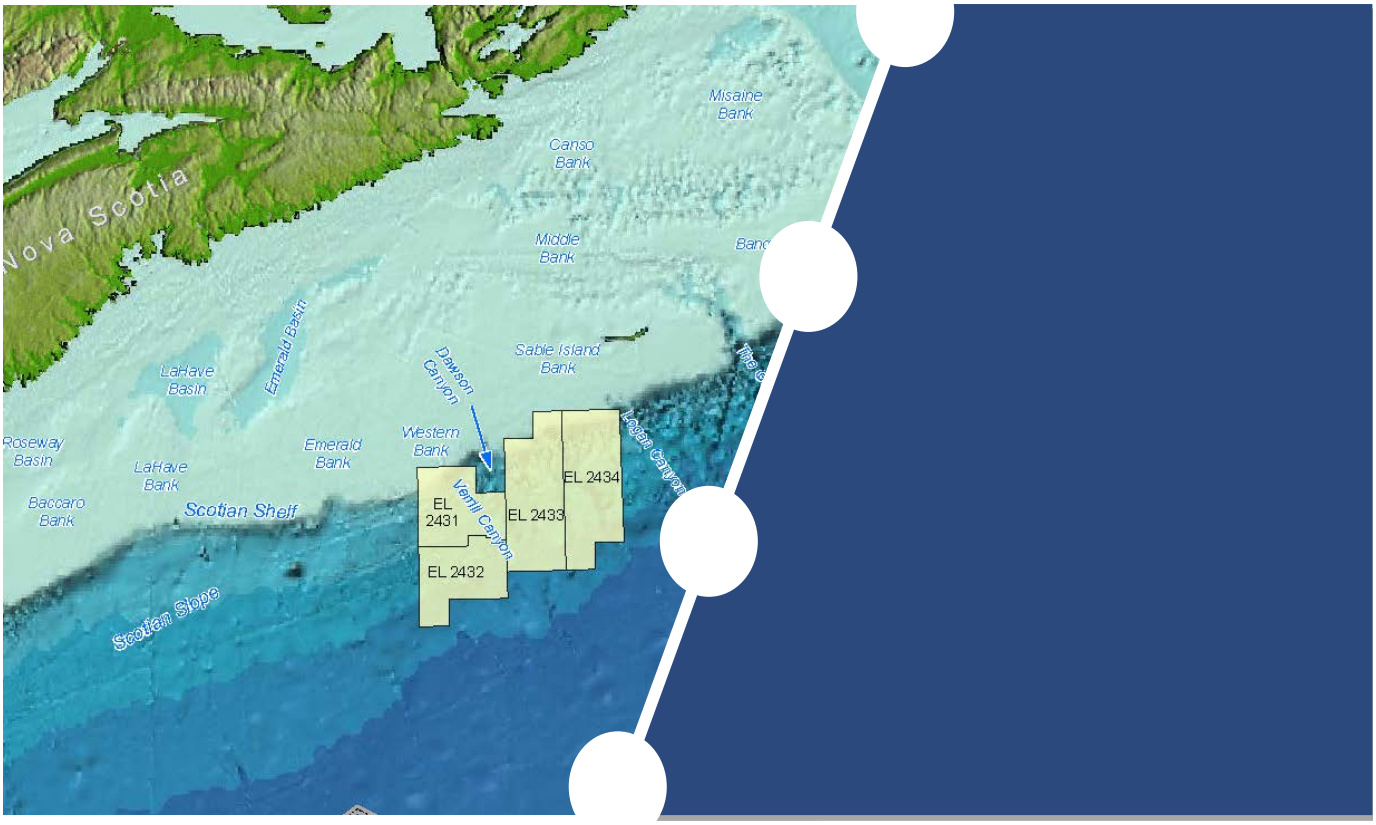
Canadian Environmental Assessment Agency | Agence canadienne d'évaluation environnementale

Scotian Basin Exploration Drilling Project

Draft Environmental Assessment Report



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Executive Summary

BP Canada Energy Group ULC (the proponent) proposes to conduct an offshore exploration drilling program within its offshore Exploration Licences located in the Atlantic Ocean between 230 and 370 kilometres southeast of Halifax, Nova Scotia. The Scotian Basin Exploration Drilling Project (the Project) would consist of up to seven exploration wells drilled in the period from 2018 to 2022. The Project would occur over one or more drilling campaigns. The first phase, consisting of one or two wells, would be based on the results of BP Exploration (Canada) Limited's Tangier 3D Seismic Survey conducted in 2014. Subsequent drilling phases would consider the results of the previous phase. A mobile offshore drilling unit designed for year-round operations in deep water would be used for the Project, as well as platform supply vessels that would travel between the drilling area and an existing supply base in Halifax Harbour. In April 2017, the proponent retained the semi-submersible drilling unit West Aquarius, owned by Seadrill Operating LP, to conduct drilling operations for the first well.

The Project will require authorization under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* and may require authorization under the *Fisheries Act*. A permit under the *Species at Risk Act* may be required for effects on species that are listed as endangered or threatened on Schedule 1 of that Act.

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

This draft EA Report provides a summary and the main findings of the federal EA. The Agency prepared the report in consultation with the Canada-Nova Scotia Offshore Petroleum Board, Fisheries and Oceans Canada, Environment and Climate Change Canada, Health Canada, Natural Resources Canada, and Transport Canada following a technical review of the 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 environment that may be adversely affected by the Project and that are within federal jurisdiction as described in subsection 5(1) of CEAA 2012, and on changes that may be caused in the environment that are directly linked or necessarily incidental to federal authorizations as described in subsection 5(2) of CEAA 2012. These are referred to as valued components. The Agency selected the following valued components for this EA:

- fish and fish habitat (including marine plants);
- marine mammal and sea turtles;
- migratory birds;

- species at risk;
- special areas;
- commercial fisheries;
- current use of lands and resources for traditional purposes by Aboriginal peoples; and
- socio-economic conditions and health of Aboriginal peoples.

The Agency assessed the potential for the Project to cause significant adverse environmental effects on these valued components based on information provided by the proponent, specialist or expert information and knowledge from relevant government agencies, and input from Indigenous peoples and the general public. Participants raised concerns about the Project's potential effects on the marine environment (e.g. marine mammals, fish, birds) and potential interference with fishing, including for Indigenous food, social, or ceremonial purposes, and related effects on socio-economic conditions in Indigenous communities. The potential effect of a large blowout (oil spill) on the marine ecosystem, fishing, and special areas such as Georges Bank and Sable Island, was also a concern.

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

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

The proponent's project planning and design incorporates measures to mitigate the adverse effects of the Project. These include adherence to existing guidelines and regulations and planning to identify, control and monitor environmental risks. The Agency also identified mitigation and follow-up measures for potential effects.

Accidents and malfunctions could occur during exploration drilling and cause adverse environmental effects. These accidents and malfunctions include fuel spills, spills of synthetic-based drilling fluid (also referred to as drilling mud), and blowouts. Oil spill fate and trajectory modelling and analyses were performed to help evaluate potential effects of accidental spills and to assist in spill response planning. In the unlikely event of a spill, oil spill containment, recovery, and shoreline protection operations would be undertaken as quickly as possible. The proponent stated that in the event of a blowout, and where conventional means of regaining well control quickly do not work (e.g. closing the blowout preventer), the well could be capped between 13 and 25 days after an incident. The upper limit allows for potential delays such as due to weather conditions. However, for worst-case modeling purposes, it was conservatively assumed that a blowout would continue for 30 days before being capped and contained.

Historically, the incidence of large oil spills during exploration drilling is extremely low. The proponent has proposed design measures, operational procedures, and dedicated resources to prevent and respond to spills of any size from the Project and concluded that significant spill-related environmental effects are not likely to occur.

The Project's possible effects on potential or established Aboriginal or treaty rights were also examined. Fishing by First Nations communities for commercial or traditional purposes is the primary rights-based activity that could be affected by the Project. The Agency believes that the recommended measures to mitigate potential environmental effects on fish and fish habitat and on commercial fisheries, and to prevent or reduce the effects of accidents and malfunctions, are appropriate measures to accommodate for potential impacts on rights.

The Agency concludes that the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures. This draft EA Report is being released for public and Indigenous group review and comment. The Agency will take into account comments received when finalizing the EA Report and recommending mitigation and follow-up measures to the Minister of Environment and Climate Change as potential CEAA 2012 decision statement conditions. The final EA Report will be submitted to the Minister for consideration when making her decisions on whether the Project is likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures, and issuing a CEAA 2012 decision statement.

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Abbreviations and Acronyms

Abbreviation/Acronym	Definition
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
Agency	Canadian Environmental Assessment Agency
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area
EIS	Environmental Impact Statement
IUCN	International Union for Conservation of Nature
MARPOL	International Convention for the Prevention of Pollution from Ships
PAH	Polycyclic Aromatic Hydrocarbon
Project	Scotian Basin Exploration Drilling Project
proponent	BP Canada Energy Group ULC
SARA	*Species at Risk Act*
UXO	Unexploded Ordnance

Terminology Note: This report uses the word "Aboriginal" when referring to Aboriginal rights in the Canadian Constitution or when referring to Section 5 of the *Canadian Environmental Assessment Act, 2012.* "Indigenous" is used for most other references.

1 Introduction

1.1 Purpose of the Environmental Assessment Report

BP Canada Energy Group ULC (the proponent) proposes to drill up to seven exploration wells in the period from 2018 to 2022, within its Exploration Licences located in the Atlantic Ocean approximately 250 kilometres southeast of Halifax, Nova Scotia. The Scotian Basin Exploration Drilling Project (the Project) would consist of one or more phases of drilling so that initial well results can be analyzed to determine subsequent drilling locations. Optimal locations for the first phase of drilling, consisting of one to two wells, would be selected based on the results of the proponent's Tangier 3D Seismic Survey conducted in 2014. A next phase of drilling, if conducted, would also consider the results of the first drilling phase.

The proponent proposes to use an existing onshore support base located in Halifax Harbour to support its drilling program. The base has been in operation for a number of years servicing the Nova Scotia offshore oil and gas sector. Helicopter operations (for crew changes and transporting light supplies) would operate from an existing air terminal at Halifax Stanfield International Airport.

The purpose of the Draft Environmental Assessment (EA) Report is to provide a summary of information and analysis considered by the Canadian Environmental Assessment Agency (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 Environment and Climate Change Canada will consider the final version of this report and comments received on this draft version from Indigenous peoples and the public when issuing an EA Decision Statement.

1.2 Scope of the Environmental Assessment

1.2.1 *Environmental Assessment Requirements*

Canadian Environmental Assessment Act, 2012 Requirements

The Project is subject to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) because it would involve activities that are described in item 10 of the Schedule to the *Regulations Designating Physical Activities* of CEAA 2012 and is therefore a designated project as defined in CEAA 2012. The Project includes the drilling, testing, and abandonment of offshore exploratory wells in the first drilling program in an area set out in one or more exploration licences issued in accordance with the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.

Based on the project description submitted by the proponent on August 11, 2015, the Agency conducted a screening of the designated project in accordance with CEAA 2012 to determine if an EA would be required. On August 19, 2015 the Agency invited the public to comment on the designated project and its potential environmental effects. On September 15, 2015 the Agency determined that the Project required a federal EA. The Agency started the EA on September 16, 2015.

Other Environmental Assessment Requirements

The Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), an independent joint agency of the Governments of Canada and Nova Scotia responsible for regulation of petroleum activities in the Nova Scotia Offshore Area, conducts EAs of exploration drilling projects as part of its authorization process pursuant to the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*. The Agency and the CNSOPB collaborated during the technical review of the proponent's Environmental Impact Statement (EIS). The federal EA of the Project conducted by the Agency is intended to also satisfy the CNSOPB's EA requirements. The Project is not subject to Nova Scotia provincial EA requirements.

1.2.2 *Factors Considered in the Environmental Assessment*

Subsection 19(1) of CEAA 2012 requires the following factors to be considered in a federal EA:

- the environmental effects of the Project, including the effects of malfunctions or accidents that may occur in connection with the Project and any cumulative 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 environmental effects;
- comments from the public;
- technically and economically feasible measures to mitigate any significant adverse environmental effects of the Project;
- the requirements of a 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 these alternatives; and
- changes to the Project that may be caused by the environment.

The Agency considered comments from Indigenous peoples, as well as from the public, during the review of the proponent's EIS and the preparation of the draft EA Report. The Agency also requested specialist or expert information or knowledge from the CNSOPB, Fisheries and Oceans Canada, Environment and Climate Change Canada, Health Canada, Natural Resources Canada, Transport Canada, and the Parks Canada Agency.

1.2.3 *Selection of Valued Components*

To focus the EA, and to guide the preparation of the proponent's EIS, the Agency issued EIS Guidelines. The *Guidelines For The Preparation of an Environmental Impact Statement Pursuant to the Canadian Environmental Assessment Act, 2012 - Scotian Basin Exploration Drilling Project - BP Canada Energy Group ULC* are available at: http://ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=80109.

The EA focused on those components of the environment, described in Section 1.2.2 of the EIS Guidelines (Factors Considered), which have particular value or significance and may be affected by the Project. These are referred to as valued components and are typically components of the environment that play an important role in the ecosystem, or have value placed on them by humans. The proponent's valued-component-selection

process considered the temporal and spatial scope of the Project and anticipated Project-environment interactions. The selections reflect knowledge of typical environmental effects of offshore petroleum exploration drilling, concerns raised by Indigenous Peoples and the public, and discussions with government experts. In addition to the factors identified in the EIS Guidelines, the Agency considered the project's potential effects on socio-economic conditions in Indigenous communities, as well as potential effects on the health of Indigenous peoples. These were added in response to concerns raised by Indigenous peoples.

