishers;
- provide information on the locations of any decommissioned subsea infrastructure, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning;
- ensure ongoing communication with NAFO Secretariat, using established information exchange mechanisms that are in place with DFO, regarding planned project activities, including timely

²⁰ Tier 2 and tier 3 responses are defined in the International Association of Oil & Gas Producers' document *Tiered Preparedness and Response* (International Association of Oil & Gas Producers, 2015).

communication of drilling locations, anti-collision and/or safety exclusion zones and decommissioned subsea infrastructure; and

- implement all mitigation listed in Sections 4.1 Fish and Fish Habitat related to providing the results of the seabed investigation survey, decommissioning procedures, selection of chemicals, disposal of spent synthetic-based muds and the discharge of waste.

The Agency also notes that the proponent has committed to developing a compensation program, to be developed in consideration of the C-NLOPB's *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities* to address any unplanned interactions between the Project and commercial fishing equipment.

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 and commercial fishers.

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

Agency Conclusion

The Agency recognizes that potential effects on commercial fisheries and other ocean users within the core development area would be negligible as there is currently limited active fisheries operating in this area. However, potential effects on commercial fisheries would be greater in the project area if future tiebacks were to occur, given there is more activity in the project area. As vessels are allowed in the safety zone, and there are measures in place in the event that gear or vessels are damaged, the Agency's conclusion is based on the restricted access in the anti-collision zone.

The Agency is of the view that adverse residual environmental effects for commercial fishing and other ocean users, would be low to medium magnitude because there would be little to no alteration of harvest activity required to continue fishing as there is no domestic fishing and low international fishing effort in the core development area. If future tiebacks occur in the project area, the magnitude would be medium as there is higher fishing effort in this area, therefore harvesters would be required to alter harvest activity in the anti-collision zone. The Agency recognizes that over the life of the Project, harvesting activity may change (i.e., target species) in the core, and as such the magnitude of effects may increase. The geographic extent of restricted access would be 10.5 square kilometers. The duration of the effects would be long-term, as the Project would occur for more than 20 years. Potential effects for commercial fishing and other ocean users would be continuous on a seasonal basis during the site preparation phase, and continuous once subsea infrastructure is installed. The Agency considers the potential effects to be reversible as once the Project is complete, the anti-collision zones would no longer be in place.

Based on the current knowledge of commercial fishing operations, including communal commercial fisheries and other ocean users, and 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 and other ocean users.

4.6 Indigenous Peoples

This section describes the potential effects of routine Project activities on the current use of lands and resources by Indigenous peoples for traditional purposes, communal commercial fisheries, health and socioeconomic conditions of Indigenous communities and impacts on asserted or established Aboriginal or treaty rights. The effects of potential accidents and malfunctions on Indigenous peoples are described in Section 5.1 (Accidents and Malfunctions).

4.6.1 Existing Environment

Current Use of Lands and Resources for Traditional Purposes

The proponent noted that there is no known current use of the land or waters in the project area for traditional purposes. However, the proponent acknowledged some species that are traditionally harvested in or around traditional territories have the potential to migrate through the project area, including fish, marine mammals, and migratory birds of cultural importance to Indigenous groups. Based on this information, the proponent identified effects on fishing for food, social, and ceremonial purposes in the marine environment as the primary effects on current use of resources by Indigenous groups for traditional purposes.

The proponent provided information on the types of marine species being harvested by each Indigenous group for food, social, and ceremonial purposes. The proponent stated that the most common species being harvested by Indigenous groups are Atlantic salmon, American eel, herring, groundfish, ducks, geese, and seals (Table 5). The proponent also provided details regarding timing and frequency of harvesting where it was publicly available. The proponent indicated that, based on the available information, harvesting for traditional purposes occurs in inshore and coastal areas, in close proximity to communities and traditional territories. It stated that none of the groups' asserted or established traditional territories overlap with the project area, and that there are no reports of fishing for food, social and ceremonial purposes in or around the Project.

Table 5 Most Common Fish, Migratory Birds and Marine Mammals Being Harvested for Food, Social and Ceremonial Purposes

Inuit and Innu (Labrador)	Innu (Quebec)	Mi'kmaq/Mi'gmaq and Wolastoqiyik (NS, NB, and PEI)	Mi'kmaq (Newfoundland)
Fish: Atlantic salmon, arctic char, and trout	Fish: Atlantic salmon, herring, and shellfish	Fish: Atlantic salmon, American eel, gaspereau, herring and groundfish*	Fish: Atlantic salmon, American eel, and trout
Migratory birds: murre, ducks and geese	Migratory birds: geese and common eider	Migratory birds: ducks and geese	Migratory birds: murre



Marine mammals:
seals

Marine mammals:
seals

Marine mammals: seals

Marine mammals: seals

** Groundfish includes: wolffish, cod, flounder, haddock, halibut, pollock, and redfish. There are variations in the type of groundfish that each group has historically harvested for traditional purposes.*

While the proponent indicated fishing for food, social, and ceremonial purposes has not been reported in the project area, there are species being traditionally harvested that may migrate through and thus could interact with routine project activities. This includes Atlantic salmon, American eel, Atlantic cod, Greenland halibut, murre, and seals.²¹

DFO issues licences for food, social and ceremonial fishing to Indigenous groups. These licences vary in terms of species included and geographic locations for harvesting. According to information provided by the proponent, 32 Indigenous groups hold food, social, and ceremonial licences for Atlantic salmon and 25 groups hold licences for American eel. Other species covered in licences held by 10 or more groups are listed in Table 6.

²¹ The North Atlantic right whale may also occur in the Project area. It is also a culturally significant species for some of the groups, particularly the Mi'kmaq/Mi'gmaq who view it as the master of life in the sea and an ally of Glooscap, the Creator. Some of the groups in Newfoundland and Labrador historically harvested the right whale for food, social and ceremonial purposes; however, this is no longer the case due to its endangered status.

**Table 6 Species Covered By Food, Social and Ceremonial Licences - 10 or More Indigenous Groups²²**

Species	Number of Indigenous Groups with Licence(s)
Atlantic salmon	32
American eel	25
Striped bass	20
Smelt	20
Groundfish*	22
Mackerel	19
Herring	18
Gaspereau	15
Shad	14
Seals	11

**Food, social and ceremonial licences for groundfish can include one or more of the following types of fish: wolffish, cod, flounder, haddock, halibut, pollock, and redfish. A few licences are “unspecified” which means any type of groundfish can be harvested.*

Communal Commercial Fishing

The proponent stated that most of the Indigenous groups are also involved in communal commercial fishing, also under licences issued by DFO. These licences provide fisheries access to a whole community or group as a collective, i.e., the licences are not issued to private individuals or corporations, as is the case with non-Indigenous commercial licences. The most common species being commercially harvested by Indigenous groups include groundfish, shrimp, crab, herring, mackerel, swordfish, bluefin tuna and seals.²³

The proponent indicated that some of the communal commercial licences are located in NAFO Divisions or Fishing Areas that overlap with the project area including licences in NAFO Divisions 3L and 3M for swordfish and bluefin tuna (i.e., species that are both culturally and economically important to some groups). According to the proponent’s information, 14 licences for swordfish and seven licences for bluefin tuna in NAFO Divisions 3L and 3M are held by Indigenous groups. Another ten bluefin tuna and

²² Some of the groups in Newfoundland and Labrador historically harvested the right whale for food, social and ceremonial purposes; however, this is no longer the case due to its endangered status.

²³ Some species are included in both a food, social and ceremonial licence and a commercial licence held by an individual group. Species that most frequently appear in both types of licences are seal, American eel, groundfish, and herring.



ten groundfish licences have no location restrictions, referred to as “not-specified” or “unspecified” (i.e., fishing can take place anywhere). There are also some licences for herring, mackerel, seal, and shrimp that have no location restrictions.

Table 7 Communal Commercial Licences Overlapping with the Project Area

Species	NAFO Division or Fishing Area	Number of Indigenous Groups with Licences
Capelin	Capelin Fishing Areas 7 and 8	3
Groundfish	NAFO Division 3L	5
Groundfish	Not Specified	10
Herring	Herring Fishing Areas 7 and 8	5
Herring	Not Specified	3
Mackerel	Mackerel Fishing Areas 7 and 8	3
Mackerel	Not Specified	1
Seal	Sealing Area 6 and 7	3
Seal	Not Specified	6
Shrimp	Shrimp Management Area 6 and 7 (located in NAFO Division 3LM)*	4
Shrimp	Not specified	1
Swordfish	NAFO Division 3LM	14
Tuna	NAFO Division 3LM	7
Tuna	Not Specified	10

**The shrimp fishery in NAFO Division 3L is currently closed; therefore, Indigenous groups are not currently fishing in this area, but this could change in the future.*

The proponent indicated it was unable to confirm locations where communal commercial fishing is currently taking place, as the Indigenous groups did not provide this information, with the exception of a few groups who indicated their swordfish and bluefin tuna licences for NAFO Division 3LM were currently inactive. Additionally, the proponent indicated that DFO locational catch data does not distinguish between domestic (i.e., non-Indigenous) commercial fishing and communal commercial fishing. The proponent did indicate that DFO locational catch data shows some fishing activity in the western and northern portions of the project area; however, as noted above, the proponent could not confirm if the data represents any Indigenous fishing activity. The proponent indicated that presently, based on available information, there is limited potential for interactions between planned project activities and commercial fishing activity, including communal commercial fishing by Indigenous groups, in or near the project area. However, communal commercial licences could be active in the future or the level of communal commercial fishing could increase.



Health and Socioeconomic Conditions

The proponent prepared a profile for each individual group that included information related to health, social, and economic conditions. Details such as population demographics, statistics on employment and income, types of services available at the community level, etc., were included, where available. The depth and breadth of information in the profiles varied significantly, as the proponent indicated it mainly utilized publicly-available sources to prepare the profiles, including information contained in past project reports, Indigenous-specific health surveys, grey (i.e., government) literature, and data published by Statistics Canada and Indigenous Services Canada. The proponent noted it sent drafts of the profiles to each representative Indigenous group for review regarding accuracy of information presented before the EIS was finalized. The community profiles presented in the EIS reflect feedback provided by Indigenous groups, although not all groups provided feedback.

Based on the information gathered, fish species of importance to Indigenous groups, included, but was not limited to Atlantic salmon and American eel. Both Atlantic salmon and American eel have been key sources of nutrient-rich food for Indigenous peoples in the region for thousands of years, due to their availability in abundant quantities at known locations.²⁴ Many Indigenous groups fish American eel for both food, social and ceremonial purposes and for commercial purposes and it is also used for a variety of medicinal purposes. Atlantic salmon²⁵ and American eel are also spiritually significant to many of the Indigenous groups and are featured prominently in place names, traditional ceremonies, legends and stories.

Fishing for food, social and ceremonial purposes and for trade, has been an integral part of the economy and social fabric of Indigenous communities, from pre-contact. The proponent indicated that many Indigenous people continue to place a high value on Indigenous traditional foods and are of the view that they cannot be replaced or substituted for other food sources because of their superior nutritional qualities as well as other important social and cultural uses. Additionally, some Indigenous groups rely on traditionally-harvested foods for subsistence purposes, and are already experiencing food insecurity due to low incomes, high unemployment and food costs in particular, groups that are located in rural and or remote locations.

The Indigenous knowledge collected confirms the act of fishing itself also fosters social cohesion; large groups of fishers historically and continue to harvest together for the benefit of their communities. The harvested resources are shared through re-distribution to individual families and through ceremonial feasting and other community events. Fishing as an activity also supports cultural continuity, providing opportunities for older harvesters and Elders to share Indigenous knowledge, practices and customs with younger generations.

The communal commercial fisheries are also linked to current baseline socio-economic conditions of Indigenous peoples, as they are a significant source of employment and income for families as well as for communities as a whole. Some Indigenous groups also operate recreational fishing enterprises as

²⁴ Some Indigenous groups are not harvesting Atlantic salmon for food, social and ceremonial purposes by choice, due to conservation concerns.

²⁵ In an effort to reverse the declining stocks of Atlantic salmon, a number of aggressive management measures were introduced by DFO, including the closure of the commercial fishery for Atlantic salmon in 1998.



part of the marine tourism industry, providing additional job opportunities for community members. The proponent reported that the Indigenous groups are using revenues from their communal commercial fisheries and other band-owned recreational and marine tourism band-owned businesses, in support of essential community-based programs, services and infrastructure.

Asserted or Established Aboriginal or Treaty Rights

The proponent identified fishing for food, social and ceremonial purposes as the primary rights-based activity that could be affected by the Project. Information for each Indigenous group is summarized in Table 8. Based on the information available, the proponent is of the understanding that none of the Indigenous groups have asserted or established Aboriginal or treaty rights, or otherwise undertake traditional activities pursuant to Section 35 of the *Constitution Act, 1982*, in the project area.

Table 8 Summary of Aboriginal or Treaty Rights Related to Fishing for Food, Social and Ceremonial Purposes

Group	Aboriginal or Treaty Rights
INUIT AND INNU FIRST NATIONS	
Nunatsiavut Government (Labrador)	Aboriginal right to fish. As per the <i>Labrador Inuit Lands Claims Agreement</i> (2005), beneficiaries have the right to harvest at any time of the year throughout the waters in the <i>Labrador Inuit Settlement Area</i> for any species or stock of fish, up to the quantity needed for their food, social and ceremonial purposes. There is no overlap between the <i>Labrador Inuit Settlement Area</i> and the project area.
Nunatukavut Community Council (Labrador)	Asserted Aboriginal right to fish throughout its asserted traditional territory within Labrador and to resources along the offshore area immediately adjacent to the Labrador coast. The asserted traditional territory does not overlap with the project area.
Innu Nation (Representing Sheshatshiu and Natuashish) (Labrador)	Aboriginal right to fish within Labrador and along the Labrador coast throughout its asserted traditional territory. The asserted traditional territory does not overlap with the project area.
Les Innus de Ekuanitshit (Quebec)	Aboriginal right to fish throughout its asserted traditional territory that extends over parts of Labrador and Quebec, including Anticosti Island in the Gulf of St. Lawrence. The asserted traditional territory does not overlap with the project area.
Première Nation des Innus de Nutashkuan (Quebec)	Aboriginal right to fish throughout its asserted traditional territory that extends over parts of Labrador and Quebec, including part of Anticosti Island and the Jacques Cartier Strait in the Gulf of St. Lawrence. The asserted traditional territory does not overlap with the project area.



MI'KMAQ/MI'GMAQ, WOLASTOQIYIK (MALISEET), AND PESKOTOMUHKATI	
13 Mi'kmaq communities in NS; nine Mi'gmaq communities in NB, six Wolastoqiyik communities in NB; Peskotomuhkati at Skutik (NB); two Mi'kmaq communities in PEI; and, three Mi'gmaq communities in Quebec. (Total: 34 communities)*	In its 1999 decision on the <i>Marshall</i> case, the Supreme Court of Canada affirmed the Mi'kmaq/Mi'gmaq, Wolastoqiyik (Maliseet) and Peskotomuhkati (Passamaquoddy) have constitutionally protected rights, pursuant to the 1760-61 Peace and Friendship Treaties and Section 35 of the <i>Constitution Act, 1982</i> , to harvest and to sell fish to obtain a moderate livelihood for themselves and their families. None of the groups' asserted traditional territories overlap with the project area.
Miawpukek First Nation (island of Newfoundland)	No constitutionally recognized Aboriginal rights or treaties. The asserted traditional territory does not overlap with the project area.
Qalipu First Nation (island of Newfoundland)	No constitutionally recognized Aboriginal rights or treaties.

*Refer to Section 3.1.1 of this report for the names of these 34 communities. Some are represented by aggregate organizations in consultation matters, but the rights are held by each individual community or collective.

4.6.2 *Proponent's Assessment of Environmental Effects*

Fishing for Food, Social and Ceremonial Purposes and Impacts to Asserted or Established Aboriginal or Treaty Rights

The proponent cited the CEAA 2012 *Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes* to explain how current use of resources for traditional purposes by Indigenous peoples (i.e., fishing for food, social and ceremonial purposes in the context of this project) is linked to rights. It said that the term "current use of lands and resources" is often expressed by Indigenous groups as being analogous to "Aboriginal rights" or "treaty rights." For this reason, the proponent's effects assessments for current use and impacts to rights were integrated. In the context of the proponent's EIS, the current use of lands and resources for traditional purposes -otherwise referred to as 'traditional harvesting'-was defined as including activities and outcomes associated with the harvesting of fish, marine mammals and migratory birds in the asserted or established traditional territories of an Indigenous group for food, social and ceremonial or economic purposes pursuant to the exercise of an Indigenous right or under licence, including the right of Indigenous groups in the Maritimes and Gaspé region of Québec to harvest for a moderate livelihood pursuant to the Peace and Friendship Treaties of 1760 and 1761.

The proponent stated that most routine project activities would take place in an offshore marine environment, 500 kilometres from land and at a distance between 640 to 2,000 kilometres from Indigenous groups. Based on available information, as noted above, the proponent indicated that none of the Indigenous groups have asserted or established traditional territories or Aboriginal or treaty rights that overlap with or extend to the project area. None of the food, social and ceremonial licences issued by DFO include areas in or around the project area. The proponent also indicated that there are no



reported instances of fishing for food, social and ceremonial in project area, and thus no direct effects on or disruptions to traditional harvesting activities are predicted.

The proponent stated that as there are no Aboriginal or treaty rights being exercised in the project area, the pathways for potential impacts to rights would be through impacts from the Project on migratory species that pass through the project area and are then harvested within the traditional territories of Indigenous groups. Migratory species that are being harvested for food, social and ceremonial purposes that may pass through the project area include Atlantic salmon, American eel, Atlantic cod, Greenland halibut, murre, and seals.

The proponent stated that Atlantic salmon migration through or inhabiting the project area is limited because of unfavourable sea surface temperatures. Therefore, it concluded that interaction of salmon with project-related emissions and discharges would also be limited.

The proponent stated that American eel may also occasionally be present in the project area, as adults migrate from coastal areas to the Sargasso Sea. Migration patterns generally follow the continental shelf areas, which according to the proponent, reduces the likelihood of American eel passing through the project area.

The proponent stated that Atlantic cod and Greenland halibut – which are harvested by some Indigenous groups – may also be occasionally present in the project area. The proponent also indicated that while these species have the potential to interact with project vessels, they also have higher capability for avoidance. While the proponent acknowledged that underwater sound is known to be a short-term stressor for Atlantic cod, they would have to remain in the area for a long period for injury or mortality to occur. Overall, the proponent predicted the potential for effects on these species would be limited due to the transitory nature of project-related vessel traffic.

For all migratory fish species being traditionally harvested that may pass through the project area, the proponent acknowledged there may be some localized and short-term effects associated with drill waste discharges; the presence of the subsea infrastructure; and, sound emissions from project vessel traffic, operation of the FPSO and MODUs and drilling activities. However, the proponent stated that the effects are unlikely to cause changes in the abundance, availability, distribution or quality of migratory species. (Section 4.1- Fish and Fish Habitat). The proponent concluded that adverse effects from routine project activities on fish being harvested for food, social, and ceremonial fishing would not be significant.

Murre (Common Murre and Thick-billed Murre), a group of migratory marine birds that are traditionally harvested by some of the Indigenous groups, may forage in the project area during spring and fall migration as well as in winter. Thick-billed murre are attracted to underwater lights, and could be attracted to the FPSO and MODUs at night for foraging opportunities and subsequently stranded. Stranding of murre on all project vessels is possible; however, the proponent predicted that, if there is an interaction with the Project, it would disrupt only a small percentage of birds at any given time because the foraging and wintering grounds of marine birds are so large. The proponent concluded that the adverse environmental effects on murre present in the project area were likely to be transient and temporary in nature, of low impact on the abundance or quality of murre available for traditional harvesting, and not significant.



Diving murres may be at somewhat higher risk of injury or disruption due to exposure to underwater sound such as that generated by geophysical sound sources. The proponent predicted that the risk of auditory injury in diving birds exposed to air source pulses is considered low and would likely be limited to a small area around the air source array. Marine birds would likely have to remain in the area of underwater sound emissions for extended periods of time for injury effects to occur, therefore effects are unlikely.

The proponent predicted that interactions with and effects on coastal breeding colonies of murres and Important Bird Areas are unlikely. These areas are not within the typical flight path of aircraft from the St. John's International Airport to the project area.

The proponent stated that, the likelihood of presence of harp and hooded seals (harvested for subsistence purposes by some Indigenous groups) in the project area is moderate and low, respectively.

Underwater sound from project activities could result in potential changes in habitat quality and use by seals. Exposure to underwater sound levels at or above established acoustic thresholds also has the potential to result in hearing impairment and/or injury, however, the proponent predicted that seals would not likely remain within the immediate vicinity of the sound sources long enough to experience mortality or hearing injuries. The proponent predicted that underwater sound levels have the potential to result in displacement or habituation behaviour effects of seals. The proponent predicted that seals tend to be less responsive to seismic air source sounds than many cetaceans and are not likely to show a strong avoidance reaction to the air source array. The proponent committed to adhering to the *Canadian Statement of Practice with Respect to Mitigation of Seismic Sound in the Marine Environment*.

Marine vessel traffic has the potential to result in ship strikes with marine mammals and there is increased risk of vessel strikes resulting in mortality or injury. The proponent noted that seals often show considerable tolerance to vessels, but can also show signs of displacement in response to vessel traffic. As mitigation, the proponent committed to ensuring that project vessels will alter course and/or reduce speed if a seal is detected ahead of the vessel.

The proponent predicted that interactions are not expected to cause ecological changes at the population level or changes in the abundance, availability, distribution or quality of seals available to be harvested by Indigenous groups for traditional purposes.

Communal Commercial Fishing

The proponent stated that the potential effects on communal commercial fishing from routine project activities would be the same as they are for non-Indigenous commercial fisheries. These effects are outlined in Section 4.5.2 (Effects on Commercial Fisheries), and include restricted access to fishing areas (due to the establishment of the safety and anti-collision zones); damage to fishing gear and vessels; changes in the abundance, distribution or quality of marine resources being harvested; and, the associated loss of catch or income. Regarding the potential for changes in abundance, distribution or quality of marine resources being harvested by Indigenous groups for commercial purposes, the proponent focused its assessment on swordfish and bluefin tuna, as these are high value species that may be harvested by Indigenous groups in NAFO Divisions 3L and 3M (which overlap with the project area).



The proponent stated that swordfish and bluefin tuna are highly mobile, 'non-schooling' fish, which means they do not swim together as a large group in the same direction in a coordinated way. The proponent indicated that any effects from light or sound (e.g., from the presence and operation of the FPSO, MODUs, and other designated project vessels) or waste discharges would not result in measurable change in the health or behaviour of fish populations, including swordfish or tuna. Based on known hearing capabilities of other pelagic fishes, as noted by the proponent, swordfish may be attracted to low frequency sounds that are typical of offshore operations, but any high intensity sounds (i.e., seismic) will likely cause movement away from the area. The proponent stated that, the spawning habitats of swordfish and tuna are located at significant distances from the project area, thus reducing potential interactions with important habitats and critical life stages.

The proponent concluded that given the above noted factors along with application of mitigation measures, adverse effects on the abundance, availability, distribution or quality of swordfish and bluefin tuna would not be significant.

Health and Socioeconomic Conditions

The proponent stated that given the distance of the project area from Indigenous groups, the Project is not expected to place any direct or indirect demands on community services and infrastructure, nor would it result in other types of adverse social and economic effects, such as disruptions to food, social and ceremonial, recreational or commercial fishing. If fishing were to occur in the project area in the future, the proponent noted that the applied mitigation would reduce the likelihood of disruptions to any type of Indigenous fishing.

As discussed in Sections 4.1, 4.2, and 4.3 the proponent did not predict any biophysical effects on fish and fish habitat, marine mammals, or migratory birds (inclusive of those being harvested by Indigenous groups). Additionally, the proponent did not predict any adverse effects on or changes to air or water quality at concentrations (Section 4.7 Air Quality) that would result in human health risks if species that passed through the project area were consumed, or from exposure of Indigenous fishers to contaminants or pollutants during fishing activities. The proponent concluded that routine project activities were unlikely to cause any real or perceived contamination that would lead to a reduction in the quantity or quality of country foods being consumed, or any other adverse effects on the physical health of Indigenous peoples.

The proponent did acknowledge that the potential exists for the Project to affect socioeconomic conditions related to the communal commercial fisheries. These fisheries are a significant source of employment and community revenues. The proponent indicated that sustained losses in employment or a reduction in availability or quality of commercially fished species, occurring over a year or more, has the potential to significantly affect the economy and overall wellbeing of the Indigenous groups. The proponent stated that with the applied mitigation, adverse effects from routine project activities to commercial fisheries, including communal commercial fishing by Indigenous groups, would not be significant, as discussed in Section 4.5 (Commercial Fisheries).

4.6.3 *Views Expressed*

Première Nation des Innus de Nutashkuan expressed concerns about the project area tiebacks, which would allow the proponent to develop any new significant discoveries in the project area, which is 4,900



square kilometres and contains exploration licences currently held by the proponent. If tiebacks are permitted, the proponent can initiate a new development project without having to undertake another environmental assessment (i.e., consultation with Indigenous groups would not be required). The proponent clarified that the scope of the Project includes a single production installation from which production activities would occur, including tiebacks. If an additional production facility were proposed in the future, it would be subject to a separate environmental assessment process.

Several Indigenous groups commented that the proponent's EIS lacks sufficient information to assess the potential adverse effects on Atlantic salmon. They noted there are gaps regarding their migration patterns and preferred overwintering areas; that the proponent did not conduct any of its own studies; and, concerns about the cited research being several decades old.

MMS commented that new studies must be completed to address the data gaps, as any negative impacts on Atlantic salmon will adversely impact Aboriginal and treaty rights. Several groups made suggestions regarding further research on Atlantic salmon that could be supported or led by the proponent. Some would like the proponent to develop its own research and monitoring programs for Atlantic salmon, above and beyond any support it is providing to Environmental Studies Research Fund research. MTI commented it remains unclear whether the proponent would contribute to the Environmental Studies Research Fund research, or if they plan on using the research to enhance and update the effects assessment for the Project. Miawpukek First Nation suggested that, rather than starting new research projects, the proponent should provide funding to support existing initiatives focused on Atlantic salmon tracking and tagging. It noted that the Atlantic Salmon Federation, the Ocean Tracking Network, and DFO are already involved in such research that could be supported by the proponent.

Several groups commented that the proponent made speculative and unsupported statements about Atlantic salmon, leading to its conclusion that there would be no significant effects from the Project and that as a result it did not propose mitigation, follow-up or monitoring of effects. They emphasized these concerns given their sacred relationship with Atlantic salmon. WNNB noted that the research cited by the proponent indicates Atlantic salmon, including the Outer Bay of Fundy population that is endangered, may overwinter or forage in the project area. It asked that the proponent explore additional monitoring options that could inform future species-specific mitigation measures for Atlantic salmon, which could protect them from further harm.

Miawpukek First Nation commented that the proponent has observed Atlantic salmon in the project area during spring, and that this timing coincides with migration of Atlantic salmon to their home rivers. As additional mitigation, they recommended that in accordance with the *Canadian Statement of Practice with Respect to the Mitigation of Sound in the Marine Environment*, the proponent should delay geophysical surveys until late summer, to ensure the Atlantic salmon are not diverted from their natural migration routes.

Several groups noted concerns or questions they have regarding what Indigenous knowledge was used by the proponent and where/how it was integrated. WNNB commented it is not evident if and how Indigenous knowledge on species distributions was included. KMKNO commented the desktop study commissioned by the proponent was a synthesis of publicly available information, and not in fact Indigenous knowledge as it was not commissioned from any potentially affected Indigenous group. Miawpukek First Nation's perspective is that neither the Crown nor the proponent made reasonable



attempts to collect Indigenous knowledge to inform the Project. MTI stated that it had provided an Indigenous knowledge study to the proponent in 2018, but that it was not clear the proponent used it for this Project despite the agreement allowing its use until 2023. The proponent responded providing clarification on where and how it used Indigenous knowledge in its EIS, including the study provided by MTI in 2018.

Miawpukek First Nation commented that the anti-collision zone established around the FPSO may provide a temporary refuge for fish due to their attraction to the installation, called the “reef effect.” It indicated that this may cause fish to move out of NAFO Division 3L where communal commercial fishing occurs, resulting in reduced catch rates. It asked that the proponent either develop a mitigation measure or develop a compensation program specifically to address this effect.

Miawpukek First Nation also stated that the proponent has only committed to mitigation measures to reduce attraction of birds to lighting from the FPSO (citing that mitigation on all drilling installations is not economically feasible). It stated that the proponent should be required to implement the lighting mitigations on all project vessels/installations (i.e., not just the FPSO), to ensure that adequate protection for migratory birds throughout all phases of the Project.

MTI commented the proponent did not propose any mitigations to reduce potential effects of underwater sound emissions from supply and servicing vessels on fish. It requested that the proponent develop a monitoring program that assesses the underwater impacts of light and sound on fish from all Project activities, including vessel traffic, drilling and operations.

Most Indigenous groups who provided comments were dissatisfied with the proponent’s lack of follow-up or monitoring programs for effects on species of cultural importance, and asked that follow-up and monitoring programs be developed and implemented collaboratively with Indigenous groups.

MMS commented that should there be impacts from the Project on Atlantic salmon, it will not be possible to quantify the impacts as no amount of financial compensation would be sufficient given the importance of Atlantic salmon to the Mi’gmaq.

A complete summary of issues raised by Indigenous groups on all phases of the Project up to and including the review of the EIS²⁶ is presented in Appendix C.

4.6.4 *Agency Analysis and Conclusion*

Analysis of Effects

The Agency notes that fishing for food, social, and ceremonial purposes was not reported in the project area but that it does occur in other areas, including coastal regions, in particular for Indigenous groups located in Newfoundland and Labrador. However, taking into account information provided by the proponent and DFO, the Agency is of the view that it is unlikely Indigenous groups harvesting in or around their traditional territories would encounter routine project activities. The Agency also

²⁶ The Agency will respond directly via written letter, to comments made by Indigenous in the final stages of the EA process (including the review of the draft EA Report and proposed potential conditions).



understands that the proponent would be required to implement measures to mitigate effects on migratory fish, marine mammals and migratory birds, as discussed in Sections 4.1, 4.2, and 4.3, including those species being traditionally harvested by Indigenous groups.

The Agency accepts that the most likely interaction between Indigenous groups and routine project activities would be potential effects on communal commercial fishing activities, should Indigenous groups decide to harvest in NAFO Divisions 3LM or fishing areas that overlap with the project area (see the list of relevant areas in Table 7). The Agency is of the view that access to fishing areas may be restricted or lost due to displacement from the established safety and anti-collision zones or damage to fishing gear, vessels or equipment because of interactions with the subsea infrastructure. The Agency also agrees that supply and servicing operations have the potential to directly interfere with and damage some gear types that may occur within vessel transit routes. The Agency understands that fishing gear, in particular crab pots, set in transit route areas are weighted to the bottom with an attached buoy or buoys at the surface creating potential for entanglement. However, supply and servicing vessels, as well as seismic vessels, would not be towing sub-surface equipment, and therefore, pose no additional risk of conflict with vessels and equipment owned by Indigenous fishers.

Based on the available information, the Agency agrees with the proponent there is a low likelihood that communal commercial fishing is currently taking place in the area where the FPSO, MODUs and subsea infrastructure would be located. The Agency is of the view; therefore, that the loss of access to/ displacement from fishing areas that overlap with the project area is also unlikely. The Agency concludes that adverse environmental effects on socioeconomic conditions, resulting from a reduction in catch rates or in the quality of species that are harvested leading to reduced revenues, would not be significant.

The Agency recognizes that should Indigenous groups start commercially harvesting with high intensity in areas that overlap with the Project, or if future tiebacks were developed, communal commercial fisheries may have a greater potential to be impacted by the Project. Potential effects could be more significant for Indigenous peoples compared to non-Indigenous commercial fishers, due to the differences between communal commercial and regular commercial licences and how revenues are used. Communal commercial licences are assigned to the community, not an individual, and they cannot be sold. The Agency understands that revenues from these fisheries support community programs and infrastructure, for which the Indigenous groups report there are no other funding sources. The Agency agrees that the value in terms of revenue and employment is significant for the Indigenous groups. As an example, the combined revenues from communal commercial fishing for a subset of the groups, was approximately \$152 Million in 2016 for 34 of the groups, and employed 1668 people living on reserve in 2018.²⁷ The Agency understands that some communities are large (1000 plus members), with many members relying on the communal commercial fisheries and band-owned marine tourism businesses for employment.

²⁷ Statistics taken from page 21-22 of a paper published by the Macdonald- Laurier Institute in October 2019, entitled: *The Marshall Decision at 20: Two Decades of Commercial Re-Empowerment of the Mi'kmaq and Maliseet*. Retrieved December 1, 2020: <https://www.macdonaldlaurier.ca/marshall-decision-impact-two-decades-commercial-re-empowerment-new-mli-report/>



The Agency notes that the proponent has committed to developing a compensation program in accordance with the C-NLOPB *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities*. The Agency understands that, in the event of any damages or losses (including those caused by routine project activities to fishing for food, social and ceremonial and to communal commercial fishing), the C-NLOPB requires the proponent to consider claims in a manner that meets the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*, and to act in good faith to resolve the claims. If the proponent and an Indigenous group are unable to resolve a claim for compensation, the group could seek relief directly to the C-NLOPB or through the court.

The Agency is of the view that the potential effects on communal commercial fishing would be mitigated through early identification and proper communication with Indigenous groups, regarding the establishment of the safety and anti-collision zones and regarding the location of decommissioned and abandoned subsea infrastructure. The Agency notes that the proponent would be required to develop and implement a Fisheries Communication Plan, in consultation with the Indigenous groups and the C-NLOPB. This plan would include communication objectives, participants and key contacts, along with guidance and instructions to ensure Indigenous groups are kept up to date with respect to both routine project activities and accidental events.

The Agency relied on information provided by the proponent, the Indigenous groups and DFO, in analyzing the potential impacts of the Project on asserted or established Aboriginal or treaty rights. Based on the current situation, the Agency agrees with the proponent that the primary rights-based activity that could be affected by the Project is fishing for food, social, and ceremonial purposes. The Agency recognizes that some Indigenous groups, particularly those who are signatories to the historic Peace and Friendship treaties, take the position their commercial fisheries are also rights-based, and to that end are actively pursuing recognition of these rights through negotiations with DFO. Additionally, some groups are in the process of negotiating agreements with DFO for new “moderate livelihood” fisheries. It is possible new or renegotiated agreements may recognize certain treaty rights in the future, and fishing activities authorized under them could be affected by the Project.

The Agency notes that while fishing for food, social, and ceremonial purposes is not reported to be occurring in the project area, Indigenous groups harvest species in their traditional territories that may migrate through the project area. The Agency acknowledges that, despite the proposed mitigation, Indigenous groups remain concerned about how the Project may affect the health and abundance of certain species, in particular, Atlantic salmon. The Agency notes that, with respect to data gaps regarding habitat use and migratory routes, the proponent would be required to contribute to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas and to update the C-NLOPB and Indigenous groups annually on research activities. The Agency notes the proponent has indicated it is involved in multiple collaborative research efforts, including the recently funded Environmental Studies Research Fund research on Atlantic salmon. The Environmental Studies Research Fund is providing \$12 million over four years in support of this project, which will involve all the Indigenous groups. The objective is to determine when, where, and for how long Atlantic salmon from three different life stages are present in the eastern Canadian offshore region. The research will inform future regulatory decision making in Canada’s areas of offshore oil and gas activity.

The Agency also recognizes that in the unlikely event of a major oil spill discussed in Section 5.1 (Accidents and Malfunctions) there is the potential for more serious effects on species being harvested

for traditional purposes and in turn a greater likelihood of impacts to asserted or established Aboriginal or treaty rights.

Key Mitigation Measures, Accommodation and Follow-Up

The Agency is of the view that the proposed mitigation measures for fish and fish habitat (Section 4.1), marine mammals (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.5) would also mitigate adverse effects on current use (fishing for food, social and ceremonial purposes); communal commercial fisheries; and health and socioeconomic conditions. Additionally, the mitigation would also function as accommodation to minimize or avoid potential adverse impacts on asserted or established Aboriginal or treaty rights. Key mitigation measures related to potential impacts on asserted or established Aboriginal or treaty rights include the following:

- Ensure that all discharges from project vessels and project activities into the marine environment are in accordance with the *Offshore Waste Treatment Guidelines* and the *International Convention for the Prevention of Pollution from Ships*;
- Plan and conduct applicable geophysical surveys in consideration of the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*;
- To prevent and reduce risks of collisions with marine mammals (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 is observed or reported within 400 metres of the vessel;
- Prepare follow-up programs for fish and fish habitat, marine mammals, and migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures, and share the results of these programs with Indigenous groups;
- In consultation with Indigenous fishers, develop and implement a Fisheries Communication Plan to facilitate and coordinate communication with fishers. The proponent is required to include in this plan, a procedure to communicate with Indigenous fishers in the event of an accident or malfunction, and 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 groups with an opportunity to consult on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups prior to drilling;
- Submit a report on all north Atlantic right whale observations annually and submit to Indigenous groups;
- 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*; and
- Contribute to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas. Update the C-NLOPB and Indigenous groups annually on research activities.

A complete list of key mitigation and follow-up measures identified by the Agency for the Project is provided in Appendix B.



Agency Conclusion

The only pathway for potential impacts from routine project activities on Indigenous groups is through impacts to migratory species of importance to Indigenous peoples: therefore, the Agency concludes adverse residual environmental effects on current use of lands and resources for traditional purposes, commercial fisheries, health and socioeconomic conditions and Aboriginal and treaty rights would likely be low in magnitude. As previously discussed in this report, effects from drilling wastes, light and sound emissions on migratory species may occur continuously, regularly or sporadically, depending on the activity and phase of the Project, which could cause localized, intermittent, medium-term changes in the abundance, availability, distribution and quality of some species over the lifetime of the Project (20 plus years). The geographic extent of these effects is not expected to reach areas where fishing for food, social and ceremonial purposes takes place, but it could include areas where communal commercial fishing occurs, should Indigenous groups decide to fish in areas that overlap with the project area in the future. However, the Agency concludes population-level effects on any species are unlikely to occur under routine project operations, and localized, intermittent effects would be reversible at the end of each phase of the Project. The Agency's conclusion takes into account the implementation of the mitigation, follow-up and monitoring measures described in Section 4.1 (Fish and Fish Habitat), Section 4.2 (Marine Mammals) and Section 4.3 (Migratory Birds). As noted previously, some of the mitigation functions as accommodation to minimize or avoid potential adverse impacts on asserted or established Aboriginal or treaty rights, such as compensation for any damages incurred by Indigenous fishers, including for losses relating to both food, social and ceremonial and communal commercial fisheries. The Agency expects that with the applied mitigation, there would be no interruption in the practice of rights (i.e., Indigenous groups could exercise these rights in the same or similar manner as before the Project) based on the current situation. The Agency acknowledges that a major spill or blowout event could have more serious effects. See Section 5.1 Accidents and Malfunctions) for more information.

4.6.5 *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 proponent 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.

4.7 Air Quality

4.7.1 *Existing Environment*

The proponent stated that the criteria air contaminants related to project activities include: nitrogen dioxide, sulphur dioxide, carbon monoxide, total particulate matter, particulate matter less than 10 microns, particulate matter less than 2.5 microns, and non-methane volatile organic compounds. The assessment of GHGs focused on emissions of carbon dioxide, methane, and nitrous oxide.



The proponent stated that given the location of the project offshore, where there are no other substantive emission sources nearby, it is likely that background air contaminant concentrations would be very low. Air quality in the project area would occasionally be influenced by transient sources, such as marine vessel traffic and exploration activities. Further, the proponent stated that air quality within the project area is considered to be good and to be meeting relevant Canadian air quality objectives.

Since the Project is located in international waters, there are no air quality regulations that directly apply to the Project. However, predicted concentrations of air emissions were compared to Newfoundland and Labrador provincial and Canadian national air quality regulations.

4.7.2 *Proponents Assessment of Environmental Effects*

Sources of air contaminant and GHG emissions from the Project include power and heat production on the FPSO; planned non-routine flaring (e.g. start-ups and shutdowns, workovers) and emergency flaring from the FPSO (i.e., during depressurization of process systems and emergency shut-downs); power production on the drilling installations; vessel (support, supply and shuttle tankers) traffic; and helicopter traffic. To represent worst-case scenarios, the proponent estimated air emissions and GHGs for the construction, installation, hook-up and commissioning phases, concurrent drilling and production phases; and normal production operations. In addition, air emissions were estimated for two accidental events: a full system depressurization over a period of three hours and the operation of the FPSO on diesel for seven days.

The proponent committed to implementing mitigation measures to help avoid or reduce project-related quantities of air contaminants and GHGs released to the atmosphere including; the use of equipment to optimize energy efficiency and power generation; use of high efficiency burners when flaring is required; recovery of low-pressure flare gas; and no routine flaring.

Criteria Air Contaminants

The proponent used concentrations of fine particulate matter, nitrogen dioxide and ground level ozone to determine potential health risks associated with local air quality. Emissions of non-methane volatile organic compounds are expected to be small, but were examined due to their potential contribution in the formation of ozone. The proponent determined the potential for the generation of ground level ozone to be quite small. It based this prediction on the low ambient concentrations of nitrogen dioxide and volatile organic compounds in the project area and the relatively low emission rates from the Project combined with the fact that events where sufficient warmth from the sun to support the conversion of non-methane volatile organic compounds to ozone are infrequent.

Modelled results of air contaminants predicted ground-level concentrations to be below the *Newfoundland and Labrador Ambient Air Quality Standards*²⁸. Likewise, modelling predicted sulphur dioxide, particulate matter less than 2.5 microns, and annual nitrogen dioxide concentrations to be below the *Canadian Ambient Air Quality Standards*²⁹. Canadian Ambient Air Quality Standard for hourly

²⁸ Newfoundland and Labrador Ambient Air Quality Standards available at: [NLR 39/04 - Air Pollution Control Regulations, 2004 under the Environmental Protection Act \(assembly.nl.ca\)](https://www.assembly.nl.ca/environment/airquality/airquality.htm)

²⁹ Canadian Ambient Air Quality Standards available at: <http://www.airquality-qualitedelair.ccme.ca/en/>



average nitrogen dioxide concentration is 113 micrograms per cubic metre; predicted ground-level concentrations of nitrogen dioxide for the Project ranged between 119 and 172 micrograms per cubic metre depending on project phase³⁰. However, in all scenarios the hourly predicted nitrogen dioxide concentrations were above the Canadian Ambient Air Quality Standards at approximately 500 metres to 1,700 metres from the FPSO and/or each MODU, beyond which concentrations decrease rapidly with distance from the source. The proponent stated that although predicted hourly nitrogen dioxide concentrations are above Canadian Standards, the Project is in a remote location offshore with no sensitive receptors nearby. In addition, the proponent stated that the Canadian standards are intended to be used as targets to manage the air quality of the air shed that encompasses larger geographic areas (may cross provincial/territorial or international boundaries) and are not directly applicable to industrial fence-line concentrations.

Greenhouse Gases

Modeling estimates indicated that the FPSO could contribute approximately 60 to 90 percent of the total GHG emissions from all activities depending on the phase and operations. Whereas emissions from a MODU contribute 20 to 25 percent of the total GHG emissions, depending on the phase. Minor contributions from flaring, offshore supply vessels and standby vessels, helicopters and shuttle tankers will apply throughout the lifetime of the Project.

The proponent predicted annual GHG emissions to range between 177,770 and 257,715 tonnes carbon dioxide equivalent emissions per year depending on power generation which represents approximately 2.4 percent of Newfoundland and Labrador's average annual emissions (10,800,000 tonnes carbon dioxide equivalent) and 0.04 percent or less of the national average annual emissions (704,000,000 tonnes carbon dioxide equivalent).

Federally, GHG emission targets have been set at a 17 percent reduction below 2005 emission levels by 2020, and a 30 percent reduction below 2005 emission levels by 2030.

4.7.3 Views Expressed

Federal Authorities

ECCC requested information from the proponent related to equipment specifications, power generation solutions, production rates, and a quantitative estimate of direct GHG emissions during all phases of the Project. The proponent indicated that given the Project is in the design stage, complete information was not available; however, it has committed to providing the information when the design is complete and power generation equipment has been selected.

ECCC stated that in Fall 2019, the Government of Canada announced further commitments to strengthen existing actions to exceed Canada's 2030 emission reduction target, and introduce new plan to set Canada on a path to achieve a prosperous net-zero emissions future by 2050. In December 2020, the Government of Canada announced A Healthy Environment and a Healthy Economy, Canada's

³⁰ Predicted ground-level concentrations of nitrogen dioxide by phase were: 172 micrograms per metre cube (hook-up and commissioning); 119 to 134 micrograms per metre cube (concurrent drilling and production); 143 to 172 micrograms per metre cube (accidental events).



strengthened climate plan to accelerate the fight against climate change. ECCC noted that the Project is expected to operate for approximately 30 years. Recognizing the review of this Project, assessed under CEAA, 2012 was initiated before the above-mentioned government announcements of net-zero by 2050, those latter principles should apply as much as possible.

ECCC is recommending the proponent to develop and implement a GHG management plan to reduce the project's GHG emissions during all phases. Emphasis should be based on maximizing GHG reductions as early as possible during the lifetime of the Project. This would support Canada's ability to meet its climate change commitments.

Public

Several comments were received related to the potential effect of the contribution of emissions from the Project on maintaining Canadian commitments to national and international climate targets, for example Canada's obligations under the Paris Agreement.

Sierra Club of Canada stated that in 2020, Canada issued new federal regulations aimed at reducing the release of methane and certain volatile organic compounds in the oil and gas sector. Sierra Club of Canada expressed concerns with the lack of information related to potential methane emissions and actions the proponent may be taking to detect, reduce and mitigate methane emissions. ECCC indicated that these regulations aim to reduce emissions from upstream oil and gas operations. With respect to methane, offshore production facilities are currently covered by the *Canadian Environmental Protection Act* federal methane regulations. These regulations will continue to apply unless *Accord Act* regulations that are "at least as stringent" come into force. In addition, World Wildlife Fund - Canada indicated that it was not clear how the proponent would reduce emissions by 50 percent in comparison to the other offshore production operations. With respect to this concern, ECCC indicated that the proponent attributed the lower emissions to efforts to minimize flaring, and that a further review of this is only possible once more detailed design information is available.

4.7.4 Agency's Analysis and Conclusions

The Agency understands that changes in air quality as a result of the Project would occur continuously and vary between phases throughout the life of the Project. The Agency is of the view that concurrent drilling and production phases would have the highest GHG emissions and highest concentrations of criteria air contaminants. However, it is also the Agency's view that the actual emissions would be influenced by the final design and selection of equipment. The Agency recognizes that the proponent would provide updated emission estimates to the C-NLOPB and ECCC at the development application phase. The Agency further notes that the proponent is committed to mitigation measures that would reduce or avoid quantities of air contaminants and GHGs released to the atmosphere from the Project.

The Agency accepts that stringent emission controls defined by the International Convention for the Prevention of Pollution from Ships for sulphur oxides, nitrogen oxides and particulate matter, applicable in designated emission control areas (which includes portions of the North Atlantic within Canada's exclusive economic zone), would apply to vessels in transit.

The Agency considered the potential for residual transboundary effects with respect to GHG emissions. The proponent's estimated contributions of GHG emissions during hook-up and commissioning, concurrent drilling and production, normal production operations, and both accidental events to



provincial and federal GHG emissions reported for 2016. Based on 2018 Canadian GHG emissions from ECCC, the Agency determined project GHG emissions would account for 0.03 percent or less of Canada's GHG emissions.

The Agency understands that the proponent's GHG estimates are based on the operation of a single MODU. However, the proponent has stated that the Project may include simultaneous operations of two MODUs. The Agency calculated that if two MODUs were operating simultaneously, estimated GHG emissions during hook-up and commissioning, concurrent drilling and production, normal production operations, and both accidental events could range from 177,770 to 309,407 tonnes carbon dioxide equivalent emissions per year or 0.04 percent of Canada's total GHG emissions. The Agency notes these estimated GHG emissions may vary from the emission volumes submitted to the C-NLOPB in the Development Application phase.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project's effects from routine activities on air emissions:

- all produced gas not used as fuel at the FPSO will be reinjected into the reservoir;
- incorporate GHG and air emission reduction measures in the design of the Project, and implement these measures during all phases of the Project. In doing so, the Proponent shall:
 - report to ECCC and the C-NLOPB on the GHG and air emission reduction measures incorporated into the final design; and
 - quantify and report to ECCC and the C-NLOPB GHG and air emissions estimates from the Project;
- incorporate, if economically and technically feasible, any modified or additional GHG emissions reduction measures, including new technologies that are available when the floating production storage and offloading vessel(s) undergoes repair and maintenance as required during dry dock inspections over the duration of the Project. Submit to the C-NLOPB and ECCC within 60 days of completion of any dry dock inspections a description of these measure(s) and the anticipated reduction in GHG and air emissions associated with these measures. Provide justification, if measures are not implemented, and
- comply with all applicable air emissions limits and limits on sulphur concentrations in diesel fuel for project vessels in accordance with the Marine Shipping Act, 2001 and the International Maritime Organization's International Convention for the Prevention of Pollution from Ships and any other legislative requirements and any other legislative requirements, where applicable.

Agency Conclusion

Criteria Air Contaminants

The Agency is of the view that adverse residual environmental effects on air quality would be moderate in magnitude because an increase in the concentration of criteria air contaminants is predicted, but regulatory limits and objectives are not expected to be exceeded (with the exception of hourly nitrogen dioxide concentrations). Concentrations of nitrogen dioxide above the Canadian Ambient Air Quality



Standards are predicted to extend no further than 1,700 metres from the FPSO and/or drilling installation. Potential residual environmental effects would be considered continuous and long term as the Project may extend 20 plus years.

Greenhouse Gases

The Agency considers the residual volume of GHG emissions from the Project to be moderate in magnitude as the Project would increase GHG relative to baseline, but concentrations will remain within regulatory limits and objectives. The GHG emissions would be continuous during operations and are considered irreversible due to the persistence of carbon dioxide in the atmosphere. The Agency notes that effects of GHG from the Project in a particular location cannot be measured; however, the geographic extent of the environmental effects is global due to the cumulative nature of GHG emissions and their contribution to climate change at the global level. The Agency recognizes that the proponent's predictions, based on 2016 data, indicate that the Project GHG emissions could be up to approximately 30 percent less compared to other Newfoundland and Labrador offshore production projects.

Taking into the account the implementation of mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on air quality or as a result of greenhouse gas emissions. The proponent would be required to consider best available and new technologies to allow for adaptive management.

5 Other Effects Considered

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

5.1 Effects of Accidents and Malfunctions

5.1.1 *Existing Environment*

A regional study area³¹ of 4,058,528 square kilometres was considered for the extent of effects from an accidental spill event.

The extent of the regional study area includes the shelf and slope regions of the Grand Bank and Flemish Cap, the Flemish Pass, and abyssal areas east of the Flemish Cap. It includes various habitat types in the intertidal zone, the subtidal zone, the deeper zone associated with the continental slope, and the very deep abyssal regions.

Within the regional study area, there are several special areas have been designated based on their importance to fish and fish habitat including, several EBSAs, VMEs, and NAFO Fisheries Closure Areas. There are several Important Bird Areas, Migratory Bird Sanctuaries and breeding sites around coastal Newfoundland and Labrador, as well as EBSAs in the Northwest Atlantic designated in part due to their importance to seabirds (See Appendix E). As well, there are several fish, migratory bird, marine mammals, and sea turtle species of conservation concern (See Appendix D). The regional study area also contains critical habitat for northern and spotted wolfish.

5.1.2 *Proponent's Assessment of Environmental Effects*

The proponent identified a number of potential accident scenarios that could occur, including vessel collisions, dropped objects, loss of stability or structural integrity, batch spills, loss of well control and subsurface blowouts. Based on consideration of project activities and potential environmental risk, the proponent conducted detailed spill fate and behaviour modelling for unmitigated subsurface blowouts, unmitigated batch spills of crude and diesel spills, and a synthetic-based whole mud spill. As the inputs and modelling scenarios would be the same, the proponent used modelling conducted by Nexen Energy ULC (now known as CNOOC) for the Flemish Pass Exploration Drilling Project environmental assessment for a nearshore vessel-to-vessel collision, representing a diesel batch spill between St. John's, and the Flemish Pass.

Probability, Fate and Behaviour of a Subsea Hydrocarbon Release

The proponent stated that there are a number of control measures in place during drilling operations to maintain well control; however, if well control measures fail, an uncontrolled release from the well consisting of drilling muds, brine, water, gas or oil may occur. This event is referred to as a blowout. The

³¹ The proponent defined Regional Study Area taking into account consideration of possible movement of marine fish, birds, mammals and sea turtles; the larger distribution and geographic extent of fishing and other human activities; and the predicted zone of influence of a potential subsea blowout.

proponent calculated the probabilities of a blowout during drilling and from wells in production. The proponent indicated that extremely large spills would be unlikely.

The proponent modelled unmitigated hypothetical worst-case subsurface crude oil blowout release scenarios representing two release durations (36 and 115 days), at two sites (in 1,134 and 500 metres water depths). Scenarios represented the maximum time to cap and contain a well (36 days), and the time to successfully drill a relief well (115 days).

To analyze the probability or likelihood of effects, the proponent defined specific thresholds typically used in oil spill modelling for surface oil thickness and shoreline oiling and in-water oil concentrations:

- Surface oil:
 - Socio-economic threshold of concern: 0.04 grams per square metre
 - Ecological threshold of concern: 10 grams per square metre
- Shoreline oil:
 - Socio-economic threshold of concern: 1.0 gram per square metre
 - Ecological threshold of concern: 100 grams per square metre
- In-Water Concentration: 1 microgram per litre of dissolved polycyclic aromatic hydrocarbons or 1 microgram per litre of total hydrocarbon concentration.

The proponent predicted the following key outcomes of a subsurface blowout:

- The highest predicted likelihood of oil occurred to the east and south of the release site, with a low probability transport to the north or west towards Canadian waters and shorelines.
- Up to 23 percent of oil was predicted to travel outside the model domain, on time scales greater than 25 to 50 days; this oil would be less toxic (i.e., the lighter and more toxic ends of the hydrocarbon would have evaporated and/or degraded, reducing the toxicity of the remaining oil) due to weathering, but in some cases would exceed socio-economic and ecological thresholds.
- The stochastic footprint³² of surface oil extent exceeding a socio-economic threshold was up to 3,565,000 square kilometres, depending on location and volume of oil spilled.
- The highest probability for oil reaching the Azores shoreline was between 70 and 77 percent in the summer months. This shoreline contact could take between 80 and 111 days after release. The proponent indicated when oil reached the shores it would be highly weathered (i.e., less toxic), patchy and discontinuous.
- There was less than 25 percent probability of oil making contact with the Newfoundland and Labrador shoreline for all scenarios, with less than one percent of the total volume released predicted to make shoreline contact. The proponent indicated when it reached the shores it would be highly weathered (i.e., less toxic), patchy, and discontinuous as time estimates ranged from weeks to over a month. It was predicted that as much as 3,933 kilometres of shoreline may

³² Stochastic results are useful in planning for oil spill response, as they characterize the probability that regions may experience oil exposure above specified thresholds, taking into account the environmental variability that is expected from many release scenarios over time that would experience different environmental forces (e.g., variable wind and current speed and direction) over the course of many years.



be susceptible to oil making contact following a release, depending on the location and volume of oil released.

Depending on the location and volume of oil spilled, the proponent predicted that by the end of 160 days, less than two percent of the total released volume, from an unmitigated subsurface blowout could reach shorelines; between 45 and 51 percent would evaporate; and between 27 and 36 percent would degrade.

For comparison, the proponent conducted spill response mitigation modelling for the 36 day scenario, considering the subsea and surface application of dispersants. It was predicted that nearly half as much (averaging 48 percent) of the released oil would evaporate and an average of 55 percent would degrade.

Effects Analysis

The proponent stated that for all valued components, the degree of exposure to accidental spills would depend on the type and size of the spill, time of year, and the number, location, and species of animals within the affected area.

Fish and Fish Habitat

The proponent stated that a subsurface blowout could affect fish habitat availability and quality; fish mortality; fish injury and health; and fish presence and abundance. While adult stages of fish and invertebrates are generally mobile and have the ability to avoid oiled areas, plankton (including juvenile fish stages), microorganisms, and sessile benthic species are more susceptible to potential impacts, as they do not exhibit avoidance responses.

The proponent stated that exposure to oil in water has the potential to affect fish habitat availability and quality, as well as cause potential lethal and sublethal effects on plankton, invertebrates and fish including potential impacts on reproduction, growth, disease prevalence, feeding and survival. The proponent indicated that there would be limited contact of oil with sediments (less than 0.01 percent); however, interactions with benthic fish habitat are likely with flocculation and sinking events associated with plankton and microbes. The proponent stated that the environmental effects would be largely dependent on a variety of factors (e.g., species, life history, behaviour, oceanographic conditions, exposure duration, oil type, etc.).

Marine Mammals

The proponent stated that marine mammals may experience a change in mortality or injury, change in health or change in habitat quality if directly exposed to oil through a combination of inhalation, ingestion, aspiration, and absorption. Marine mammals may also experience sub-lethal effects from direct contact with spilled hydrocarbons or consumption of contaminated prey or various effects from response measures (e.g., vessel collision, underwater sounds from vessels, aircraft and equipment, dispersant exposure, etc.).

Sea Turtles

The proponent indicated that sea turtles may experience a change in mortality or injury, change in health or change in habitat quality and be more susceptible to the potential effects of exposure to spilled hydrocarbons, as they do not exhibit avoidance behavior, exhibit indiscriminate feeding, and take

large pre-dive inhalations. The proponent predicted environmental effects of hydrocarbon exposure following a spill on sea turtles may include reduced lung capacity, decreased oxygen uptake, reduced digestion efficiency, and damaged eyelid and nasal tissue.

Migratory Birds

The proponent stated that seabirds, waterfowl and divers, and shorebirds are the most vulnerable to environmental effects from oil spills as they spend much of their life in the marine environment. Some land bird species may also be affected, in particular, those that are associated with coastal habitat, any that migrate nocturnally over offshore waters, or forage offshore. The proponent indicated that accidental hydrocarbon spills from a blowout have the potential to adversely affect marine birds (individuals and populations), resulting in potential changes to the presence, abundance, distribution and/or health because of physical exposure or ingestion. The proponent further stated that possible physical effects of oil exposure on birds include changes in thermoregulatory capability (hypothermia) and buoyancy (drowning) due to feather matting. Ingestion of oil may result in physiological effects and sublethal effects such as damage to organs, and potential reduced reproductive success. Additionally, oiling of birds plumage may lead to behavioral changes such as increased time spent preening at the expense of foraging and breeding. The proponent indicated, that effects from a subsurface blowout are predicted to be significant depending on the specific occurrence, the nature and degree of the event, and the presence of certain species of birds, but extremely unlikely to occur. Infrequent batch spills and synthetic-based mud releases are predicted to affect a smaller number of individuals and be reversible at the population level; therefore, would not cause a detectable decline in overall abundance or change in distribution over more than one generation.

Special Areas

The proponent predicted that a hydrocarbon spill could potentially degrade the ecological integrity of special area which could result in the area not being able to provide the same biological or ecological function for which it was designated. These effects would be closely linked to effects on other valued components (e.g., fish and fish habitat).

Commercial Fisheries and Other Ocean Users

The proponent noted that commercial harvesters may experience temporary loss of access to fishing areas, damage to fishing gear or vessels and associated loss of catch for harvesters, and/or a change in abundance, distribution and quality of marine resources as a result of a hydrocarbon spill. Potential closure of fish harvesting in the immediate vicinity of a spill, and the potential for actual or perceived fish taint which may affect marketability of affected commercial fisheries, could translate into direct economic effects. The proponent indicated that damage to fishing vessels and gear may affect the quality of harvest or cause harvesters to stop fishing resulting in potential economic impacts. If a spill were to reach the shoreline, there could also be potential economic effects on aquaculture operations and inshore fisheries, as well as potential effects on recreational fishing activities.

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

Potential interactions in the event of a blowout may be direct or indirect and could include change in commercial communal fisheries, and/or change in current use of lands and resources for traditional purposes. The proponent stated that, as with non-Indigenous commercial fishers, accidental events could directly affect fisheries and/or fishing activity that could result in adverse environmental effects upon the socio-economic value of the communal commercial fisheries. These fisheries are an important source of revenue generation for Indigenous communities; therefore, the proponent also noted the potential for indirect socio-economic impacts. It indicated a blowout could also potentially affect the social, spiritual and cultural value of the fishery to Indigenous groups. Additionally, potential effects on marine fish or other resources used for traditional purposes could also affect physical health from direct exposure to contaminants or through consumption of affected fish and wildlife, as well as the mental and spiritual well-being of Indigenous peoples. The proponent noted, while it is obviously not possible to determine whether any individual of a species used for traditional purposes by any group may be present in the affected area before moving to an area that is the subject of traditional harvesting activity, there is limited potential for any degree of interaction. Further, scheduled Atlantic salmon rivers, where adults migrate to spawn, are within the predicted potential shoreline contact footprint. However, the proponent stated that the probability of shoreline oiling is very low and given the time to reach the shoreline, the oil would be highly weathered, patchy and discontinuous.

Potential or Established Aboriginal or Treaty Rights

The proponent stated that no Indigenous communities, or activities associated with the current use of lands and resources for traditional purposes are undertaken within or near the project area. It also predicted that oil spills had limited potential to reach the shoreline near any Indigenous community. The proponent indicated; therefore, that potential environmental effects upon Indigenous groups would be indirect in nature and would be limited to marine-associated species harvested by Indigenous fishers in either the communal commercial or traditional fisheries. The proponent committed to implementing prevention and response measures in order to reduce the likelihood of a spill and resultant environmental effects.

Probability, Fate and Behaviour of Batch Spills, Vessel Collisions and Synthetic-Based Mud Spills

The proponent stated that the most likely types of spills from the Project would be low volume batch spills that can occur during routine use, storage, and movement of fuels, involving instantaneous or short duration discharges. These spills could occur from the FPSO, MODU, subsea infrastructure, transshipment tanker, or support/supply vessels, and could result in the release of different types of hydrocarbons including crude oil, diesel fuel, hydraulic fluid, aviation fuel, or whole synthetic-based muds. Based on historical spill data from the C-NLOPB for offshore Newfoundland and Labrador the proponent stated that although small volume batch spills may occur more often, the average volume per spill from development/production wells (of hydrocarbons and synthetic-based muds combined) is approximately ten barrels [about 1.59 cubic metres] per well.

The proponent stated that the probability of large batch spills from a FPSO are highly unlikely, ranging from 0.00013 per well year for large spills (between 159 and 1,590 cubic metres) and 0.0000013 per well



year for extremely large spills (greater than 23,848 cubic metres). Based on spill trajectory modelling, the proponent predicted that for an unmitigated batch crude oil release at the surface from the FPSO, at the end of the 30-day simulation: between 37 to 39 percent would evaporate; 29 percent would remain on the water surface; between 22 and 24 percent would be degraded; between 10 and 11 percent would remain entrained in the water column; and 0.01 percent would contact sediments. The proponent predicted that surface oil concentrations would exceed socio-economic thresholds up to 300 kilometres from the release site, and that there would be no shoreline oiling.

The proponent predicted that other spills, including small volumes of crude oil and diesel fuel, have a higher probability of occurring than large batch spills, with the probability of spills less than 0.159 cubic meters (or less than 1 barrel) at 0.017 per well year, to 0.0073 for batch spills with volumes ranging between 15.9 to 159 cubic metres.

The proponent predicted that for an unmitigated batch spill of crude oil at the seafloor at the end of a 30-day simulation: 42 percent would evaporate; 6 percent would be entrained; 20 percent would degrade; and 32 percent would remain on the water surface. No oil was predicted to be found on sediments. The model predicted a dull sheen (0.001 to 0.01 millimetres thick) that could extend up to 300 kilometres southwest of the release site with no shoreline oiling predicted.

The proponent predicted that, for a diesel spill: 58 percent would evaporate, 30 percent would degrade, 12 percent would be entrained in the water column, and less than one percent would remain at the water surface. The proponent also predicted that surface oiling would be patchy and there would be discontinuous distribution of sheens (<0.0001 millimetres) close to the release locations. Ecological and socioeconomic thresholds were predicted to be within 200 kilometres of the release site.

The proponent predicted that a vessel-to-vessel collision spill could result in a surface oil exposure area of 13 square kilometres and 925 square kilometres for the ecological threshold and the socioeconomic threshold, respectively. It was predicted that the sheen would be patchy and discontinuous, and would migrate east with no shoreline oiling.

Based on historical C-NLOPB spill data, the proponent estimated the annual probability of a synthetic-based mud spill of any size volume to be 0.15 per well year, ranging from 0.034 per well year for a volume of ten litres to 0.0005 for a large spill (275,000 litres). The proponent stated that data from the C-NLOPB related to synthetic based mud spills indicate that since 1997 there have been an average of two synthetic-based mud spills per year from exploration and production activities. Spilled synthetic-based mud would behave differently than spilled oil as these heavy, dense fluids sink rapidly through the water column resulting in limited effects on the water's surface. The proponent predicted that for surface releases of synthetic-based muds, seabed deposition could extend from 590 metres to 1.5 kilometres from the spill site, depending on water depth. Subsurface releases of synthetic-based mud were predicted to result in sediment deposition between 60 and 80 metres from the release site. The proponent also stated that there is potential for water concentrations of total suspended solids to exceed 10,000 milligrams per litre within ten metres of the spill location; however, these concentrations would be brief and temporary.

Effects Analysis

The proponent predicted that the potential adverse environmental effects of an unmitigated batch spill of crude oil or marine diesel would be of low magnitude and not likely to occur for fish and fish habitat, migratory birds, marine mammals, sea turtles and special areas, as the size and persistence of the area of potential effects is smaller than for a subsurface blowout. The proponent stated that if project-related batch spills resulted in a surface sheen, adverse environmental effects would be temporary, limited in size and affect only birds in the immediate area. The proponent indicated that migratory birds that forage in the area (i.e., Leach's Storm-Petrel) may be exposed to surface hydrocarbons from the sheen, potentially resulting in changes in presence and abundance.

The proponent predicted that potential adverse environmental effects of batch spills on commercial fisheries, including commercial communal fisheries, would be similar to those associated with a blowout (e.g., closed areas, perceived fish tainting); however, the spatial extent and temporal scale would be smaller.