In accordance with subsection 5(1) of CEAA 2012, the Agency assessed potential environmental effects on fish and fish habitat as defined in the *Fisheries Act*, aquatic species as defined in the *Species at Risk Act*, and migratory birds as defined in the *Migratory Birds Convention Act*. Also in accordance with subsection 5(1) of CEAA 2012, the Agency took into account any change that may be caused to the environment that would occur on federal lands (e.g. in the marine environment) or on special areas such as the Sable Island National Park Reserve. The Agency considered the effects on Aboriginal peoples of any changes that may be caused to the environment by the Project.

Subsection 5(2) of CEAA 2012 requires the Agency take into account the effects of any changes in the environment that are directly linked or necessarily incidental to a federal authority's exercise of a power, duty or function that would permit the Project to proceed in whole or in part. Accordingly, the Agency assessed the potential effects of the project-induced changes on commercial fishing, based on the need for authorization by the CNSOPB under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* and the potential need for authorization under the *Fisheries Act* and a permit under the *Species at Risk Act*. In accordance with subsection 5(2) of CEAA 2012, the Agency also considered the potential for environmental effects on certain coastal special areas (e.g. Terence Bay Wilderness Area).

In addition to CEAA 2012 requirements, Section 79 of the *Species at Risk Act* requires the Agency to consider the project's environmental effects on species at risk. The valued components considered by the Agency and the corresponding valued components selected by the proponent are presented in Table 1.

Table 1 Valued Components Selection

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
Effects identified under subsection 5(1) of CEAA 2012			
Fish and fish habitat	Yes	This valued component is included because of its ecological importance, the legislated protection of fish and fish habitat and applicable species at risk, the socio-economic importance of fisheries resources, and the nature of potential project-valued component interactions. This valued component includes corals.	Fish and fish habitat
Marine plants	Yes	Potential effects on marine plants were considered in the Agency's assessment of effects on fish habitat.	Fish and fish habitat
Marine mammals and sea turtles	Yes	This valued component is included because of its ecological importance, species at risk, and the nature of potential project- valued component interactions.	Marine mammals and sea turtles
Migratory birds	Yes	This valued component is included because of its ecological importance, the legislated protection of migratory birds and other applicable species at risk, and the nature of potential project- valued component interactions.	Migratory birds
Current use of lands and resources for traditional purposes by Aboriginal peoples	Yes	Changes to the environment that are due to the Project may cause a change in the use of lands and resources for traditional purposes by Aboriginal peoples. Indigenous commercial fishing activities are carried out under communal commercial licences in the project vicinity. Food, social, and ceremonial fishing is carried out in the nearshore waters of Nova Scotia. Indigenous fisheries could be affected by the Project, especially by malfunctions or accidents. In addition to commercial fishing, First Nations cite use of certain species for traditional purposes such as communal gatherings for feasts.	Current Aboriginal use of lands and resources for traditional purposes.
Socio-economic conditions and health of Aboriginal peoples	Yes	This valued component was added by the Agency based on concerns raised during the EA by Indigenous peoples about the potential effects of a large oil spill such as might result from a well blowout.	None

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
Physical or cultural heritage of Aboriginal peoples and historical, archaeological, paleontological or architectural sites or structures of Aboriginal peoples	No	Project activities and components are not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage. Surveys conducted in the project area prior to seabed disturbance (drilling) would allow detection and avoidance of heritage resources, if present.	None
Special Areas	Yes	There are several areas of physical and cultural importance in the regional assessment area, which are considered federal lands (the offshore). These may be affected by the Project.	Special Areas
Air quality	No	The proponent has indicated that emissions from the Project would adhere to applicable regulations and standards, including the Nova Scotia *Air Quality Regulations*, the *National Ambient Air Quality Objectives*, and the *Canadian Ambient Air Quality Standards*. Given its remote offshore location, the project area is not close to any receptors that would be sensitive to atmospheric emissions from routine project activities or malfunctions or accidental events. No comments about air quality were received from Indigenous groups or the public.	None
Water quality	No	Potential changes in water quality were taken into account as applicable when assessing effects on other valued components.	No distinct valued component identified by the proponent. Potential changes in water quality were taken into account as applicable when assessing effects on other valued components (e.g. fish and fish habitat).
Effects identified under subsection 5(2) of CEAA 2012			
Commercial fisheries	Yes	There is commercial fishing activity in the area that could be affected by normal operations (e.g. exclusion zone) or by accidental events.	Commercial Fisheries
Recreational fisheries	No	There is no known recreational fishing activity in the vicinity of the exploration licences, which range from 230 to 370 kilometres from land.	None

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
		Routine project activities and components are not expected to interfere with nearshore recreational fisheries because platform supply vessels would use existing approaches to Halifax Harbour, avoiding interference with nearshore activities outside the approaches. Nearshore recreational fishing may be affected by accidental events associated with the Project since nearshore recreational fisheries tend to target the same species that are fished commercially. Measures proposed to mitigate effects on fish and fish habitat valued and commercial fisheries would mitigate similar environmental effects on recreational fisheries.	
Human health	No	The project site would be located at least 230 kilometres offshore where there is only intermittent human presence on fishing or other vessels. Therefore, routine project activities would not expose the public to a health risk.	None
Special Areas	Yes	There are several areas of physical or cultural importance in the regional assessment area that are not federal lands (e.g. certain coastal areas). These may be affected by the Project.	Special Areas
Effects identified under section 79 (2) of the *Species at Risk Act*			
Federal species at risk	Yes	The *Species at Risk Act* (SARA) requires consideration of listed species when conducting an EA under CEAA 2012. The Agency also examined effects on species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or of special concern.	There was no distinct valued component identified by the proponent in its EIS. Rather, the proponent assessed applicable species at risk within its analyses of effects on fish and fish habitat, marine mammals and sea turtles, and migratory birds. After reviewing the EIS, the Agency required the proponent to prepare a stand-alone analysis of potential effects on species at risk.

1.2.4 *Spatial and Temporal Boundaries*

Spatial and temporal boundaries of an EA are established to define the area and timeframe within which a Project may interact with the environment and cause environmental effects. The spatial and temporal

boundaries may vary among valued components depending on the nature of the potential environmental interaction with the Project. Spatial boundaries reflect the geographic range over which a project's potential environmental effects may occur, recognizing that some environmental effects could extend beyond the immediate vicinity of a project. Temporal boundaries identify when an environmental effect may occur in relation to specific project activities and components. Spatial and temporal boundaries are developed for each valued component in consideration of:

- the timing and scheduling of project activities for all project phases;
- known natural variations of each valued component;
- information gathered on current and traditional land and resource use;
- the time required for recovery from an environmental effect; and
- the potential for cumulative environmental effects.

The proponent defined three types of spatial boundaries for the Project:

Project Area: The project area encompasses the immediate area in which project activities and components may occur and includes the area within which direct physical disturbance to the marine benthic environment may occur. Well locations have not yet been identified, but would occur within the project area and represent the actual project footprint. As a subset of the project area, the wellsite is referenced in the assessment discussion where required to more appropriately characterize the associated effects. The project area includes Exploration Licences 2431, 2432, 2433, and 2434[1].

Local Assessment Area: The local assessment area is the maximum area within which environmental effects of project activities and components can be predicted or measured with a reasonable degree of accuracy and confidence. It consists of the project area and adjacent areas where project-related environmental effects are reasonably expected to occur based on available information including effects thresholds, predictive modelling and professional judgement. The local assessment area includes platform supply vessel routes to and from the project area.[1]

Regional Assessment Area: The regional assessment area is the area within which residual environmental effects from project activities and components may interact cumulatively with the residual environmental effects of other past, present, and future (i.e. certain or reasonably foreseeable) physical activities and to provide regional context for the effects assessment. The regional assessment area is restricted to the 200 nautical mile limit of Canada's exclusive economic zone, including offshore marine waters of the Scotian Shelf and Slope within Canadian jurisdiction.

The project area and regional assessment area are constant for all valued components and are shown in Figure 1. The local assessment area varies by valued component; Figure 1 shows the local assessment areas for all valued components, along with environmentally sensitive features within the regional assessment area.

1 Although the proponent defined its project area for the EA as the boundaries of its exploration licences, the Agency considers platform supply vessel activities to be incidental to the designated physical activity and therefore the routes to and from the supply base in Halifax could also be considered part of the project area.

The temporal boundaries of the EA encompass all project phases: well drilling, testing, and abandonment. Up to seven exploration wells could be drilled over the period from 2018 to 2022, with each well taking approximately 120 days to complete. Project activities could occur at any time of year.

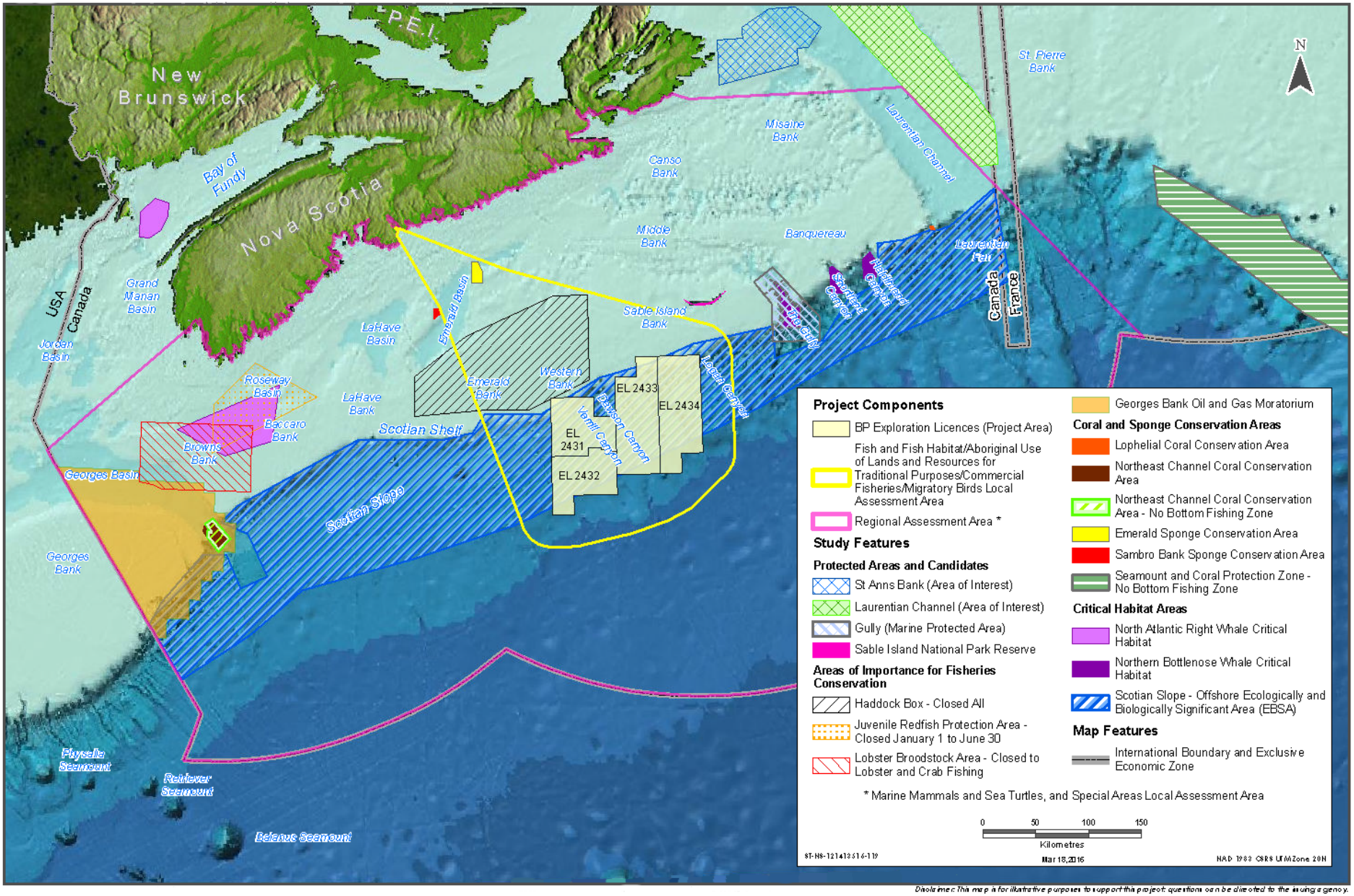

Figure 1 Environmental Assessment Spatial Boundaries and Environmental Features

Source: Stantec, 2016

1.2.5 *Method and Approach*

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

- the proponent's EIS;
- additional information that the Agency requested from the proponent during the review of the EIS;
- advice from expert departments and agencies, including the CNSOPB;
- comments received from the public; and
- comments received from Indigenous peoples.

In its EIS, the proponent assessed the project's effects based on a structured approach that is consistent with accepted practices for conducting environmental impact assessments and with the Agency's *Reference Guide: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*. The approach is designed to:

- identify the issues and potential effects that are likely to be important;
- consider key issues raised by Indigenous peoples, stakeholders, and the public; and
- integrate engineering design and programs for mitigation and follow-up into a comprehensive environmental planning process.

The potential environmental effects of project activities and components were assessed using a standardized framework to facilitate individual assessment of each valued component. The assessment of project-related environmental effects followed a sequential process whereby potential interactions between each valued component and the Project were first identified, and where such interactions may exist, a more detailed assessment of those effects was completed. Evaluation tables were utilized to assess interactions and effects, and considered effects pathways, standard and project-specific mitigation, and residual effects (i.e. those environmental effects that remain after the planned mitigation measures have been implemented). Residual environmental effects on each valued component were characterized based on:

- direction: whether the effect is predicted to be positive, adverse, or neutral;
- magnitude: the amount of change in a measurable parameter relative to baseline conditions or other standards, guidelines, or objectives;
- geographic extent: the geographic area or spatial scale over which the residual effect is expected to occur;
- duration: the period of time over which the residual effect would occur;
- timing: when project activities will occur in relation to aspects such as seasonal land and resource use, or periods of increased vulnerability such as bird breeding season or species migration;
- frequency: how often the residual effect may occur within a given time period;
- reversibility: whether or not the valued component can return to its pre-project condition once the activity or component causing the disturbance ceases; and

- context: the current degree of anthropogenic disturbance or ecological sensitivity in the area in which the residual effect may occur.

The proponent then determined the significance of each residual project-related environmental effect based on pre-defined standards or thresholds (i.e. significance rating criteria). Where a significant effect was predicted to occur, the likelihood of this significant effect was discussed in the context of probability and certainty. Appendix C summarizes the proponent's residual effects assessment for all valued components for routine operations. Effects of accidents and malfunctions are described in Section 7.1.

The Agency's assessment included both direct effects from the Project and those effects that may result from predicted changes to the environment. The Agency's analysis and conclusions on the significance of effects on valued components from routine projects operations are presented in Chapter 6.

The Agency also considered:

- the effects of accidents and malfunctions that may occur in connection with the Project (potential events that could result in adverse environmental effects – Section 7.1);
- effects of the environment on the Project (potential changes to the Project that may result from interactions with the environment or natural events – Section 7.2); and
- cumulative environmental effects (the potential for the residual environmental effects of the Project to interact cumulatively with the residual environmental effects of other past, present, or reasonably-foreseeable future physical activities – Section 7.3).

2 Project Overview

2.1 Project Location

The Project would take place within the proponent's Exploration Licences 2431, 2432, 2433, and 2434, located in the northwest Atlantic Ocean and ranging from approximately 230 to 350 kilometres southeast of Halifax, Nova Scotia and 48 kilometres south-southeast of Sable Island National Park Reserve. The Exploration Licences have a combined surface area of approximately 14 000 square kilometres and water depths varying from 100 metres to over 3000 metres. The area has no permanent human presence and sees intermittent human activity related to fishing, shipping, research, military (naval) manoeuvres, and oil and gas exploration. Figure 1 depicts the boundaries of the proposed drilling area. The proponent has not yet finalized exact drilling locations, which would be selected to optimize the potential discovery of hydrocarbon reservoirs based on:

- geophysical (i.e. seismic survey) data;
- geohazard data (a geohazard is a feature or geological condition which could pose a potential hazard to drilling activity); and
- seabed baseline conditions, including environmental sensitivities and anthropogenic features.

The proponent proposes to use the Woodside Terminal, an existing multi-user industrial port facility located in Halifax Harbour, as its onshore supply base. Helicopter flights for crew changes and transporting light supplies to the mobile offshore drilling unit would operate from an existing air terminal at Halifax Stanfield International Airport.

2.2 Project Components

The Project would be comprised of the following primary components:

- a mobile offshore drilling unit designed for year-round operations in deep water; and
- up to seven offshore exploration wells, drilled in two phases (up to two wells in the first phase and up to five more in the second phase).

Logistical support required for the Project consists of:

- platform supply vessels for re-supply and for on-site standby during drilling activities and
- helicopter support for personnel transport and delivering light supplies and equipment.

The mobile offshore drilling unit, supply vessels and helicopters would be leased by the proponent from other parties. The only new components developed for the Project would be the offshore exploration wells.

2.3 Project Activities

This section describes the following routine project activities:

- Seabed Inspection
- Drilling

- Vertical Seismic Profiling
- Well Flow Testing
- Abandonment
- Supply and Servicing

There would also be maintenance activities conducted as required throughout the Project.

2.3.1 *Seabed Inspection*

The proponent would conduct an imagery-based (video) seabed survey at the well sites prior to drilling. The main purposes of the survey would be to confirm the absence of shipwrecks, seafloor debris, unexploded ordnance (UXO) and sensitive environmental features, such as aggregations of habitat-forming corals or species at risk. The survey would be carried out from the drilling unit when it arrives on location, but prior to drilling. If any sensitive environmental or anthropogenic features are identified during the survey, the proponent proposes to move the wellsite to avoid affecting them, if feasible. If it is not feasible, the proponent would consult with the Canada Nova Scotia Offshore Petroleum Board (CNSOPB) to determine an appropriate course of action.

2.3.2 *Drilling*

Exploration drilling is planned in one or more phases so that initial well results can be analyzed to determine subsequent drilling locations. Up to seven exploration wells may be drilled in phases over the terms of the exploration licences, contingent on the drilling results of the initial wells. Each well is anticipated to take approximately 120 days to drill.

Oil and gas wells are drilled using a drill bit in a number of sections of progressively smaller-diameter intervals. Drill bits are available in various sizes to drill different diameter holes. The top interval is drilled starting at the sea floor and has the largest diameter hole, typically 36 inches (0.9 metres) or 42 inches (1.5 metres). The drill bit is controlled from the mobile offshore drilling unit through a series of pipes, referred to as the drill string, which rotate the drill bit. The drill bit is lubricated by drilling fluid, commonly referred to as drilling mud. Drilling mud also carries drill cuttings to the top of the well for disposal. The weight of the mud also counterbalances hydrostatic pressure in the wellbore.

Well drilling would occur in two phases: riserless drilling and riser drilling. A riser is a pipe that connects the mobile offshore drilling unit at the sea surface to the well on the seafloor, allowing the recovery of drilling fluid and cuttings to the mobile offshore drilling unit for treatment and disposal. During riserless drilling, drilling fluid and cuttings are deposited directly on the sea floor around the well, also known as the wellbore, as it is drilled. Riserless drilling is usually conducted in the top section or two of the well, after which the wellhead can be installed. Water-based drilling mud would be used during riserless drilling, while either water-based or synthetic-based mud would be used for riser drilling. Cuttings produced while drilling with synthetic-based mud would be circulated up to the mobile offshore drilling unit for treatment and then discharged into the ocean via a sub-surface pipe.

Each section of the well is drilled with an increasingly smaller drill bit and lined with casing as the well is drilled. Casing is steel pipe that serves to prevent the wellbore from caving in, to isolate different geologic formations

from one another to prevent flow or cross flow of formation fluids, and provide a means of maintaining control of formation fluids and pressure as the well is drilled. Once the casing has been inserted into a newly-drilled section, it is cemented in place to secure it. The cement permanently seals the space between the casing and the wall of the borehole, referred to as the annulus, preventing fluids from entering and potentially being released into the environment. It also seals the formation, preventing the loss of drilling fluid.

Once the surface casing has been installed, a blowout preventer is attached to the end of the riser and connected to the wellhead. The blowout preventer allows the well to be closed remotely (e.g. from the mobile offshore drilling unit on the sea surface) or manually at the blowout preventer, to stop hydrocarbons from escaping from the well. The process of drilling, casing and cementing would continue for the remaining drill sections, until the total desired depth of the well is reached. A typical drilling sequence for the Project is depicted in Figure 2.

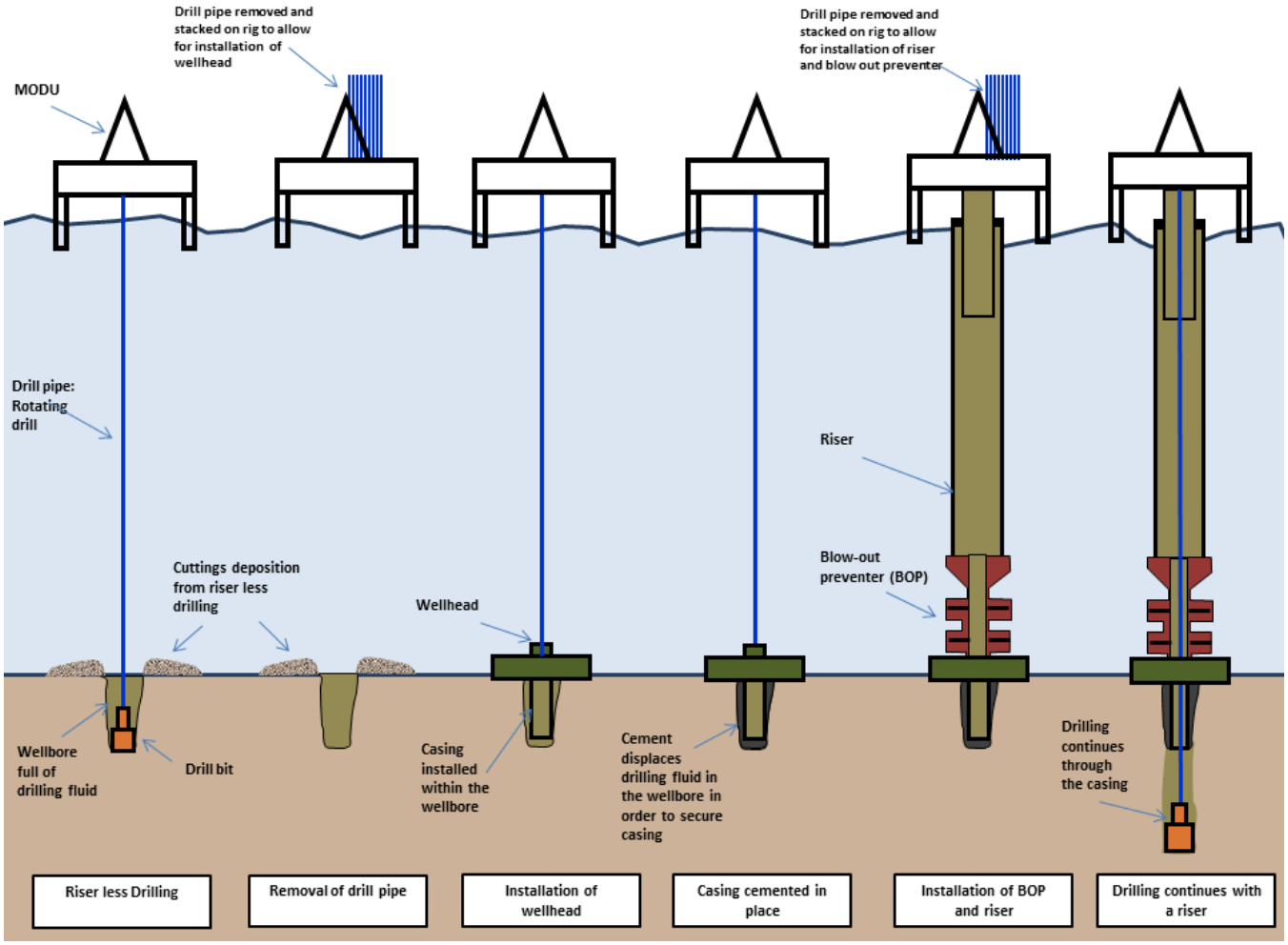

Figure 2 Typical Drilling Sequence for the Project

Source: Stantec, 2016

A seabed survey would be conducted at the end of the drilling program to look for debris.

2.3.3 *Vertical Seismic Profiling*

The purpose of a vertical seismic profiling survey is to correlate conditions found in the well to data collected during pre-project acoustic seismic surveys. This permits calibration of data previously gathered during surface-vessel-based seismic surveys to actual geologic conditions encountered in the well.

Vertical seismic profiling would most likely be conducted using a stationary acoustic sound source deployed from the mobile offshore drilling unit while receivers, positioned at different depths within the well, record how long it takes sound generated at the source to reach them. This form of vertical seismic profiling survey operation is referred to as zero-offset. Offset, or walk-away, vertical seismic profiling may also be used, in which the acoustic source is deployed from a vessel up to eight kilometres from the well.

Up to 12 sound sources may be used, generally positioned five to ten metres below the water surface. Vertical seismic profiling surveys are short duration and usually take no more than a day to complete. Longer surveys may be used for additional characterization, which could extend the duration by a few days.

2.3.4 *Well Flow Testing*

In the event that hydrocarbons are present in the well, well flow testing may be required by the CNSOPB to establish a potential significant discovery. Testing is carried out to gather information about sub-surface characteristics such as potential productivity, connected volumes, fluid properties, composition, flow, pressure, and temperature. Testing is required to convert an exploration licence to a significant discovery licence, in the event that potentially-commercial quantities of hydrocarbons are discovered.

Testing equipment must be designed to safely control the maximum potential pressure that may be encountered. The proponent would likely use conventional drill-stem testing techniques, sub-sea safety systems and temporary surface flow equipment to manage and measure the well fluids, and to collect fluid samples and necessary data.

Any formation hydrocarbons, such as gas, oil, or formation water that are brought to surface as part of the well test activity would need to be flared via one of two horizontal burner booms, either a high efficiency burner head for liquids, or simple open-ended gas flare tips for gases. Flaring for well flow testing, if conducted, could last up to two or three days, per well potentially on several occasions toward the end of drilling operations per tested well. Flaring during the well testing phase may also occur for operational purposes such as for flushing or bleeding which is anticipated to be carried out over a one- to six-hour period, with low flow rates.

2.3.5 *Abandonment*

Once wells have been drilled to total depth and well evaluation programs completed (if applicable), the well would be plugged and abandoned in line with applicable regulations, and requirements established by the CNSOPB. Plugs would be placed above and between any hydrocarbon bearing intervals at appropriate depths in the well, as well as at the surface.

Abandonment plans for individual wells would be developed case-by-case and would require approval by the CNSOPB.