The proponent stated that a spill of synthetic-based muds would have the potential to change habitat availability and quality, fish mortality, injury and health, and fish presence and abundance. The proponent stated that a spill of synthetic-based muds would have the potential to result in seabed disturbance, chemical toxicity bioaccumulation (the uptake of contaminants by invertebrates or fish), and the presence or perception of taint; and therefore, result in potential adverse effects on fish and fish habitat. The proponent predicted that, as the toxicity of synthetic-based muds is considered low, the adverse environmental effects on marine biota and habitats would be low. Sediment deposition and burial would result in injury and mortality of sessile or low mobility species. The proponent indicated that the predicted zone of influence for surface spills on marine sediments would be between 550 metres to 1,500 metres, depending on water depth. However, for subsurface releases, the predicted zone of influence for where burial effects may occur would be between 200 and 220 metres of the release site. As noted above regarding recovery of benthic habitat, the proponent predicted recovery to occur over a few years, based on an aerobic environment for hydrocarbon degradation.

The proponent predicted that the potential adverse environmental effects of a spill of synthetic-based muds on special areas would be the same as on fish and fish habitat, as special areas have been identified and/or protected due to the presence of high densities of corals and/or sponges. The potential effects of a synthetic-based muds spill on migratory birds, marine mammals and sea turtles, commercial fisheries and other ocean users would be similar to other hydrocarbon exposures. However, synthetic-based muds are heavy, dense fluids that sink rapidly and the effects on the water surface would be limited compared to marine diesel or crude oils spills.

Effects of Dispersants

The proponent stated that dispersants may be used to respond to spills if authorized by the C-NLOPB, and although they can accelerate the degradation of spilled oil, they have the potential to increase the toxic components of the oil and thus, affect fish species throughout the water column and the benthic environment. Chemically dispersed oil may have more pronounced effects on the pelagic early life stages of fish and invertebrates than on adults, and may cause reduced larval settlement, abnormal development and tissue degradation, with some studies indicating an increased rate of deformities and mortality in certain fish eggs.



The proponent stated that dispersed oil has similar effects on birds to those of untreated oil. However, the proponent indicated that with the application of dispersants, potential exposure to floating oil on the sea surface and shorelines would be reduced. The use of dispersants may be beneficial for marine mammals within a spill area by reducing the exposure to floating oil on the sea surface. However, it may expose swimming or feeding marine mammals to the consumption of contaminated fish, skin/fur contamination and potentially the clogging of baleen in whales. The proponent noted that overall, dispersants mitigate the potential effects of oil on birds, marine mammals and sea turtles.

Prevention, Preparedness, and Response Measures

The proponent committed to implementing preventative measures to manage the risks of incidents occurring and to mitigate potential adverse environmental effects. These measures include those related to routine maintenance and testing; development of standard operating procedures; equipment design and engineering; mechanical controls; and personnel training. The proponent stated that in the unlikely event of a spill, the proponent's contingency plans, based on well control and containment, would provide a basis for an emergency response.

Should a blowout occur, the proponent indicated if well control measures failed, a capping stack may be required to stop or divert the well flow. The proponent indicated that typically a capping stack is installed while the relief well was being drilled to permanently shut-in the well. The proponent stated that, if required, a capping stack would be mobilized by sea, and could be mobilized and deployed within 18 to 36 days of the incident occurring. The precise duration for cap installation and closure would be highly dependent on a number of factors including sea states and local conditions specific to the incident, vessel mobilization, need for clearance surveys, site preparation, etc. The proponent noted that, in the event of a subsea blowout, it would mobilize and install the capping stack as rapidly as safely possible, and that the capping stack would be shipped from either Norway or Brazil.

The proponent estimated that a relief well could be executed in 100 to 115 days, taking into consideration the time required to have a drilling installation arrive on site, time for regulatory permitting, and technical considerations.

The proponent stated that its Oil Spill Response Plan would be approved by the C-NLOPB during the Operations Authorizations approval process, and would include a range of response tactics appropriate for use offshore and onshore, in the event that oil reached shorelines, and may include containment and recovery of oil, and surveillance and tracking measures of spilled oil.

The proponent committed to developing and implementing a compensation program for damages resulting from project activities, including spill events. The compensation program would be developed in consideration of the C-NLOPB Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities (2017) and will be aligned with the Best Practices Document for Compensation Processes and Procedures being developed by One Ocean³³.

³³ One Ocean is the liaison organization established by and for the fishing and petroleum industries of Newfoundland and Labrador. The organization is comprised of a Chairman, Secretariat and the One Ocean Industry Board, which has equal membership representation from both industry sectors.



5.1.3 Views Expressed

Federal Authorities

ECCC provided comments on the potential negative impacts of dispersants on migratory birds. ECCC advised that in laboratory experiments, birds exposed to oil, or a dispersant and oil mixture, experienced dose-dependent waterproofing impairment without recovery over two days, and the impacts of oil and dispersed oil did not improve over time. ECCC stated that results of laboratory experiments may differ when compared to open cold water conditions in the project area.

ECCC suggested the potential for exposure and the likelihood of adverse effects on marine and migratory birds within 250 kilometres of a release would be low to medium in magnitude depending on the timing and location of the batch spill. ECCC stated that impacts of crude batch spills to individuals may be significant.

DFO advised that the effect of an oil spill on the connectivity for vulnerable marine ecosystems and economically important species was not assessed. It indicated that the recolonization of benthic communities from potential impacts would be influenced by population patches and connectivity, and influenced by oceanographic regime.

DFO commented that the observations from the Deepwater Horizon blowout which indicated that a significant portion of the oil was found on deep-water coral and sponge reefs in the area was not considered by the proponent. The proponent responded that the model did allow for a small amount of the release to settle, and that it would be this portion that would affect deep-water corals, and sponge reefs. The proponent noted that analysis is ongoing and there has not been a scientific consensus on the fate pathways and relative amounts of hydrocarbons that may sink as a result of an unmitigated or mitigated release. The proponent confirmed that the model contained current state of knowledge and was validated against real world releases.

Natural Resources Canada noted that the spill model used is limited in its ability to predict the degradation and sinking of crude oil heavy ends and corresponding smothering effects on benthic biota. Natural Resources Canada advised that the model does not consider the contents of the persistent portions of the crude oil and that biodegradation rates are therefore over-estimated. However, Natural Resources Canada agreed that this is an ongoing area of research and has indicated that it will conduct simulations, publish data and continue discussions with industry to further advance existing models.

Indigenous Groups

Several Indigenous groups requested information on the role of Indigenous groups in the development, review, and implementation of the Oil Spill Response Plan and other contingency plans, as well as the role that Indigenous groups would have in reviewing the effectiveness of response measures in the event of an accident.

MTI stated that in the event of an accidental event, not only could communal commercial harvesters be affected as a result of closed areas or lost or damaged vessels or gear, but that spills would adversely affect species that migrate to the spill areas and are then harvested for food, social, or ceremonial reasons (e.g., Atlantic salmon, bluefin tuna). MTI is of the view that the compensation plan should not

only consider potential effects to the communal commercial harvesters, but also losses and/or damages to the food, social, and ceremonial fisheries.

Several Indigenous groups, including MTI, MMS and KMKNO, expressed concerns related to relying on a capping stack from Norway or Brazil in the event of a well blowout. These groups stated it should be required that a capping stack be located in Atlantic Canada. Several groups also indicated that, in addition to the capping stack, it is critical to have a locally managed entity to ensure appropriate capacity for equipment modification, rapid staging and development, and to be involved in continual research and development of best available and safest technologies.

Public

World Wildlife Fund – Canada expressed concerns related to the effectiveness of a spill response, in severe weather in deep waters offshore Newfoundland and Labrador. In addition, Sierra Club Canada and World Wildlife Fund – Canada provided comments related to the effectiveness of response measures, including dispersant application and in situ burning, due to the harsh environmental conditions (e.g. wave height, wind, ice, etc.) offshore Newfoundland and Labrador.

5.1.4 Agency Analysis and Conclusion

Analysis of Effects

The Agency is of the view that an accidental release of oil from an uncontrolled blowout, batch spills and untreated whole synthetic-based muds releases would result in potential adverse environmental effects on fish, migratory birds, marine mammals, and sea turtles, including species at risk. In addition, a spill could result in adverse environmental effects on special areas; socio-economic conditions; commercial fisheries; Indigenous peoples; and other ocean users. The Agency recognizes that predicted potential adverse environmental effects from a blowout spill could have transboundary effects as the Project is located in international waters, and that international shorelines could be reached. The Agency acknowledges that the proponent predicted the probability of a blowout or well-release of any size from a producing well would be as low as 5.89×10^{-5} , but that it would vary depending on water depth. The Agency is aware that accidental events from oil production activities in this region have occurred in the past; however, the vast majority of these events have been relatively minor. Large-scale releases, are less likely to occur, but could have major consequences on the marine ecosystem and resource users.

The Agency is aware that the C-NLOPB verifies that appropriate measures are in place for spill prevention, preparedness, and regulatory compliance, and that the C-NLOPB's expectations for facility safety, pollution prevention and emergency response capability are met (e.g., Oil Spill Response Plan, a plan for well capping and containment, Environmental Protection Plans, etc.). The C-NLOPB advised the Agency that as part of its Operations Authorization and approval processes, the proponent would be required to demonstrate that there is a satisfactory approach to risk management in place; take all reasonable measures to minimize the probability of accidents; and is sufficiently prepared to appropriately respond in the event of an accident.

The Agency also understands that the Oil Spill Response Plan would incorporate recommendations and guidance from ECCC, including measures related to wildlife surveillance, wildlife deterrent techniques, and the collection and storage of deceased wildlife. In addition, the Oil Spill Response Plan would



require the proponent undertake a spill impact mitigation assessment which would 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 prior to actual implementation.

The Agency acknowledges that the Operations Authorization would include a plan for well capping and containment, required by the C-NLOPB, and would contain a discussion of any potential options to reduce overall timelines. The plan would include detailed accounting of timelines for mobilization and installation of capping stacks; review of opportunities to conduct preparatory work that may reduce timelines (e.g., permitting requirements, Canadian Customs and Border Services Agency requirements), and availability of drilling installations to drill a relief well. In addition, the proponent would be required to demonstrate that it has 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 Agency recognizes that, if required, a capping stack would be sourced from Norway or Brazil and transported directly to the well site by vessel; and that mobilization and installation of the capping stack could take between 18 and 36 days. The Agency is aware that that having a capping stack system in eastern Canada would be unlikely to reduce the overall time for installation. 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, including clearing of the site and cutting away of debris to ready the well for capping stack installation.

The Agency recognizes that, even if effects on species important to Indigenous and non-Indigenous groups are relatively minor, perceived contamination may discourage individuals from engaging in certain traditional practices or consuming certain species that may have interacted with a spill. For both Indigenous and non-Indigenous fishers (domestic and international), any equipment damages and/or imposed exclusions, 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 Agency understands that the proponent would be required to develop and implement a Fisheries Communication Plan, in consultation with the C-NLOPB, Indigenous groups and commercial fishers. The plan would include procedures to communicate with fishers, including Indigenous fishers, in the event of an accidental spill.

The Agency accepts that project activities would likely have limited effects on species that migrate through the area. However, in the unlikely event of a blowout, the potential for more serious effects on these species may result in potential impacts on potential or established Aboriginal or treaty rights of Indigenous groups. Further, 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 consequence of an accidental spill on Indigenous fishers and Indigenous communities: however, the Agency accepts that the probability of a major subsea blowout is low, and therefore, the potential effects are unlikely. Indigenous groups would be notified in the development of spill response plans, and provided with the approved version. The Agency acknowledges that the Spill Response Plan would include sharing results of environmental monitoring and appropriate feedback mechanisms for the concerns of Indigenous groups, fishers and other ocean users.



The Agency notes that the proponent would be required to implement a follow-up monitoring plan (developed in consultation with DFO and the C-NLOPB) to monitor the effects of a spill and the effectiveness of the response measures. Monitoring could include taint and contamination testing of harvested fish species, marine mammal and migratory bird monitoring, and monitoring of benthic species and habitat in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment and to verify the predicted degradation rate.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying 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 well control strategies, which include measures for well capping, containment of fluids lost from the well and the drilling of a relief well(s), as well as options to reduce overall response timelines. The well control strategies 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;
- prior to drilling, submit a Spill Response Plan that takes into account the results of spill modelling and 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 or 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 ECCC; and
 - specific role and responsibility descriptions for offshore operations and onshore responders and the list of authorities to notify of a spill, including when they will be notified and the means to notify them;
- provide Indigenous groups with an opportunity to consult 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 throughout the project at an interval determined in consultation with the C-NLOPB and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise and any subsequent updates to Indigenous groups following review by the C-NLOPB;
- review and update the Spill Response Plan as required throughout the project at a frequency determined in consultation with the C-NLOPB and before commencing a new well, and provide the update to Indigenous groups;



- prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the project area and submit to the C-NLOPB for acceptance prior to drilling;
- undertake a 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. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Science Table. Publish the spill impact mitigation assessment on the internet;
- in the event of an 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 in the Fisheries Communication Plan a procedure to notify fishers in the event of an accident or malfunction and 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 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 has 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, 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 and any other contaminants, as applicable;
 - measuring levels of contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to be submitted to relevant authorities including those responsible for fishing area closures;
 - monitoring marine mammals, sea turtles and birds for signs of contamination or oiling and reporting results to the C-NLOPB; 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; and
- 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 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. Further, a large subsea release, although unlikely, could affect special areas and sensitive habitats. 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 potential effects on 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.

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 is of the view that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions.

5.2 Effects of the Environment on the Project

The Agency evaluated the effects of the environment on the Project from severe and irregular environmental conditions or events which can increase the probability of an accident or malfunction that could in turn affect the environment.

5.2.1 Proponent's Assessment of Environmental Effects

Several key environmental factors and phenomena may potentially affect the Project, including seismicity and geohazards: weather and oceanographic conditions: sea ice and icebergs: and climate change.

Seismicity and Geohazards

Potential offshore geohazards in the Flemish Pass consist of geological phenomena (e.g., tectonic events, venting of shallow gas, and gas hydrates) that may cause submarine landslides. Based on historic data, the proponent indicated that an offshore tectonic event could cause an earthquake that results in seafloor instability, which may result in a landslide that could damage subsea infrastructure, disrupt project activities, and increase the risk of potential accidental events; however, earthquakes are relatively rare throughout much of the region. The closest significant earthquake was a 4.1-magnitude event in 2018 (more than 300 kilometres away from the project area).



The proponent noted that there is a risk of a landslide every 20,000 years in offshore eastern Canada and a minor one may occur every few thousand years. Within the Flemish Pass, the proponent notes the worst-case scenario of a landslide is every 10,000 years (or approximately a 1 in 500 probability of a landslide occurring in a 20-year period). These slope failures would likely be triggered by major earthquakes in the northern Flemish Pass area. The proponent noted that given the 30-year life of the Project, the probability of a major seismic event (and resulting landslides or tsunamis) occurring during the Project is very low. A Certificate of Fitness would be obtained from an independent, third-party certifying authority for the FPSO and MODUs to ensure they are designed to mitigate potential environmental loads imposed by earthquakes and other naturally occurring phenomena.

Excess pore pressure resulting from shallow gas and hydrate formation³⁴ may also be a preconditioning factor for landslides; however, the proponent noted that shallow sediments within the project area generally lack sufficient conditions for the development of massive hydrate zones. In addition, direct hydrate encounters or issues related to hydrates have not been recorded in the region.

Climatology, Weather and Oceanographic Conditions

The proponent explained that adverse weather and oceanographic conditions may affect project activities. Poor visibility resulting from fog, heavy rain, or snow conditions can also hinder helicopter transits, which could potentially delay supply and personnel movement to and from the Project and increase the risk of an accidental event (vessel or aircraft collision). The proponent noted that there are set visibility requirements for helicopter flights. If these requirements are not met, flights will not occur.

The project area and surrounding areas have some of the highest occurrence rates of marine fog in North America, which is most prevalent in spring and summer. Visibility is poorest in summer, with very poor visibility (less than 500 metres) occurring 25 percent of the time in June, 40 percent in July, and 31 percent in August. The best visibility occurs during fall and winter.

The proponent indicated that a number of factors can contribute to vessel icing potential, including air and sea temperature, wind speed, wave height and precipitation. Vessel icing in this region is likely to occur in the period between November and May, with the highest frequency typically occurring in February. Icing of the FPSO and/or MODUs can result in a raised centre of gravity, slower vessel speed, and maneuvering difficulty, as well as problems with cargo-handling equipment. The proponent indicated that the FPSO will be designed in accordance with recognized standards to handle certain extreme icing loads. If the meteorological conditions are present, visual monitoring for the buildup of icing will be carried out, and if required, the ice will be removed.

High wind speed and waves can also increase stress conditions on the FPSO, MODUs, and other project vessels. A Certificate of Fitness would be obtained for the FPSO and MODUs to ensure it is designed to mitigate severe weather and oceanographic conditions. Similarly, the proponent indicated its selection of MODU and vessels would consider their operability in a harsh environment.

³⁴ Hydrate formation occurs due to the reaction of water with hydrocarbons present in the reservoirs. Hydrates are solid shaped ice-like crystalline particles formed when natural gas and water combine at low temperature and high pressure (<https://www.petropedia.com/definition/8142/hydrate-formation>).



The proponent stated it would contract weather forecasting services, which would provide forecasts specific to the project area and provide other support vessels, helicopters, MODUs, and the FPSO with forewarning of extreme weather conditions. The proponent indicated that vessel captains, helicopter pilots and the FPSO/drilling installation managers would have the authority to suspend or modify operations in case of adverse weather that could compromise the safety of offshore supply vessel, helicopter, or production/drilling operations.

Sea Ice and Icebergs

Sea ice and icebergs occur seasonally in the project area. Sea ice is typically present as early as mid- to late-January for the southwestern portion of the project area and covers most of the project area by the first week of February and remains until mid- to late-April. Sea ice along the vessel transit route may occur more frequently due to landfast ice (ice which forms and remains along the coast) and may pose a risk for project vessels, although landfast ice is unlikely to be a factor in the project area itself.

The proponent noted that climate change and the shrinking Arctic sea ice cover has resulted in more mobile sea ice. The increased mobility of sea ice from the Arctic poses a potential risk of increased multi-year ice (which is harder, stronger and usually thicker than first year ice) in the project area. The proponent stated that over the last 30 years, the National Research Council Program of Energy Research and Development iceberg database has records of 74 icebergs for the core development area, 1,255 icebergs within the project area, and 1,433 and 1,597 for the western and eastern portions of the vessel traffic route, respectively. Icebergs can be present in the project area from January through September, with the majority of icebergs observed in March and April.

The primary risk of sea ice and icebergs is associated with vessel collisions and impacts with the surface installations. Icebergs can pose a risk to subsea equipment; however, the proponent noted that there is no risk of iceberg scour on the Project since water depths in the project area range from 340 metres to 1,200 metres.

The proponent noted that it would monitor physical environmental conditions, including the presence and movement of icebergs, and establish practices and limits for operating in poor weather or under other conditions (e.g., presence of icebergs). The proponent would also have an emergency protocol to disconnect and move the FPSO and/or MODUs to a safe location in the event of a potential collision. The proponent committed to submit an ice management plan to the C-NLOPB for acceptance as part of the Operations Authorization.

Climate Change

Over the life of the Project, the proponent noted that the project area is predicted to experience changes in climate beyond what is presently found in recent trends and interannual variability. Air and sea surface temperatures are predicted to increase from current levels. Annual precipitation volumes are projected to increase by up to 10 percent in the Flemish Pass and be more intense; however, the number of precipitation events is projected to remain relatively unchanged. There is no expected increase in the frequency of tropical storms in the project area; however, hurricanes in the northwest Atlantic region are expected to be stronger due to climate change, with a greater percentage of high intensity hurricanes. The proponent further noted that the frequency of high-speed hourly wind gusts is expected to increase slightly in the project area, whereas sustained (hourly average) wind speeds are



projected to decrease slightly or remain unchanged. Warmer air temperatures could lead to an increase in mobile sea ice and iceberg caving rates, and less obstructed routes for movement to the project area.

5.2.2 Views Expressed

Federal Authorities

Natural Resources Canada advised that sediment failure is essentially a consequence of gradient, magnitude of seismic acceleration and sediment strength. Most continental margin sediments, except on slopes of more than a few degrees, are relatively stable and would require seismic accelerations associated with a large earthquake (magnitude of five or greater) to fail.

Natural Resources Canada advised that seismic events have far ranging impacts away from the epicentre and that a seismic event outside the project area may still affect the Project. The proponent noted that it would likely take a major earthquake in the northern Flemish Pass to trigger future landslides, which is consistent with the findings of a review of existing geophysical data from the Flemish Pass region.

ECCC advised that with increased warming, there is an expected increase in thick multi-year ice from the Arctic Ocean being transported southward and eventually reaching offshore Newfoundland.

The C-NLOPB advised that the proponent's assessment of effects of sea ice and icebergs on the Project, in particular their effects on the FPSO did not discuss the possibility of a collision with the FPSO or the resultant effects should a collision occur, such as an oil spill. The C-NLOPB confirmed that the proponent would be required to submit a safety plan for approval. This plan would address the possibility of pack sea ice or drifting icebergs in the project area and along the vessel route, and outline 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. More broadly, the proponent would also be required to implement a physical environment monitoring program and establish and enforce practices and limits for operating in all conditions that may be reasonably expected.

Indigenous Peoples

KMKNO questioned the proponent's measures for mitigating harsh (or extreme) weather events. KMKNO suggested that the proponent should recognize the importance of training, protocols and procedures (including clear roles and responsibilities for key crew members) and incorporate these into the mitigation measures. KMKNO also suggested that the proponent should establish conservative operating limit thresholds during extreme weather events and provide the process for identifying and assuring adherence to these thresholds.

KMKNO also questioned the proponent's assessment on how extreme weather events (e.g., high wind and wave conditions, iceberg impact with installations) may in turn result in effects to the environment (e.g., release of synthetic-based muds or hydrocarbons resulting from an emergency disconnect).

Miawpukek First Nation and MTI questioned how the proponent will meet its commitments to environmental monitoring should vessels become iced or encounter extreme or poor weather conditions. MTI suggested the use of supporting technology/equipment (e.g., bird radar, cameras,



acoustic recording/deterrents) to account for limitations of observer-based surveying during poor conditions.

Public

One member of the public expressed concern regarding the limited information on the impacts of more extreme weather events that are predicted due to climate change. Another member of the public noted that spill response can be challenging due to extreme weather and ice and that oil behaves differently in icy water which may influence the extent of an oil spill.

5.2.3 Agency Analysis and Conclusion

Analysis of Effects

The Agency understands that severe 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: weather conditions; oceanographic conditions; sea ice; icebergs; FPSO, MODU and support vessel icing; and geological instability and seismicity. These environmental conditions can affect the overall stability and functioning of the FPSO, MODU or support vessels. In extreme situations, these conditions may result in a required evacuation of the FPSO, MODU or other project vessels. Extreme environmental conditions may also result in failure of the FPSO, MODU or support vessel which could result in a spill or another unplanned event. A discussion on accidental spills of various volumes is provided in Section 5.1.

The FPSO, MODUs and other support vessels may be vulnerable to iceberg collisions, particularly in light of climate change predictions on warming temperatures and increased iceberg presence and movement through the project area and vessel route. The Agency understands that incidents and near misses involving collisions (including iceberg collisions) that 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.

The Agency understands that the proponent would obtain a Certificate of Fitness for the FPSO and MODUs 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 also be implemented over the life of the Project to forecast and respond to severe environmental conditions. The C-NLOPB *Offshore Physical Environmental Guidelines* describe the requirements for monitoring and reporting of environmental conditions.

The Agency further notes that the development and implementation of an Ice Management Plan is required under the *Newfoundland Drilling and Production Regulations* as part of the Safety Plan, which must be submitted by the proponent with an application for authorization by the C-NLOPB. The Ice Management Plan would outline methods for monitoring icebergs and sea ice and provide measures to protect the FPSO and other Project vessels, including systems for ice detection, surveillance and monitoring, data collection, reporting, forecasting and potentially ice avoidance, and disconnection and movement of the FPSO or MODUs as required. The proponent would be required to establish and enforce practices and limits for operating in all severe environmental conditions and to ensure that the FPSO and MODUs have the ability to quickly disconnect the riser from the well. The Agency considers



the Ice Management Plan to be appropriate for preventing potential effects associated with icebergs and sea ice.

The Agency agrees with Miawpukek First Nation and MTI that poor weather conditions, such as dense fog, heavy precipitation, and high winds and waves can hinder the efficacy of monitoring programs, particularly those for marine mammals and migratory birds. The Agency understands that the project area is located in a generally harsh environment, where poor weather conditions and extreme weather events are common. The project area and surrounding areas have some of the highest occurrence rates of marine fog in North America. The climate change predictions for the region suggest weather and oceanographic conditions may further inhibit these monitoring programs in the future, as annual temperature and precipitation levels, high-speed wind gusts, and storm severity increase. The Agency is of the view that for marine mammals and migratory birds these poor weather conditions may not only hinder the efficacy of the monitoring programs, but may hinder the efficacy of mitigation measures, particularly related to those measures designed to mitigate marine mammal collisions with vessels.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered measures proposed by the proponent, comments from Indigenous groups and advice from federal authorities in identifying key measures to mitigate the effects of the environment on the Project. The proponent shall:

- in consultation with the C-NLOPB and ECCC, develop and implement a physical environment monitoring program in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and meet or exceed 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, severe 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 with integrated adaptive management strategies to allow for the integration of updated climate model predictions and observations, 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 the FPSO, MODU(s) and shuttle tankers are designed to quickly disconnect in event of an emergency or severe weather conditions.

Follow-up

The Agency identified the following measures 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 severe 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.



Agency Conclusion

Based on commitments made by the proponent 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.

5.3 Cumulative Environmental Effects

Cumulative environmental effects are defined as the result of project-related residual effects that act in combination with the effects of other projects or activities that are certain and reasonably foreseeable. Cumulative effects can be additive, synergistic or antagonistic. This cumulative effects assessment was based on the Agency's guidance documents for assessing cumulative effects under CEAA 2012³⁵.

5.3.1 Approach and Scope

Proponent's Approach and Scope

The proponent's assessment focused on valued components with predicted residual environmental effects and potential effects of other relevant projects and activities that may contribute to cumulative effects. The proponent identified the zone of influence of project-related effects that overlap or interact with other ongoing and future petroleum-based projects and other activities (e.g., commercial fishing) in the regional study area. The temporal boundaries were based on the life of the Project (12 to 20 plus years).

Agency's Approach and Scope

The Agency's analysis of cumulative effects expanded the proponent's spatial and temporal boundaries. The spatial boundaries considered by the Agency covered the full extent of the proponent's regional study area and was not based solely on spatially overlapping or interacting projects. The temporal boundaries considered historic and recently drilled well records and extended through to decommissioning of the Project.

The Agency's analysis included those projects and activities identified by the proponent, as well as the BHP Newfoundland Orphan Basin Exploration Project (2019-2028) and potential future exploration projects identified by the C-NLOPB 2020 Call for Bids³⁶. The Agency's assessment excluded the Husky Energy Delineation/Exploration Drilling Program for the Jeanne d'Arc Basin Area (2008 – 2020) since it is captured within the White Rose and Extension Oil and Gas project area. Husky Energy's Jeanne d'Arc Basin/Flemish Pass Regional Seismic Program, which is scheduled for completion in 2020, was also excluded from the analysis since this project would not temporary or spatially interact with the Project. Projects and activities included in the Agency's analysis are listed in Table 9 and illustrated in Figure 6

³⁵ Operational Policy Statement (OPS): <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-under-canadian-environmental-assessment-act-2012.html>. Interim Technical Guidance (March 2018). <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html>.

³⁶ <https://www.cnlopb.ca/news/nr06112020a/>.



(due to the transient nature of geophysical surveys, vessel traffic and commercial fisheries, these activities are not shown in the Figure).

Table 9 Projects and Activities Considered in the Agency's Cumulative Environmental Effects Assessment

Project/Activity	Duration of Project/Activity	Distance to Project/Activity ¹ (kilometres)
Existing Petroleum Production Projects		
Hibernia Oilfield (Hibernia MDC)	1997 – 2040	157
Terra Nova Oilfield (Suncor Energy)	2002 – 2029	166
White Rose and Extension Oil and Gas (Husky Energy)	2005 – 2042	118
Hebron Oilfield (ExxonMobil)	2017 – 2042	160
Offshore Petroleum Exploration Drilling		
Flemish Pass Exploration Drilling Project (Equinor Canada)	2018 – 2028	< 1
West Flemish Pass Exploration Drilling Project (Chevron Canada)	2021 – 2030	0
Eastern Newfoundland Exploration Drilling Project (ExxonMobil)	2018 – 2028	Overlap
CNOOC International Flemish Pass Exploration Drilling Project	2020 – 2028	Overlap
Jeanne D'Arc Exploration Drilling Project (Husky Energy/ExxonMobil)	2018 – 2025	52
Newfoundland Orphan Basin Exploration Drilling Project (BP Canada Energy)	2017 – 2026	65
Central Ridge Exploration Drilling Project (Equinor Canada)	2020 – 2029	39
BHP Canada Exploration Drilling Project	2019 – 2028	35
C-NLOPB 2020 Call for Bid – Parcel 9 (BP Canada Energy)	TBD	102
Offshore Petroleum Geophysical and Other Exploration Activities		
2D, 3D, 4D Seismic Projects for the Hibernia Oilfield (Hibernia MDC)	2013 – 2040	123
Eastern Newfoundland Offshore 2D, 3D, 4D Seismic Program (Suncor Energy)	2014 – 2024	Overlap
Eastern Newfoundland Geophysical Program (ExxonMobil Canada)	2015 – 2024	Overlap
Eastern Newfoundland Offshore Seismic Program (WesternGeco Canada)	2015 – 2024	Overlap
Southeastern Newfoundland Offshore Seismic Program (WesternGeco Canada)	2015 – 2024	180
Eastern Newfoundland Offshore 2D, 3D, 4D Seismic Program (Polarus UK Ltd.)	2016 – 2022	Overlap
Newfoundland Offshore 2D, 3D, 4D Seismic Program (CGG Services)	2016 – 2025	Overlap



Project/Activity	Duration of Project/Activity	Distance to Project/Activity ¹ (kilometres)
Seitel's East Coast Offshore 2D, 3D, 4D Seismic Program (Seitel's Canada)	2016 – 2025	180
Offshore Seafloor and Seep Sampling Program (Fugro Geosurveys)	2017 – 2027	Overlap
Newfoundland Offshore Seismic Program (Multiklient Invest AS (MKI))	2018 – 2023	54
Eastern Newfoundland Geophysical, Geochemical, Environmental and Geotechnical Program (CNOOC Petroleum)	2018 – 2023	Overlap
Fishing Activity		
Commercial fisheries within and around the project area are widespread and diverse; less harvesting in the Core Area. Indigenous groups hold commercial-communal fishing licences for swordfish and tuna in NAFO 3L and 3M; no commercial-communal fishing occurs currently in these areas.	Continuous	Overlap
Vessel Traffic		
Vessel traffic occurs year-round throughout the region and includes offshore oil tanker and supply vessels, cargo ships, cruise ships, navy ships, fishing vessels and so forth. Other marine vessel traffic activity will extend throughout the temporal duration of the Project.	Continuous	Overlap
Hunting Activity		
Indigenous groups conduct traditional harvesting activities, including food, social and ceremonial (FSC), throughout the regional study area, but little or no hunting is expected to occur in the project area; hunting in nearshore areas of NL may affect bird and seal populations that occur in the regional study area.	Continuous	Overlap

¹ For the existing production facilities, measured as the closest distance between the project area and the existing facility. For exploration projects and geophysical projects, measured as the closest distance between the project area and the closest edge of the Exploration License area or the geophysical survey boundary. Distances determined using the C-NLOPB Offshore Petroleum Mapping Application (<https://dnr-energy-gis.maps.arcgis.com/apps/webappviewer/index.html?id=06ba697cc3c5407b8390daf28b3209d0>).