Sub-sea infrastructure may be removed or left in place. If removed, the casing would be cut below the seabed and the wellhead removed; no infrastructure would be left on the seafloor after the wellhead has been removed.

Approval may be sought to leave the wellhead in place. If left in place, the wellhead could be approximately 1.5 to 3.7 metres high and would occupy less than one square metre of seabed.

Site-specific abandonment plans would consider potential interference with fishing activity and other ocean users. In addition to the potential for interaction with other commercial users, geotechnical considerations such as sediment stability and erosion potential are considered when contemplating whether or not to leave infrastructure in place.

2.3.6 *Supply and Servicing*

The proponent would use an existing on-shore supply terminal to support logistical requirements for offshore operations. Platform supply vessels would transport fuel, equipment, drilling mud, and other supplies from the on-shore supply terminal to the mobile offshore drilling unit, and transport waste requiring on-shore disposal to the terminal. Two or three platform supply vessels would be used, including one vessel on stand-by at the mobile offshore drilling unit at all times. Platform supply vessels would make two or three round trips per week between the mobile offshore drilling unit and the supply base. During these trips, vessels would typically travel at approximately 12 knots (22 kilometres per hour), allowing them to reach the furthest point of the project area from Halifax in approximately 16 hours.

The proponent would use helicopters for routine crew changes and to support any required medical evacuation from the mobile offshore drilling unit or search and rescue operations in the area. Approximately one helicopter trip per day would be required to transport crew and any supplies not carried by the platform supply vessels to the mobile offshore drilling unit. The mobile offshore drilling unit would be equipped with a helideck that meets all applicable aviation safety standards. Helicopters would operate from an existing base at Halifax Stanfield International Airport. The average flying time to the mobile offshore drilling unit would be around 90 minutes.

2.4 Schedule

Subject to the necessary regulatory approvals, authorizations, and permits, the first phase of drilling could start as soon as the second quarter of 2018. Each well is expected to take approximately 120 days to complete. Subject to initial well results, up to six additional wells may be drilled, up to the expiry of the Exploration Licences in early 2022. The proponent's proposed project schedule is outlined in Figure 3.

Task	2015				2016				2017				2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Well Selection, Design and Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
Stakeholder and Aboriginal Engagement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Permitting			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
Logistics Preparation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
Supply Base Preparation, Mobilization of Crew and Equipment							✓	✓	✓	✓	✓	✓	✓											
Exploration Drilling														✓	✓									
Assessment of Drilling Program Results																✓	✓	✓	✓					
Abandonment																✓								
Potential Further Exploration Drilling (subject to initial well results)																		✓	✓	✓	✓	✓	✓	✓

Figure 3 Proponent's Proposed Project Schedule

Source: Stantec, 2016

Note:

Q1 (Quarter 1): January, February and March

Q2: April, May and June

Q3: July, August and September

Q4: October, November and December

2.5 Environmental Planning

As part of its project planning and as required by the CNSOPB's authorization process for drilling projects, the proponent must prepare a number of documents, including:

- an environmental assessment (EA) Report (the environmental impact statement [EIS] prepared for the Agency would fulfill this requirement);
- an Environmental Protection Plan (including a waste management plan);
- an Incident Management Plan including a Spill Response Plan; and
- a certificate of fitness for the drilling unit proposed for use.

The proponent would also prepare a net environmental benefit analysis, also referred to as a spill impact mitigation assessment, to consider appropriate spill response options, including the possible use of dispersants, and identify those techniques that, according to the circumstances of the spill, afford the best opportunities to minimize its environmental consequences.

3 Project Purpose and Alternative Means

3.1 Purpose of the Project

The proponent indicated that the purpose of the Project is to determine the presence, nature, and quantities of potential hydrocarbon resources and to meet the proponent's work expenditure commitments during the term of the exploration licence period. Wells developed as part of the Project would be developed specifically for exploration and appraisal of the potential hydrocarbon resource, not for development or production of the resource. Any wells proposed to be developed for production would be considered under a different project scope requiring a separate Environmental Assessment (EA) and further licensing from the Canadian Nova Scotia Offshore Petroleum Board (CNSOPB).

3.2 Alternative Means of Carrying out the Project

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) requires that federal EAs of a designated project take into account the alternative means of carrying out the Project that are technically and economically feasible and also consider the environmental effects of any such alternative means. The Agency's Operational Policy Statement *Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012* sets out the general requirements and approach to address the alternative means of carrying out the designated project.

The proponent assessed alternative means of carrying out the Project by:

1. considering the technical feasibility (e.g. safety, schedule, operational feasibility) of alternative means of carrying out the Project;
2. considering the economic feasibility of alternative means of carrying out the Project;
3. considering the environmental and socio-economic effects of the identified technically and economically feasible alternative means of carrying out the Project; and
4. selecting the preferred alternative means of carrying out the Project, based on the consideration of effects and of technical and economic feasibility.

The proponent evaluated alternatives for drilling fluid selection, drilling waste management, flaring, and lighting based on technical and economic feasibility criteria.

Drilling Fluid Selection

The proponent assessed the feasibility of two drilling fluid options: use of water-based mud only, and use of water-based mud and synthetic-based mud. Both options are technically and economically feasible; however, use of water-based mud alone may result in drilling delays and technical challenges due to thermal instability, lubricity, wellbore integrity, and protection against formation of gas hydrates. The proponent stated that there is no substantive difference in environmental or socio-economic effects between the two alternatives, assuming the *Offshore Waste Treatment Guidelines* are followed and chemical selection is in line with the *Offshore Chemical Selection Guidelines*.

With regards to discharge, synthetic-based drill waste generally accumulates closer to the well site, limiting the zone of influence. Water-based drill wastes tend to remain suspended longer with greater potential to affect filter-feeding organisms.

Fishing inside the mandatory 500-metre safety zone would be restricted regardless of the type of drilling fluid used.

The proponent states that the use of synthetic-based mud was considered the preferred option for riser drilling to minimize technical challenges and subsequent potential safety risks.

Drilling Waste Management

The proponent assessed the feasibility of three options for managing drilling waste: reinjection of cuttings in a dedicated disposal well, onshore disposal, and discharge to the water column.

The proponent indicated that reinjection of drill cuttings is not technically or economically feasible. This option would require drilling an additional dedicated well for reinjection in targeted geological formations under pressurized conditions. This technology is limited, unproven, and technically challenging for mobile offshore drilling units in water depths greater than approximately 300 metres. Subsea cuttings reinjection has never been developed for deep water drilling either by operators or by the service sector because the risked costs are too high especially for exploration drilling.

Onshore disposal of drill cuttings is technically and economically feasible; however, there is added cost for transport of cuttings to shore. These costs are associated with additional ships and crews for cuttings transport to shore, truck transport from port to an approved disposal facility, and disposal costs. Given the distance from shore and the depth of the well and duration of drilling, operational delays could occur due to weather and lack of storage on the drilling unit for cuttings. Onshore disposal would have less environmental effect on the marine environment in proximity to the well; however, additional potential environmental effects due to increased marine transportation (e.g. air emissions, noise and disturbance from additional ship traffic) and the potential effects of onshore waste disposal.

Discharge to the water column involves discarding drill cuttings, and some drilling fluids directly into the marine environment. The proponent stated that during the riserless drilling phase, only water based muds would be used; and as per the *Offshore Waste Treatment Guidelines*, spent and excess water based muds and cuttings may be discharged into the water column from offshore installations without treatment. During the phase of drilling with a riser, when synthetic-based muds are used the proponent stated that cuttings associated with synthetic-based muds would only be discharged into the water column when performance targets stated in the *Offshore Waste Treatment Guidelines* could be met. Further the proponent stated that in accordance with the *Offshore Waste Treatment Guidelines*, no excess or spent synthetic-based muds would be discharged into the water column; if synthetic-based muds cannot be reused, they would be brought to the surface for disposal onshore.

The proponent's preferred option for drilling waste management is discharge to the water column as per the *Offshore Waste Treatment Guidelines*.

Flaring

Well testing, including flaring, is a regulatory requirement to obtain a Significant Discovery Licence, in the event that a significant discovery is made. The proponent assessed three options for flaring: no flaring, reduced flaring (i.e. no flaring at night or during inclement weather), and flaring as required. The proponent indicated that flaring would be expected to be brief and intermittent, lasting two to three days at a time.

Currently, there are no approved alternatives to flaring. No flaring is not an option, as current regulatory practice requests flaring to secure a Significant Discovery Licence.

Reduced flaring may be technically and economically feasible; however, the data obtained from limited flow tests (associated with flaring) may not satisfy the regulatory requirements for a Significant Discovery Licence and may increase the overall duration of well testing. Reduced flaring is expected to reduce, but not eliminate, atmospheric emissions and potential effects on birds; however, it may compromise the health and safety of workers onboard the drilling unit.

The proponent sated that flaring as required is economically and technically feasible, but may have some limited effects associated with light and atmospheric emissions. Elsewhere in the Environmental Impact Statement (EIS), the proponent indicated that flaring may also pose a risk to migratory birds. However, flaring is expected to be intermittent and brief in duration over a temporary period at the end of drilling.

Flaring as required is the proponent's preferred option.

Lighting

Lights are used on the mobile offshore drilling unit and platform supply vessels for navigation and safety purposes. Lighting is required under Canadian and international law to minimize the risk of collisions between vessels. The proponent considered two options: standard lighting as found on mobile offshore drilling units, and spectral modified lighting. It concluded that, of these, only standard lighting is technically and economically feasible.

3.2.1 *Views Expressed*

Federal Authorities

Environment and Climate Change Canada requested that the proponent discuss the feasibility of exclusively using water-based muds as a means to reduce risks to migratory birds. The proponent noted that the exclusive use of water-based muds is both technically and economically feasible, but synthetic-based muds offer operational advantages such as improved lubrication, thermal stability, wellbore integrity, and protection against gas hydrates while drilling. The proponent confirmed that only water-based muds or a combination of water-based muds and synthetic-based muds would be used for drilling activities. The proponent noted that all discharges of synthetic-based mud cuttings would adhere to the *Offshore Waste Treatment Guidelines.*

Environment and Climate Change Canada requested that the proponent clarify why the preferred option was flaring when required and not reduced flaring (i.e. not flaring at night), and that the proponent discuss the technical and economic feasibility of installing flare shields or commercially-available enclosed incineration systems. The proponent acknowledged that while not flaring at night is technically and economically feasible, it was not identified as the preferred option because it could compromise safety and the success of the well test.

The proponent noted that flaring is not expected to occur for the first two wells drilled, and if well testing is required, it would not commence during the night. The proponent committed to considering the use of a water curtain around the flare, which may deter migratory birds in the general vicinity. The proponent noted that enclosed incineration systems are typically found on permanent offshore installations (i.e. production) rather than mobile offshore drilling units and are therefore considered not technically feasible for the Project.

Environment and Climate Change Canada requested additional information about the proponent's conclusion that spectral modified lighting is not technically and economically feasible, noting that spectral-modified lighting could reduce bird attraction at night. The proponent identified a number of disadvantages associated with spectral-modified lighting including potential effects on helicopter approach and landing activities, limitations in commercial availability, limited extreme weather capability, and low energy efficiency. These disadvantages have limited spectral modified lighting implementation in the offshore oil and gas industry. The proponent indicated that it is not aware of any operating mobile offshore drilling units that are currently equipped with spectral modified lighting and that also have the technical capability to support the Project, hence, this option is not considered technically feasible. Further, the proponent also noted that because the mobile offshore drilling unit would be leased from a third party, it would have limited ability to modify lighting.

Indigenous Peoples

The Maliseet Nation in New Brunswick requested that the proponent discuss additional alternatives that could reduce bird attraction to flares and lights. The proponent acknowledged that there is the potential to harm migratory birds due to the use of standard lighting which can attract migratory birds as well as harm from the flare, if flaring is taking place. The proponent indicated that information on industry best practices for reducing lights on mobile offshore drilling units is not currently available but efforts would be made to reduce lighting to the extent that worker safety and safe operations is not compromised. In addition the proponent indicated that it would consider the use of water curtains when flaring, which may aid in deterring birds from the general vicinity of the flare.

Public

The Agency did not receive any public comments about alternative means of carrying out the Project.

3.2.2 *Agency Analysis and Conclusion*

The proponent considered alternative means of drilling fluid selection, drilling waste management, flaring, lighting and chemical selection based on technical and economic feasibility criteria.

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

4 Consultation

4.1 Crown Consultation with Indigenous Peoples

The Crown has a duty to consult Indigenous peoples in Canada, and, where appropriate, to accommodate, when its proposed conduct might adversely impact a potential or established Aboriginal or treaty right. Indigenous consultation is also undertaken more broadly to aid good governance, sound policy development and decision-making.

4.1.1 *Indigenous Consultation Led by the Agency*

For this environmental assessment (EA), the Agency served as Crown Consultation Coordinator for a whole-of-government approach to consultation. It consulted Indigenous peoples in Nova Scotia, New Brunswick, and Prince Edward Island. The Agency consulted communities and groups that hold communal commercial fishing licenses in North Atlantic Fisheries Organization (NAFO) areas that overlap the project area, local assessment area, and regional assessment area, or portions of them, or hold licenses for species that migrate through the project area such as tuna (NAFO areas 4X, 4W, and 4VS). These are listed below:

Nova Scotia

Mi'kmaq:

- Acadia First Nation
- Annapolis Valley First Nation
- Bear River First Nation
- Eskasoni First Nation
- Glooscap First Nation
- Membertou First Nation
- Millbrook First Nation
- Paqtnkek (Afton) First Nation
- Pictou Landing First Nation
- Potlotek (Chapel Island) First Nation
- Sipekne'katik First Nation
- Wagmatcook First Nation
- Waycobah First Nation

Of these communities, all are represented in consultation by the Kwilmu'kw Maw-klusuaqn Negotiation Office, except Millbrook and Sipekne'katik First Nations.

New Brunswick

Wolastoqiyik (Maliseet):

- Kingsclear First Nation
- Madawaska Maliseet First Nation
- Oromocto First Nation
- St. Mary's First Nation

- Tobique First Nation
- Woodstock First Nation

These communities are represented in consultation by the Maliseet Nation in New Brunswick, except Woodstock First Nation, which represented its own interests.

Mi'gmaq:

- Buctouche First Nation
- Eel River Bar First Nation
- Fort Folly First Nation
- Esgenoopetitj First Nation
- Indian Island First Nation
- Pabineau First Nation

These communities are represented in consultation by Mi'gmawe'l Tplu'taqnn Incorporated.

Prince Edward Island:

- Abegweit First Nation
- Lennox Island First Nation

Both Prince Edward Island First Nations are represented in consultation by the Mi'kmaq Confederacy of Prince Edward Island.

Early in the EA, the Agency identified that certain Indigenous communities could be affected by the Project based on known fishing operations or interests (i.e. licences) in the regional assessment area, which included all Nova Scotia Mi'kmaq First Nations, and the Fort Folly, Kingsclear, Oromocto, St. Mary's, Tobique, and Woodstock First Nations in New Brunswick.

In September 2015, the Assembly of First Nations Chiefs in New Brunswick (New Brunswick Assembly) requested that the Agency consult all of its member groups, noting that the right to a moderate livelihood established by the Peace and Friendship Treaties extends to all signatory First Nations and is not exclusive to a reserve's location. The New Brunswick Assembly indicated that the First Nation communities of Buctouche, Esgenoopetitj, Indian Island, Eel River Bar, and Pabineau have an interest in the Project because tuna migrate through the project area. The Agency expanded its consultation breadth to include the above listed New Brunswick Mi'gmaq First Nations.

In early 2016, the New Brunswick Assembly ceased operations and two new organizations were formed: Mi'gmawe'l Tplu'taqnn Incorporated, representing New Brunswick Mi'gmaq First Nations (except Elsipogtog) and the Maliseet Nation in New Brunswick representing New Brunswick Maliseet First Nations, except for Woodstock.

In September 2016, the proponent identified two Mi'kmaq groups on Prince Edward Island with commercial communal licences to fish within the regional assessment area. Consequently, the Agency expanded its consultation scope to include Abegweit First Nation and Lennox Island First Nation.

The Agency supported the participation and consultation of Indigenous groups during the EA through its Participant Funding Program. Funding was made available to assist in reviewing and providing comments on the environmental impact statement (EIS), the draft EA Report (this document), and potential EA conditions. In total, the Agency allocated $500,310 to 10 groups and organizations to reimburse eligible expenses incurred by Indigenous groups that participated in or were consulted during the EA. Details of the funding allocation are available on the Agency's Internet site at http://www.ceaa.gc.ca/050/details-eng.cfm?evaluation=80109.

The Agency integrated the Crown's consultation activities into the EA and invited Indigenous groups to review and comment upon the summary of the project description, draft Guidelines for the EIS, a plain-language summary of the EIS, and the draft EA Report and potential conditions. Table 2 provides the dates and durations of the comment periods, which coincided with public comment periods.

Table 2 Comment Opportunities During the Environmental Assessment

Document or Subject of Consultation	Dates
Summary of the project description	August 19, 2015 – September 8, 2015 (20 days)
Draft EIS Guidelines	September 16, 2015 – October 16, 2015 (30 days)
EIS and Summary	November 8, 2016 – December 9, 2016 (30 days)
Draft EA report and Potential Conditions	November 22 – December 22, 2017 (30 days)

Based on submissions from Indigenous groups following their review of the EIS and associated summary, the Agency asked the proponent to provide additional information on a number of topics. Indigenous groups were provided the proponent's responses for additional review and comment.

Prior to commencing consultation, the Agency provided draft consultation plans to the Kwilmu'kw Maw-klusuaqn Negotiation Office, Millbrook First Nation, Sipekne'katik First Nation, the Assembly of First Nations Chiefs in New Brunswick, the New Brunswick First Nation communities of Kingsclear, Oromocto, St. Mary's Tobique and Woodstock, and the Prince Edward Island First Nation communities of Abegweit and Lennox Island. No comments were received.

The Agency received written comments from Indigenous groups throughout the EA process and also met with Indigenous groups as needed to discuss the process and to ensure that their concerns were understood. In addition, the Agency maintained contact with Indigenous groups (e.g. general meetings with Maliseet consultation coordinators, periodic emails to verify that participants were aware of the EA process as it advanced, respond to questions, and discuss comments). Meetings between the Agency and Indigenous groups are listed in Table 3.

Table 3 Agency Meetings with Indigenous Peoples

Group or Community	Date	Purpose
Woodstock First Nation	September 2015	Discuss the EA process and proposed Project.
New Brunswick Maliseet (all communities)	October 2015	Discuss the EA process, the Participant Funding Program, and the Project.
Assembly of First Nations Chiefs in New Brunswick	December 2015	Discuss the EA process, the Participant Funding program, and the Project.
All New Brunswick Maliseet groups	February 2016	Discuss the Agency's conformity review process and discuss issues related to the Project
Millbrook First Nation	January 2017	Discuss the EA process and discuss potential issues related to the Project.
Mi'gmawe'l Tplu'taqnn Incorporated	March 2017	Discuss the EA process and discuss potential issues related to the Project.
Sipekne'katik First Nation	March 2017	Discuss the EA process and discuss potential issues related to the Project.
Mi'gmawe'l Tplu'taqnn Incorporated	July 2017	Discuss MTI's comments on the EIS.

The main areas of concern raised by Indigenous peoples included:

- effects on fish and fish habitat;
- effects on fishing for communal commercial and food, social or ceremonial purposes, including related socio-economic and health effects;
- effects of accidents and malfunctions, including the use of dispersants in oil spill response;
- effects on migratory birds; and
- compensation in the event of- and damages from normal operation or due to accidents and malfunctions.

Appendix D contains a summary of comments provided by the Indigenous peoples during the EA process, along with the proponent's and Agency's responses. Some of these comments are also discussed in the context of individual valued components throughout Chapter 6. Potential effects of the Project on the current use of lands and resources for traditional purposes are described in Section 6.7, effects on health and socio-economic conditions are described in Section 6.8, effects of accidents and malfunctions are discussed in Section 7.1, and impacts on potential or established Aboriginal or treaty rights are discussed in Chapter 8. All comments received were considered in developing this Draft EA report.

4.1.2 *The Proponent's Indigenous Engagement Activities*

The proponent engaged with the Mi'kmaq of Nova Scotia, the Mi'gmaq and Maliseet of New Brunswick, and Mi'kmaq of Prince Edward Island. Early engagement began in 2014 with the Native Council of Nova Scotia and the Kwilmu'kw Maw-klusuaqn Negotiation Office. Communications with individual First Nations were initiated in 2015. Engagement methods included face-to-face meetings, provision of information packages, phone calls and emails. The proponent stated that it would continue its engagement efforts throughout the Project.

The proponent held technical sessions with several First Nations groups in Nova Scotia (through the Kwilmu'kw Maw-klusuaqn Negotiation Office) and New Brunswick in May and June 2016, to provide an overview of offshore exploration drilling activities and emergency planning and response. An additional technical session was held to continue discussions with the Kwilmu'kw Maw-klusuaqn Negotiation Office in November 2016. Project updates and newsletters were provided to all groups in 2017, and the proponent conducted additional engagement in the summer of 2017 to gather socio-economic information.

The proponent commissioned a Traditional Use Study in an effort to better understand traditional use of marine areas and resources by Indigenous peoples and potential effects on potential or established Aboriginal and treaty rights. All 13 First Nations in Nova Scotia and the Native Council of Nova Scotia, as well as three First Nations in New Brunswick (Fort Folly, St. Mary's, Woodstock) were invited to participate. Interviews with fisheries managers, captains and fishers, along with a literature review and review of Fisheries and Oceans Canada licensing information were used to help characterize communal commercial and food, social or ceremonial fisheries that could be occurring in the regional assessment area. The Traditional Use Study included information about the following First Nation communities: Acadia, Eskasoni, Millbrook, Pictou Landing, Glooscap, Potolek (Chapel Island), Membertou, Paq'tnkek, Wagmatcook, Waycobah (We'koqma'q), Fort Folly, St. Mary's, and Woodstock.

4.2 Public Participation

4.2.1 *Public Participation Led by the Agency*

The Agency provided four opportunities for the public to participate in the EA, as listed in Table 2 (Section 4.1.1) and made funding available through its Participant Funding Program to support the public in reviewing and providing comments on the EIS, the draft EA Report, and on potential EA conditions.

Notices of comment periods were posted on the Canadian Environmental Assessment Registry Internet Site and advertised through local media to solicit public participation. In response to the notices, environmental organizations, industry organizations, Indigenous groups, and individuals participated in the EA. Submissions were received from:

- the World Wildlife Fund Canada;
- Citizen Action to Protect the Environment;
- the Maritimes Energy Association;
- the Native Council of Nova Scotia;
- the Seafood Producers Association of Nova Scotia; and

- 26 individuals.

Of the 26 individuals who submitted comments, 25 were generally opposed to oil and gas exploration and one supported the Project. The Seafood Producers Association of Nova Scotia stated that the fishing and the oil and gas industries can coexist in the Nova Scotia offshore, but that it does not agree with the proponent's conclusion that the Project would result in no significant residual adverse environmental effects. It expressed concern that damaged or lost fishing gear would not be properly compensated for, concern about detrimental short- and long-term effects on commercial fishing as a result of a spill, and potential effects of a spill on George's Bank. The Maritimes Energy Association expressed support for the Project. The World Wildlife Fund Canada and Citizen Action to Protect the Environment expressed concerns regarding oil spill response, specifically dealing with spill response plans and capping stack response time.

4.2.2 *Public Participation Activities by the Proponent*

The proponent's public consultation and engagement activities were aimed at fishing organizations and other interest groups, with stated objectives to:

- provide appropriate information in a timely manner to relevant, interested, and affected parties based on the nature, location, and duration of the Project;
- create an understanding of the proponent's proposed operations and address questions and concerns that arise; and
- provide feedback to stakeholders so that they are satisfied, or if not satisfied, that they understand how the proponent has represented and responded to their input.

The proponent conducted engagement efforts for its EIS from December 2014 until submission of the EIS in October 2016. Engagement on the Project used a variety of methods including, but not limited to, face-to-face meetings, written correspondence, and project presentation meetings. The proponent has committed to continuing its engagement throughout the duration of the Project.

4.3 Participation of Federal Government Experts

Federal departments and agencies with specialist information or expert knowledge relevant to the Project supported the Agency throughout the EA, participating in the Agency's decision to require a federal EA, development of the EIS Guidelines, review of the EIS, and preparation of the draft EA Report and potential EA conditions. The Agency sought input from:

- The Canada Nova Scotia Offshore Petroleum Board (CNSOPB) is an independent joint agency of the Governments of Canada and Nova Scotia responsible for the regulation of petroleum activities in the Nova Scotia Offshore Area. Its responsibilities under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Acts* (federal and provincial) include health and safety, environmental protection, and resource conservation, among others. It has expertise in all aspects of offshore drilling, the environmental effects of offshore drilling, mitigation measures, and spill response planning. The CNSOPB has Memoranda of Understanding in place with Environment and Climate Change Canada and Fisheries and Oceans Canada for working together on environmental protection matters, including developing spill response plans and responding to spills.

- Fisheries and Oceans Canada provided expertise related to requirements of the *Fisheries Act* (e.g. fisheries protection), the *Oceans Act*, and *Species at Risk Act* (aquatic species). It has expertise related to marine mammals, marine turtles, fish and fish habitat, as well as the mitigation of effects of oil and gas exploration drilling on marine species. Fisheries and Oceans Canada also has expertise in fate and behaviour of oil and dispersed oil, other chemical discharges and associated biological effects.
- Environment and Climate Change Canada contributed expertise related to the *Migratory Birds Convention Act, 1994*, the *Species at Risk Act*, the pollution prevention provisions of the *Fisheries Act*, and control of toxic substances under the *Canadian Environmental Protection Act, 1999*. Environment and Climate Change Canada has expertise in oil spill trajectory modeling and oil spill response, and in air quality, weather and sea state conditions that could be expected during the Project. It also has climate change expertise.
- Health Canada participated in relation to its responsibilities for the health of Indigenous peoples.
- Transport Canada contributed expertise and knowledge related to marine shipping, navigation and oil spill surveillance based primarily on its mandate under the *Canada Shipping Act, 2001* and the *Navigation Protection Act*.
- Natural Resources Canada contributed expertise on potential effects of the environment on the Project, principally earthquake risk in the drilling area.
- Indigenous and Northern Affairs Canada provided general advice in relation to Indigenous consultation activities conducted by the Agency.

The Agency also notified and invited comments from the Parks Canada Agency due to the Sable Island National Park Reserve being located approximately 48 kilometres northeast of the project area. No concerns were expressed.

5 Geographical Setting

The project area is a remote, open-ocean location with intermittent human presence associated with activities such as fishing, oil and gas, shipping, military exercises, and scientific research. The regional assessment area is rich in marine life, including numerous fish and bird species, mammals (e.g. whales), and turtles. The activities closest to the project area are two offshore natural gas production facilities: the Deep Panuke Offshore Gas Development Project (Deep Panuke) and the Sable Offshore Energy Project (Sable Project). These are located near Sable Island, approximately 48 kilometres northeast of the project area.