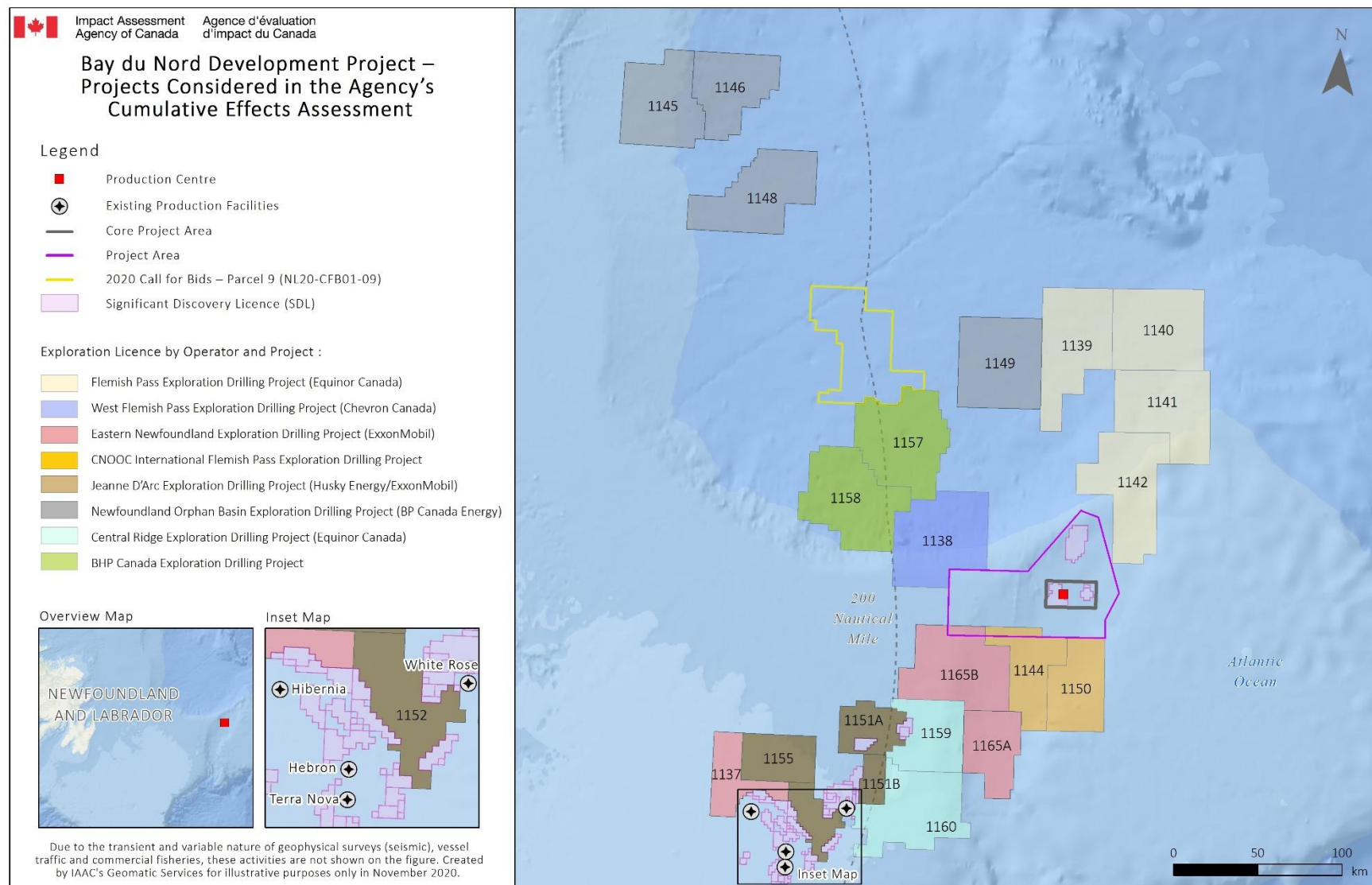


Figure 6 Projects Considered in the Agency's Cumulative Effects Assessment



A review of the C-NLOPB Schedule of Wells data indicated that 500 total wells (excluding re-entries) have been drilled in the Newfoundland and Labrador offshore region, including 263 production wells, 58 delineation wells, 177 exploration wells, and two delineation/exploration wells (dual classification)³⁷. For the drill cutting deposition analysis on relevant VCs (i.e., fish and fish habitat, special areas), the Agency extracted only those wells drilled in similar deep-water habitats or habitat features.

The Agency concluded that the environmental effects on valued components are not significant, after taking into account the key mitigation and follow-up program measures; however, the effects can be combined with the effects of other past, existing and reasonably foreseeable physical activities resulting in cumulative environmental effects. The Agency has considered all potential residual effects in its analysis of potential cumulative effects; however, the assessment focuses on those potential effects identified in the VC-specific sections with the greatest residual effect, greatest uncertainty related to the residual effect, or the greatest potential to interact cumulatively. These include:

- potential cumulative effects of drill cuttings deposition on fish and fish habitat;
- potential cumulative effects of sound emissions and vessels collisions on marine mammals;
- potential cumulative effects of light attraction and sheens on migratory birds; and
- potential cumulative effects of drill cuttings deposition and sound emissions on special areas.

Other potential effects considered by the Agency, but not discussed in the report include cumulative effects of light, produced water and subsea infrastructure on fish and fish habitat and cumulative effects on commercial fisheries.

5.3.2 Cumulative Effects – Fish and Fish Habitat

Proponent's Assessment of Environmental Effects

The proponent indicated that the Project may contribute to cumulative effects on fish (including species at risk) and fish habitat as a result of changes in habitat availability and quality; food availability and quality; mortality, injury and health; and fish presence and abundance. The proponent considered Project-related interactions with other projects/activities relative to produced discharges (including drill cuttings), sound and light emissions, and presence of infrastructure (including subsea).

The drill cuttings discharge modelling indicated that burial of benthic habitat (greater than 1.5 millimetres thickness) would extend up to 200 metres from each template site. Drill cuttings deposition above 1.5 millimetres may drift and settle up to two kilometres from the well site, which the proponent predicted would be patchy and not result in adverse effects on corals, sponges and sea pens. The proponent stated that drill cuttings modelling for recent exploration drilling programs are generally localized to within one kilometre from the wellhead. Released cuttings beyond one kilometre are predicted to be patchy and highly dispersed and are unlikely to form accumulations that would result in cumulative burial effects among projects. As such, the proponent concluded that drill cuttings deposition is localized and unlikely to result in significant adverse cumulative environmental effects on benthic habitats.

³⁷ Accessed December 2020. <https://www.cnlopb.ca/wells/>



The proponent predicted that effects of sound emissions on fish could extend out to 50 kilometres from seismic sound sources and may cause behavioural effects on fish with swim bladders, as well as species with sensitivities to particle displacement in the water column. The proponent predicted that although there could be distributional shifts of fish species within 50 kilometres of seismic activities, the overall behavioural effects would be temporary and all fish would not leave the area defined by the 50 kilometre radius. The proponent highlighted that the standard practice for seismic operators to communicate with each other to provide spatial and/or temporal separation of operations is expected to mitigate against cumulative effects of concurrent geophysical surveys.

The proponent predicted that sound emissions from MODUs (at 50% thruster capacity) would be localized (less than one square kilometre per MODU), limiting the potential for behavioural response in fish or cause potential fitness-related behavioural changes in fish species with swim bladders. Based on the minimum separation distance of 500 metres for each installation (due to safety zone requirements), any concurrent drilling activities among projects would be separated by at least one kilometre. As a result, the proponent predicted that sound emissions from other drilling installations would not result in cumulative effects with the Project.

The proponent concluded that with the application of proposed mitigation and environmental protection measures, the Project in combination with other projects and activities are not likely to result in significant residual adverse cumulative environmental effects on fish and fish habitat.

Views Expresses

Federal Authorities

DFO noted that the cumulative effects assessment only considered the potential for overlap of the Project's residual environmental effects with those of other projects. DFO noted that only residual effects deemed significant were considered in the proponent's cumulative effects assessment, thus the potential for additive or synergistic interactions with other projects were not addressed.

DFO noted that the proponent did not consider past projects as part of its cumulative effects assessment, as such it did not consider the potential for cumulative effects from the previous 15 exploration/delineation wells drilled in the project area. In addition, monitoring information (compliance or EEM) from these past activities was not discussed to support the determination that past wells had no residual effect on the environment. DFO also expressed concern regarding the proponent's conclusions on the extent of drill cuttings that may be detrimental to benthic habitats. DFO further noted the proponent minimized the potential for direct cumulative effects on habitat caused by fragmentation, alteration or contamination.

DFO recognized that there is uncertainty around the conclusions of cumulative impacts where there are multiple, acoustically-overlapping seismic programs and requested the proponent determine whether there are additional mitigation measures required (e.g., minimizing acoustic overlap and long-term shooting) for seismic sound.



Public

The World Wildlife Fund - Canada raised concerns that the proponent did not consider how Project activities could contribute cumulatively to other ongoing and planned oil and gas activities in the region, in light of the C-NLOPB's objective to drill of up to 100 new exploration wells by 2030.

Nature Newfoundland noted that the evidence provided by the proponent justifying the “localized” and “not significant” cumulative impacts on the marine environment were not sufficient and suggested further research be conducted prior to project implementation and monitored throughout the longevity of the Project.

Indigenous Peoples

The Miawpukek First Nation commented that the continued exploration in offshore Newfoundland may potentially exert direct impacts and cumulative effects on Atlantic salmon through seismic effects, changes to water quality, major accidents and malfunctions, and more. These effects may cause stress to migrating salmon, induce behavioural changes, reduce feeding efficiency and, in limited circumstances, direct mortality. Miawpukek First Nation suggested implementing the precautionary principle to mitigate potential harm, especially given the already extremely fragile state of the stock. Miawpukek First Nation also stressed that any negative effects to Atlantic salmon would represent a direct impact on its rights and interests.

MTI indicated that consideration of noise impacts or disturbance to migrating fish species was deficient and that a more comprehensive analysis of vessel traffic should be completed. MTI further noted that the proponent did not adequately consider the extent of cumulative impacts of drilling muds release on the overall marine environment.

Agency Analysis and Conclusions

The Agency considered the analysis of cumulative environmental effects provided by the proponent, advice from federal authorities and comments received from the public/Indigenous groups and is of the view that the residual environmental effects of the Project on fish and fish habitat could interact cumulatively with the effects of other projects and activities.

Cumulative Effects of Drill Cuttings Dispersion

The Agency notes that the proponent's cumulative effects assessment was only based on potential overlapping deposition from approved and proposed exploration projects in adjacent exploration licence areas. The Agency conducted a quantitative assessment of potential cumulative effects on benthic habitat from the accumulation of drill cuttings. The Agency's analysis focused on: 1) potential mortality of benthic species due to burial, and 2) potential changes in sediment chemistry from synthetic-based mud deposition resulting in potential toxic effects (e.g., reduced feeding, growth and reproduction). As discussed in Section 4.1, burial of benthic habitat may extend up to 1.26 square kilometres and potential toxic effects may extend up to 110 square kilometres (taking into account overlapping deposition) within the project area.

The Agency's analysis was focused within similar sensitive, deep-water habitats of the Flemish Pass and Orphan Basins. The Agency identified 18 historic or recent wells drilled in the project area, including 13 wells drilled by the proponent during exploration/delineation activities, three new wells drilled by the



proponent since summer 2020, and two historic wells drilled in 1985 and 2003. Within the regional study area, the Agency identified six approved or proposed exploration drilling projects, as well as the C-NLOPB 2020 Call for Bids parcel with the successful bid (NL20-CFB01-09), located in similar deep-water habitat (Table 9). The Agency also identified 11 historic wells within deep-water habitats.

For the analysis, the Agency applied the following assumptions relative to the estimated dispersion and number of wells:

- Drill cuttings from the 18 past and recent wells drilled in the project area were assumed to disperse in a manner described in the proponent's modelling for the Project;
- Drill cuttings dispersion from the six exploration drilling projects was based on worst-case modelling for each project;
- The NL20-CFB01-09 parcel was assumed to have the potential for up to six exploration/delineation wells (based on the average number of approved/proposed wells for the eight other exploration projects in the area);
- The estimated drill cuttings deposition for the NL20-CFB01-09 parcel and historic wells was extrapolated from the average dispersion of the six exploration drilling projects; and
- No overlapping drill cuttings areas, except for those drill sites known to overlap in the project area.

The Agency's analysis indicates that 16.9 square kilometres of deep-water benthic habitat may be buried by drill cuttings and muds. The Project represents nearly eight percent of this estimated burial footprint (Table 10). The analysis further notes that up to 400 square kilometres of deep-water benthic habitat may be cumulatively harmed by toxic sediment deposition from drill cuttings and synthetic-based mud, of which the Project represents 28 percent (Table 10). The Agency's analysis does not consider drill cuttings fines that may remain suspended beyond the modelled domains due to limited information provided in the EIS.

The Agency acknowledges that many approved and proposed exploration wells are unlikely to come to fruition. A review of the Regional Assessment³⁸ indicated that the average and median numbers of wells drilled under any individual exploration licence issued by the C-NLOPB are 0.35 wells and 1.0 wells, respectively. While these values may represent a more likely scenario, they may not be representative of future drilling objectives in the Newfoundland offshore region. The Agency's approximation provides a potential worst-case scenario of cumulative drill cuttings deposition that could result in mortality or harm to sensitive benthic species (e.g., corals, sea pens and sponges). The analysis does not consider the potential for significant discoveries and development into production licences. The Agency notes that the requirements for proponents to relocate drilling activities or discharges if aggregations of environmentally sensitive species are identified would reduce the cumulative environmental effects on benthic habitat and species.

Table 10 Potential Cumulative Effects of Drill Cuttings and Muds in Deep-Water Habitat of the Flemish Pass and Orphan Basins

³⁸ Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador.
<https://www.ceaa.gc.ca/050/evaluations/proj/80156>.



Projects/Activities	No. of Potential Wells ²	Burial Effects		Toxic Effects	
		Footprint per Well (square kilometres) ³	Total Footprint (square kilometres)	Footprint per Well (square kilometres) ³	Total Footprint (square kilometres)
Wells within Project Area					
Proposed Wells Centres	10	0.13	1.26	12.56	110.67
Existing Wells (incl. 2 historic wells) ¹	18	0.13	2.34	12.56	171.45
Exploration Drilling Projects and Other Wells					
Flemish Pass (Equinor Canada)	12	0.10	1.20	1.00	12.00
Newfoundland Orphan Basin (BP)	20	0.08	1.60	0.93	18.60
Eastern Newfoundland (ExxonMobil)	16	0.10	1.60	1.00	16.00
CNOOC International Flemish Pass	10	0.18	1.80	2.00	20.00
West Flemish Pass (Chevron)	8	0.28	2.24	1.60	12.80
BHP Canada	20	0.12	2.40	0.90	18.00
2020 Call for Bids - Parcel 9 (BP)	6	0.14	0.84	1.24	6.84
Historic Exploration Wells	11	0.14	1.54	1.24	13.64
Total	131	-	16.82	-	400.00

¹ Estimated total deposition corrected based on overlap with proposed Project wells.

² Based on approved or proposed number of wells for each exploration project. Number of wells for potential future ELs based on average number of wells (6) from the eight exploration projects in the regional study area.

³ Based on EIS documents for each project. The estimated drill cuttings deposition for the NL20-CFB01-09 parcel and historic wells was extrapolated from the average dispersion of the six exploration drilling projects.

Cumulative Effects of Sound Emissions

The Agency is of the view that project-related effects of sound emissions on fish may cumulatively interact with other projects and activities in the region. The Agency's determination is based on the modelled zone of influence for project-related behavioural effects of sound emissions on fish (between 25 to 50 kilometres [or about 1,960 to 7,855 square kilometres] from seismic sound source). Sound emissions produced from petroleum activities cause little direct physical damage to fish beyond a few hundred metres from the source.

A review of sound modelling predictions from other petroleum-based activities in the region indicated that sound propagation eliciting a behavioural response from fish may extend up to 35 kilometres for the existing production facilities, between 56.8 and 150 kilometres for exploration drilling projects, and between 50 and 150 kilometres from geophysical seismic activities. The Agency identified that the four existing production facilities and all eight approved and proposed exploration drilling projects would temporally overlap with the Project. All exploration projects, except the Husky/ExxonMobil Jeanne D'Arc Exploration Drilling Project, may spatially overlap with the Project. The existing production projects do not spatially overlap with the Project's predicted sound emissions; however, these projects, as well as

the Husky/ExxonMobil project, will additively contribute to sound emissions within the region. The Agency notes the importance of recognizing additive effects of sound emissions from non-overlapping activities since DFO has indicated that many marine finfish can travel across great distances on their migrations (e.g., Atlantic salmon) and may experience disturbances from multiple human-caused sound sources across a relatively large region.

The Agency conducted a quantitative assessment of potential sound emissions that may result in cumulative adverse effects on fish using the sound modelling from the Project and other projects in the region. Since exploration projects are generally short-term, transient and temporary in nature and MODUs are generally limited in availability, the Agency assumed two non-spatially overlapping exploration drilling projects could be simultaneously active with the Project. The analysis suggests that between 20,270 and 141,400 square kilometres of the region may be disturbed by sound emissions from exploration projects. Assuming one seismic survey is being undertaken in the region but not overlapping with sound emissions from the Project or exploration projects, adverse behavioural responses may occur over an additional 7,850 to 70,685 square kilometres. The Agency understands, based on advice from the C-NLOPB, that it is not uncommon for multiple seismic survey programs to be undertaken simultaneously. Under this scenario, sound emissions from multiple seismic vessels interacting with sound emissions from the Project (and other activities) could be expansive. The Agency acknowledges that the two exploration drilling projects and one geophysical seismic survey operating in relatively close proximity may produce overlapping sound emissions, thus reducing the potential spatial extent of behavioural effects on fish; however, overlapping sound emissions may result in increased sound disturbance over a reduced area (synergistic effects) and produce greater behavioural responses than would each sound source acting independently.

The sound emissions from the existing production facilities are assumed to be continuous, further adding about 9,400 square kilometres of sound emissions to the region. Depending on the source location, commercial fishing and other vessel traffic activities will also additively or synergistically contribute to sound emissions, further exacerbating adverse effects on the auditory environment for fish.

The cumulative sound emissions generated by the Project and other offshore petroleum activities suggest those species whose ranges covers a large extent of the region may be exposed to various sources of underwater sound emissions throughout their lifecycle that do not necessarily overlap (additive effect). Atlantic salmon is of particular concern due to their importance to Indigenous communities and their potential use of the region. Based on known Atlantic salmon migration routes and overwintering areas, DFO acknowledges there is low potential for interaction with the Project. DFO has previously advised that monitoring of finfish for the past 25 to 30 years in the Newfoundland and Labrador offshore region has revealed no appreciable effects on fish health from previous or ongoing oil and gas operations.

Key Mitigation Measures to Avoid Significant Effects

The Agency has identified mitigation measures, follow-up and monitoring related to fish and fish habitat to reduce project-specific effects (Section 4.1). The Agency is of the view that these measures would reduce the Project's contribution to cumulative effects and would serve to verify the accuracy of the predictions made during the environmental assessment process.

Agency Conclusion

The Agency is of the view that residual adverse cumulative effects on fish and fish habitat would occur continuously for drill cuttings deposition and sound emissions. The potential drill cuttings analysis represents a worst-case scenario of deposition that could result from the previous wells in the Flemish Pass and if all approved and proposed wells for exploration drilling projects are carried out. The effects to benthic and pelagic finfish would be reversible once the Project is completed; however, the effects from sediment deposition and dispersion resulting in burial or smothering effects to sensitive benthic species (e.g., corals, sponges and sea pens) may not be reversible due to the extensive time for recolonization in deep-water habitats. The geographic extent of drill cuttings deposition is considered to be in the deep water habitats of the regional study area, with up to 400 square kilometres of benthic habitats potentially affected. The Agency understands that the potential adverse effects to benthic habitats would be reduced if wells and infrastructure are located in less sensitive habitats or compensation measures are implemented for the habitat loss. The Agency is of the view that cumulative effects from sound emissions would be reversible and the geographic extent would be dependent on the sound source and its location, but has the potential to affect up to 229,000 square kilometres. The Agency is of the view that the magnitude of effects related to sediment deposition and sound emission is medium because a portion of the deep-water benthic and pelagic populations may be affected over one or more generations and over multiple trophic levels. The long-term integrity of any one population is unlikely to be adversely affected. Due to the uncertainty of models as well as the limited information of species occurrence, distribution and diversity, the magnitude of effects is uncertain.

Taking into account the implementation of the mitigation measures proposed for the Project, the Agency is of the view that the Project is not likely to contribute to significant adverse cumulative environmental effects on fish and fish habitat. The Agency's conclusion is based on an understanding that drilling activities can avoid sensitive benthic habitats and that sound emissions from the various cumulative sources (i.e., other exploration and geophysical activities) are temporary, short-term, and reversible, and have limited temporal and spatial overlap.

5.3.3 Cumulative Effects – Marine and Migratory Birds

Proponent's Assessment of Environmental Effects

The proponent stated that potential interactions with artificial lighting from the Project and other projects and activities in the region is the primary cumulative effect of concern for migratory birds. There may also be sensory disturbance or a risk of mortality or injury from underwater sound, discharges, and vessel and helicopter traffic, as well as changes in the availability, distribution, and/or quality of food resources or habitats due to physical displacement from vessel presence, disturbances, and/or Project-related waste discharges.

The proponent focused the cumulative effects assessment on Leach's Storm-Petrel due to its vulnerability to light attraction in the offshore environment, where this species undertakes extremely long foraging trips during the breeding season and post-fledging period into waters within and surrounding the project area. Individual petrels may interact with other offshore petroleum projects and activities in the region resulting in potential cumulative effects on individuals or populations.



The proponent asserted that the existing offshore production facilities located greater than 118 kilometres from the project area would not contribute to cumulative effects of Leach's Storm-Petrel. The proponent indicated that the zones of influence for light emission produced by the Project and the relatively short-term nature of residual effects associated with nearby geophysical surveys and exploration drilling, would reduce the likelihood of potential spatial and temporal overlap of residual effects of the Project and other projects/activities. The proponent acknowledged that the predictions have been made with a moderate to high level of confidence due to the uncertainty in the distance at which Leach's Storm-Petrel and other seabirds are attracted to artificial lighting.

Leach's Storm-Petrels and other seabirds undertaking long-distance movements between nesting colonies and foraging areas in Flemish Pass have the potential to interact with waste discharge from multiple production projects. However, given the distance between the Project and these other offshore production projects, the proponent did not anticipate the interactions with sheening and other discharges to overlap spatially. The proponent also noted that the existing production facilities have demonstrated a localized geographic extent of sheen formation. Similarly, zones of influences associated with other discharges, including food and sewage wastes, are localized to the installations. The proponent concluded the number of individuals exposed to all the producing operations is likely small and therefore, the cumulative effects of sheening on birds from waste discharge would be unlikely.

The proponent indicated that with the application of proposed mitigation and environmental protection measures, the Project in combination with other projects and activities is not likely to result in significant residual adverse cumulative environmental effects on migratory birds.

Views Expressed

Federal Authorities

ECCC noted that Leach's Storm-Petrel transits over vast areas in order to reach their foraging areas; therefore, multiple exposures may occur for migrating birds from multiple project light emissions. The foraging range of two Leach's Storm-Petrel colonies collectively overlap with the project area as well as the existing production facilities and as a result are exposed to light emissions, and at greater risk of light attraction, from all existing production facilities and support vessels.

ECCC also indicated that it disagreed with the proponent's analysis on the cumulative effects of oil sheens and produced water on marine birds. ECCC noted that additional areas of sheening are likely to result in a cumulative effect.

ECCC expressed concern regarding whether residual effects would be adequately addressed through search and release efforts of stranded birds. Without a systematic search methodology and documentation of search effort, ECCC indicated it is difficult to quantify the number of dead birds that may go undetected during the searches. ECCC requested that the proponent implement a systematic monitoring program to verify the effectiveness of measures to mitigate any uncertainty in the prediction of residual adverse effects on marine and migratory birds.

Agency Analysis and Conclusions

The Agency is of the view, based on the analysis from the proponent, advice from federal authorities and comments from Indigenous groups and the public, that the residual effects of the light emissions



(including flaring) and waste discharges from the Project could interact cumulatively with the effects of other projects and activities.

Cumulative Effects of Light Emissions

The Agency understands that attraction of seabirds to artificial light has been demonstrated at distances of less than two kilometres from gas flares and up to five kilometres from production facility lighting; however, ECCC noted there remains uncertainty regarding the predicted zone of influence related to light attraction in the offshore environment. As described in Section 4.2 (Marine and Migratory Birds), the effects of light emissions on migratory birds could extend out to an estimated 1,448 to 1,540 square kilometres during hook-up and commissioning and operations. The Agency applied the upper estimate in its analysis. The Agency used the proponent's 15 kilometre zone of influence to determine the potential cumulative effects of artificial light sources on seabirds from other projects.

The Agency's assessment of light emissions from other exploration projects revealed five approved or proposed projects that have the potential to result in overlapping cumulative effects of artificial lighting on birds³⁹. With the limited availability of MODUs in the offshore region, the Agency assumed two additional MODUs operating simultaneously with the two Project MODUs would result in additional light emissions spanning 1,414 square kilometres. When combined with the worst-case extent of light emissions produced from the Project, the cumulative effects may result in up to 2,954 square kilometres of continuous or fragmented light disturbance (depending on whether the individual zone of influences abut).

Seismic vessels would also produce additional light sources within the surrounding areas. The approved or proposed boundaries of up to nine geophysical projects overlap or are in close proximity to the project area. Assuming one seismic survey is being undertaken in the region, but not overlapping with light emission from the Project or exploration projects, adverse effects of artificial light may occur over an additional 707 square kilometres. The Agency understands that it is not uncommon for multiple seismic survey programs to be undertaken simultaneously. For example, a review of the C-NLOPB records indicates that during one week in August 2019, five seismic vessels were simultaneously conducting seismic surveys in the region. Under such a scenario, light emissions from five vessels interacting with light emissions from the Project would contribute 3,535 square kilometres of additional light emissions in the region. A visual representation of potential cumulative lighting is provided in Figure 7.

The Agency agrees with ECCC that the additive cumulative effects analysis should incorporate the presence of artificial lighting along flight paths and not solely spatially overlapping light sources. In this context, the Project has an even greater potential to act cumulatively with the effects of other offshore projects and activities on migratory birds, including light emissions from the existing production facilities. The additive cumulative effect may be most relevant to Leach's Storm-Petrel, as this species is considered to be the most sensitive to artificial lighting given its nocturnal foraging behaviour. Both the Project and other existing production facilities are located within the foraging ranges of two important Leach's Storm-Petrel colonies on Baccalieu and Gull Islands. The impacts of light emissions would be

³⁹ Includes Flemish Pass Exploration Drilling Project (Equinor); CNOOC International Flemish Pass Exploration Drilling; Eastern Newfoundland Exploration Drilling Project (ExxonMobil); and West Flemish Pass Exploration Drilling Project (Chevron).



greatest during the breeding season when adults spend extended time at sea during foraging trips (up to 6 days per trip) and the post-fledging period (September and October) when juvenile birds not adapted to their offshore environment are most susceptible to artificial light. Assuming a 15 kilometre zone of influence around each existing production facility (and accounting for overlapping light emissions), the existing production facilities contribute around 2,300 square kilometres of light emissions within the foraging ranges of these two storm-petrel colonies. This additional light source constitutes approximately 5,961 square kilometres of cumulative light emissions within the foraging ranges of the Baccalieu and Gull Island colonies which represents approximately 0.83 percent of the approximately 721,575 square kilometres of foraging area of both combined colonies (Hedd et al., 2018). This area does not include additional light sources from fishing activity, vessel traffic or hunting activity that are difficult to quantify due to their irregular nature and locations. The Agency, with advice from ECCC is of the view that this cumulative area exposes Leach's Storm-Petrel and other seabirds to greater risk of mortality or physical injury due to potential stranding and increased opportunities for predation, collisions with structures, and individual or mass incineration events during flaring activities.

The Agency agrees with ECCC that the Regulations Respecting Excluded Physical Activities (Newfoundland and Labrador Offshore Exploratory Wells)⁴⁰ and recent condition statements for exploration projects will reduce the potential for cumulative effects. The Agency understands that ECCC is working with petroleum companies to implement industry-wide daily monitoring protocols to document the presence of stranded birds, as well as requiring knowledge sharing and incorporation of new technologies (e.g. radar, infrared imaging, high definition aerial surveys, telemetry studies, etc.) as they become available. Research that arises from the future ESRF will also help better understand if and how seabirds, in particular Leach's Storm-Petrel, are attracted to light generated by oil and gas activities in the Atlantic offshore environment. Such coordination would facilitate the reduction of cumulative effects of light attraction on seabirds.

⁴⁰ Regulations Respecting Excluded Physical Activities (<https://www.canada.ca/en/impact-assessment-agency/corporate/acts-regulations/legislation-regulations/regulations-respecting-excluded-physical-activities.html>). Developed based on recommendations from the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (<https://iaac-aeic.gc.ca/050/evaluations/proj/80156>).

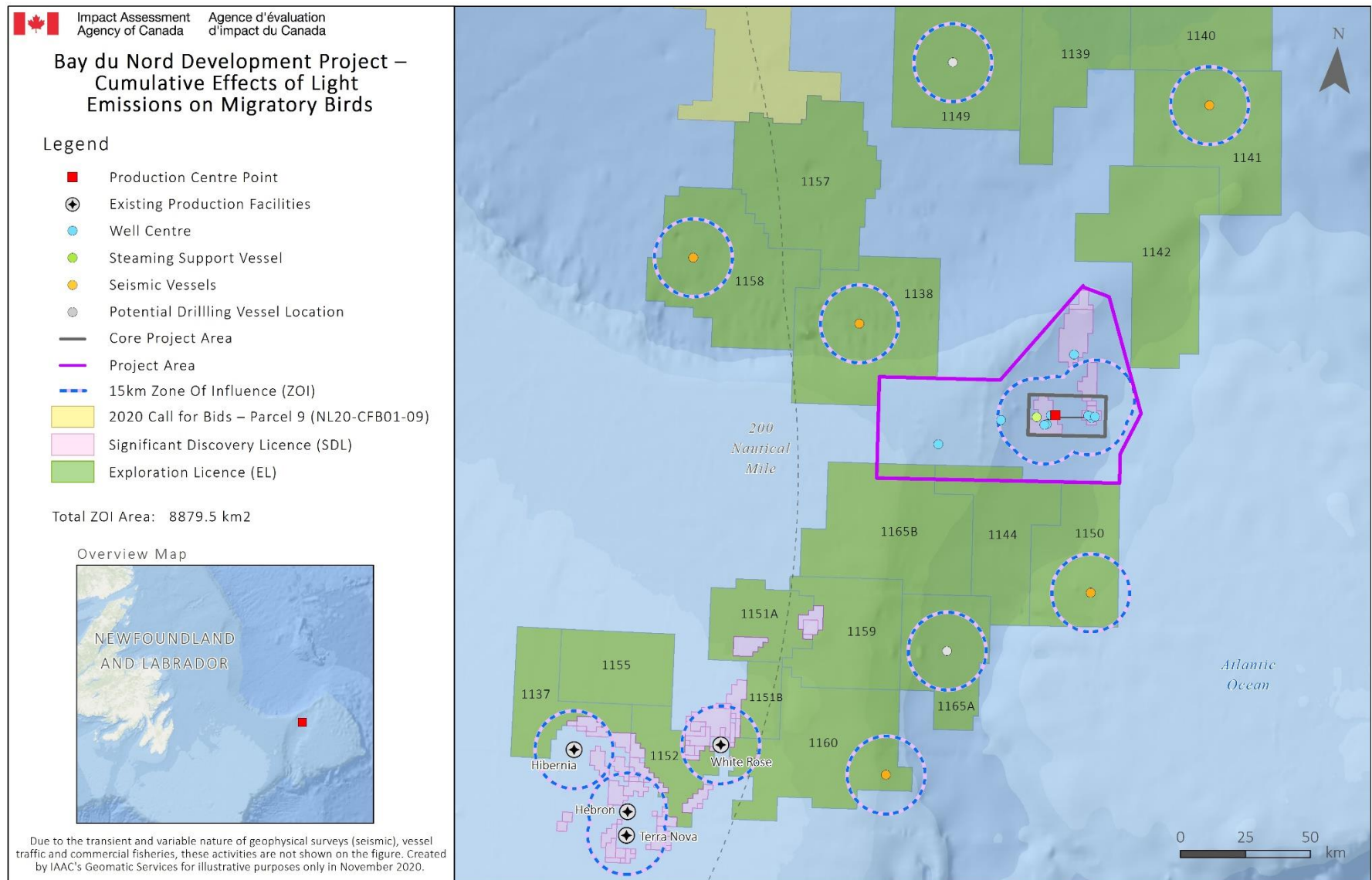


Figure 7 Potential Cumulative Effects of Light Emissions on Migratory Birds



Cumulative Effects of Waste Discharges

Based on advice from federal authorities and comments from Indigenous groups and the public, the Agency is of the opinion that the residual effects of waste discharges on birds could interact cumulatively with the effects of other projects and activities.

Migratory birds with large ranges may be exposed to oil sheen discharges from various sources within the region throughout their life cycle, potentially resulting in a cumulative change in habitat quality and use. Discharges of drilling operations 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 they are particularly vulnerable to hydrocarbon contamination. However, as each new production facility, support vessel, and other project vessels are added to the offshore environment, the number of potential sources of oil sheens and waste increases. Accordingly, the potential for a bird to encounter a sheen, regardless of its source increases with each new project in the offshore environment. While the Project discharge does not spatially overlap with other offshore petroleum projects, it creates a new source of potential sheens that individual birds can encounter; therefore, increasing the potential additive cumulative effect of sheens on birds.

Key Mitigation Measures to Avoid Significant Effects

The Agency has identified mitigation measures, follow-up and monitoring related to migratory birds to reduce Project-specific effects (Section 4.3). The Agency is of the view that these measures would reduce the Project's contribution to cumulative effects and would serve to verify the accuracy of the predictions made during the environmental assessment process.

Agency Conclusion

The Agency is of the view that the adverse residual cumulative effects on migratory birds would be of low to medium magnitude because predicted impacts may affect particular populations over more than one generation, but is unlikely to affect the long-term integrity of all populations. The Agency notes that for Leach's Storm-Petrel, the magnitude of the adverse cumulative effects is less certain as the species is already in decline. The Agency is of the view that the geographic extent of light emissions would affect portions of the foraging zones (0.83 percent) associated with the Leach's Storm-Petrel colonies on Baccalieu Island and Gull Island, but the effect would occur primarily during night hours, periods of poor weather and periods of species-specific vulnerability (e.g., during the post-fledging period). The duration of cumulative effects of light emissions is considered long-term, but sporadic given the short-term nature of exploration and geophysical surveys. The Agency is of the view that the potential distribution of surface oil sheens is unknown but unlikely to cause a measurable cumulative risk of mortality or physical injury to migratory birds. The Agency anticipates that the adverse environmental effects on migratory birds from light emissions and sheens would be reversible post-decommissioning.