5.1 Biophysical Environment

5.1.1 *Benthic Environment*

There is a general lack of benthic data for most of the Nova Scotia offshore. However, available data for the Scotian Slope suggest that the sea bottom in the project area is relatively barren, with low abundance and diversity of benthic fauna. Results of deepwater benthic surveys conducted in 2001 and 2002 on the Scotian Slope and reports in the Shell Canada Limited Characterization of Benthic Habitat Exploration Licenses 2381 and 2382 indicate the presence of sea whips (Order Gorgonacea) and soft coral (Athomastus spp.) and octocoral (Umbellula spp.) in water depths less than 2000 metres.

The proponent carried out a geo-hazard baseline review based primarily on exploration seismic data. Geo-hazards are features or geological conditions that could pose a hazard to drilling activity. These may include variable seabed topography, and seabed sediment conditions and slope failures including slumps and debris flows. Some of these features could be suitable habitat for cold water corals and other benthic communities, however, there were no amplitude anomalies or topographic features that suggested the presence of aggregated benthic communities.

During the fall of 2014, Shell Canada Limited collected seabed samples and photographs near five potential drilling locations for its proposed Shelburne Basin Venture Exploration Drilling Project, which is immediately west of the project area and in similar water depth and may therefore be representative of conditions for the Project. There were no aggregations or communities of corals, sponges, or other benthic epifauna observed, nor was any type of macrofauna observed to be common or abundant. Observed species included uncommon occurrences of stony coral, octocoral, sea cucumbers, nudibranchs and sponge species; brittle stars and gadoid fish were more occasionally observed. The types of organisms observed during the survey are generally consistent with those observed during benthic habitat characterization surveys previously undertaken in the offshore and did not include any unusual species that had not been previously observed on the Scotian Shelf and Slope. None of the species observed were considered species of conservation interest (i.e. listed as endangered, threatened, or special concern under the *Species at Risk Act* or assessed by the Committee on the Status of Endangered Wildlife in Canada).

5.1.2 *Atmospheric Environment*

The climate of the project area is affected by the varying air streams that converge in the region. Fog is common in summer months and tropical storms frequent the area in late summer and through autumn.

There are no air quality data available directly within the project area, but based on the lack of air pollutant sources in the vicinity, air quality is expected to be generally good. Data from an air quality monitoring station on Sable Island, which closed in 2014 and was very near both the Sable Project and Deep Panuke, indicated that the ambient air quality in the area was good, with no regulatory exceedances. The Sable Island Air Station collected data for ozone, particulate matter with mean diameters less than or equal to 2.5 micrometres, nitrogen dioxide, and sulphur dioxide.

5.1.3 *Water Quality*

Water temperatures on the Scotian Shelf and in the Gulf of Maine are among the most variable in the North Atlantic. Based on data collected by the Atlantic Zone Off-Shelf Monitoring Program in May 2010, surface temperatures on the Scotian Slope along the sampling line were as high as 20 degrees Celsius, while temperatures found in deeper waters ranged from about 4 degrees Celsius at 1500 metres to 2.5 degrees Celsius at 3000 metres. Temperatures as low as minus 2 degrees Celsius were measured at depths greater than 4500 metres.

Salinity is an important characteristic of seawater and influences the presence of marine life. A salinity profile taken during May 2010 depicts salinity decreasing with depth (and temperature), with values above 36 practical salinity units near the surface and approximately 35 practical salinity units in the water depths at which drilling is proposed.

Measured pH (acidity or alkalinity) values in surface waters on the Scotian Shelf ranged from 8.05 to 8.11, with intermediate and bottom waters ranging from 7.89 to 8.03 based on data reported in the *Deep Panuke Project Comprehensive Study Report* (Encana 2002). Data collected in 2015 on the Scotian Shelf indicates pH surface values range from 7.8 in April and increase to greater than 8.0 in September with subsurface pH values remaining approximately 7.6 throughout the region. It is expected that pH values in the project area and local assessment area would be comparable to those referenced for the Scotian Shelf.

The *Deep Panuke Project Comprehensive Study Report* found a paucity of data on suspended particulate matter in the region, referencing data collected in 1970 on Emerald Bank. These data indicated a concentration of 5.5 milligrams per litre at the surface, increasing to 10.1 milligrams per litre at 20 metres and then decreasing to 4.0 milligrams per litre below this depth. Suspended particulate matter concentrations in the project area are expected to be lower than those measured in the shallower waters on Emerald Bank.

5.1.4 *Acoustic Environment*

Underwater noise is an important factor when assessing effects on certain species, especially marine mammals that rely on sound to communicate, locate food, or detect threats. Sound transmits far better in water than in air. The ocean is a naturally noisy environment with ambient noise escalating as the wind and sea state rise. In addition, the Scotian Shelf is an active economic area with shipping, commercial fishing, oil and gas, defence, construction, marine research, and tourism that all contribute to the ambient noise. Although there has not

been a formal long-term program of monitoring ambient noise on the Scotian Shelf, several studies over the past 50 years, which have characterized its general ambient noise characteristics, show that there is considerable spatial and temporal variation in ambient noise levels. Wind and wave generated noise is generally higher than predicted for average sea states. Noise can be expected to be higher close to fixed developments and sites where there are various mechanical sources emitting noise concurrently.

5.2 Human Environment

The Project would be located between 230 and 370 kilometres southeast of Halifax and 48 kilometres from Sable Island National Park Reserve. Sable Island is the nearest permanent, seasonal or temporary residence to the project area except for workers inhabiting offshore platforms at the Sable Project and the Deep Panuke developments, both of which are near Sable Island. Drilling activities would occur at least 230 kilometres from rural and Indigenous communities along the Nova Scotia shore.

There is no permanent or semi-permanent human presence in the project area. There is transitory human presence on vessels operating in the area for various purposes, including oil and gas exploration and production, military operations, marine (commercial) traffic, tourism and recreation, and marine research.

A number of known unexploded ordnance (UXO) disposal sites are located off the coast of Nova Scotia. All of the known sites are located well outside of the project area. However, Halifax Harbour has been used as a military port for centuries and lost or discarded UXO could be present at various locations on the Scotian Shelf, including in association with shipwrecks. Through the UXO Legacy Sites Program, Defence Construction Canada and the Department of National Defence identify sites that may pose UXO risk as a result of past military activities. The proponent identified these locations along with recorded shipwrecks and non-explosive ocean disposal sites in the vicinity of the project area. As part of the exploratory drilling program, the proponent would conduct a survey in advance of drilling activities to effectively identify any potential seabed hazards (e.g. corals, subsea cables, explosive disposal sites, UXO, historical shipwrecks).

6 Predicted Effects on Valued Components

This chapter of the report focuses on the predicted effects of routine project operations. The effects of possible accidents and malfunctions are assessed in Section 7.1.

6.1 Fish and Fish Habitat

This section discusses the potential effects of routine project activities on fish and fish habitat. Potential routine effects on species at risk and associated critical habitat are discussed in this section and Section 6.4 Special Areas, respectively; these are also acknowledged in Section 6.5 Species at Risk. The effects of potential accidents and malfunctions are described in Section 7.1.

6.1.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

The environment in the project area is typical of the Scotian Shelf break and Scotian Slope, with many species of fish frequenting the area. Marine benthic, demersal, and pelagic fish species and habitat are present in and around the project area, local assessment area, and regional assessment area. Appendix E contains a list of fish species of commercial, recreational, or Indigenous value that the proponent identified as being most likely to occur in the regional assessment area, along with their conservation status, if applicable. There are 24 fish species at risk that may be present on the Scotian Shelf or Slope at various times of the year. The *Fisheries Act* definition of fish includes marine mammals and sea turtles; however, for this environmental assessment (EA) they were assessed separately (in Section 6.2) because the nature of the potential effects of exploration drilling on mammals and sea turtles differs from the potential effects on other fish, particularly the potential effects of underwater noise.

Fish eggs and larvae may be found in areas of the Scotian Shelf and Slope year-round. The Scotian Shelf supports an array of species larvae throughout the year with seasonal changes of species abundance. Species including Atlantic Cod, Roundnose Grenadier, and Skate may spawn year-round. Other species spawn for short periods over the course of a few months throughout the year, including Atlantic Mackerel and American Plaice (April-May), Flounder (May-October), and Wolffish (September-November).

The Haddock Nursery Closure area on Emerald and Western Bank, commonly referred to as the Haddock Box, is an important nursery area for the protection of juvenile haddock and is closed to the commercial groundfish fishery. The Haddock Box overlaps slightly with Exploration Licence 2431; approximately 153 hectares (or about 0.01%) of the Haddock Box lies within the project area. Although there are currently no restrictions on oil and gas activity in the Haddock Box, the proponent has committed that no project wells would be located within it.

Atlantic Salmon are expected to be transient, with individuals from the Outer Bay of Fundy, Inner Bay of Fundy, Nova Scotia Southern Upland, and Eastern Cape Breton populations potentially migrating through the project area between March and November. The proponent further noted that individuals from the Inner Bay of Fundy are not expected to occur in the project area due to limited migration, and that the migration route for individuals from the Eastern Cape Breton population is not likely to cross the project area.

The proponent based its description of benthic habitat in the project area on seismic survey data it collected in its Exploration Licences in 2014, data from visual observation and bottom sampling programs conducted in the early 2000s along the Scotian Slope by a consortium of offshore operators, and data collected in 2014 by Shell Canada Limited in support of its Shelburne Basin Venture Exploration Drilling Project. The proponent noted that survey results within the project area were characteristically consistent between sites along the Scotian Slope, and were also consistent with findings reported by Shell Canada Limited during their benthic surveys. It stated that this consistency provides supporting evidence to suggest that similar habitat may occur within the project area. The surveys reported brittle stars and burrowing anemones as the most commonly encountered species, with uncommon occurrences of corals such as sea whips, soft coral *Anthomastus* spp. and octocoral *Umbellula.* Overall, surveys showed low abundance and diversity of benthic fauna and did not reveal any regions with substantial coral development.

Predicted Effects

The proponent predicted that the presence and operation of the mobile offshore drilling unit, routine wastes, emissions, and discharges; vertical seismic profiling; supply and servicing operations and well abandonment all may affect fish and fish habitat in the project area and the local assessment area.

Risk of Mortality or Physical Injury to Fish

Fish within the local assessment area may be at increased risk of mortality or physical injury due to underwater noise emissions during certain project activities. The proponent conducted acoustic modelling to determine anticipated levels of exposure to underwater noise at the source and in the surrounding environment. It noted that establishing a single sound exposure criterion for marine fish to predict physical or behavioural changes is challenging given the variation in sound characteristics from different sources and differences in how sound affects different species. Exposure criteria must also account not only for the maximum acoustic energy released by a sound event, but also the duration of sound exposure. The proponent selected a peak exposure level of 206 dB re 1 µPa (decibels relative to a fixed reference pressure of 1 micropascal), based on work by the United States Fisheries Hydroacoustic Working Group. This peak exposure level is the threshold for potential mortality or injury of fish (weighing two grams or more) from an instantaneous sound exposure.

Vertical seismic profiling surveys are estimated to emit the most intense sounds associated with the Project, and would typically occur over a one-day period per well. Based on the acoustic modelling the proponent conducted, peak sound levels from vertical seismic profiling surveys are anticipated to be 248 dB re 1 µPa at one metre from the source. Sound levels could injure or kill fish (weighing two grams or more) located within approximately 140 metres of the well during vertical seismic profiling. Mortality of fish eggs, larvae or fry could occur in close proximity (i.e. within 5 metres) of the sound source, and fish eggs and larvae within 160 metres of the source may be injured. The majority of motile fish species are expected to avoid underwater noise at levels lower than those at which injury or mortality would occur and thereby avoid those effects. The proponent predicted that any injury or mortality would be negligible and within the range of natural variability.

The estimated peak sound level from the mobile offshore drilling unit was 208.7 dB dB re 1 µPa, which could injure or kill fish at very close range (i.e. within one to two metres). The proponent noted that fish are likely to be startled by mobile offshore drilling unit movement and activation of thrusters, and would likely avoid the area immediately around the thrusters before injury could occur.

To account for potential mortality or injury due to noise exposure over a 24 hour period, the proponent also compared acoustic model results to the United States Fisheries Hydroacoustic Working Group guidelines threshold of 187 dB re 1 μPa^2s^2 for a cumulative exposure level for fish two grams or heavier. Modelling conducted by the proponent showed that cumulative sound levels would decrease below a cumulative exposure level of 190 dB re 1 μPa^2s beyond a distance of two kilometres from the mobile offshore drilling unit and platform supply vessels, and a distance of 1.7 kilometres from the wellsite during vertical seismic profiling. Maximum values were based on cumulative sound exposures over a 24-hour period. The proponent noted that fish would likely not remain in the area for 24 hours, but would likely move away from the source and therefore experience lower cumulative sound exposure. It further noted recent studies suggest that the criterion for cumulative exposure level may be lower than the actual level at which hearing effects are observed. Overall, the proponent stated that the risk of mortality or injury from cumulative sound exposures would be low.

The proponent noted that any risk of mortality or injury to fish resulting from drill waste discharge would be primarily related to physical disturbance of benthic habitat. Accumulations of solids (i.e. approximately 10 millimetres thick or more) has been shown to cause smothering of benthic communities comprised of sedentary or slow moving species. Effects of smothering can include mortality, reduced growth of some species, reduced larval settlement, and a change in fauna composition. This is a concern while drilling the top section of the well, without a riser, during which drilling would be carried out using water-based drilling mud, and cuttings and adhered mud would be discharged directly to the sea floor, accumulating around the hole. After the riser is installed, synthetic-based drilling mud may be used for drilling deeper well sections. To meet the *Offshore Waste Treatment Guidelines*, cuttings produced while drilling with synthetic-based drilling muds would be treated to limit the amount of synthetic on cuttings adhered to a maximum of 6.9 percent by wetted weight, prior to marine discharge via a sub-sea pipe with a discharge point just below the sea surface. Synthetic-based drilling mud would be recycled for re-use as much as possible, and then taken ashore for disposal at an approved facility when it can no longer be reused.

Sediment dispersion modelling conducted for the Project predicted that for each well, approximately 0.54 hectares of the sea floor (i.e. an area extending up to 116 metres from the discharge point at the well) would experience drill waste deposition thicknesses of approximately 10 millimetres or greater. Thinner deposits (between 1 and 10 millimeters) were predicted to extend up to 563 metres from the discharge site and occupy a maximum area of 9.91 hectares per well.[3] The model considered locations representing two different water depths (2104 metres and 2790 metres). Deposition, dispersion, and thickness may vary slightly from well to well depending on specific well design and conditions of the receiving environment, particularly water current.

[2] The 187 dB threshold is sound exposure level (SEL) which is a measure of the total energy (pressure squared) and that takes into account duration of the signal. The energy is proportional to the squared pressure and the reference time for SELs is one second.

[3] The proponent predicted that overall, the dispersion of sediments associated with drill waste discharges would extend to approximately 1367 metres from the wellsite. The minimum deposition thickness represented by this distance is 0.1 millimetres, which was not identified as having the potential for adverse effects.

Change in Habitat Quality and Use

The proponent acknowledged that the dynamic positioning system (i.e. thrusters) aboard the mobile offshore drilling unit would generate underwater sound which may affect the underwater acoustic environment for fish. The proponent noted that studies have demonstrated that avoidance behaviour of fish from approaching vessels can vary by species, environmental conditions, and the physiological state of the fish. During the initial period of drilling, some fish species may avoid the area. A general behavioural response would be expected at sound levels of 156 to 161 dB re 1 µPa. Acoustic modelling conducted by the proponent predicted sound levels from the mobile offshore drilling unit and platform supply vessels to decrease to below this behavioural response threshold within approximately 400 metres. The proponent predicted that fish would become habituated to the sound, and avoidance and startle responses would cease.

As the vertical seismic profiling would generate more intense sound, the area of sound exposure above this behavioural response threshold was predicted to be larger, with peak sound levels decreasing to below 160 dB re 1 µPa at distances greater than 20 kilometres from the well site.[4] Avoidance behaviour in this case would be short term, as vertical seismic profiling surveys are typically conducted in a single one-day period per well.

The proponent acknowledged that lights from the mobile offshore drilling unit could cause physiological stress in fish, and noted that fish commonly react to artificial light by schooling and moving towards the light source. The proponent stated that sharp light contrasts created by over-water structures due to flaring during the day and artificial light at night could alter the feeding, schooling, predator avoidance, and migratory behaviours of fish.

Discharges into the marine environment would occur throughout the estimated 120-day duration of each well. Discharges would include:

- drilling waste (spent water-based drilling mud and untreated cuttings with water-based drilling mud adhered, and treated cuttings with synthetic-based drilling mud adhered); and
- liquid wastes, including:
    - bilge and deck drainage water;
    - grey and black water;
    - fluids used in the blow-out preventer;
    - cooling water;
    - ballast water;
    - fire control system test water; and

[4] The distance reported here represents the extent to which *peak* sound levels will exceed 160 dB re 1 µPa. The units used here are different from the 160 dB re 1 µPa *root-mean-square* sound pressure level threshold for sensory disturbance to marine mammals identified in Section 6.2. Sound pressure levels (SPLs) can be measured by their root-mean-square (RMS) pressure which indicates an average SPL over a given amount of time. SPLs can also be measured by their peak pressure (maximum wave amplitude) or peak to peak pressure (maximum negative to maximum positive amplitude). There can be large differences between these three measures. The RMS measure is considered generally more appropriate for measuring non-impulsive signals (e.g. thruster noise) and historically have also been used to characterize pulsed signals. Peak SPLs are commonly used for impulsive sounds (e.g. VSP) as they provide information related to the instantaneous intensity of a sound; however they do not account for the bandwidth or duration of the sound.

- well treatment and testing fluids, and produced water (if hydrocarbons are encountered and the well is tested).

Of the expected discharges from exploration drilling, drilling waste (drill cuttings and spent drilling fluid) constitutes the largest volume. For a typical well, the estimated volumes of drilling waste are given in Table 4.

Table 4 Estimated Volumes of Drilling Waste Discharges into the Marine Environment for a Typical Well

Type of Discharge	Discharges by Weight (tonnes)
Total cuttings discharged to sea while drilling	2406
Total water based muds discharged to sea while drilling	1314
Total batch discharge of water based muds to sea	2887
Total synthetic-based muds discharged to sea while drilling	328
Total drilling chemicals discharged to sea	1276
Note: Discharges of synthetic-based oil included within the synthetic-based mud discharge is 119 tonnes. Chemicals includes commercial solids (barite, bentonite, etc.) added to the mud system.	

Source: Stantec, 2016 (Appendix C)

Drill waste discharges would result in temporary elevated levels of total suspended solids, if finer sediment from drill cuttings becomes entrained in the water column; however, studies have predominantly focused on the effects of drill waste on marine benthos. The proponent stated that most field studies and environmental effects results have shown:

- no evidence of ecologically significant bioaccumulation of metals and petroleum hydrocarbons by marine organisms;
- no evidence of toxicity effects associated with water-based drilling fluid constituents;
- minimal or no short-term effects on zooplankton communities; and
- most effects on benthic macro- and mega-faunal communities restricted to approximately 500 metres from the well, and usually within a few hundred metres.

The proponent predicted that marine water quality would not be measurably changed by the Project, except in close proximity to a discharge point (e.g. in the order of tens of metres or less). Routine discharges may cause sensory disturbance and trigger behavioural responses (e.g. change in swimming patterns) in fish within the local assessment area.

Proposed Mitigation Measures, Monitoring and Follow-up

To minimize or avoid direct mortality or physical injury to fish, the proponent proposed to:

- Conduct a visual survey of the seafloor using a remotely operated vehicle with video capability, prior to drilling, to confirm the absence of sensitive environmental features, such as aggregations of habitat-forming corals, species at risk, or unidentified species. A survey team would be assembled to review the footage in

real-time, including at a minimum, a remotely operated vehicle operator, a shallow-hazards specialist and an independent marine scientist. If such features are identified during the survey, the proponent would move the wellsite to avoid affecting them if it is feasible to do so. If it is not feasible, the proponent would notify the Canada Nova Scotia Offshore Petroleum Board (CNSOPB) immediately to discuss an appropriate course of action. No drilling would occur before a decision is made by the CNSOPB, which would consult with other regulatory agencies (e.g. Fisheries and Oceans Canada) if they determine it is necessary. A report would be submitted to the CNSOPB within 48 hours of survey completion.

- Not locate any project wells within the Haddock Box.
- Select drilling chemicals in accordance with the *Offshore Chemical Selection Guidelines* that provide a framework for chemical selection to reduce potential for environmental effects. During planning of drilling activities, where feasible, lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements would be preferentially used. Where feasible, the chemical components of the drilling fluids would be those that have been rated as being as least hazardous under the *Offshore Chemical Notification Scheme* and as *Pose Little or No Risk* (PLONOR) by the Oslo and Paris Commission.
- Discharge synthetic-based drill mud and cuttings in accordance with the *Offshore Waste Treatment Guidelines*. Synthetic based mud and associated drill cuttings would only be discharged once the performance targets of 6.9 percent (by weight) retained synthetic on cuttings is met. The concentration of synthetic-based mud on cuttings would be monitored on the mobile offshore drilling unit for compliance with the performance target. In accordance with the *Offshore Waste Treatment Guidelines*, no excess or spent synthetic-based mud would be discharged to the sea. Spent or excess synthetic-based mud that cannot be re-used during drilling operations would be taken ashore for disposal.
- Plan and conduct vertical seismic profiling surveys in consideration of the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*, including:
    - Implementing a ramp-up procedure (i.e. gradually increasing seismic source elements over a period of approximately 30 minutes until the operating level is achieved) before any vertical seismic profiling survey begins.
    - Using the minimum amount of energy necessary during vertical seismic profiling surveys to achieve operational objectives; reducing energy at frequencies above those necessary for the purpose of the survey; and reducing proportion of energy that propagates horizontally.

The proponent also proposed additional measures to mitigate effects on fish habitat, including:

- Developing and implementing plans and procedures for the management of waste discharges and transfers.
- Adhering to the *Offshore Waste Treatment Guidelines* for all discharges from the mobile offshore drilling unit (i.e. drill cuttings, cement, produced water, deck drainage, ballast water, sewage, cooling water, blowout preventer fluids, and food waste) and, for platform supply vessels, to the *International Convention for the Prevention of Pollution from Ships* (MARPOL). Waste discharges that do not meet these standards would not be discharged to the ocean and would be brought to shore for disposal.
- Reducing lighting to the extent that worker safety and safe operations is not compromised. Reduction of light may include avoiding use of unnecessary lighting, shading, and directing lights towards the deck.

The proponent proposed a follow-up visual survey of the sea bottom around the well after drilling is complete to verify modeling predictions related to thickness and areal extent within the vicinity of the wellhead.

The proponent also proposed an acoustic monitoring program during the first phase of the drilling program to collect field measurements of underwater sound to verify the results of the acoustic modelling study carried out in support of the environmental impact statement (EIS) and to measure source levels generated by the mobile offshore drilling unit. The proponent stated that the data and technical specifications for the acoustic monitoring program would be selected to maximize the potential to collect marine mammal vocalisation and sound from the drilling unit. The program design would be finalized in consultation with the CNSOPB and other federal authorities, as appropriate, and would consider lessons learned from a similar sound source characterization program that was conducted for the recent Shelburne Basin Venture Exploration Drilling Project. The proponent committed to implementing additional mitigation measures as identified in Appendix B.

Predicted Residual Effects

The proponent predicted that the Project would cause a change in risk of mortality or physical injury resulting from underwater sound emissions or from smothering by discharged drill muds and cutting. After implementation of mitigation measures, the residual adverse effects were predicted to be low-magnitude and restricted primarily to the project area, but could extend into parts of the local assessment area during vertical seismic profiling surveys. The proponent predicted that the quantity of eggs and larvae that may be exposed to sound levels causing physical injury or mortality would be negligible relative to total amount present in the regional assessment area and well within the natural range of variability. The duration of effects would vary from short-term (e.g. vertical seismic profiling) to medium-term, continuous or regular events that would continue over the duration of the drilling period (e.g. operation of the mobile offshore drilling unit and platform supply vessels). The proponent predicted effects would be reversible. The effects may occur within a disturbed ecological and socio-economic context (associated with ongoing harvesting of fish species and underwater sound and waste discharge associated with marine shipping in the regional assessment area).

The proponent predicted that the Project would cause a change in habitat quality and use as a result of disturbance from light and sound emissions and changes to water and sediment quality. It predicted that residual adverse effects would be low in magnitude, occur within the project area or parts of the local assessment area, be of short to medium-term in duration, be reversible at the completion of the Project, and occur within a relatively undisturbed ecological and socio-economic context. The proponent later updated the predicted duration to “long-term” to reflect the possibility that effects of a well drilled near the end of the licence period could extend beyond the end of the Project, but still predicted that no permanent alteration to, or destruction of, fish habitat would occur due to routine project activities.

After the implementation of mitigation and environmental protection measures, the proponent predicted that the residual environmental effects of the Project on fish and fish habitat, including species at risk, would not likely be significant.

6.1.2 *Views Expressed*

Federal Authorities

Fisheries and Oceans Canada requested more information about the proponent’s proposed pre-drill seabed survey, including its ability to record the extent of benthic smothering predicted by the sediment dispersion model, the duration of the recolonization of drill muds and cuttings by benthic organisms, the proponent’s characterization of the potential occurrence of fish species, larvae and eggs in the project area, and underwater

sound generated by acoustic positioning. The proponent confirmed that the pre-drill seabed survey would cover a 500-metre radius from the well location and is expected to capture the full extent of benthic smothering. The proponent cited several studies to support its predictions related to recolonization in deep water over a period of five years or less and to support its view that the effects of synthetic-based mud and cuttings are usually less severe at greater water depths (i.e. 1000 metres or more), compared to recovery times for wells drilled in shallow water. It provided additional clarification on fish species, eggs, and larvae with low, medium and high potential to occur in the project area. The proponent required no change in its prediction of effects as a result of these clarifications. It also provided additional information on sound generated by acoustic positioning, concluding that this sound source would contribute to overall avoidance effects when in operation.

Fisheries and Oceans Canada advised the Agency that the proposed mitigation measures, monitoring commitments, and follow-up programs would adequately address the potential effects of the Project on fish and fish habitat.

Indigenous Peoples

Mi'gmawe'l Tplu'taqnn Incorporated and the Maliseet Nation in New Brunswick requested analysis of the Project's potential effects on fish species that they harvest or are culturally important, including Winter Skate, Gaspereau, American Eel, Atlantic Sturgeon, Atlantic Salmon, Atlantic Herring, Bluefin Tuna, Swordfish, and Silver Hake. The proponent provided additional information and analysis to support its predictions that the Project's effects on these species would be temporary, localized and reversible. It stated that, to be conservative, the effects assessment focused more on resident species, but transient species such as American Eel, Gaspereau, and Atlantic Salmon, which may migrate through the local assessment area, could experience changes in habitat quality, on a limited scale.