Taking into account the implementation of the mitigation measures proposed for the Project, the Agency is of the view that the Project is not likely to contribute to significant adverse cumulative environmental effects on migratory birds.



5.3.4 Cumulative Effects – Marine Mammals

Proponent's Assessment of Environmental Effects

The proponent's cumulative effects assessment on marine mammals focused on the potential hearing impairment/injury and behavioural effects in response to interacting sound emissions produced from the Project and other projects and activities in the area, based on the analysis of potential effects from routine project activities. Regarding cumulative injury/mortality effects on marine mammals, the proponent focused on two primary sources of human-related activities: vessel strikes and entanglement in fishing gear.

The proponent determined that cumulative underwater sound emissions produced from the Project and other activities are not expected to result in marine mammal mortality or injury/hearing impairment since modelling suggests that marine mammals would need to be in close proximity (10s to 100s of metres) to the air source array to experience permanent injury.

The proponent noted that potential adverse behavioural effects due to sound emission interactions with other projects is of concern, particularly if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period or the sound source masks communication and prey detection. The proponent's underwater sound modelling conservatively predicted that marine mammals may exhibit avoidance behaviour up to 34 kilometres from drilling and FPSO activities or vessel traffic and 20.1 kilometres from seismic surveys or other sound emitting activities (e.g., sidescan sonar, multibeam echosounder). The proponent concluded that sound emissions from other projects and activities would result in limited potential for additive or synergistic cumulative effects due to either their distance from the Project or their relative short-term nature. In addition, the proponent's modelling predicted that sound emissions from the project area would not propagate well to the shelf waters, thus reducing cumulative behavioural effects to marine mammals present in the shelf waters. The proponent predicted that maintaining a minimum spatial separation distance between seismic vessels (30 kilometres) would further reduce additive and/or synergistic cumulative effects.

The proponent indicated that there is potential for cumulative change in risk of mortality or physical injury for marine mammals due to increased potential for strikes with vessels. During the peak of activity, the proponent estimated that the Project could include supply vessels moving twice per week between the Newfoundland and Labrador inshore and the project area. The proponent indicated that there have only been two unconfirmed reports of supply vessels striking a marine mammal at night on the Grand Banks. The proponent predict that project vessels transiting to and from the project area and within the project area are unlikely to strike a marine mammal and, thus there is limited potential for cumulative effects of ship strikes on marine mammals. The proponent also contends that project-related supply vessels and other support vessels for existing operations would use established routes when transiting between shore base and production platforms wherever possible. Consistent with the *International Regulations for Preventing Collisions at Sea*, the proponent committed to having its vessels maintain a steady course and constant speed whenever possible and maintain proper lookout per regulatory requirements and alter course and/or reduce speed if a marine mammal(s) is/are sighted ahead of the vessel.

The proponent indicated that marine mammals are also at risk of entanglement in fishing gear which is one of the leading causes of mortality for the North Atlantic right whale. Given that the Project is not expected to result in mortality or injury to marine mammals, there is limited potential for cumulative mortality effects from net entanglement.



The proponent concluded that the Project in combination with other projects and activities is not likely to result in significant residual adverse cumulative effects on marine mammals. The proponent indicated that the prediction is made with a moderate level of confidence due to uncertainty, particularly regarding the effects of underwater sound on marine mammals from multiple exploration activities combined with project activities in and near the project area.

Views Expressed

Federal Authorities

DFO noted that the proponent did not provide an adequate rationale for concluding that the existing production facilities and the Project could not result in cumulative effects on the displacement of marine mammals. DFO noted that studies have demonstrated a reduced density of marine mammals near seismic array operations, and this displacement effect may persist for days or weeks. The persistent displacement may be particularly problematic when there are multiple seismic operations detectable in an area. DFO further noted that when there are multiple seismic operations, a species that detects sound in the low-frequency range, such as a baleen whale, would be unable to reduce its exposure to the many seismic pulses while remaining in the area to feed or migrate. The fact that some marine mammals remain in areas exposed to multiple seismic pulses highlights the likely importance of these areas to these whales and may not necessarily indicate the species' ability to adapt to sound emissions.

DFO expressed concerns that the potential cumulative increase in ship strikes was not adequately addressed and that reporting ship strikes to DFO is not a mitigation. DFO noted that vessel strikes with mammals have been reported on several occasions and are likely underestimated. DFO recommended that to potentially mitigate the risk of a ship strike, reporting of groups of foraging marine mammals to DFO and more importantly to vessels operating or planning to transit the area, would likely be beneficial. DFO recommends that the proponent implement a reporting system to alert vessels transiting the project area of whale aggregations or feeding animals.

Public

The World Wildlife Fund - Canada suggested that the evidence presented by the proponent is not sufficient to conclude that the cumulative effects of the Project to marine wildlife are likely to be "localized and short-term" and "not significant".

Agency Analysis and Conclusions

Based on the analysis from the proponent, advice from federal authorities and comments from Indigenous groups and the public, the Agency is of the view that the residual effects of sound emissions and potential ship strikes from the Project could interact cumulatively with the effects of other projects and activities.

Cumulative Effects of Sound Emissions

Marine mammals in the eastern Newfoundland offshore area may be affected by sound emissions from 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 Agency determined worst-case project sound emissions resulting in adverse behavioural effects on marine mammals may extend between 2,100 and 4,000 square kilometres (see



Section 4.2.4)⁴¹. Based on the proponent's information and a review of other projects and activities in the region, the Agency understands that marine mammals may experience a behavioural response up to 35 kilometres from the existing production facilities (Delaure et al. 2018), between 56.8 and 150 kilometres from exploration drilling projects, and between 50 and 150 kilometres from geophysical seismic activities. In determining the potential cumulative effects of sound emission on mammals, the Agency assumed two exploration drilling projects and one seismic survey producing non-overlapping sound emissions are active simultaneously with the two Project MODUs.

The Agency estimated that between 20,270 and 141,400 square kilometres of the region could be disturbed by sound emissions from exploration drilling projects with the potential to elicit an adverse behavioural response in marine mammals. Non-overlapping sound emissions from seismic surveys could produce adverse behavioural responses over an additional 7,850 to 70,685 square kilometres. As noted in Section 4.3, C-NLOPB records indicate that multiple seismic surveys could be undertaken simultaneously, suggesting sound emissions from seismic vessels could further expand the area of effects. Similar to fish, these sound emissions would result in the formation of overlapping and non-overlapping areas with sound disturbance. Although non-overlapping sound emissions from the existing production facilities do not directly interact with the Project, the Agency calculated these sound sources may contribute up to 9,400 square kilometres of disturbed habitat to the Regional Study Area. Although the mobile nature of marine mammals may allow them to avoid or pass through disturbed areas, avoidance of otherwise suitable habitat is in itself an adverse effect and is of concern when considering potential cumulative effects from multiple projects.

Despite the potential for cumulative effects to marine mammals from other exploration and geophysical surveys, the Agency notes that these activities are generally short-term, transient and temporary. The nature of these other projects would limit the potential for long-term temporal overlap between the Project's effects and the effects from other projects and activities.

Cumulative Effects of Ship Strikes

The proponent concluded that the limited number of reported whale strikes is suggestive of the limited potential for the Project to contribute to potential ship strikes; however, this rationale is unsubstantiated in the proponent's documentation. DFO noted that several reports of supply or crew vessels striking large whales en route to and from offshore oil installations have been reported, but not re-sighted to allow for confirmation of the incident, and a number of large, dead whales sighted on the Grand Banks do not show evidence of net entanglement. The Agency agrees with DFO that these events suggest that ship strikes may be an issue that, while seemingly a rarely-occurring event, could nonetheless be significant if a ship strikes a species listed under the *Species at Risk Act*. Although offshore ship strikes by large vessels are rarely detected and/or reported, this is not the same as concluding that such events are rare overall. Therefore, the Agency is of the view that the Project has the potential to contribute to the cumulative effects of ship strikes on marine mammals.

⁴¹ Due to the variable water depths of seismic survey areas and exploration licence areas, the Agency's cumulative effects assessment only examined the potential area of impact (square kilometres), not the volume of impact (cubic kilometres).



Key Mitigation Measures to Avoid Significant Effects

The Agency has identified mitigation measures, follow-up and monitoring related to marine mammals to reduce project-specific effects (Section 4.2). These measures are expected to reduce their contribution to cumulative effects and will be assessed to verify the accuracy of the predictions made during the environmental assessment. Mitigation, follow-up and monitoring for this Project would contribute to the mitigation or monitoring of cumulative environmental effects.

Agency Conclusion

The Agency is of the view that residual adverse cumulative effects on marine mammals would occur continuously for sound emissions and sporadically for ship strikes. Sound emission modelling suggests the geographic extent has the potential to span over the regional study area; however, the cumulative effects of sound emissions from other projects and activities would be reversible upon completion because exploration projects and geophysical surveys are temporary and short-term. The Agency is of the view that the magnitude of cumulative sound effects is medium because a portion of a population may be affected over one or more generations. Due to the uncertainty of models as well as the lack of information related to species occurrence, distribution and habitat use, these predictions are made with a low level of confidence and emphasize the importance of follow-up monitoring as identified in Section 4.2 Marine Mammals and Sea Turtles. The residual adverse cumulative effects of ship strikes on mammals has the potential to span over the regional study area and would be irreversible in the event of mortality or critical injury; however, the magnitude is considered low because ship strikes are unlikely to affect a portion of the population over one or more generations. These predictions are made with a moderate level of confidence.

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

5.3.5 Cumulative Effects – Special Areas

Proponent's Assessment of Environmental Effects

The proponent identified several Project-related environmental effects on special areas that may interact with the effects from other projects and activities in the region, primarily focusing on interactions with previous drill cuttings depositions and sound and light emissions. These direct and indirect cumulative effects may change the characteristics and integrity of the features that define and distinguish the value of the special area. Ongoing and potential future projects and activities that may contribute to cumulative effects on special areas include fisheries, general vessel traffic, and offshore exploration and production projects.

The proponent identified seven special areas in the offshore Newfoundland area (or portions of them) that overlap with the project area, including an EBSA, Fisheries Closure Area, and several VMEs designated for the presence of corals, sponges and sea pens. Several other special areas overlap (or are adjacent to) the Project vessel transit route and have the potential to be cumulatively affected by other projects and activities in the region (see Section 4.4 Special Areas).

The proponent indicated there is potential for cumulative interactions (from drill cuttings deposition) between previous exploration drilling activities and project drilling activities in the special areas within the core development area. The subsea infrastructure and potential zone of influence from cuttings deposition (200



metres) is estimated to occupy 7.5 percent of the core development area, which includes 0.05 percent of the Northwest Flemish Cap (10) Fisheries Closure Area. The proponent predicted that given the localized nature of drilling discharges, in combination with the localized effects of previous exploration drilling on special areas, and the conclusion that the Project will not have a significant effect on these special areas, potential cumulative interactions are anticipated to be localized and unlikely to result in significant adverse cumulative effects.

The Project, along with potential exploration drilling activities from six adjacent projects⁴², overlap the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA. Due to the localized footprint of drilling activities; however, the proponent predicted that significant cumulative effects of drill cuttings are not anticipated to occur in this special area. Furthermore, the existing production facilities are located 60 kilometres from the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA and as such, drill cuttings from the project in combination with these exploration drilling projects would not contribute to cumulative effects on this special area.

Marine mammals and fish species occupying special areas along or adjacent to the vessel and helicopter transit route may be particularly sensitive to the cumulative effects of sound emissions interacting with other projects in the region, particularly the Northeast Slope EBSA and the Northeast Newfoundland Slope Closure Marine Refuge. The proponent stated that the addition of project-related supply and servicing activities is unlikely to cause a cumulative disturbance to mammals and fish utilizing these special areas due to the short-term and transitory nature of these activities, as well as their short-term presence at any one location. Vessel and aircraft traffic for supply and servicing of the Project would be additional to marine traffic for other activities in the St. John's area; however, it represents a small contribution to the overall vessel traffic off eastern Newfoundland.

The proponent concluded that the Project in combination with other projects and activities is not likely to result in significant residual adverse cumulative effects on special areas. The implementation of mitigation measures for each valued component, including those designed to avoid or reduce project-related discharges and/or disturbances and their associated environmental effects, would also serve to help address potential project-related contributions to cumulative effects on special areas.

Views Expressed

Federal Authorities

DFO expressed concern that the Project may result in cumulative effects on special areas in consideration of previous anthropogenic damage to benthic habitats within the special areas. DFO notes that effects from simultaneous/multiple exploration programs may also interact with the Project and adversely affect the integrity of the special areas.

⁴² Flemish Pass Exploration Drilling Project (Equinor), Eastern Newfoundland Exploration Drilling Project (ExxonMobil), West Flemish Pass Exploration Drilling Project (Chevron), CNOOC International Exploration Drilling Project, Central Ridge Exploration Drilling Project (Equinor), and BHP Canada Exploration Drilling Project



Agency Analysis and Conclusions

Based on the analysis from the proponent and advice from federal authorities, the Agency is of the opinion that the Project could affect special areas cumulatively with the effects of other projects and activities in the region.

Cumulative Effects of Drill Cuttings Dispersion

The Agency carried out a quantitative cumulative effects analysis for the effects of drill cuttings and associated muds on special areas. The Agency's analysis focused on the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA, in consideration of the potential disturbance to this special area. The Agency applied the same analytical assumptions applied for fish and fish habitat (see Section 4.1 Fish and Fish Habitat), except the number of wells for potential exploration wells was extrapolated based on the percentage of the approved and proposed exploration licences that overlap the special area. The Agency also assessed cumulative effects of drill cuttings and associated muds on Northwest Flemish Cap (10) Fisheries Closure Area, which has experienced drill cuttings deposition from two previous wells, including one by the proponent in 2016 and one historic well in 1985.

Modelling indicated that drill cuttings and associated muds may bury up to 1.26 square kilometres of benthic habitats and may result in toxic effects on benthic species over an area of 110 square kilometres. The Agency's analysis revealed that up to 10.6 square kilometres of the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA may be buried by drill cuttings and associated muds (Table 11), which represents 0.01 percent of the EBSA (the entire special area is 87,817 square kilometres). The analysis further revealed that up to 341 square kilometres of this EBSA may be cumulatively harmed by toxic sediment deposition from drill cuttings and associated muds (Table 11) and represents 0.39 percent of the EBSA. Some of the areas experiencing toxic harm may also experience smothering due to the additive effects of several wells in close proximity, particularly delineation wells. In addition, the Agency notes that potential cumulative effects may be further exacerbated by sediment fines that do not settle but instead drift beyond areas of predicted effects.

The Agency's analysis does not take into account the geopolitical boundary between international waters and Canada's exclusive economic zone. The Northeast Newfoundland Slope Closure Marine Refuge is near contiguous with the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA (both share similarly important habitat attributes). In consideration of the cumulative extent of potential drill cuttings and associated muds deposition from exploration drilling projects in the Northeast Newfoundland Slope Closure Marine Refuge, the Agency is of the view that potential cumulative effects of drill cuttings and associated muds on these special areas distinguished for their important benthic habitats are noteworthy.

Although the Agency recognizes that it is unlikely that all of these potential wells would be drilled, the approximation above provides the greatest potential deposition that could result in the mortality or harm of sensitive benthic species within the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA. The Agency's analysis highlights the importance of seabed surveys to avoid or minimize adverse cumulative environmental effects on the benthic species within the special area.

The Agency is aware that bottom trawling in the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA is also prevalent, particularly along the Sackville Spur and parts of the Flemish Pass in the western portions of the project area. Bottom trawling can cause removal or burial of sensitive benthic species and has the potential to affect filter-feeding species by re-suspending bottom

sediments. These sediments can remain suspended with oceanic currents and disperse over vast distances (Pham et al., 2019). The potential cumulative effects of the Project interacting with bottom trawling activities can affect sensitive ecosystems dominated by sponges, corals and sea pens for hundreds of kilometres.

Table 11 Potential Cumulative Effects of Drill Cuttings and Muds on the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA

Projects/Activities	No. of Potential Wells ²	Burial Effects		Toxic Effects	
		Footprint per Well (square kilometres) ³	Total Footprint (square kilometres)	Footprint per Well (square kilometres) ³	Total Footprint (square kilometres)
Wells within Project Area					
Proposed Wells Centres	10	0.13	1.26	12.56	110.67
Existing Wells (incl. 2 historic wells) ¹	18	0.13	2.34	12.56	171.45
Exploration Drilling Wells					
Flemish Pass (Equinor Canada)	7	0.10	0.70	1.00	7.00
Newfoundland Orphan Basin (BP)	1	0.10	0.10	1.00	1.00
Eastern Newfoundland (ExxonMobil)	8	0.10	0.80	1.00	8.00
CNOOC International Flemish Pass	8	0.18	1.44	2.00	16.00
West Flemish Pas (Chevron)	7	0.28	1.96	1.60	11.20
BHP Canada	8	0.12	0.96	0.90	7.20
2020 Call for Bids - Parcel 9	2	0.14	0.28	1.24	2.48
Historic Exploration Wells	5	0.14	0.70	1.24	6.20
Total	74	-	10.58	-	341.20

¹ Estimated total deposition corrected for based on overlap with proposed Project wells.

² Only ELs overlapping the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA listed.

³ Based on percent of ELs overlapping the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA (rounded to nearest whole number). For potential future ELs, the Agency assumed six wells per EL.

⁴ Based on EIS documents for each project. The estimated drill cuttings deposition for the NL20-CFB01-09 parcel and historic wells was extrapolated from the average dispersion of the six exploration drilling projects.

The Agency estimated the cumulative deposition footprint from past drilling activities based on the proponent's drill cuttings modelling for the Project to inform the cumulative effects assessment on the Northwest Flemish Cap (10) Fisheries Closure Area. Drill cuttings deposition at the two well templates located in this special area could result in burial of benthic habitats spanning 0.25 square kilometres and potential adverse toxic harm to benthic habitats spanning 19.2 square kilometres (see Section 4.4 Special Areas). With the assumption of similar dispersions from the two past wells drilled in the Fisheries Closure Area, the cumulative effects of burial on



benthic habitats could double to 0.50 square kilometres and the adverse toxic harm could extend to about 28 square kilometres (or 8.8%) of the Fisheries Closure Area.

Cumulative Effects of Sound Emissions

The Agency understands that although sound emissions are not predicted to have a direct effect on special areas, underwater sound emissions may affect mammal and fish species attracted to special areas that support important benthic habitat features. The Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA, as well as the Northeast Slope EBSA and the Northeast Newfoundland Slope Closure Marine Refuge, are of particular concern since Project support vessels would be moving through or adjacent to these special areas as frequently as every other day during peak times. With six of eight exploration projects in the region producing sound emissions that overlap these special areas and four of eight exploration projects with vessel supply routes that overlap these special areas, the cumulative underwater sound emissions have the potential to cause avoidance behaviour of marine mammal and finfish species that are dependent on these special areas. The Agency is of the view that sound emissions from these cumulative projects and activities in the region may adversely affect the integrity of the special area.

The Agency acknowledges that other projects and activities producing potential behaviour-altering sound in the marine environment are generally short-term, transient and temporary, which would limit the potential for the Project's effects to temporally overlap with the effects from other projects and activities.

Key Mitigation Measures to Avoid Significant Effects

The Agency has identified mitigation measures, follow-up and monitoring related to fish and fish habitat, mammals, and special areas to reduce Project-specific effects (see Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals, and Section 4.4 Special Areas). The Agency is of the view that these measures would reduce the Project's contribution to cumulative effects and would serve to verify the accuracy of the predictions made during the environmental assessment process.

Agency Conclusion

The Agency is of the view that adverse residual environmental effects on special areas would occur continuously and sporadically for the life of the Project. The potential drill cuttings analysis represents a worst-case scenario of deposition within the special areas that could result if all approved and proposed wells for exploration drilling projects are carried out. Due to the predicted slow growth and rate of recolonization of benthic species in deep, cold water habitats duration of effects could be permanent and may not be reversible. The geographic extent has been based on proponent's modelling and will vary depending on drilling location wastes and associated effects. However, due to the uncertainty of the models and location of the exploration drilling within the regional study area, the geographic extent of drill waste effects on special areas is uncertain. The Agency is of the view that cumulative effects from sound emissions would be reversible and the geographic extent within the regional study area would be dependent on the sound source and its location. The Agency is of the view that the magnitude of effects is medium, given the potential implications of sound emissions on mammal and fish species occupying the Slopes of the Flemish Cap and Grand Bank United Nations Convention of Biological Diversity EBSA and the potential cumulative footprint of sediment deposition within the Northwest Flemish Cap (10) Fisheries Closure Area (8.8 percent of the special area). Due to the uncertainty of models as well as the limited information of species occurrence, distribution and diversity, the magnitude of effects is uncertain.



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



6 Conclusions and Recommendations of the Agency

The Agency considered the Proponent's EIS and responses to information requests from the Agency, as well as comments received from the public, government agencies, and Indigenous peoples during this Draft EA Report. 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 Proponent.

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

The Agency understands that there are no Aboriginal or treaty rights being exercised in the project area, therefore the pathways for potential impacts to rights would be through impacts from the Project on migratory species that pass through the project area and are then harvested within the traditional territories of Indigenous groups. The Agency is of the opinion that the recommended measures to mitigate potential environmental effects from routine operations on migratory birds, fish and fish habitat, marine mammals, sea turtles, special areas, and commercial fisheries, are appropriate to also accommodate for potential impacts on rights.

The Agency also recognizes that in the event of a major oil spill there is the potential for more serious effects on species being harvested for traditional purposes and in turn a greater likelihood of impacts to asserted or established Aboriginal or treaty rights; however, the Agency considers such an event to be unlikely.

The Agency is of the view that the proposed Bay du Nord Development Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in this Draft 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 his decision statement in the event that the Project is permitted to proceed.

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8 Appendices

Appendix A Environmental Effects Rating Criteria

Agency's Environmental Effects Rating Criteria
Air Quality and Greenhouse Gas Emissions Component
<p>Context: Considerations of resilience of the environment to the effect related to current level of exposure or pristine condition.</p> <p>Magnitude:</p> <ul style="list-style-type: none"> • Negligible: No measurable adverse effect anticipated. • Low: Residual effect is detectable but within normal variability of baseline. • Medium: Residual effect will cause an increase relative to baseline but is within regulatory limits and objectives. • High: Residual effect occurs that would singly or as a substantial contribution in combination with other sources cause exceedances of objectives or standards beyond the Project boundaries. <p>Duration:</p> <ul style="list-style-type: none"> • Short-term: Residual effects measurable seasonally for 3 years. • Long-term: Residual effects measurable for greater than 20 plus years.
Ecological Components
<p>Context: Considerations with regards to ecological context for migratory birds, marine fish, marine mammals or marine turtles include the presence of species at risk, whether the area represents unique habitat to any particular species including the presence of critical habitat for species at risk, the prevalence of species using the area for their important life processes, and the ability of the valued component to be resilient or adapt to project effects.</p>
Migratory Birds
<p>Magnitude:</p> <ul style="list-style-type: none"> • Negligible – no measurable change. • Low: affects a specific group of localized individuals within a population over one generation or less, but does not affect other tropic levels or the population itself. • Medium: affects a population and may bring about a change in abundance and or reduction in the distribution over one or more generations, but does not threaten the long-term integrity of that population or any population dependent on it. • High: affects an entire population or species to a sufficient degree to cause a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species or any population or species dependent upon it, to its former level within several generations or when there is no possibility of recovery. <p>Duration:</p>



Agency's Environmental Effects Rating Criteria	
<ul style="list-style-type: none">• Short-term: Effect less than one breeding season/generation.• Medium-term: Effect occurs for several breeding seasons/generations.• Long-term: Effect occurs across multiple breeding seasons/generations.• Permanent: Effect permanent and unlikely to recover following Project decommissioning.	
Marine Fish and Fish Habitat	
Magnitude: <ul style="list-style-type: none">• Negligible: No measurable change in fish presence/abundance/distribution for all species, in fish habitat quality or quantity, or in water and sediment contaminant levels.• Low: Measurable change in fish presence/abundance/distribution, in fish habitat quality or quantity, or in water and sediment contaminant levels that affects individuals within a population over one generation or less, but does not affect other trophic levels or the population itself.• Medium: Measurable change in fish presence/abundance/distribution, in fish habitat quality or quantity, or in water and sediment contaminant levels that affects a population over one or more generations, but does not threaten the long-term integrity of that population or any population dependent on it.• High: Measurable change in fish presence/abundance/distribution, in fish habitat quality or quantity, or in water and sediment contaminant levels that affects an entire population or species to a sufficient degree to cause a decline beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species or any population or species dependent upon it, to its former level within several generations or when there is no possibility of recovery. Duration: <ul style="list-style-type: none">• Short-term: Less than one spawning season or growing season (calendar year).• Medium-term: Over several spawning or growing seasons.• Long-term: Over multiple spawning or growing seasons.• Permanent: Measurable parameter unlikely to return to baseline level.	
Marine Mammals	
Magnitude: <ul style="list-style-type: none">• Negligible: No measurable change in marine mammal presence/abundance/distribution, in habitat quality or quantity, or in behaviour.• Low: Measurable change in marine mammal presence/abundance/distribution or in habitat quality or quantity, some behaviour change but not important for life processes.• Medium: Measurable change in marine mammal presence/abundance/distribution, some changes to habitat quality or quantity or behaviour change that could affect important life processes but does not threaten the long-term integrity of that population.• High: Measurable change in marine mammal presence/abundance/distribution, major changes to habitat quality or quantity or behaviour change that affects important life processes and threatens the long-term integrity of that population.	



Agency's Environmental Effects Rating Criteria	
Duration:	<ul style="list-style-type: none">• Short-term: Less than one average calving season (calendar year).• Medium-term: Over several calving seasons.• Long-term: Over multiple calving seasons.
Socio-economic Components	
Context:	Consideration of the vulnerability and resilience to change cause by the project related to Indigenous and non-Indigenous practice of an activity relative to historical use and interference with opportunities of engagement in use as preferred.
Current use of lands and resources for traditional purposes, commercial fisheries, health and socioeconomic conditions and Indigenous and treaty rights	
Magnitude	<ul style="list-style-type: none">• Low: Very small detectable change from baseline; no exacerbation of existing conditions. Little to no alteration of behaviour is required to carry out current Indigenous use.• Medium: Varies from baseline and may result in noticeable changes to the activity; at least some behaviours are altered at least some of the time while carrying out the activity.• High: Varies from baseline to a high degree; the current activity can no longer be carried out in preferred locations and ways.
Duration:	<ul style="list-style-type: none">• Short-term: Effect restricted to installation and drilling phases.• Medium-term: Effect extends through the duration of construction, operations and decommissioning.• Long-term: Effects extends beyond decommissioning.
Commercial Fisheries and Other Ocean Users	
Magnitude	<ul style="list-style-type: none">• Negligible: No measurable change.• Low: Very small detectable change from baseline; no exacerbation of existing conditions; little to no alteration of harvest and/or research activity is required to carry out the activity.• Medium: Varies from baseline and may result in noticeable changes to the activity; at least some harvest and/or research activities are altered at least some of the time while carrying out the activity.• High: Varies from baseline to a high degree; the current harvest and/or research activity can no longer be carried out in preferred locations and ways.
Duration	<ul style="list-style-type: none">• Short-term: Measurable effects during geophysical support surveys for 4 weeks, once or twice annually.• Medium-term: Measurable effects during seasonal activities of site preparation, construction, and installation phases for 2 to 3 years.



Agency's Environmental Effects Rating Criteria

- Long-term: Measurable effects are continuous during operations and decommissioning phases.



Appendix B List of Key Mitigation Measures, Monitoring and Follow-Up Considered by the Agency

Valued Component (VC)	Mitigation	Follow-up
Fish and Fish Habitat (Section 4.1)	<ul style="list-style-type: none">• develop and conduct a seabed investigation survey based on the location for all subsea infrastructure (each well template, each flowline, and mooring points) and associated protection features (rock placement, concrete mattresses and/or trenching) in consultation with the C-NLOPB and DFO prior to conducting any project activities on the seafloor. The plan should be designed to:<ul style="list-style-type: none">◦ collect data to confirm the presence or absence of fish and fish habitat, including species at-risk, aggregations of habitat-forming corals or sponges (biogenic), species associated with these sensitive biogenic habitats and other sensitive epifauna;◦ demonstrate that the survey is designed and conducted using appropriate technology by qualified individuals and appropriate equipment;◦ survey areas around well templates should reflect the proponent's drill cuttings dispersion modelling and extent of predicted effects on suspended particulate matter from releases of drill muds and drill cuttings;◦ ensure transects around the FPSO mooring system and all subsea infrastructures and associated protection features should extend	<ul style="list-style-type: none">• monitor the concentration of non-aqueous base fluid on drill cuttings to verify that the discharge meets, at a minimum, the performance target specified in the <i>Offshore Waste Treatment Guidelines</i> and report results to the C-NLOPB;• develop and conduct specific follow-up monitoring, in consultation with the C-NLOPB, DFO, and ECCC all subsea infrastructure installation, (including well templates, flowlines and mooring points and associated protection features) prior to any project activities related to the installation of this infrastructure, including:<ul style="list-style-type: none">◦ provide the follow-up monitoring plan for the C-NLOPB's, DFO's, and ECCC's review based on applicable seabed placement of structures, and predictions of drill cuttings and suspended drill mud dispersion.◦ measurement of sediment deposition extent, and quality pre- and post-drilling to verify drill cuttings dispersion modelling predictions;◦ survey benthic fauna post-drilling to verify the effectiveness of mitigation measures;◦ measurement of suspended particulate matter prior to and during drilling to verify drilling muds and cuttings dispersion predictions;



Valued Component (VC)	Mitigation	Follow-up
	<p>at least 50 metres from the extent of each structure;</p> <ul style="list-style-type: none">• provide the results of seabed surveys to the C-NLOPB and DFO prior to conducting any activities on the seafloor related to the installation of any subsea infrastructure, including well templates, flowlines and mooring points and associated protection features. The proponent would be required to post the results of the surveys online for public access and notify Indigenous groups of the availability of these documents within 48 hours of their publication;• if aggregations of habitat-forming corals or sponges or other sensitive fish and fish habitat are identified when undertaking the survey:<ul style="list-style-type: none">◦ relocate the mooring system, well template, flowlines, and/or redirect mud and cuttings discharges to ensure that the all project-based sources of elevated suspended particulate material and seabed disturbances will not affect them, unless not technically feasible, as determined in consultation with the C-NLOPB; or◦ if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the mooring system, well templates, or flowlines or redirect mud and cuttings discharges, the proponent shall consult with the C-NLOPB and DFO to determine an appropriate course of action, including the implementation of any additional mitigation	<ul style="list-style-type: none">◦ monitor recovery of sediment quality and fish and habitat determined to be affected, to verify predictions of impact duration;◦ survey colonization of subsea infrastructures by epifauna (sessile organisms) to verify prediction of changes in benthic communities;• report results, including a comparison of modelling results to in situ results, at a frequency determined by the C-NLOPB and provide results to Indigenous groups and post online for public access;• develop and implement, in consultation with the C-NLOPB, DFO and Indigenous groups, a monitoring plan of underwater sound to verify the effects predictions of all project sound sources. The plan should be designed to:<ul style="list-style-type: none">◦ measure underwater sound levels to verify acoustic modeling results.◦ collect information on avoidance behaviour of fish from sound to verify sound effects predictions;◦ Identify the equipment used for the surveys, to be operated by a qualified individual, and• contribute to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas and update the C-NLOPB and Indigenous groups annually on research activities. Communicate with Indigenous groups to determine the means by which they will be updated. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups.



Valued Component (VC)	Mitigation	Follow-up
	<p>measures and monitoring (e.g., requirements in accordance with any <i>Fisheries Act</i> Authorization for the death of fish or harmful alteration, disruption, and destruction of fish habitat)</p> <ul style="list-style-type: none">• select chemicals to be used during the Project in accordance with the <i>Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands</i> and use lower toxicity drilling muds and lower toxicity additives within muds and cements;• treat all discharges into the marine environment from project activities to meet the <i>Offshore Waste Treatment Guidelines</i>, and any other legislative requirements;• transport spent or excess synthetic-based muds that cannot be re-used during drilling operations to shore for disposal at an approved facility;• ensure that Project vessels operating in Canadian waters meet the requirements of the <i>Ballast Water Control and Management Regulations</i>, of the <i>Canada Shipping Act</i>;• treat all discharges from all project vessels in accordance with MARPOL, and other legislative requirements; and• conduct a pre-installation survey with qualified individual(s) at each well site and flowline to determine the presence of any unexploded ordnance or other seabed hazards. If any such ordnance or seabed hazard is detected, avoid	



Valued Component (VC)	Mitigation	Follow-up
	disturbing or manipulating it and contact the nearest Joint Rescue Coordination Centre and the C-NLOPB prior to commencing any work on the seabed within the project area to determine an appropriate course of action.	
Marine Mammals and Sea Turtles (Section 4.2)	<ul style="list-style-type: none">• conduct applicable geophysical surveys in accordance with the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment;<ul style="list-style-type: none">◦ shut down or delay ramp up of air source arrays for all marine mammals and sea turtles when observed within the safety zone;◦ establish a safety (observation) zone of a minimum of 500 metres around the sound source;◦ for survey activities scheduled to occur in areas where beaked and other deep-diving whales, such as the northern bottlenose whale, may be present conduct a 60 minute pre-watch for marine mammals prior to ramp-up of the air source. If passive acoustic monitoring is being used prior to ramp-up, it would be for the same duration as visual monitoring.• The proponent shall ensure that it does not undertake seismic testing concurrently with any planned seismic testing occurring within 30 kilometres of the Designated Project. The proponent shall consult with the C-NLOPB in respect of planned seismic testing and, if the	<ul style="list-style-type: none">• monitor marine mammals to verify effects predictions related to underwater sound levels with field measurements before and during the project activities taking into account multiple project sources:<ul style="list-style-type: none">◦ measure project underwater sound levels to verify acoustic modeling results;◦ surveys of marine mammal presence, distribution, important habitat areas, and behavior within the zones of influence for behavior predicted by modelling prior to installing subsea infrastructures and during drilling, production and seismic activities;◦ identify qualified individual trained in marine mammal observation to implement survey;• record and report the activities, observations and results of a marine mammal and sea turtle monitoring to the C-NLOPB, DFO, and Indigenous groups and post online for public access; and• submit a report on all north Atlantic right whale observations annually and submit to Indigenous groups; and• contribute to research on the behaviour, presence, distribution, and important habitat areas of cetaceans in eastern Canadian offshore areas and update the C-NLOPB and Indigenous groups annually on research activities.



Valued Component (VC)	Mitigation	Follow-up
	<p>Board indicates that seismic testing will be occurring within 30 kilometres of the Designated Project, the proponent shall alter its seismic testing schedule to avoid testing concurrently with that planned seismic testing.</p> <ul style="list-style-type: none">the energy output of the thrusters on the floating production storage and offloading vessel(s) and mobile offshore drilling unit(s) does not exceed 50% of their maximum energy output, unless not feasible for safety reasonsto prevent and reduce risks of collisions between all project vessels with marine mammals and sea turtles (when and where such speeds do not present a risk to safety of navigation) require all project vessels to use established shipping lanes, where they exist; and reduce supply vessel speed to seven knots (13 kilometres per hour) when a marine mammal and sea turtle is observed or reported within 400 metres of the vessel; andin consultation with the C-NLOPB and DFO, develop a marine mammal monitoring plan which includes using marine mammal observer qualified individuals. Provide the plan to the C-NLOPB for review and approval 30 days prior to initiating activities. The plan would describe:<ul style="list-style-type: none">monitoring during applicable geophysical surveys, including information on visual monitoring and specific passive acoustic or equivalent technology monitoring configuration that would be implemented, to	<p>Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups.</p>



Valued Component (VC)	Mitigation	Follow-up
	<p>enable verification that species that may occur within the safety zone can be detected and to ensure the ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the project area, and</p> <ul style="list-style-type: none"> 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 	
Migratory Birds (Section 4.3)	<ul style="list-style-type: none"> consult with ECCC when designing lighting configurations for the Project's FPSO, MODU and designated project vessels; identify in consultation with ECCC and implement measures to reduce/control all unnecessary project lighting, including its direction, timing, intensity, and glare, where economically and technically feasible and in line with health and occupational safety requirements, to reduce the attraction of migratory birds to the FPSO, MODU and designated project vessels: <ul style="list-style-type: none"> by removing all sources of lighting that are not required to complete daily operations or compromise worker safety; by reducing the amount of nighttime lighting, where possible; and by evaluating the economic and technical feasibility of lighting mitigations, including 	<ul style="list-style-type: none"> monitor daily for the presence of migratory birds at the MODU, and other designated project-related vessels, excluding supply and standby vessels, using a trained observer whose primary responsibility is observing migratory birds and following <i>ECCC's Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabirds Surveys from Moving and Stationary Platforms</i>; monitor, during flaring, for the presence of migratory birds using a trained observer whose primary responsibility is observing migratory birds and document migratory bird behavior around the flares; undertake daily systematic searches for the presence of stranded and re-stranded migratory birds at the MODU and other designated project-related vessels, excluding, supply and standby vessels by dedicated, trained observers in accordance with the most recent version of <i>ECCC's Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabirds Surveys from Moving and Stationary Platforms</i>;



Valued Component (VC)	Mitigation	Follow-up
	<p>spectral modified lighting, shielding lights downwards, changing the type and/or intensity of light, and evaluating how these measures meet health and occupation safety requirements. Provide this evaluation to the C-NLOPB and ECCC prior to implementing measures.</p> <ul style="list-style-type: none">• limit the duration of non-routine and safety flaring to the length of time required;• prior to finalizing the design of the FPSO, conduct an analysis of the feasibility of a pilotless flaring system and submit a report of the results of this analysis subject to review and acceptance by the C-NLOPB;• start non-routine and safety flaring as early as practicable during daylight hours to limit flaring that occurs during nighttime;• minimize the number of non-routine and safety flaring events during nighttime and poor weather conditions (i.e., flaring during daylight hours and on clear days, where possible);• identify the circumstances under which the proponent shall not commence non-routine and safety flaring during conditions of poor visibility• including when there is low cloud ceiling or fog and not commencing flaring during these circumstances;	<ul style="list-style-type: none">• consult with ECCC to develop vessel-specific systematic monitoring protocols, in advance of Project commencement to determine:<ul style="list-style-type: none">◦ the number of stranded birds;◦ the species of stranded birds;◦ oiling of birds;◦ the number of injuries / mortalities;◦ the number of re-stranding incidents;◦ if lighting reduction / adjustment measures are effective to reduce attraction, collisions and strandings;◦ if a different spectrum of light attracts birds more or less than another spectrum of light◦ that survey efforts are conducted during appropriate times; and◦ that survey efforts include all accessible areas of the MODU and other designated project vessels, excluding supply and standby vessels;• include alternative search efforts and technology (e.g., cameras) considered for inaccessible area of the structures and vessels;• develop a comprehensive monitoring program that incorporates additional technological methods, where possible (e.g., radar, infrared imaging, high definition aerial surveys, and/or telemetry studies) to complement research on, the effectiveness of mitigation of light attraction;• survey efforts to include bird activities in the vicinity of the vessels;



Valued Component (VC)	Mitigation	Follow-up
	<ul style="list-style-type: none">• notify the C-NLOPB at least 30 days in advance of planned flaring to determine whether flaring would occur during a period of migratory bird vulnerability and to determine how the proponent plans to avoid adverse environmental effects on migratory birds, including implementing modified or additional mitigation measures;• plan any routine/maintenance flaring outside of periods of migratory bird vulnerability where possible (i.e., avoiding mid-September to mid-October).<ul style="list-style-type: none">• Include awareness training for all offshore workers associated with the Project regarding migratory bird strandings as part of overall training/orientation program, including reporting stranded birds to the relevant personnel tasked with monitoring stranding;• monitor the species at risk review on Leach's Storm-Petrel which may influence the listing of the species under the Species at Risk Act and modification of mitigation measures;• 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 1,000 metres from known bird colonies within the Baccalieu Island and Eastern Avalon EBSAs (unless there is an emergency situation); and	<ul style="list-style-type: none">• contribute to a research program to identify changes in light spectrum, type and/or intensity that may further reduce attraction for storm-petrels and other seabirds;• participate in research to help reduce the uncertainty related to the effects of light attraction on migratory birds. Ongoing research by ECCC into the effects of light attraction on migratory birds includes:<ul style="list-style-type: none">◦ long-term monitoring programs (population and demographic);◦ global positioning system and global location sensor tracking studies to further describe migratory bird foraging and overwintering areas, and to assess threats to migratory birds at sea;◦ research to understand Leach's Storm-Petrel vulnerability to light attraction, quantifying the impact of light attraction on Leach's Storm-Petrel, and determining effective mitigations to reduce potential impacts;◦ enhancing the offshore observer program and expanding this program to include systematic surveys for stranded birds on platforms and vessels;• develop a systematic monitoring program to document the presence and extent of surface sheens;• monitor the presence and behavior of seabirds and their encounters with surface oil sheens;• provide the results of the monitoring data to ECCC annually, using the standard Eastern Canada Seabirds at Sea (ECSAS) Microsoft Access database format;



Valued Component (VC)	Mitigation	Follow-up
	<ul style="list-style-type: none">implement mitigation measures related to chemical selection, waste discharge, and disposal of spent synthetic-based muds as described in Section 4.1 – Fish and Fish Habitat.	<ul style="list-style-type: none">take any new information from research, and updates on species at risk and special areas into account when implementing adaptive management;update the C-NLOPB and Indigenous groups annually on research activities. Communicate with Indigenous groups to determine the means by which they will be updated. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups; andProvide 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 4.4)	<ul style="list-style-type: none">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 1,000 metres from Quidi Vidi Lake Important Bird Area and known bird colonies within the Baccalieu Island and Eastern Avalon EBSAs (unless there is an emergency situation);implement mitigation listed in Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals, and Section 4.5 Commercial Fisheries.	<ul style="list-style-type: none">monitoring would include the implementation of follow-up measures listed in Section 4.1 Fish and Fish Habitat and Section 4.2 Marine Mammals as it relates to monitoring of drill cuttings dispersion and sound emissions.
Commercial Fisheries (Section 4.5)	<ul style="list-style-type: none">in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during all project phases, including future activities. The plan should include:	<ul style="list-style-type: none">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 and commercial fishers.



Valued Component (VC)	Mitigation	Follow-up
	<ul style="list-style-type: none">○ a description of planned project activities;○ information on anti-collision and/or safety zones and decommissioned and abandoned subsea infrastructure;○ information on vessels travelling between Newfoundland and Labrador and the project area including number per week, and general route;○ procedures to notify fishers a minimum of two months prior to the commencement of the project;• regular updates to provide specific information on plans for project activities and the movement of the FPSO, MODU and designated project vessels, excluding supply and standby vessels and an opportunity for feedback and further exchange of information on specific aspects of interest;• procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during FPSO, , MODU and designated project vessels, excluding supply and standby vessels movement and the use of a Fisheries Liaison Officer during geophysical programs;• procedures to notify Indigenous groups and commercial fishers in the event of a spill and communicate the results of monitoring of its potential adverse effects on the environment and human health; and	



Valued Component (VC)	Mitigation	Follow-up
	<ul style="list-style-type: none">• procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill;• in accordance with <i>the Newfoundland Offshore Petroleum Drilling and Production Regulations</i> prepare a decommissioning and abandonment plan, that meets or exceeds the requirements of the Drilling and Production Guidelines, and submit it to the C-NLOPB for acceptance prior to the start of the production project. If it is proposed that any subsea infrastructure remains 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 anti-collision zone and/or safety exclusion zones and decommissioned subsea infrastructure, if left on the seafloor, are published in Notice to Mariners, provided in Navigational Warnings and communicated to fishers;• provide information on the locations of any decommissioned subsea infrastructure, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning;• ensure ongoing communication with NAFO Secretariat, using established information exchange mechanisms that are in place with DFO, regarding planned project activities, including timely communication of drilling locations, anti-collision	



Valued Component (VC)	Mitigation	Follow-up
	and/or safety exclusion zones and decommissioned subsea infrastructure; and implement all mitigation listed in Sections 4.1 Fish and Fish Habitat related to providing the results of the seabed investigation survey, decommissioning procedures, selection of chemicals, disposal of spent synthetic-based muds and the discharge of waste.	
Indigenous Peoples (Section 4.6)	<ul style="list-style-type: none">• ensure that all discharges from project vessels and project activities into the marine environment are in accordance with the <i>Offshore Waste Treatment Guidelines</i> and the <i>International Convention for the Prevention of Pollution from Ships</i>;• plan and conduct applicable geophysical surveys in consideration of the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i>;• to prevent and reduce risks of collisions with marine mammals (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 is observed or reported within 400 metres of the vessel;• prepare follow-up programs for fish and fish habitat, marine mammals, and migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures, and share the results of these programs with Indigenous groups;• in consultation with Indigenous fishers, develop and implement a Fisheries Communication Plan to	



Valued Component (VC)	Mitigation	Follow-up
	<p>facilitate and coordinate communication with fishers. The proponent is required to include in this plan, a procedure to communicate with Indigenous fishers in the event of an accident or malfunction, and procedures to engage in two-way communication with Indigenous groups in the event of a spill requiring a tier 2 or tier 3 response;</p> <ul style="list-style-type: none">• provide Indigenous groups with an opportunity to consult on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups prior to drilling;• submit a report on all north Atlantic right whale observations annually and submit to Indigenous groups;• 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>; and• contribute to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas. Update the C-NLOPB and Indigenous groups annually on research activities.	
Air Quality (Section 4.7)	<ul style="list-style-type: none">• all produced gas not used as fuel at the FPSO will be reinjected into the reservoir;• incorporate GHG and air emission reduction measures in the design of the Project, and	



Valued Component (VC)	Mitigation	Follow-up
	<p>implement these measures during all phases of the Project. In doing so, the Proponent shall:</p> <ul style="list-style-type: none">○ report to ECCC and the C-NLOPB on the GHG and air emission reduction measures incorporated into the final design; and○ quantify and report to ECCC and the C-NLOPB GHG and air emissions estimates from the Project;• incorporate, if economically and technically feasible, any modified or additional greenhouse gas emissions reduction measures, including new technologies that are available when the floating production storage and offloading vessel(s) undergoes repair and maintenance as required during dry dock inspections over the duration of the Project. Submit to the C-NLOPB and ECCC within 60 days of completion of any dry dock inspections a description of these measure(s) and the anticipated reduction in greenhouse gas and air emissions associated with these measures. Provide justification, if measures are not implemented, and• comply with all applicable air emissions limits and limits on sulphur concentrations in diesel fuel for designated project vessels in accordance with the <i>Marine Shipping Act, 2001</i> and the International Maritime Organization's International Convention for the Prevention of Pollution from Ships and any	



Valued Component (VC)	Mitigation	Follow-up
	other legislative requirements and any other legislative requirements, where applicable.	
Accidents and Malfunctions (Section 5.1)	<ul style="list-style-type: none">• 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 well control strategies, which include measures for well capping, containment of fluids lost from the well and the drilling of a relief well(s), as well as options to reduce overall response timelines. The well control strategies 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;• prior to drilling, submit a Spill Response Plan that takes into account the results of spill modelling and must include:<ul style="list-style-type: none">◦ procedures to respond to an oil spill (e.g., oil spill containment, oil recovery) and spills of other types (e.g., synthetic-based mud or cuttings spill);◦ reporting thresholds and notification procedures;◦ measures for wildlife response, protection and rehabilitation (e.g., collection and cleaning of	<ul style="list-style-type: none">• as required by and in consultation with the C-NLOPB, 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:<ul style="list-style-type: none">◦ sensory testing of seafood for taint and chemical analysis for oil concentrations and any other contaminants, as applicable;◦ measuring levels of contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to be submitted to relevant authorities including those responsible for fishing area closures;◦ monitoring marine mammals, sea turtles and birds for signs of contamination or oiling and reporting results to the C-NLOPB; 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; and• develop a procedure to communicate monitoring results to Indigenous and commercial fishers, as well as Indigenous groups.



Valued Component (VC)	Mitigation	Follow-up
	<p>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 ECCC; and</p> <ul style="list-style-type: none">○ specific role and responsibility descriptions for offshore operations and onshore responders and the list of authorities to notify of a spill, including when they will be notified and the means to notify them;• provide Indigenous groups with an opportunity to consult 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 throughout the project at an interval determined in consultation with the C-NLOPB and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise and any subsequent updates to Indigenous groups following review by the C-NLOPB;• review and update the Spill Response Plan as required throughout the project at a frequency determined in consultation with the C-NLOPB and before commencing a new well, and provide the update to Indigenous groups;• prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the project area and submit to the C-NLOPB for acceptance prior to drilling;	



Valued Component (VC)	Mitigation	Follow-up
	<ul style="list-style-type: none">• undertake a 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. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Science Table. Publish the spill impact mitigation assessment on the internet;• in the event of an 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 in the Fisheries Communication Plan a procedure to notify fishers in the event of an accident or malfunction and communicate the results of any associated monitoring and any potential health risks. Information that is provided	



Valued Component (VC)	Mitigation	Follow-up
	<p>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</p> <ul style="list-style-type: none">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 5.2)	<ul style="list-style-type: none">in consultation with the C-NLOPB and ECCC, develop and implement a physical environment monitoring program in accordance with the Newfoundland Offshore Petroleum Drilling and Production Regulations and meet or exceed 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, severe 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 with integrated adaptive	<ul style="list-style-type: none">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 severe 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.



Valued Component (VC)	Mitigation	Follow-up
	<p>management strategies to allow for the integration of updated climate model predictions and observations, including procedures for detection, surveillance, data collection, reporting, forecasting and avoidance or deflection of icebergs; and</p> <ul style="list-style-type: none">• in consultation with the C-NLOPB, implement measures to ensure that the FPSO, MODU(s) and shuttle tankers are designed to quickly disconnect in event of an emergency or severe weather conditions.	
Cumulative Environmental Effects (Section 5.3)	Mitigation measures, related to fish and fish habitat, mammals, and special areas to reduce Project-specific effects (see Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals, and Section 4.4 Special Areas) would reduce the Project's contribution to cumulative effects.	Follow-up and monitoring measures for this Project would contribute to the mitigation or monitoring of cumulative environmental effects.

Appendix C Summary of the Crown Consultation with Indigenous Groups

The table below briefly describes key comments and concerns raised by Indigenous groups during the EA process prior to the release of the draft EA Report on August 5, 2021 along with the Agency response(s).⁴³ The Agency's responses were developed using information from the proponent's EIS and their responses to information requirements issued on October 25, 2020. Input from the federal authorities and the C-NLOPB also informed the Agency's responses.

In most cases, the comments and concerns described in the table have been summarized from more detailed written submissions provided by Indigenous groups to the Agency. The complete comment submissions received during the EA process are available on the Canadian Impact Assessment Registry at: [Bay du Nord Development Project - Canada.ca \(iaac-aeic.gc.ca\)](https://www.baydunord.ca/iaac-aeic.gc.ca) (click the "View Comments" button to access a list of all submissions).

Content in the table is organized by subject area, in alphabetical order. At the end of the table, any miscellaneous comments or concerns are listed along with the Agency's response(s). In some cases, the Agency's response(s) have been summarized from more detailed sections elsewhere in this report, and in these cases the reader is referred to the relevant sections for more information.

⁴³ The content in the table reflects the main comments and concerns raised by Indigenous groups throughout the project starting with the review of the project description and up to including the review of the proponent's final EIS during the public comment period held July 30- September 13, 2020. In some cases, where comments came directly to the Agency outside of a key phase of the EA process, the Agency responded or will respond directly to the Indigenous group (i.e., those comments may not be reflected in this Appendix). Additionally, the Agency will respond directly to each Indigenous group that provides comments on the draft EA Report (i.e., comments received on the draft EA Report are also not included in this Appendix).



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Aboriginal and Treaty Rights	Concern about potential infringements on fishing rights and species of importance	Première Nation des Innus de Nutashkuan	The Agency identified measures to mitigate effects on Indigenous fishery resources and fishing activity. These measures are discussed in Section 4.6 of this report. Additionally, measures discussed in Section 4.1 and Section 4.5 would also mitigate effects on Indigenous fisheries. Some of the identified mitigation would function as accommodation to minimize or avoid potential adverse impacts on asserted or established Aboriginal or treaty rights, such as compensation for any damages incurred by Indigenous fishers, including for losses relating to both food, social and ceremonial and communal commercial fisheries. The Agency expects that with the applied mitigation, under routine project operations, there would be no interruption in the practice of rights, i.e., Indigenous groups could exercise these rights in the same or similar manner as before the Project. The Agency acknowledges that a major spill or blowout event could have more serious effects. The effects of accidents and malfunctions are discussed in Section 5.1 of this report.
Aboriginal and Treaty Rights	Rights to navigable waters may be impacted from increased traffic in the region and in and around St. John's Harbour	Miawpukek First Nation	The Agency notes that the Project will not obstruct navigable waters in or around the harbour in St. John's, and there are designated traffic lanes associated with approaches to the harbour.
Aboriginal and Treaty Rights	The proponent did not provide information for each individual Indigenous group in their EIS, such as potential effects of the Project on Aboriginal and treaty rights, current use, health and socioeconomic conditions, etc., however, the EIS guidelines required a group by group breakdown	NunatuKavut Community Council	<p>The proponent included community profiles for each individual group, either in Chapter 7 in their EIS, or in a desktop study (which was attached to the EIS as an appendix).</p> <p>There are no known archaeological, paleontological, historical or architectural sites of any group that overlap with the project area, as stated by the proponent in each of the community profiles.</p> <p>As discussed in Section 4.6 of this report, the proponent identified fishing for food, social and ceremonial purposes as the primary rights-</p>

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			based activity that could be affected by the Project. Information on fishing-related rights also appears in the community profiles.
Accidents and Malfunctions	In the event of an incident, better information sharing, transparency and follow up is requested. The public should remain informed throughout any spill response as well as monitoring programs to ensure the proponent is following proper protocol and that routine activities are not having negative effects on the environment	Qalipu First Nation	<p>The Agency notes that the proponent would be required to develop and implement a Fisheries Communication Plan, in consultation with the C-NLOPB, Indigenous groups and commercial fishers. The proponent would be required to include in this plan, a procedure to communicate with Indigenous fishers in the event of an accident or malfunction, as well as procedures to engage in two-way communication with Indigenous groups in the event of a spill requiring a tier 2 or tier 3 response.</p> <p>The Agency has also identified key mitigation measures, follow-up programs and potential EA conditions which include communications related to accidents and malfunctions. See Section 5.1 of this report for more information.</p>
Accidents and Malfunctions	<p>It is critical to have a locally managed capping stack, deployment entity, and appropriate capacity for equipment modification and rapid staging and deployment situated in Newfoundland or Atlantic Canada to mitigate the risks associated with an uncontained blowout</p> <p>The proponent should confirm a list of vessels of opportunity that have the capability to transport and install a capping stack would be maintained</p> <p>The proponent should be required to provide a detailed schedule for</p>	Miawpukek First Nation, MTI, KMKNO	<p>The Agency relied on the C-NLOPB's expertise and advice in reviewing the proponent's analyses and proposed approach to spill response, including the proposed approach to capping stack mobilization and deployment. The Agency notes that the C-NLOPB was satisfied with the information presented by the proponent.</p> <p>The Agency notes that the C-NLOPB's authorization of drilling activities is contingent on its confidence that the Proponent have a satisfactory approach to risk management. The proponent would also be required to demonstrate their preparedness to appropriately respond in the event of an accident or malfunction, including preparation of a detailed Spill Response Plan and well control strategies, which would include discussion of any potential options to reduce overall response timelines.</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	response, including justification as to why an air freightable capping stack may not be an optimal solution		<p>The Agency acknowledges that a plan for well capping and containment would include detailed accounting of timelines for mobilization and installation of capping stacks, and a review of opportunities to conduct preparatory work that may reduce timelines (e.g., permitting requirements, Canadian Customs and Border Services Agency requirements).</p> <p>As part of the well control strategies, the proponent would also be required to 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 capping stack(s), appropriate capping stack vessels, and drilling rigs capable of drilling a relief well. The proponent shall communicate this information to the C-NLOPB and update C-NLOPB, when any of this information changes, and prior to and during the drilling of each well.</p> <p>The Agency has identified key mitigation measures that would ensure the proponent fulfill these commitments (refer to Section 5.1.4 of this report as well as Appendix B), which include the requirement to prepare a Spill Response Plan and well control strategies, which would be submitted to the C-NLOPB for acceptance prior to drilling, including measures related to the capping of a blowout.</p> <p>Further, the Agency identified a potential EA condition that the proponent ensure that actions taken to meet all conditions are informed by the best information and knowledge available, and apply the best available economically and technically feasible technologies.</p>
Accidents and Malfunctions	Conformation required from proponent that event-specific environmental monitoring programs will be developed with appropriate	KMKNO	The Agency identified the need for a follow-up program to ensure the effectiveness of mitigation measures and to verify accuracy of predicted effects in the event of a spill. The proposed EA condition requires that follow-up monitoring include: sensory testing of seafood for taint and chemical analysis for oil concentrations and other



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	regulatory agencies, irrespective of a regulatory requirement to do so		contaminants; measuring contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment; monitoring marine mammals, sea turtles and birds for signs of contamination or oiling, and reporting of results; 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.
Accidents and Malfunctions	<p>Concerns related to the proponent's spill model inputs including: influence of seasonality on results; selection of and limitations of selected probable no effect concentrations; and validity of conclusions and literature to support chosen probable no effect concentration values</p> <p>Explain in Chapter 9 exactly what the 70.5 micrograms per litre of "oil" refers to (e.g. physical oil, dissolved concentrations of specific constituents)</p>	WNNB	<p>Appendix J supports the EIS information. The Oslo and Paris Conventions (OSPAR 2014) predicted no-effects concentrations are based on long-term laboratory toxicity tests, usually at three trophic levels (algae, zooplankton and fish). The proponent noted that as such, they are general and can be used as a first gauge of potential effects.</p> <p>The proponent chose the calmest time of year to evaluate a worse-case scenario for dispersion of produced water. Winter conditions would increase entrainment and dilution of produced water thus reducing effects.</p> <p>Expert federal authorities reviewed the spill modeling and determined it was appropriate to evaluate potential risks. The Agency proposed key mitigation and follow-up requirements to verify the predictions of the EIS.</p> <p>The 70.5 micrograms per litre is the concentration of whole oil in produced water.</p>
Accidents and Malfunctions	Proponent should provide assumptions associated with	KMKNO	Section 16.3 of the EIS indicates that the 115-day timeline for drilling a relief well is based on the maximum time for the successful drilling of the relief well. Section 16.1.2.2 of the proponents EIS indicates that it takes approximately 45 to 85 days to drill and complete a well, and



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	estimated timeframe for drilling a relief well		that the 115-day timeline to drill a relief well considers the mobilization to the site of the rig, time for regulatory permitting, and technical regulations. The proponent stated that while the duration for relief well execution may be higher or lower, the precise duration would be dependent on local operating conditions (e.g., weather), condition of the well, well design and subsurface location.
Accidents and Malfunctions	The Proponent should extend the identified events (e.g., high wind and wave conditions, iceberg impact with installations) to assess how these may in turn result in effects to the environment (e.g., release of synthetic-based mud or hydrocarbons resulting from an emergency disconnect	KMKNO	<p>In section 5.2 of this report, the Agency evaluated the effects of the environment on the Project from severe and irregular environmental conditions or events which can increase the probability of an accident or malfunction that in turn could affect the environment.</p> <p>The Agency identified potential EA conditions related to measures to mitigate effects of the environment on the Project, including development and implementation of operating procedures which include thresholds for cessation of work or activity with respect to meteorological and oceanographic conditions; development and implementation of a physical monitoring plan and ice monitoring plan.</p>
Accidents and Malfunctions	Emphasis is given to the probability of exceeding the threshold and how long it takes to exceed the threshold, but from a toxicological perspective, it is the actual concentrations that matter. In some cases, the spill models predict lethal concentrations of certain chemicals in water surrounding the project area, but the ramifications of these predicted lethal concentrations are not addressed in the EIS	WNNB	<p>In Section 16.7 of its EIS, the proponent predicted that some degree of residual adverse effects to biological receptors in the area at the time of the accident or malfunction are expected. The degree of exposure and thus the type and level of any such effects would depend on the type and size of spill, time of year, and the number, location, and species of animals within the affected area. Further, the proponent predicted a spill event would not likely result in an overall detectable decline in overall marine animal populations in the overall regional study area for one or multiple generations.</p> <p>The Agency proposed key mitigation and follow-up requirements to verify the predictions of the EIS. With respect to follow-up monitoring related to accidents, the Agency has indicated that in consultation with the C-NLOPB, the proponent would monitor the environmental</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			effects of a spill on components of the marine environment until specific endpoints identified in consultation with expert government departments are achieved, including: sensory testing; chemical analysis for oil concentrations and any other contaminants; measuring levels of contamination in recreational, commercial and traditionally harvested fish species; monitoring for marine mammals, sea turtles and birds for signs of contamination or oiling; and monitoring benthic organisms and habitats.
Accidents and Malfunctions	<p>Concerns with the assessment of a spill on fish species and conclusions based on the assessment including: how the spill assessment considers cumulative impacts to fish from other limiting factors such as overharvest, effects of spill on fish species whose population is already limited; consideration of ecosystem effects based on information from the Deep Water Horizon spill.</p> <p>Consider significant direct and indirect mortalities on fish and fish habitat in determining the level of impact</p>	WNNB	<p>The Agency has identified follow-up monitoring and proposed EA conditions which require the proponent to monitor the environmental effects of a spill on components of the marine environment. The Agency concluded that 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. Further, a large subsea release, although unlikely, could affect special areas and sensitive habitats. The Agency recognizes that the probability of occurrence for a major event is very low and thus, these effects are unlikely to occur.</p>

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Accidents and Malfunctions	Request that the applicable regulator(s) confirm that the proponent's model domain and/or reliance on CNOOC's model is appropriate	KMKNO	With respect to the proponent's spill modelling and effects assessment, the Agency issued several information requirements to the proponent. The Agency and federal authorities reviewed the proponent's responses (and revisions made to the final EIS) and were determined that the spill model scenarios, and inputs were appropriate and acceptable.
American eel	The Proponent should seek opportunities to enhance the understanding of the migratory routes of American eel as they are assumed to overlap with the Project	KMKNO	<p>The Agency has identified a potential EA condition that would require the proponent to develop and implement, in consultation with Indigenous Groups, the C-NLOPB, and DFO, follow-up monitoring requirements to verify the accuracy of the environmental assessment as it pertains to underwater sound levels on fish. Among other things, the follow-up monitoring would include collection of information on avoidance behavior and injury effects to fish (including American eel).</p> <p>In addition, the Agency identified a potential EA condition related to the annual reporting on follow-up program results, and publishing the report on the internet for the public to review. The proponent would be required to notify Indigenous groups of the availability of these documents within 48 hours of their publication.</p>
Atlantic salmon	<p>Concern about potential impacts of the Project on migrating Atlantic salmon populations and the effectiveness of proposed mitigation measures</p> <p>Baseline data on the migration and behaviour of Atlantic salmon while at sea is insufficient to adequately assess the effects of the Project; more research/studies are needed</p>	Elsipogtog First Nation, Miawpukek First Nation, MMS, MTI, Nunatukavut Community Council, WNNB	<p>The Agency notes that DFO reviewed available information on Atlantic salmon and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of Atlantic salmon; however, is of the view that there is a low potential for Atlantic salmon to interact with the project area.</p> <p>Based on this advice, the Agency is of the view that effects on Atlantic salmon, under routine project operations, are unlikely. 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 is of the view</p>

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p>The precautionary principle should be considered in the 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 Atlantic salmon</p> <p>To ensure that Atlantic salmon are not diverted from their natural migration routes, the proponent must commit to delaying geophysical surveys until late summer</p> <p>The proponent should provide funding for tracking studies of Atlantic salmon; these studies should be completed before the Project commences</p>		<p>that restricting or delaying project activities at certain times of the year is not warranted.</p> <p>Given the uncertainty about Atlantic salmon and the importance of the species to Indigenous groups, the proponent would be required to support research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas, and update the C-NLOPB and Indigenous groups annually on research activities. Atlantic salmon was identified as an area of research interest by the ESRF, an industry levy-funded initiative managed by a joint government/industry/public board. The ESRF recently concluded a selection process for proposals, and a four-year, \$12 million collaborative research project on Atlantic salmon, led by DFO, has been funded. The project has 50 partners and collaborators, including federal and provincial governments and agencies, academic institutions, not for profit organizations, as well as Indigenous groups and organizations. The objective of the project is to determine when, where, and for how long Atlantic salmon from three different life stages (juvenile post-smolt, post-spawned kelt, and multi-sea winter adults) are present in the eastern Canadian offshore regions. The research will inform regulatory decision making in Canada's areas of offshore oil and gas activity.</p> <p>The Agency has also identified a potential EA condition that would require the proponent to develop and implement, in consultation with Indigenous Groups, the C-NLOPB, and DFO, follow-up monitoring requirements to verify the accuracy of the environmental assessment as it pertains to underwater sound levels on fish. Among other things, the follow-up monitoring would include collection of information on avoidance behavior and injury effects to fish.</p> <p>In addition, the Agency identified a potential EA condition related to the annual reporting on follow-up program results, and publishing the</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			report on the internet for the public to review. The proponent would be required to notify Indigenous groups of the availability of these documents within 48 hours of their publication.
Atlantic salmon	Concern that the proponent used old reports prepared by DFO's Canadian Science Advisory Secretariat (CSAS) on Atlantic salmon stocks instead of more recent reports (such as CSAS's 2019 report)	NunatuKavut Community Council	<p>The 2019 Stock Status Update report prepared by Canadian Science Advisory Secretariat on Atlantic salmon stocks in Newfoundland and Labrador was published in 2020, after the proponent had already prepared its EIS. The Agency notes that the proponent has committed to pursuing ongoing research related to Atlantic salmon migration and behaviour at sea. Additionally, the aforementioned ESRF research is intended to address gaps in knowledge regarding the at-sea migration patterns and habitat use of Atlantic salmon in the offshore area of Newfoundland and Labrador.</p> <p>The Agency proposed a follow-up requirement for the proponent to contribute to research on the presence and distribution of Atlantic salmon in 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.</p>
Atlantic salmon	Concern about cumulative effects on Atlantic salmon through seismic effects, changes to water quality, and major accidents and malfunctions	Miawpukek First Nation	Based on what is currently known about Atlantic salmon migration routes and overwintering areas, DFO indicated there is low potential for interaction with the Project, and further, that Atlantic salmon generally have higher avoidance capabilities and access to alternative, less disturbed habitats. In previous exploration projects, DFO had also advised that monitoring of finfish for the past 25 to 30 years in the Newfoundland and Labrador offshore region has revealed no appreciable effects on fish health from previous or ongoing oil and gas operations.
Climate Change	Concern about the continued development of hydrocarbon resources in light of warnings about	Première Nation des Innus de Nutashkuan	ECCC would require the incorporation of greenhouse gas and air emission reduction measures in the design of the Project, and implement these measures during all phases of the Project. As well,

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	climate change, and how climate change could impact Indigenous peoples		the proponent would be required to comply with all applicable air emissions limits and limits on sulphur concentrations in diesel fuel for project vessels in accordance with the International Maritime Organization's International Convention for the Prevention of Pollution from Ships and any other legislative requirements, where applicable.
Commercial Fishing	Commercial fishing in zones 3KL and 3LN overlap with the Project	Miawpukek First Nation	In Section 4.6 of this report, the Agency has listed the communal commercial licences held by Indigenous groups that overlap with the project area, including licences in NAFO Divisions 3LM. Based on the available information, the Agency agrees with the proponent there is a low likelihood that communal commercial fishing is currently taking place in the area where the FPSO, MODUs and subsea infrastructure would be located. However, this could change in the future. Should Indigenous fishers start commercially harvesting in areas that overlap with the Project, the proponent has committed to developing a compensation program in accordance with the C-NLOPB <i>Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities</i> .
Commercial Fishing	The "reef effect" resulting from the presence of the FPSO and other vessels may have an impact on communal commercial licence holders for NAFO Divisions adjacent to the project area	Miawpukek First Nation	The potential impact of a reef effect was considered during the assessment process. Federal authorities determined that commercial fisheries would not be adversely effected from fish attracted to the FPSO or other vessels.
Compensation	Any damages, including the loss of commercial or food, social and ceremonial fisheries must require compensation in accordance with the C-NLOPB's <i>Compensation</i>	KMKNO, Miawpukek First Nation, MMS, MTI, WNNB	The Agency notes that the proponent has committed to developing a compensation program in accordance with the C-NLOPB <i>Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities</i> . The Agency understands that, in the event of any damages or losses (including those caused by routine project activities

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p><i>Guidelines Respecting Damages Relating to Offshore Petroleum Activity</i></p> <p>The requirement to compensate commercial fishing would be insufficient to compensate or mitigate any loss. The Proponent has indicated that it will develop and implement a compensation program for damages experienced by commercial and communal commercial fishers resulting from the project activities</p> <p>A project-specific compensation program should be developed which includes the potential economic loss and the cultural and mental impacts from fishing gear loss, the loss or reduced access to commercial communal fishing areas and moderate livelihood through the establishment of an exclusion zone</p>		<p>to food, social and ceremonial and communal commercial fishing), the C-NLOPB requires the proponent to consider claims in a manner that meets the requirements of the <i>Canada-Newfoundland and Labrador Atlantic Accord Implementation Act</i>, and to act in good faith to resolve the claims. If the proponent and an Indigenous group are unable to resolve a claim for compensation, the group could seek relief directly to the C-NLOPB or through the court.</p>
Consultation/Engagement	Concern that comments from Indigenous groups may not receive attention they deserve	Première Nation des Innus de Nutashkuan	The Agency appreciates the considerable time and effort Indigenous groups put into participating in consultation activities throughout EA processes. The Agency tracks and considers all the comments and concerns raised by Indigenous groups in deciding what information and studies the proponent will be required to undertake; in its analysis of the information provided by the proponent; and, in the



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			preparation of the draft EA report (including identification of mitigation measures and potential EA conditions for the Project).
Consultation/ Engagement	The Crown has a duty to consult and accommodate under section 35 of <i>Constitution Act</i> and also responsibility under UNDRIP	Miawpukek First Nation	The Agency has outlined its obligations regarding the duty to consult Indigenous peoples, and noted its support for the Government of Canada's commitment to implement UNDRIP, in Section 3.1 of this report.
Consultation/ Engagement	Indigenous groups should be provided with an opportunity to review the well and containment plan when it is developed	Miawpukek First Nation	The Agency has identified a potential EA condition which would require the proponent to make their well control strategies (including plans for well capping and containment) publicly available, and to notify Indigenous groups of the availability of the documents within 48 hours of their publication.
Consultation/ Engagement	Concern about the approaches being taken by the proponent and the Agency to consultation; some groups have concerns about funding to participate in the EA process	Miawpukek First Nation, MTI	<p>The Agency continues to encourage proponents to provide funding to allow meaningful participation of Indigenous groups in environmental/impact assessments.</p> <p>The Agency provides funding support for Indigenous groups to participate in environmental/ impact assessments, through its Participant Funding Program.</p> <p>The Agency assisted several communities in accessing additional funding from the Agency in 2020 to 2021 and 2021 to 2022, through a new initiative called the Indigenous Capacity Support Program. This program is intended to support capacity building for participation in environmental/impact assessments. One of the streams of funding is specifically for individual communities (those not represented by an aggregate organization or tribal council).</p>
Consultation/ Engagement	An environmental advisory committee should be established to provide a forum for ongoing consultation and oversight of	Miawpukek First Nation, MTI	While the potential EA conditions identified by the Agency do not reflect a requirement that a committee be established, the Agency



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	potential impacts of offshore projects on Indigenous peoples; this committee should be supported with capacity funding		<p>has made the proponent, as well as proponents of other offshore projects, aware of this request from Indigenous groups.</p> <p>Should the Project proceed, the Agency also suggests that Indigenous groups indicate how they want to be consulted post-EA, directly with the proponent.</p>
Consultation/ Engagement	Request for additional consultation on oil spill trajectory and fate modeling and information on how oil will be transported	Miawpukek First Nation, MTI	<p>During the public comment period on the EIS, the Agency hosted an information and facilitated discussion session on August 12, 2020, exclusively for Indigenous groups. During this session, the proponent explained that shipment and transportation of oil was outside the scope of the Project. Transport Canada is the lead regulatory agency that manages and governs Canada's Marine Oil Spill Preparedness and Response Regime under the authority of the <i>Canada Shipping Act, 2001</i> (CSA 2001), which applies to all vessels within Canadian waters.</p> <p>The proponent also explained the modelled accidental spill scenarios, and results, including prevention and response measures and proposed follow-up monitoring.</p> <p>The meeting notes from the session are available on the Canadian Impact Assessment Registry at: https://iaac-aeic.gc.ca/050/evaluations/document/136169. See page 5 of the notes for highlights of the discussion related to the shipment of oil.</p> <p>At the end of the August 12, 2020 session, both the Agency and proponent offered to follow up with virtual or phone meetings with individual Indigenous groups to discuss any aspects of the EIS. The Agency followed up with Indigenous groups again via e-mail on August 24, 2020 to offer additional meetings to discuss outstanding questions or concerns.</p> <p>Additional information on spill modelling completed for the Project can also be found in Section 5.1.2 of this report; additionally,</p>



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			Indigenous groups can reach out to the Agency or the proponent at any time with questions.
Cumulative Effects	The EIS should include a summary of the findings of the Regional Assessment and discussion on how the Project aligns with the findings and mitigation measures laid out in the Regional Assessment recommendations	MTI	<p>The Agency's cumulative environmental effects assessment considers the overall effect on valued components as a result of the Project's predicted residual environmental effects and those of other projects and activities that have occurred, are ongoing or are expected to occur in the future.</p> <p>While the Regional Assessment relates to the exploration drilling projects, the Agency did consider the Regional Assessment of Offshore Oil and Gas Exploration Drilling East of Newfoundland and Labrador when completing the cumulative effects analysis, in Section 5.3 of this report.</p>
Cumulative Effects	The proponent should have included an analysis of the cumulative effects of continuous drilling fluid release in their EIS (in context of species of importance to Indigenous groups)	MTI	The proponent provided an analysis of the intermittent release of drilling fluids. Refer to section 9.3.3, 9.4.3, 10.3.3, 11.3.3., and 12.3.3 of the proponents EIS.

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Current Use	Concern about the proponent's effects assessment as it relates to migratory species that are harvested by Indigenous groups for food, social and ceremonial purposes	KMKNO	<p>In consultation with DFO, the Agency has identified mitigation measures and follow-up programs that the proponent would be required to develop and implement to address uncertainties in the effects assessment for fish and fish habitat, including:</p> <ul style="list-style-type: none"> • compliance monitoring with C-NLOPB regulations; • surveying to collect baseline data; • verifying the effects prediction on fish and fish habitat; • verifying modeling results; and • contributing to research on the presence and distribution of Atlantic salmon in eastern Canadian offshore areas, including updating the C-NLOPB and Indigenous groups annually on research activities. <p>See Section 4.1.4 of this report for more information.</p>
Current Use	The proposed offshore drilling site is within fishing grounds that are part of our traditional territory	Miawpukek First Nation	<p>Based on information provided by DFO, none of the Indigenous groups' traditional territories overlap with the project area. Further, no Indigenous groups have reported fishing for this purpose in the project area. However, food, social and ceremonial fishing does occur in other areas, including coastal regions which border the offshore area, particularly for Indigenous groups located in Newfoundland and Labrador. However, taking into account the available information, the Agency is of the view that it is unlikely Indigenous groups harvesting in in these areas would encounter routine project activities. Additionally, the proponent would be required to implement measures to mitigate effects on migratory fish, marine mammals and migratory birds (as discussed in Sections 4.1, 4.2, and 4.3 of this report), including those species being traditionally harvested by Indigenous groups.</p> <p>As discussed in Section 5.1 of this report, the Agency acknowledges that in the unlikely event of a major oil spill, there is potential for</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			more serious effects on species being harvested for traditional purposes.
Current Use	The proponent should engage with Indigenous groups and Anqotum Fisheries Resource Center to conduct research on species of cultural importance (swordfish, Atlantic salmon and Atlantic Bluefin tuna) to address data gaps	MTI	The Agency will share the information about Anqotum and reiterate MTI's interest in being involved in any research studies with the proponent as well as other offshore oil and gas operators.
Current Use	An oil spill could impact food, social and ceremonial harvest and moderate livelihood fishing for marine and migratory species that occur in coastal areas and harvest activities near shorelines. Proponent should provide rationale for not conducting specific studies on current use of lands and resources for traditional purposes	KMKNO	The Agency, this proponent, and proponents of previous exploration oil and gas projects have specifically requested information about the practice of fishing for food, social and ceremonial and commercial purposes (such as locations, timing, and frequency) directly from Indigenous groups. Information is not available or cannot be provided. As such, the Agency has relied on information from DFO, such as locational catch data (which does not distinguish between domestic (i.e., non-Indigenous) commercial fishing and communal commercial fishing) and licence agreements (such as species covered, areas fishing is permitted to occur in, etc.). The Agency is of the opinion that conducting additional studies on the current use of lands and resources for traditional purposes would not change the Agency's analysis or conclusions, or the identified key mitigation measures, follow-up requirements and potential EA conditions that are proposed for the Project. The Agency acknowledges in Section 4.6 of this report that the intensity of Indigenous fishing in the project area could change/increase in the future. The Agency also notes in Section 4.6 of this report that some groups are in the process of negotiating agreements with DFO for new moderate livelihood fisheries. It is possible that new or renegotiated fishing agreements may recognize certain treaty rights in the future, and fishing activities authorized



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			<p>under them could be affected by the Project. The Agency has identified key mitigation measures, follow-up monitoring requirements and potential EA conditions to address any potential impacts should they arise, including: the development and implementation of a Fisheries Communication Plan to address communications prior to and during all project phases, including future activities; regular updates on plans for project activities and movement of drilling installations and an opportunity for feedback and further exchange of information; procedures to notify Indigenous groups and commercial fishers in the event of a spill and communication of results of monitoring; and reporting annually to the C-NLOPB any incidents of lost or damaged fishing gear as a result of interactions with project components.</p> <p>The Agency does acknowledge in the unlikely event of a major oil spill, there is potential for more serious effects on species of cultural and commercial importance, which could in turn, adversely impact health and socio-economic conditions or aboriginal and treaty rights. As discussed in Section 5.1 of this report, a spill event could decrease the quantity, quality and health of the fish being harvested by Indigenous groups. As discussed in Section 4.6 of this report, the commercial fisheries are intimately tied to socioeconomic conditions, with communities relying on revenues from these fisheries to provide community based programs and services. The Agency has identified key mitigation measures, follow-up requirements and potential EA conditions to reduce the likelihood of a major spill event occurring, including requiring the proponent to take all reasonable measures to prevent accidents and malfunctions; preparation of a plan for avoidance of collisions with vessels and other hazards; and preparation of an Ice Management Plan.</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			The Agency has also identified potential EA conditions to respond to potential effects of a spill (should one occur), including preparation of well control strategies, including measures for well capping and containment of fluid and measures to quickly disconnect the MODU and FPSO from well(s) in the event of an emergency or extreme weather conditions; maintenance of up to date information on the availability of capping stack(s) and drilling rigs capable of drilling a relief well; preparation of a Spill Response Plan; conducting Spill Response Plan exercises; and undertaking a Spill Impact Mitigation Assessment to identify spill response options that could be implemented in the event of a spill to provide for the best opportunities to minimize environmental consequences.
Drilling Wastes and Discharges	Request that the drilling waste be disposed of onshore in an approved and regulated facility, as opposed to discharged to the water column	Miawpukek First Nation	<p>With respect to the management of-synthetic-based mud associated cuttings, the proponent considered offshore disposal, onshore disposal (ship-to-shore) and offshore reinjection. The proponent indicated that onshore disposal of synthetic-based mud cuttings is not economically feasible nor technically available in Newfoundland and Labrador. As per the C-NLOPB Operations Authorization process, the proponent will manage the treatment of drill cuttings using the best available proven technology bearing in mind that technologies may change over the duration of the Project.</p> <p>The C-NLOPB confirmed that as per the proponent's EIS, excess or spent-synthetic-based mud that can no longer be used is sent to shore for disposal at an approved waste management facility.</p>
Drilling Wastes and Discharges	Offshore oil and gas proponents could pool resources to create an approved treatment facility in Newfoundland. All cuttings from existing and proposed drilling could	Miawpukek First Nation	The proposed Drill Mud Processing Facility in Conception Bay South would be designed to treat spent drilling muds only, and not designed to treat drill cuttings. SBM cuttings will be treated using best treatment practices that are commercially available and economically feasible, in accordance with the OWTG. The drilling installation will be



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	be directed to this facility for treatment and disposal		equipped with solids control equipment to treat SBM cuttings prior to discharge. . As per the C-NLOPB Operators Authorization process, Equinor Canada will assess available drill cuttings treatment technology with the intent of using the best available proven technology bearing in mind that technologies may change over the duration of the Project.”
Drilling Wastes and Discharges	Concerns related to the scope of the model for produced water release scenarios, including why only June was selected and the source and validity of the chosen threshold values for toxic constituents	WNNB	<p>The proponent chose the calmest time of year to evaluate a worse case scenario for dispersion of produced water. Winter conditions would increase entrainment and dilution of produced water thus reducing effects.</p> <p>Appendix J supports the EIS information. The Oslo and Paris Conventions (OSPAR 2014) predicted no-effects concentrations are based on long-term laboratory toxicity test, usually at three trophic levels (algae, zooplankton and fish). The proponent noted that as such, they are general and can be used as a first gauge of potential effects.</p>
Effects Assessment	The Proponent should provide an overview of the uncertainty associated with the effects assessment, particularly as it relates to a lack of information on migratory species, knowledge of traditional land and resource use practices	KMKNO	The proponent acknowledged data gaps and uncertainties with its effects assessment related for some species of interest to Indigenous groups, commercial fishing locations, etc. In consultation with DFO and ECCC, the Agency has identified mitigation measures and follow-up programs that the proponent would be required to develop and implement to address uncertainties in the effects assessment for fish, marine mammals and migratory birds.
Effects of the Environment on the Project	Concern about how the proponent will conduct environmental monitoring during periods of icing	Miawpukek First Nation	The proponent would be required to demonstrate to the C-NLOPB that its vessels are fit for purpose and certified for adverse weather conditions, including winter conditions. Environmental monitoring programs would be planned to account for seasons. Results from follow-up programs would be shared publicly on the internet, with a

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	and other extreme weather (e.g., wind and waves)		requirement for the proponent to notify Indigenous groups within 48 hours of publication.
Effects of the Environment on the Project	Concern that project personnel may not have specialized training and explicit procedures required to work in the harsh weather environment associated with the project area	KMKNO	The Agency consulted with C-NLOPB regarding this concern. C-NLOPB advised that Part 10 of the Newfoundland Offshore Petroleum Drilling and Production Regulations (SOR/2009-316) requires offshore oil and gas operators to ensure all personnel have the necessary experience, training and qualifications and are able to conduct their duties safely, competently and in compliance with the <i>Regulations</i> before assuming their duties. Operators are also required to keep records of the experience, training and qualifications of all personnel and make them available to the C-NLOPB upon request.
Fish and Fish Habitat	Concern about fish habitat offsetting plan as described in the EIS	Elsipogtog First Nation, MTI, WNNB	Requirements for a habitat offsetting plan will be determined by DFO as a potential component of a <i>Fisheries Act</i> Authorization.
Fish and Fish Habitat	Unclear what the proponent means by the term “net loss.” Does this mean they are planning to offset habitat before the calculation of lost habitat through a Fisheries Act Authorization and subsequently only requiring offset of the remaining (net) habitat?	KMKNO	DFO provided their <i>Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act</i> to the proponent. This policy provides guidance on undertaking effective measures to offset death of fish and the harmful alteration, disruption or destruction of fish habitat, consistent with the fish and fish habitat protection provisions of Canada’s <i>Fisheries Act</i> . DFO will provide guidance to the proponent on fish and fish habitat mitigation.
Fish and Fish Habitat	The proponent should calculate fish habitat surface area losses in the project area by type of habitat or provide rationale and justification as to why there would be no losses	KMKNO	The Agency’s analysis considered the potential effects of project activities on fish habitat loss. The Agency identified potential EA conditions related to conducting a seabed investigation survey of fish and fish habitat prior to conducting activities on the seafloor related to the installation of infrastructure, and in the event that sensitive fish



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	Concern related to the area impacted by drill cuttings	Elsipogtog First Nation	<p>or fish habitat is identified the proponent must implement additional measures and monitoring.</p> <p>Further, the Agency identified follow-up related to fish and fish habitat to verify the accuracy of the predictions made during the environmental assessment, and to determine the effectiveness of mitigation measures.</p>
Fish and Fish Habitat	<p>Additional information requested on geographic extent of survey data related to species distribution and abundance surveys</p> <p>Requested revised EIS figures related to species abundance and distribution baseline, as well as most recent literature available to describe biology and distribution of the fish species, including species at risk</p> <p>Indicate how Indigenous knowledge on species distribution/abundance was incorporated into fish assessment</p>	WNNB	<p>The proponent mapped distribution of harvested commercial catches. Not all species captured in the trawl surveys were provided. DFO requires the proponent to conduct additional surveys and the Agency is proposing a condition to ensure the surveys are completed.</p> <p>The Agency defined a proposed EA condition which requires the proponent to ensure that its actions are consistent with any applicable recovery strategy and action plans listed for species at risk.</p>
Fish and Fish Habitat	Concern about the proponent's conclusion that adverse effects on Acadian and deepwater redfish will not contribute to a population decline in these species (which are	WNNB	DFO advised the Agency that the project activities will not cause an adverse effects on finfish population as they are able to relocate from areas of disturbance.



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	designated as threatened by COSEWIC)		
Follow up and Monitoring	<p>Environmental monitoring programs for fish, marine mammals and migratory birds should be developed in consultation with Indigenous groups</p> <p>Results of environmental monitoring and follow-up programs should be shared with Indigenous groups</p> <p>Request for the participation of Indigenous community monitors in monitoring programs for fish and fish habitat, marine mammals and sea turtles, and migratory birds</p> <p>Fund the necessary training for community members to participate in the Project as monitors and provide the resources required for an annual community meeting</p>	Miawpukek First Nation, MTI	<p>The Agency identified various follow-up programs for fish and fish habitat, marine mammals, and migratory birds; these are described in Sections 4.1, 4.2 and 4.3 of this report, as well as in Appendix A. The Agency has also identified potential EA conditions that would require the proponent to share results and information from follow-up and monitoring programs with Indigenous groups.</p> <p>The Agency has shared with the proponent, requests from Indigenous groups seeking increased participation in follow up programs and funding to support this participation.</p>
Follow up and Monitoring	The proponent should hire Indigenous community members as marine and migratory bird and marine mammal observers and provide them with industry-standard job training	Miawpukek First Nation, MTI	As part of their Development Application to the C-NLOPB, the proponent would be required to submit a Benefits Plan that is part of a socio-economic impact statement. The plan must contain certain provisions including: individuals living in Newfoundland and Labrador shall be given first consideration for training and employment; designated individuals or groups are given access to training and employment opportunities; and, a provision to enable such individuals or groups to participate in the supply of goods and services.



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			The proponent noted in its EIS that their Benefits Plan would include an associated Gender Equity and Diversity Plan.
Greenhouse Gas Emissions	<p>Concern about the compatibility of oil and gas projects with Canada's commitments to greenhouse gas reduction</p> <p>The proponent should explain why it did not treat air quality as a valued component as suggested by the EIS guidelines</p> <p>Clarification needed as to if new federal regulations on methane reduction was considered as applicable</p>	<p>Premiere Nation des Innus de Nutashkuan,</p> <p>NunatuKavut Community Council</p>	<p>Section 7.3.8.1 of the EIS guidelines defines other valued components that may be affected, including air quality and greenhouse gas emissions. The proponent addressed all requirements under section 7.3.8.1 of the guidelines. Further, the proponent carried out an analysis of air quality and greenhouse gases, including completion of air emissions dispersion study.</p> <p>The Agency has identified a potential EA condition that would require the proponent to identify and incorporate greenhouse gas and air emission reduction measures into the design of the Project, and to implement these measures for the duration of the Project. The condition would also require the proponent to submit these measures to ECCC and the C-NLOPB prior to conducting any project activities. Additionally, the Agency has identified a potential EA condition that would require the proponent to quantify greenhouse gas and air emissions estimates based on final design measures, and submit the information to the C-NLOPB and ECCC prior to conducting any activities in the project area.</p> <p>Further, the proponent must adhere to applicable air emission limits and limits on sulphur concentrations in diesel fuel for designated project vessels, including the International Maritime Organization's International Convention for the Prevention of Pollution from Ships. Based on comments during the public comment period on the EIS, the Agency discussed the application of federal regulations related to methane to the designated project, which was incorporated into this report (see Section 4.7 for more information).</p>

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Greenhouse Gas Emissions	Request for the proponent to quantify the greenhouse gas emissions that would result from shipping drilling waste to shore, and share the information with Indigenous groups	Miawpukek First Nation	The transportation of spent drilling waste for disposal was not within the scope of the EA for the Project.
Indigenous Knowledge	<p>Concerns about what Indigenous knowledge was collected and how it has been used in the EIS</p> <p>The desktop study commissioned by the proponent did not come from the affected First Nations but was a review of publicly available information; Indigenous knowledge should come directly from groups potentially impacted by the Project</p> <p>The proponent indicates that Indigenous knowledge helped inform their assessment of fish and fish habitat but it is not evident in the EIS where Indigenous concerns for American eel, Atlantic bluefin</p>	Miawpukek First Nation, KMKNO, MTI, WNNB	<p>Section 4.2.2 of the <i>Guidelines for the Preparation of an Environmental Impact Statement</i> for offshore oil and gas development projects stipulates the following related to traditional (Indigenous) knowledge: <i>“The Proponent will incorporate into the EIS the community knowledge and Aboriginal traditional knowledge to which it has access or that is acquired through public participation and engagement with Indigenous groups, in keeping with appropriate ethical standards and obligations of confidentiality.”</i></p> <p>Based on comments received from Indigenous groups during the EIS review, the Agency requested additional information from the proponent regarding the sources of Indigenous knowledge that informed their analyses and where it could be found in their EIS. The proponent provided a detailed response⁴⁴ including explaining the primary and secondary sources of information utilized, specifically what knowledge was collected and where it could be found in the EIS. Based on the proponent’s response, the Agency is of the opinion that the proponent has collected and considered the available Indigenous knowledge to the best of their ability.</p>

⁴⁴ The proponent’s detailed response to the additional information requested by the Agency regarding Indigenous knowledge can be found on the Canadian Impact Assessment Registry at: <https://iaac-aeic.gc.ca/050/evaluations/document/137212> (relevant section of the response is covered on pages 87-94 of the PDF document.)



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	tuna, and Atlantic salmon were considered		<p>The Agency also acknowledges that Indigenous groups would like to see more Indigenous knowledge being used in EAs for offshore oil and gas projects.</p> <p>To this end, the ESRF will be funding a two-eyed seeing project to gather Indigenous knowledge related specifically to the offshore environment. Indigenous groups consulted on this Project and the exploration projects are expected to be involved in the research.</p>
Light and Light Emissions	<p>The proponent should implement lighting changes on all project vessels, not just the FPSO</p> <p>The proponent should perform their own feasibility assessment of whether shading, directing lighting towards the deck, and spectral modification of some lighting is possible on the drilling installation</p>	Miawpukek First Nation, MTI	<p>The Agency has identified potential EA conditions that require the proponent, in consultation with ECCC and the C-NLOPB, to develop measures to mitigate impacts of lighting from the Project on migratory birds, including measures to control the direction, timing, intensity, and glare of light fixtures while meeting operational health and safety requirements. The Agency has also identified potential EA conditions that require the proponent to develop and implement procedures and methods for monitoring migratory bird interactions with lighting related to the Project, including the effectiveness of any spectrally modified lighting measures, if implemented. The methods used shall consider and, where appropriate, incorporate the use of radar, infrared imaging, aerial surveys or telemetry studies.</p> <p>The potential EA conditions identified by the Agency would apply to all MODUs, the floating production storage and offloading vessel and seismic vessels.</p>
Light and Light Emissions	The proponent should implement the use of water curtains which have been used as industry-standard mitigation measures	Miawpukek First Nation, MTI	The Agency has identified potential EA conditions regarding changes in lighting and flaring. These conditions would require the proponent to submit a letter to the C-NLOPB, prior to commencing project activities, confirming its intent to contribute to research and monitoring programs pertaining to the effects of light attraction on migratory birds in offshore areas and mitigation measures to reduce the attraction of migratory birds to lighting including a summary of



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	<p>The proponent should use supporting technology/equipment (e.g., bird radar, cameras, acoustic recording/deterrents) to account for limitations of observer-based surveying during poor conditions</p> <p>Data from follow-up programs, monitoring and mitigation on migratory birds should be shared annually with ECCC and Indigenous groups</p>		<p>potential research initiatives to which they could contribute. The requirements would also include notifying potential researchers and monitoring programs of their interest in contributing to research and monitoring programs related to:</p> <ul style="list-style-type: none">• impacts of offshore lights on Leach's Storm-Petrel's and other migratory birds;• migratory bird foraging and overwintering areas in the offshore;• migratory bird populations distributions and demographics in the offshore; and• reducing the attraction of migratory birds to lighting in offshore areas, including the effectiveness of measures related to the spectrum, type or intensity of light. <p>The proponent would also be required to update the C-NLOPB and Indigenous groups annually on the research activities, and to communicate with Indigenous groups regarding the means by which they plan to update them.</p> <p>Potential EA conditions identified by the Agency related to flaring focus on limiting non-emergency flaring and limiting flaring in nighttime and under poor visibility, as well as notifying the C-NLOPB at least 30 days in advance of planned flaring to determine how adverse environmental effects on migratory birds would be avoided, including by implementing modified or additional mitigation measures.</p>
Light and Sound	Considering the potential adverse effects on fish, the EIS should include a monitoring program that assesses the underwater impacts of light and	MTI	The Agency has proposed follow-up programs for the proponent to survey the presence of fish species and characteristics of an artificial reef associated with the MODUs, FPSO and its mooring system to verify predictions on fish populations. The proponent would be



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	sound from all project activities, including vessel traffic, drilling and operations		<p>required to prepare a monitoring plan of underwater sound and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. This plan will:</p> <ul style="list-style-type: none">• provide a scientifically robust survey design based on underwater sound model results;• measure underwater sound levels based on acoustic modeling results;• collect data on avoidance behaviour and injury effects to fish from sound to verify sound effect predictions relative to predictions of attraction to underwater light and presence effects;• measure the zone of influence of underwater particle motion from the FPSO, MODUs and project vessels; and• identify the equipment used for the surveys, to be operated by a qualified individual. <p>The proponent would also be required to prepare a survey plan of underwater light and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. This plan will:</p> <ul style="list-style-type: none">• provide a scientifically robust survey design based on underwater light predictions;• collect data on underwater light levels and extent of illumination based on predictions; and• collect data on species presence, abundance and feeding dynamics of fish and night feeding birds to verify the prediction of attraction impacts.
Marine Mammals	The proponent should use passive acoustic monitoring (PAM) in	Miawpukek First Nation	The Agency identified mitigation measures and potential EA conditions related to follow-up monitoring for marine mammals, including:



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	addition to marine mammal observers		<ul style="list-style-type: none">• The proponent shall apply DFO's <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> during the planning and the conduct of all applicable geophysical surveys;• The proponent shall develop, in consultation with DFO and the C-NLOPB, a marine mammal monitoring plan that shall be submitted to the C-NLOPB at least 30 days prior to the commencement of any geophysical surveys; and• The proponent shall implement the plan when geophysical surveys are being conducted. <p>The marine mammal monitoring plan would specify observation requirements, including:</p> <ul style="list-style-type: none">• the use of passive acoustic monitoring, or equivalent technology, and visual monitoring by marine mammal observers throughout any geophysical surveys;• the requirements for shut down of the sound source if any marine mammal is observed within the established safety zone; and• the start of the sound source can only begin once marine mammals have not been observed within the safety zone for 60 minutes. <p>The proponent would also be required to submit results of the activities undertaken as part of the marine mammal observation requirements to the C-NLOPB within 60 days of conducting a geophysical survey.</p>

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Marine Mammals	<p>The proponent should complete marine mammal and sea turtle baseline studies within the project area</p> <p>There are uncertainties associated with this assessment, specifically the use of the project area by marine mammals and the impacts of sound on the change in habitat quality for marine mammals</p> <p>The proponent noted in its EIS that a marine mammal monitoring plan will be developed for 4-dimensional seismic surveys, but there is no mention of a monitoring plan or the use of marine mammal observers for other project activities</p>	Elsipogtog First Nation, Miawpukek First Nation, MTI, KMKNO	The Agency has identified a potential EA condition that would require the proponent to develop and implement a follow-up program to verify the accuracy of the environmental assessment as it pertains to underwater sound levels on marine mammals, in consultation with Indigenous groups, DFO and the C-NLOPB. The requirements would include: surveys of marine mammal distribution, important habitat areas, and avoidance behavior within the project area; requirement that marine mammal observations be conducted by a marine mammal observer; and preparation of an annual summary report of all north Atlantic right whale (<i>Eubalaena glacialis</i>) observations recorded, to be provided to Indigenous groups.
Marine Mammals	The proponent should adopt a higher standard for mitigating the effects of geophysical surveys on marine mammals or sea turtles. This would require the immediate shutdown of the air source array if any species of marine mammal or sea turtle is observed within a 500-metre radius of the platform, regardless of whether or not it is	Miawpukek First Nation	Based on advice from DFO, the Agency noted that a key mitigation measure would be for the proponent to conduct applicable geophysical surveys in accordance with the <i>Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment</i> ; and delay ramp up of and shut-down of air source arrays for all marine mammals when observed within the safety zone.

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	designated as a species at risk, or a beaked whale species		
Marine Mammals	Marine mammal and sea turtle observers must be present on all supply and servicing vessels and surveying vessels	KMKNO, Miawpukek First Nation	As discussed in Section 4.2 of this report, the proponent determined that dedicated onboard marine mammal observers on its vessels would not be necessary. The proponent made this determination based various factors including the low numbers of reported ship strikes; and that the vessel-traffic corridor is not within important marine mammal habitat.
Marine Mammals	As a precautionary measure, the Proponent should implement a visual watch 30 minutes prior to scheduled helicopter takeoff from the FPSO or other vessel. If a sea turtle or marine mammal is observed within the 500-metre safety zone, helicopter takeoff from the FPSO or other vessel should be restricted until the sea turtle or marine mammal has moved outside of the safety zone	Miawpukek First Nation	The Agency acknowledges that the proponent committed to helicopter flight paths and supply vessel routes adhering to periods of avoidance, and specific set back distances, associated with specific and established migratory bird nesting colonies outlined in the <i>NL Seabird Ecological Reserve Regulations, 2015</i> , and in consideration of ECCC guidelines, in order to reduce disturbance. Low-level helicopter operations would also be limited or avoided where it is not required per Transport Canada protocols.
Marine Mammals	The proponent should commit to providing the marine mammal and sea turtle program to Indigenous groups for review and input The plan should include information on surveying protocol, marine	Elsipogtog First Nation, Miawpukek First Nation, MTI	The Agency has identified a potential EA condition that would require the proponent to develop and implement the follow-up requirements to verify the accuracy of the environmental assessment as it pertains to marine mammals, in consultation with Indigenous groups. The follow-up requirements would include surveys of marine mammal distribution, important habitat areas, and avoidance behavior within the project area.

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	mammal observers, and reporting and oversight requirements		
Marine Mammals	<p>Speed restrictions of 10 knots during active seasons for North Atlantic Right Whales, should be voluntarily accepted</p> <p>Concern related to marine mammals being harmed as a result of vessels in transit</p>	<p>MTI</p> <p>Elsipogtog First Nation</p>	<p>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 4.2 of this report and in Appendix B. The proponent would be required to:</p> <ul style="list-style-type: none"> • limit supply vessel 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 whale or sea turtle species at risk is observed or reported within 400 metres of the vessel.
Migratory Birds	Concerns about effects of the project on migratory birds	MTI	<p>The Agency has identified mitigation measures and potential EA conditions that would require the proponent to develop monitoring programs in consultation with ECCC and the C-NLOPB, to verify the accuracy of the environmental assessment as it pertains to migratory birds and to determine the effectiveness of the mitigation measures implemented to avoid harm to migratory birds, their eggs and nests. The proponent would be required to develop monitoring programs prior to commencing project activities. Monitoring program requirements would include:</p> <ul style="list-style-type: none"> • daily monitoring for the presence of migratory birds at the mobile offshore drilling unit, floating production storage and offloading unit, and seismic vessels using a trained observer whose primary responsibility is observing migratory birds and following ECCC's <i>Eastern Canada Seabirds at Sea Standardized</i>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			<p><i>Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms;</i></p> <ul style="list-style-type: none">• developing and implementing procedures/methods for monitoring the MODUs, FPSO, and supply vessels daily for the presence of stranded and re-stranded migratory birds using a trained observer and following ECCC's <i>Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada</i>. The procedures would include any technically and economically feasible ways to monitor strandings from areas of the MODUs, FPSO, and supply vessels that are inaccessible to observers; and• developing and implementing procedures/methods for monitoring migratory bird interactions with project-related lighting, including the effectiveness of any spectrally-modified lighting measures, if implemented. These procedures/methods would consider and, where appropriate, incorporate the use of radar, infrared imaging, aerial surveys or telemetry studies.
Migratory Birds	All project staff should have general awareness training on seabird strandings	Miawpukek First Nation, MTI	The Agency has identified key mitigation measures and potential EA conditions for migratory birds, related to the development and implementation of awareness training on strandings. The potential EA condition indicates that awareness training would be provided to all offshore workers associated with the Project, including a process for reporting bird strandings to relevant personnel (i.e., those responsible for monitoring strandings). See Section 4.3.4 and Appendix A in this report for more details on key mitigation measures.
Migratory Birds	The proponent should commit to employing dedicated qualified marine and migratory bird observers	KMKNO, Miawpukek First Nation, MTI	Trained observers would follow Environment and Climate Change Canada's <i>Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada</i> .



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p>that receive training in ECCC's Eastern Canada Seabirds at Sea (ECSAS) protocol (Canadian Wildlife Service, 2012) and perform these surveys daily from the project vessels and drilling installations</p> <p>Survey data should be provided in an annual report that is shared with Indigenous groups</p> <p>There should be dedicated, qualified marine and migratory bird observers present during flaring activities to record data and note the effectiveness of the water curtains</p> <p>The marine and migratory bird monitoring program should be implemented on all vessels (not just the FPSO)</p> <p>If an injured species at risk is found, ECCC's Canadian Wildlife Service should be contacted immediately for further guidance on appropriate actions</p>		<p>The Agency identified a potential EA condition that would require daily monitoring for the presence of migratory birds at the MODUs, FPSO, and seismic as, by a trained observer whose primary responsibility is observing migratory birds and following Environment and Climate Change Canada's <i>Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms</i>.</p> <p>The Agency has also identified potential EA conditions that would require the use of trained observers in monitoring programs, and annual reporting follow-up programs to the C-NLOPB and the Agency. These reports would be made publicly available on the internet, with a requirement for the proponent to notify Indigenous groups within 48 hours of publication.</p>
Migratory Birds	There should be consultation with ECCC's Canadian Wildlife Service regarding the timing of flaring events and potential impacts during	MTI	The Agency has identified key mitigation measures and potential EA conditions for migratory birds, which would mitigate effects of flaring on migratory birds.



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	sensitive periods for marine and migratory birds		<p>Potential conditions related to flaring focus on limiting non-emergency flaring and limiting flaring in nighttime and under poor visibility, as well as notifying the C-NLOPB at least 30 days in advance of planned flaring to determine whether flaring would occur during a period of migratory bird vulnerability and to determine how to avoid adverse environmental effects on migratory birds, including by implementing modified or additional mitigation measures.</p> <p>Further, one of the identified potential EA conditions would require the proponent to develop, in consultation with ECCC and the C-NLOPB, follow-up monitoring requirements to verify the accuracy of the environmental assessment as it pertains to migratory birds and to determine the effectiveness of mitigation measures implemented to avoid harm to migratory birds, their eggs and nests.</p>
Migratory Birds	Concerns about the effects of artificial lighting from project vessels on migratory birds; more recent and relevant studies are needed to assess the effects of oiling on birds and their chances of survival	KMKNO, Miawpukek First Nation, MTI	<p>As noted in Section 4.3.4 of this report, ECCC recognized the knowledge and data gaps in bird attraction to project lighting. ECCC further noted that research is underway to reduce these uncertainties including its own initiatives that have the following research goals:</p> <ul style="list-style-type: none">• Increasing research to understand Leach's Storm-Petrel vulnerability to light attraction, quantifying the impact of light attraction on Leach's Storm-Petrel, and determining effective mitigations to reduce potential impacts; and• Enhancing the offshore observer program and expanding this program to include systematic surveys for stranded birds on platforms and vessels. <p>Additionally, in December 2020, the ESRF announced a call for research proposals with the objective to develop a program of research aimed to better understand if and how seabirds, in particular</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			<p>Leach's Storm-Petrel, are attracted to light generated by oil and gas activities in the Atlantic offshore environment.</p> <p>The Agency has also identified potential EA conditions that would require the proponent to: reduce lighting and flaring; study effects of reduced lighting; conduct systematic study of migratory bird stranding; monitor daily for the presence of migratory birds at the MODU, FPSO, and seismic vessels using a trained observer; incorporate active and passive monitoring tools; evaluate efficacy of mitigation measures; monitor for effects of sheens on seabirds; and contribute to research and monitoring programs pertaining to the effects of light attraction on migratory birds in offshore areas.</p>
Project Description, Area, and Scope	Concern about tieback threshold distance for future well site development as described in the EIS	Première Nation des Innus de Nutashkuan	<p>The Agency confirmed with the C-NLOPB that 40 kilometres is the technically feasible distance that tiebacks to the production installation could occur (i.e., only new discoveries within this geographic range could be tied back to the single production installation that will be part of the Project).</p> <p>The Physical Activities Regulations identify the types of activities that are considered "designated projects" – i.e., those that are subject to the Impact Assessment Act (IAA). This includes "the construction, installation and operation of a new offshore floating or fixed platform, vessel or artificial island used for the production of oil or gas." (Section 35 of the Regulations: SOR-2019-285.pdf (justice.gc.ca)).</p>
Project Description, Area, and Scope	<p>Concern about well design and locations not being finalized</p> <p>Currently, as the EIS is laid out, the options being pursued are said to likely result in the harmful alteration, disruption or destruction (HADD) of</p>	Première Nation des Innus de Nutashkuan, MTI	DFO advised the Agency that once the final layout design of the subsea infrastructure is completed, additional environmental studies will be required. The Agency has identified potential EA conditions requiring that C-NLOPB and responsible federal departments including DFO and ECCC review final design information.



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	fish habitat as determined by DFO and may require a section 35(2) <i>Fisheries Act</i> Authorization. It is difficult to determine whether the current design is the plan that will have the least amount of impacts to fish and fish habitat when there are other potential options still under review		
Project Description, Area, and Scope	<p>Concern that the diversity of the marine and submarine systems is not reflected in the EIS; lack of information regarding ecosystems, particularly benthic ecosystems in the project area</p> <p>The proponent indicated that well templates would not be placed over <i>Lophelia pertusa</i> corals, however precise locations for installation of anchor frames and drilling wells are not determined</p> <p>The proponent should demonstrate how it intends to avoid <i>L. pertusa</i> during the installation of all seafloor infrastructure</p>	<p>Première Nation des Innus de Nutashkuan</p> <p>Elsipogtog First Nation</p>	<p>As noted in Section 4.1.4 of this report, the Agency identified key mitigation measures to mitigate the Project's effects on fish and fish habitat. The Proponent would prepare a seabed survey plan based on the final layout design for all subsea infrastructure (each well template, each flowline, and FPSO mooring points) and associated protection features (rock placement, concrete mattresses and/or trenching) and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. The Proponent would provide the results of seabed surveys to the C-NLOPB and DFO prior to conducting any activities on the seafloor related to the installation of any subsea infrastructure, including well templates, flowlines and mooring points and associated protection features. In addition, the Proponent would provide a description of additional mitigation and monitoring based on the results of the survey and predicted areas of sediment disturbance and alteration, and elevated suspended particulate matter. Results of the surveys would be made publicly available on the internet, with a requirement for the proponent to notify Indigenous groups within 48 hours of publication.</p> <p>Proponent noted in its preliminary seabed surveys that <i>Lophelia pertusa</i> was not present in the project area.</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p>The proponent should describe its proposed approach to quantifying impacts and recovery of <i>L. pertusa</i> during and after project operations and decommissioning</p> <p>The proponent should commit to a monitoring/research program that will document the time to recovery of benthic megafauna (including <i>L. pertusa</i>) after decommissioning</p>		
Project Description, Area, and Scope	<p>All species listed in EIS are of concern - Mi'kmaq people have no assumptions of superiority over other life forms. All creation is sacred and should be treated with respect and honor</p> <p>Some Indigenous groups consider swordfish a species of cultural importance but this is not reflected in the EIS</p>	Qalipu First Nation, MTI	<p>The Agency appreciates Indigenous groups sharing cultural and traditional perspectives regarding species of importance, as part of the EA for the Project. Species of importance to Indigenous groups are discussed in Section 4.6 of this report.</p> <p>Swordfish has been noted as a species of both cultural and commercial importance to some Indigenous groups, in Section 4.6 of this report.</p>
Project Description, Area, and Scope	Request that certain information be updated/revised in the EIS (for e.g., that changes to syntax or grammar be made)	KMKNO, MTI, WNNB	On July 30, 2020, the Agency determined that the proponent's final EIS conformed to the EIS guidelines, and a 45-day public comment period commenced. Once an EIS is deemed to conform to the EIS guidelines, the Agency generally does not ask proponents to revise their EIS. If there is further information the Agency requires to



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p>Request for additional analyses related to benefits of batch drilling</p> <p>Request for additional references related to effects assessment</p> <p>Request for description of Indigenous group to be updated</p>		<p>complete the EA and/or to prepare the draft EA report, information requirements (IRs) are issued to the proponent, who then responds with clarification or additional information separately. With respect to these requests, the Agency determined that it did not require the information or changes to complete the EA or the draft EA report.</p> <p>The Agency will make a note to use MTI's description of the Mi'gmaq of New Brunswick, in future EA reports that will include profiles for individual nations/Indigenous groups. In Section 4.6 of this EA report, the Agency notes that pursuant to the 1760-61 Peace and Friendship Treaties and Section 35 of the <i>Constitution Act, 1982</i>, the Mi'gmaq have a right to harvest and to sell fish to obtain a moderate livelihood for themselves and their families. Further, it is noted that some groups are in the process of negotiating new moderate livelihood licences/agreements with DFO. These new or renegotiated fishing agreements may recognize certain treaty rights in the future, with the potential for moderate livelihood fishing activities authorized under them to be affected by the Project.</p>
Project Description, Area, and Scope	The proponent should provide further information on the use of the project area rather than the local study area as the point of reference for assessing the spatial extent of an effect	KMKNO	The spatial extent of predicted effects varies in the proponent's EIS. The LSA is defined by the 50 kilometre zone of influence around the project area considered the potential effects on finfish based on the proponent's sound modeling, as well as 10 kilometres along the traffic route. Depending on the project activity, other areas of effects are predicted by the proponent to occur inside the project area or the regional study area.
Species at Risk/Special Areas	The proponent did not provide evidence to support their conclusion that adverse effects on Acadian and deepwater redfish will not contribute to a population decline in	WNNB	DFO advised the Agency that the project activities will not cause an adverse effect on finfish population as they are able to relocate from areas of disturbance.

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	these species (which are designated as threatened by COSEWIC)		
Species at Risk/Special Areas	Concern about assessment of potential oil release effects on the Laurentian Channel Marine Protected Area (MPA) and the Miramichi Bay Closure marine refuge; how a spill from an oil tanker could effect sensitive habitats, species at risk and species of cultural importance	MTI	<p>The model domain for the spill assessment conducted by the proponent does cover the areas of the Miramichi Bay Closure and Laurentian Channel MPA. Spill modelling results predicted that the probability of surface oiling and in water dissolved hydrocarbons could occur in the Laurentian Channel MPA at one percent, at which point hydrocarbons would be highly weathered. However, modelling predicted that a subsurface blowout is highly unlikely to occur.</p> <p>Modelling predicted that spilled hydrocarbons would not reach the Miramichi Bay closure.</p>
Species at Risk/Special Areas	Insufficient information provided in the EIS regarding critical habitat and existing distributions of Roundnose Grenadier in the project area	WNNB	The Agency considered the status of species of concern or at risk when assessing the potential impacts of the proposed project on fish, marine mammals, and migratory birds.
Spill Response	<p>Request that the proponent share contingency plans with Indigenous groups for review, prior to the commencement of operations</p> <p>Indigenous groups should be fully engaged and consulted on the development and implementation of remediation activities planned in the event of a spill</p>	<p>Miawpukek First Nation</p> <p>MTI</p>	<p>The Agency received additional information related to spill response plans and strategies while conducting previous exploration drilling EAs. This information was considered during the EA for this Project. The Agency has identified key mitigation measures, follow-up programs and potential EA conditions for accidents and malfunctions. These are described in Section 5.1 of this report and in Appendix B, and include the following:</p> <ul style="list-style-type: none"> • 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; • include procedures to notify Indigenous groups and commercial fishers in the event of an accident or



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
			<p>malfunction and communicate the results of monitoring of its potential adverse effects on the environment and human health in the Fisheries Communications Plan; and</p> <ul style="list-style-type: none">include procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill in the Fisheries Communications Plan. <p>Note that the proposed EA condition related to the Spill Response Plan requires that it include procedures to respond to and mitigate the potential environmental effects of a spill (including spill containment and recovery); list of relevant authorities to be notified of a spill; notification thresholds and procedures; measures for wildlife response; protection and rehabilitation and for shoreline protection and clean-up; and, roles and responsibilities for offshore operations and onshore responders.</p>
Vessel Traffic/Transit	Concern about marine vessel transits having the potential to adversely affect Leach's Storm-petrels especially since the proposed transit route passes through the Baccalieu Island Canadian Ecologically and Biologically Significant Areas (EBSA)	Miawpukek First Nation	In consultation with ECCC, the Agency has identified key mitigation measures and potential EA conditions, related to migratory birds, including Leach's Storm-Petrels. These are described in Section 4.3.4 of this report, as well as in Appendix B.
Vessel Traffic/Transit	Concern about the proponent's stated approach for detection by relying on crew to detect marine mammals and sea turtles in supply and servicing vessels' travel path; no commitment for crew-based detections during supporting surveys. Vessel crew members are	Miawpukek First Nation	<p>The Agency has identified key mitigation measures and potential EA conditions that would mitigate the potential effects of vessels on marine mammals, sea turtles, and migratory birds. These are described in Sections 4.2 and 5.3.4 of this report, as well as in Appendix B. The proponent would be required to:</p> <ul style="list-style-type: none">limit supply vessel movement to established shipping lanes where they are available; and

Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
	<p>unlikely to have appropriate experience, familiarity, or training to accurately detect the presence of marine mammals</p> <p>The proponent must set the vessel travelling speed and implement firm speed restriction upon detection of a marine mammal for supply and servicing vessels and survey vessels</p>		<ul style="list-style-type: none"> 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 species at risk is observed or reported within 400 metres of the vessel. <p>The proponent would also be required to conduct activities in accordance with all applicable acts and regulations including the <i>Fisheries Act</i> and the <i>Marine Mammal Regulations</i>.</p> <p>Additionally, the Agency has identified a potential EA condition that would require the proponent to develop and implement the follow up requirements to verify the accuracy of the environmental assessment as it pertains to marine mammals, in consultation with Indigenous groups. The follow-up requirements would include surveys of marine mammal distribution, important habitat areas, and avoidance behavior within the project area.</p>
Vessel Traffic/Transit	A comprehensive analysis of vessel traffic, including noise impacts and potential risk of fuel spills, should be completed. This should include a more detailed description of scheduling and frequency of vessel activity	MTI	<p>The Agency considered the potential effects of sound emissions from MODUs; the FPSO; supply vessels; and, geophysical surveys.</p> <p>The Agency identified a potential EA condition that would require the proponent to conduct follow-up to verify the accuracy of the environmental assessment as it pertains to underwater sound levels on fish, including marine mammals, and taking into account all project-related sources of sound.</p> <p>The potential environmental effects of a spill resulting from a vessel to vessel collision was considered by the proponent in its EIS and by the Agency in Section 5.1 of this report.</p>



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Miscellaneous	Difficult to understand the proponents predictions related to significance, considering variability and uncertainty with baseline data	Première Nation des Innus de Nutashkuan	<p>In conducting the environmental assessment, and in writing the draft EA report, the Agency considered not only information provided by the proponent in its EIS and responses to information requirements, but also comments received from the public and Indigenous groups, and advice from expert federal departments and agencies.</p> <p>With respect to effects criteria, the Agency accepted the proponent's criteria and thresholds as adequate for the purposes of assessing environmental effects under CEAA 2012. However, the Agency used different criteria for magnitude, see Appendix A in the draft EA report.</p>
Miscellaneous	<p>Request for details for disregarding a specific action as an approach, method or measure that could help mitigation potential risk or harm</p> <p>Explain how decision to disregard mitigation methods or measures is reconciled with the precautionary approach</p>	NunatuKavut Community Council	<p>The Agency is aware of the uncertainties identified by the proponent in the EIS related to some of their predicted effects, and has proposed key mitigations and conditions to verify predictions of the EIS and to address knowledge and data gaps. The Agency has proposed conditions to incorporate the principals of precautionary approach.</p> <p>The Agency identified a proposed potential EA condition which would require the proponent to ensure that actions in meeting the conditions during all phases of the Project are considered in a careful and precautionary manner, promote sustainable development, and are informed by the best information and knowledge available at the time.</p>
Miscellaneous	Questions regarding the proponent's market strategy, destinations for oil (most seems to be currently exported overseas rather than being sent to Canadian refineries, would the potential closing of the refinery in Newfoundland change the strategy)	NunatuKavut Community Council	The EIS Guidelines for the Project did not require the proponent to describe their plans or strategies for the marketing of oil. This information is outside of the scope of the EA. Direct shipment and trans-shipment options for oil produced by the Project were discussed by the proponent in its EIS.



Subject	Comment(s) or Concern(s)	Source	Agency Response(s)
Miscellaneous	Hope to see safe practice and regulation enforced on the proponent to maintain and increase environmental protections and reduce the likelihood of adverse effects	Qalipu First Nation	<p>Following review of the final EA report, the Agency's recommendations and proposed conditions, the Minister of Environment and Climate Change Canada will issue a decision on whether or not the Project can proceed. If the Minister decides that the Project can proceed, the Minister's Decision Statement will include legally binding conditions related to mitigation, follow-up and monitoring that the proponent must carry out when proceeding with the Project.</p> <p>The Minister's Decision Statement is a document for the proponent, and therefore would not contain information on other authorities' obligations/responsibilities regarding the monitoring and enforcement of the proponent's compliance with the conditions. The C-NLOPB has indicated that it intends to include the conditions in the authorization that may be granted to the proponent under the <i>Canada–Newfoundland and Labrador Atlantic Accord Implementation Act</i>. Should this occur, the C-NLOPB would verify the proponent's compliance with the conditions and with any authorization granted by the C-NLOPB.</p>
Miscellaneous	Request for a follow-up program to monitor and evaluate the accuracy of effects predictions and mitigation effectiveness specifically for Indigenous peoples	MTI	<p>As discussed in Section 4.6 of this report, the pathway for potential impacts from routine project activities on Indigenous peoples is through impacts to migratory species that may pass through the project area before these species are harvested elsewhere. As noted in other Agency responses in this Appendix, the Agency has identified potential EA conditions that require the proponent to develop and implement follow-up programs to ensure the effectiveness of mitigation measures and to verify accuracy of predicted effects for fish, marine mammals and migratory birds.</p>



Appendix D Species at Risk, COSEWIC and IUCN-listed Species that May be Found in the Bay du Nord Project Area

The Agency has taken a conservative approach to identifying potential species at risk by including all species that were identified by the Proponent in the EIS and additional species the Agency believes may occur in the Project Area 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 International Union of Conservation of Nature and reviewed by DFO and ECCC.

Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment	IUCN
Fish			
Acadian Redfish (<i>Sebastes fasciatus</i>) – Atlantic population	Not listed	Threatened	Endangered
Albacore Tuna (<i>Thunnus alalunga</i>)	Not listed	Not listed	Near Threatened
American Eel (<i>Anguilla rostrata</i>)	Not listed	Threatened	Endangered
American Plaice (<i>Hippoglossoides platessoides</i>) – Maritime population	Not listed	Threatened	Not Listed
American Plaice (<i>Hippoglossoides platessoides</i>) – Newfoundland and Labrador population	Not listed	Threatened	Not Listed
Atlantic Bluefin Tuna (<i>Thunnus thynnus</i>)	Not listed	Endangered	Endangered
Atlantic Cod (<i>Gadus morhua</i>) – Laurentian North population	Not listed	Endangered	Vulnerable
Atlantic Cod (<i>Gadus morhua</i>) – Newfoundland and Labrador population	Not listed	Endangered	Vulnerable
Atlantic Salmon (<i>Salmo salar</i>) – Inner Bay of Fundy population	Endangered	Endangered	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Outer Bay of Fundy population	Not listed	Endangered	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Eastern Cape Breton population	Not listed	Endangered	Least Concern



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment	IUCN
Atlantic Salmon (<i>Salmo salar</i>) – Nova Scotia Southern Upland population	Not listed	Endangered	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – South Newfoundland population	Not listed	Threatened	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Quebec Eastern North Shore population	Not listed	Special concern	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Quebec Western North Shore population	Not listed	Special concern	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Anticosti Island population	Not listed	Endangered	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Inner St. Lawrence population	Not listed	Special concern	Least Concern
Atlantic Salmon (<i>Salmo salar</i>) – Gaspé-Southern Gulf of St. Lawrence population	Not listed	Special concern	Least Concern
Atlantic Wolffish (Striped Wolffish) (<i>Anarhichas lupus</i>)	Special concern	Special concern	Not listed
Barndoor Skate (<i>Dipturus laevis</i>)	Not listed	Not at risk	Endangered
Basking Shark (<i>Cetorhinus maximus</i>) –Atlantic population	Not listed	Special concern	Vulnerable
Big eye Tuna (<i>Thunnus obesus</i>)	Not listed	Not listed	Vulnerable
Blue Shark (<i>Prionace glauca</i>)	Not listed	Not at risk	Near Threatened
Cusk (<i>Brosme brosme</i>)	Not listed	Endangered	Not listed
Deepwater Redfish (<i>Sebastes mentalla</i>) – Northern population	Not listed	Threatened	Least Concern
Deepwater Redfish (<i>Sebastes mentalla</i>) – Gulf of St. Lawrence-Laurentian Channel population	Not listed	Endangered	Least Concern
Haddock (<i>Melanogrammus aeglefinus</i>)	Not listed	Not listed	Vulnerable
Little Skate (<i>Leucoraja erinacea</i>)	Not listed	Not listed	Near Threatened



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment	IUCN
Lumpfish (<i>Cyclopterus lumpus</i>)	Not listed	Threatened	Not listed
Northern (Broadhead) Wolffish (<i>Anarhichas denticulatus</i>)	Threatened	Threatened	Not listed
Porbeagle Shark (<i>Lamna nasus</i>)	Not listed	Endangered	Vulnerable
Roundnose Grenadier (<i>Coryphaenoides rupestris</i>)	Not listed	Endangered	Critically Endangered
Shortfin Mako (<i>Isurus oxyrinchus</i>) – Atlantic population	Not listed	Endangered	Vulnerable
Smooth Skate (<i>Malacoraja senta</i>) – Funk Island Deep population	Not listed	Endangered	Endangered
Smooth Skate (<i>Malacoraja senta</i>) – Laurentian-Scotian population	Not listed	Special concern	Endangered
Spiny Dogfish (<i>Squalus acanthias</i>) – Atlantic population	Not listed	Special concern	Vulnerable
Spinytail Skate (<i>Bathyraja spinicauda</i>)			Near Threatened/Vulnerable
Spotted Wolffish (<i>Anarhichas minor</i>)	Threatened	Threatened	Not listed
Thorny Skate (<i>Amblyraja radiata</i>)	Not listed	Special concern	Vulnerable
White Hake (<i>Urophycis tenuis</i>) – Atlantic and Northern Gulf of St. Lawrence population	Not listed	Threatened	Not listed
White Shark (<i>Carcharodon carcharias</i>) – Atlantic population	Endangered	Endangered	Vulnerable
Winter Skate (<i>Leucoraja ocellata</i>) – Eastern Scotian Shelf - Newfoundland population	Not listed	Endangered	Endangered
Marine Mammals			
Atlantic Walrus (<i>Odobenus rosmarus rosmarus</i>) – Central/Low Arctic population	Not listed	Special concern	Near threatened
Beluga Whale (<i>Delphinapterus leuca</i>) – St. Lawrence Estuary population	Endangered	Endangered	Least concern



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment	IUCN
Blue Whale (<i>Balaenoptera musculus</i>) – Atlantic population	Endangered	Endangered	Endangered
Bowhead Whale (<i>Balaena mysticetus</i>) – Eastern Canada-West Greenland population	Not listed	Special concern	Least concern
False Killer Whale (<i>Pseudorca Crassidens</i>)	Not listed	Not listed	Near threatened
Fin Whale (<i>Balaenoptera physalus</i>) – Atlantic population	Special concern	Special concern	Vulnerable
Harbour Porpoise (<i>Phocoena phocoena</i>) – Northwest Atlantic population	Not listed	Special concern	Least concern
Killer Whale (<i>Orcinus orca</i>) – Northwest Atlantic/Eastern Arctic population	Not listed	Special concern	Data deficient
Long-finned Pilot Whale (<i>Globicephala melas</i>)	Not listed	Not at risk	Least concern
Narwhal (<i>Monodon monoceros</i>)	Not listed	Special concern	Least concern
North Atlantic Right Whale (<i>Eubalaena glacialis</i>)	Endangered	Endangered	Critically endangered
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>) – Scotian Shelf population	Endangered	Endangered	Data deficient
Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>) – Davis Strait-Baffin Bay-Labrador Sea population	Not listed	Special concern	Data deficient
Sei Whale (<i>Balaenoptera borealis</i>) – Atlantic population	Not listed	Endangered	Endangered
Sowerby's Beaked Whale (<i>Mesoplodon bidens</i>)	Special concern	Special concern	Least concern
Sperm Whale (<i>Physeter macrocephalus</i>)	Not listed	Not at risk	Vulnerable
Sea Turtles			
Leatherback Sea Turtle (<i>Dermochelys coriacea</i>) – Atlantic population	Endangered	Endangered	Vulnerable
Loggerhead Sea Turtle (<i>Caretta caretta</i>)	Endangered	Endangered	Vulnerable
Birds			



Species	Species at Risk Act Status (Schedule 1)	COSEWIC Assessment	IUCN
Barrow's Goldeneye (<i>Bucephala islandica</i>)	Special concern	Special concern	Least concern
Buff-breasted Sandpiper (<i>Tryngites subruficollis</i>)	Special concern	Special concern	Near threatened
Harlequin Duck (<i>Histrionicus histrionicus</i>)	Special concern	Special concern	Least concern
Ivory Gull (<i>Pagophila eburnea</i>)	Endangered	Endangered	Near threatened
Leach's Storm-Petrel (<i>Oceanodroma leucorhoa</i>)	Not listed	Threatened	Vulnerable
Peregrine Falcon anatum/tundrius (<i>Falco peregrinus anatum/tundrius</i>)	Special concern	Not at risk	Least concern
Piping Plover (<i>Charadrius melodus melodus</i>)	Endangered	Endangered	Near threatened
Red Knot (<i>Calidris canutus rufa</i>) – Rufa subspecies	Endangered	Endangered	Near threatened
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	Special Concern	Special concern	Least concern
Roseate Tern (<i>Sterna dougallii</i>)	Endangered	Endangered	Least concern
Ross's Gull (<i>Rhodostethia rosea</i>)	Threatened	Threatened	Least concern

Sources: 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>.

Species listing updated as per International Union of Conservation of Nature (IUCN) accessible at:
<https://www.iucnredlist.org/search?query=peregrine%20falcon&searchType=species>



Appendix E Special Areas in the Regional Study Area

The table below lists special areas identified by the proponent within the Project's regional study area. Special areas are categorized by type, with governing bodies indicated in parentheses. The locations of these special areas are illustrated in Figure 4 of this Draft EA report; further detail can be found in the Bay du Nord Development Project EIS (Section 6.4). Additional information on special areas within the region is accessible in the Regional Assessment's GIS Decision-Support Tool (<https://nloffshorestudy.iciinnovations.com/mapviewer/>).

Special Areas located within the Project's Regional Study Area	
Ecologically Biologically Significant Area (DFO)	
Baccalieu Island	
Bonavista Bay	
Eastern Avalon	
Fogo Shelf	
Haddock Channel Sponges	
Labrador Slope	
Laurentian Channel	
Lilly Canyon-Carson Canyon	
Northeast Slope	
Notre Dame Channel	
Orphan Spur	
Southeast Shoal	
Southwest Slope	
St. Mary's Bay	
Virgin Rocks	
Marine Protected Area (DFO)	

**Special Areas located within the Project's Regional Study Area**

Eastport – Duck Islands

Eastport – Round Island

Migratory Bird Sanctuary (ECCC-Canada Wildlife Service)

Terra Nova

Marine Refuge (DFO)

30 Coral Closure (portion inside Economic Exclusion Zone)

Funk Island Deep Closure

Northeast Newfoundland Slope Closure

Fisheries Closure Area - Snow Crab Stewardship Exclusion Zones (DFO)

Crab Fishing Area – 8BX

Crab Fishing Area 5A (2 zones)

Crab Fishing Area 6A (2 zones)

Crab Fishing Area 6B

Crab Fishing Area 6C

Crab Fishing Area 9A (2 zones)

Near Shore (2 zones)

Canada Fisheries Closure Areas (DFO)

Eastport Lobster Management Area

Funk Island Deep Box

National Marine Conservation Area (Parks Canada)

Representative Marine Area I- South Burin/St. Pierre Bank

Representative Marine Area II- West Avalon/Green Bank-

Representative Marine Area III- East Avalon/Grand Banks

National Park (Parks Canada)

Terra Nova

Critical Habitat (DFO, ECCC, Parks Canada)

**Special Areas located within the Project's Regional Study Area**

Northern Wolffish

Spotted Wolffish

Significant Benthic Area (DFO)

Large Gorgonian Corals

Sea Pens

Small Gorgonian Corals

Sponges

Provincial Ecological Reserve (Government of Newfoundland and Labrador – Parks and Natural Areas Division)

Baccalieu Island Seabird

Funk Island Seabird

Mistaken Point Fossil

Witless Bay Seabird

Provincial Park (Government of Newfoundland and Labrador – Parks and Natural Areas Division)

Chance Cove

Deadman's Bay

Dungeon

Ecologically and Biologically Significant Areas (United Nations Convention on Biological Diversity)

Orphan Knoll

Seabird Foraging Zone in the Southern Labrador Sea

Slopes of the Flemish Cap and Grand Bank

Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank

Fisheries Closure Area - Sponge/Coral Closure (NAFO)

Tail of the Bank (1)

Flemish Pass / Eastern Canyon (2)

Beothuk Knoll (3)

**Special Areas located within the Project's Regional Study Area**

Eastern Flemish Cap (4)

Northeast Flemish Cap (5)

Sackville Spur (6)

Northern Flemish Cap (7)

Northern Flemish Cap (8)

Northern Flemish Cap (9)

Northwest Flemish Cap (10)

Northwest Flemish Cap (11)

Northwest Flemish Cap (12)

Beothuk Knoll (13)

30 Coral Closure

Fisheries Closure Area – Seamount Closure (NAFO)

Fogo Seamounts (1)

Newfoundland Seamounts

Orphan Knoll Seamount

Vulnerable Marine Ecosystem (NAFO)

Large Gorgonian Coral

Sea Pen

Sponge

Important Bird Area (BirdLife International)

Baccalieu Island

Cape Freels Coastline and Cabot Island

Cape St. Francis

Funk Island

Grates Point

Mistaken Point

Quidi Vidi Lake

**Special Areas located within the Project's Regional Study Area**

Terra Nova National Park

The Cape Pine and St. Shotts Barren

Wadham Islands and adjacent Marine Area

Witless Bay Islands

UNESCO World Heritage Site (Government of Newfoundland and Labrador – Parks and Natural Areas Division; World Heritage Advisory Council)

Mistaken Point Ecological Reserve

Coastal Provincial Historic Sites

Cape Bonavista Lighthouse

Hearts Content Cable Station

Coastal National Historic Sites

Cape Spear

Ryan Premises

Signal Hill