The Maliseet Nation in New Brunswick raised concerns about how the Project could affect the distribution, abundance, or quality of zooplankton in the local assessment area as a result of routine operations and how such effects could affect marine mammals and sea turtles that rely on zooplankton as food. The proponent predicted that the Project's effects on zooplankton would be negligible.

Public

The Agency did not receive any comments from the public related specifically to fish and fish habitat.

6.1.3 *Agency Analysis and Conclusion*

Analysis of Effects

The Project may kill or injure fish, or adversely affect the quality of fish habitat. Mortality or injury of fish may be caused by exposure to noise within one to two metres of the sound source during operation of the mobile offshore drilling unit, and over a distance of 140 metres from the wellsite during vertical seismic profiling surveys. Mortality of fish fry, eggs or larvae may occur within close range (i.e. within five metres) of vertical seismic profiling, with a potential range of injury extending approximately 160 metres from the source. Acoustic model predictions for a similar project, Shelburne Basin Venture Exploration Drilling Project, were verified by a follow-up acoustic characterization program, which found that the modeling was conservative; all measured values fell within the predicted maximums (JASCO, 2017).

Mortality or physical injury effects may also result from discharging drill wastes into the marine environment; at thicknesses of approximately 10 millimetres or more, benthic communities comprised of sedentary or slow moving species may be smothered and the sediment quality would be altered by nutrient enrichment and oxygen depletion; deposits in excess of approximately 10 millimetres were predicted to extend up to a maximum of 116 metres from each wellsite, and cover an area of about 0.54 hectares. Sediment deposition model predictions for a similar project, Shelburne Basin Venture Exploration Drilling Project, were verified by follow-up visual surveys using a remotely operated vehicle. Those surveys observed the majority of mud and cuttings within 50 to 100 metres of the wellsites (Stantec 2016, Stantec 2017). Research has shown that deposits less than 10 millimetres thick generally are not known to cause adverse effects. Changes to habitat quality resulting from disposal of drill muds and cuttings would extend to a larger area: sediment thicknesses at or above 1 millimetre would extend up to 563 metres from the discharge site and occupy a maximum areal extent of approximately 10 hectares per well. Overall, the benthic communities in the project area are expected to be low in abundance and diversity.

Habitat quality and use would also be altered by light and sound emissions in the water from vertical seismic profiling, the mobile offshore drilling unit and supply vessels; and a change in the chemical composition of sediment or water due to routine discharges. Underwater noise levels are anticipated to be in the range likely to cause avoidance behaviour up to 400 metres from the mobile offshore drilling unit and platform supply vessel, and approximately 20 kilometres from the wellsite during vertical seismic profiling surveys.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponent, expert federal advice from federal authorities, and comments from Indigenous groups, and identified the following key measures to mitigate the project's effects on fish and fish habitat:

- Prior to commencing drilling a well, undertake a video survey of the sea floor using a remotely-operated vehicle to confirm the absence of sensitive environmental features, such as aggregations of habitat-forming corals. A qualified independent marine scientist should be retained to provide advice in real time. If any sensitive environmental features are identified during the survey, move the wellsite to avoid them if feasible; if not feasible, notify the CNSOPB immediately to discuss an appropriate course of action. No drilling should occur before a decision is made by the CNSOPB, which may consult with other regulatory agencies (e.g. Fisheries and Oceans Canada).
- Select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines*. During planning of drilling activities, where feasible, lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements will be preferentially used. Where feasible the chemical components of the drilling fluids will be those that have been rated as being as least hazardous under the Offshore Chemical Notification Scheme and as Pose Little or No Risk (PLONOR) by the Oslo and Paris Commission.
- Ensure that all discharges from the mobile offshore drilling unit (i.e. drill cuttings, cement, produced water, deck drainage, ballast water, sewage, grey water (from showers, laundry, etc.), cooling water, blowout preventer fluids and food waste) meet the *Offshore Waste Treatment Guidelines*.

- Transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility.
- Ensure that all discharges from platform supply vessels meet or exceed the standards established in the *International Convention for the Prevention of Pollution from Ships* (MARPOL).
- Plan and conduct vertical seismic profiling activity in accordance with the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment,* including implementing a ramp-up procedure (i.e. gradually increasing seismic source energy over a period of approximately 30 minutes until the operating level is achieved) before any vertical seismic profiling operations begin and using only the minimum amount of energy necessary to achieve operational objectives.

Follow-up

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

- Provide the results of pre-drilling benthic video survey to the CNSOPB within 48 hours of commencing drilling.
- Monitor the concentration of synthetic-based mud on drill cuttings to verify compliance with the performance target specified in the *Offshore Waste Treatment Guidelines*. Report results to the CNSOPB.
- Collect sediment (drill waste) deposition information after drilling activities and prior to departing the location to determine the thickness and extent of drilling waste and to confirm modelling predictions. The survey coverage should be sufficient to verify the predicted extent of sediment deposition thickness that would cause smothering (9.6 millimetres). Report results to the CNSOPB.
- Verify predicted underwater noise levels with field measurements during the first phase of the drilling program. Provide the plan on how this would be conducted to the CNSOPB at least 30 days in advance of drilling, and the monitoring results within 90 days of well abandonment.

Agency Conclusion

The Agency predicts that the adverse residual environmental effects of the Project on fish and fish habitat would be low-magnitude, occur locally, and occur continuously or regularly during drilling operations, which could take place at any time of year up to the expiry of the Exploration Licences in 2022. Effects on fish and fish habitat would be reversible.

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

6.2 Marine Mammals and Sea Turtles

This section discusses the potential effects of routine project activities on marine mammals and sea turtles. Potential routine effects on species at risk and associated critical habitat are discussed in this section and in Section 6.4 Special Areas, respectively; these are also acknowledged in Section 6.5 Species at Risk. The effects of potential accidents and malfunctions are described in Section 7.1.

6.2.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

The Project would take place within the Scotian Slope offshore region, which supports a diverse array of marine mammals and sea turtles and contains important foraging areas and migratory routes for these species.

Three types of marine mammals are found on the Scotian Shelf and Slope: Mysticetes (toothless or baleen whales), Odontocetes (toothed whales), and Phocids (seals). Six species of Mysticetes and fifteen species of Odontocetes, including seven species at risk, are known to occur on the Scotian Shelf and Slope and could potentially be present in the project area. These seven species at risk include the Blue Whale, North Atlantic Right Whale, Northern Bottlenose Whale, Fin Whale, Harbour Porpoise, Killer Whale, and Sowerby's Beaked Whale. Critical Habitat has been identified within the Project regional assessment area for North Atlantic Right Whale in the Roseway Basin and the Northern Bottlenose Whale in the Gully Marine Protected Area, and Shortland and Haldimand Canyons.

Five seal species are known to forage year-round in the waters over the Scotian Shelf and Slope. Grey Seals and Harbour Seals are known to breed in the Nova Scotia offshore (Sable Island). None of the seal populations present offshore Nova Scotia are of conservation concern.

Four species of sea turtles migrate and forage on the Scotian Shelf and Slope and may occur within the project area, including two that are of conservation concern (Leatherback Sea Turtle and Loggerhead Sea Turtle). A complete list of marine mammal and sea turtle species that occur within the project area, their conservation status, and times of year when they are present in the regional assessment area, is provided in Appendix E.

Predicted Effects

Potential environmental effects of routine project operations on marine mammals and sea turtles include increased risk of mortality or physical injury due to auditory damage from underwater noise emissions during certain project activities and potential collisions with platform supply vessels. Noise from project activities would include noise from vertical seismic profiling operations, the mobile offshore drilling unit, platform supply vessels, helicopters, and well abandonment activities. Marine mammals and sea turtles may also be adversely affected by changes in habitat quality and use due to waste discharges and underwater noise emissions from the Project.

Change in Risk of Mortality or Physical Injury

Sound from vertical seismic profiling surveys, which is expected to be the most intense underwater sound generated by the Project, may affect hearing in marine mammals. Thresholds for auditory injury could be exceeded within 1.6 kilometres from the vertical seismic profiling sound source, based on the most conservative modeling. Noise from the mobile offshore drilling unit and platform supply vessels may reach levels that could cause injury as far as 470 metres from the source. The proponent stated that the assumption of harm would require a marine mammal or sea turtle to remain exposed continuously over a 24-hour period, which is unlikely to occur; marine mammals and sea turtles would be expected to avoid areas of intense underwater noise.

The proponent acknowledged that marine mammals and sea turtles could be injured or killed if struck by a platform supply vessel. Of the marine mammals and sea turtles that occur within the project area, Mysticetes were identified as being the most vulnerable to vessel collisions. In particular, North Atlantic Right Whales

(endangered under the *Species at Risk Act*) were identified as being especially vulnerable because they are slow moving and have a low profile in the water. The proponent stated that the planned two-to-three round trips per week between the onshore supply base and the mobile offshore drilling unit by platform supply vessels would only slightly increase vessel traffic in the regional assessment area. Platform supply vessels would be confined to the local assessment area for routine operations.

Changes in Habitat Quality and Use

The proponent predicted changes in habitat quality or use for marine mammals and sea turtles from activities associated with the mobile drilling unit, discharge of drill muds and cuttings, vertical seismic profiling operations, platform supply vessels, and helicopter operations, and well abandonment. These activities may affect the quality of the underwater acoustic environment for marine mammals. As well, well abandonment activities could alter benthic habitat by leaving the wellhead in place.

Marine mammals rely on their ability to hear and use underwater sounds to communicate, locate prey, avoid predators, and gather other information about their surroundings. “Masking” can occur when an anthropogenic noise is strong enough to impair detection of biologically important sound signals, echo-location clicks, and passive detection cues used to navigate and find prey. Behavioural disturbances may include deviation from migration routes, altered feeding patterns, avoidance behaviour, and temporary behavioural responses. The proponent noted that because most species use a range of frequencies to communicate, it would be unlikely that the full range would be masked for extended periods. It identified that Mysticetes vocalize primarily in the same frequency range as the sound emissions from mobile offshore drilling unit and platform supply vessels and therefore are susceptible to masking from those emissions.

Based on the most conservative modelling results for underwater sound from project activities provided by the proponent, the behavioural threshold published by the National Oceanic and Atmospheric Administration for marine mammals exposed to continuous underwater sound (120 dB re 1 µPa root-mean-square sound pressure level) could be exceeded up to 150 kilometres from the drilling unit during winter (when conditions are best for sound propagation) and approximately 50 kilometres during summer. The National Oceanic and Atmospheric Administration interim threshold for sensory disturbance from an impulsive sound source (160 dB re 1 µPa root-mean-square sound pressure level) would be exceeded up to 3.2 kilometres from the sound source during vertical seismic profiling surveys[5]. Some marine mammal species may be present in the regional assessment area year-round (e.g. Northern Bottlenose Whale). However, the proponent stated that most marine mammals are present only from spring to fall, and predominantly in the summer. Extreme behavioural responses such as the long-term displacement of a marine mammal or sea turtle from an area would likely occur at shorter distances.

The proponent also stated that routine discharge of wastes and emissions (e.g. drill waste) from project activities could result in a change in habitat quality or use for marine mammals and sea turtles, but that such discharges and emissions were not expected to be bio-accumulating or toxic to marine mammals or sea turtles.

[5] The Agency understands that noise from vertical seismic profiling surveys, when compared to noise from vessels such as mobile offshore drilling units, is created in a targeted manner into a drilled well and it does not propagate over a larger area such as it would for vessels.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent proposed the following mitigation measures to address potential effects on marine mammals and turtles:

- Ensure that measures are consistent with the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment, including but not limited to:
- establishing a 650-metre safety (observation) zone around the sound source of the vertical seismic profiling (the Statement of Canadian Practice recommends a 500-metre zone);
- gradually increasing sound intensity at the start-up of the vertical seismic profiling activity;
- shutting down the sound source if a marine mammal or sea turtle species listed on Schedule 1 of the *Species at Risk Act* (SARA), or other baleen whales (i.e. Mysticetes) or sea turtles are observed within the 650-metre safety zone during operations;
- developing and implementing prescribed procedures when active surveying ceases: operator shuts down all sources of energy or one source after completing a seismic survey activity; and
- using passive acoustic monitoring to detect vocalizing marine mammals during conditions of low visibility (e.g. fog and darkness). The technical specifications and operational deployment configuration of the passive acoustic monitoring system will be optimized within the bounds of operational and safety constraints in order to maximize the likelihood of detecting cetacean species anticipated being in the area.
- Require supply vessel and drilling unit contractors to have a maintenance management system to reduce excess noise.
- Require helicopters to fly at altitudes greater than 300 metres and to avoid a two-kilometre buffer around Sable Island, to avoid aggregations of breeding seals.
- Consult with Fisheries and Oceans Canada prior to project commencement regarding additional mitigation measures that would be appropriate during vertical seismic profiling that should be considered to avoid or reduce adverse effects of sound on cetacean species at risk.
- To reduce the likelihood of vessel collisions with marine mammals and sea turtles:
    - use established shipping lanes in proximity to shore;
    - limit the speed of supply vessels transiting to and from the project area to 12 knots (22 kilometres per hour);
    - carry out opportunistic visual monitoring during platform supply vessel transits and report any sightings to Fisheries and Oceans Canada;
    - reduce vessel speed in the event that a marine mammal or sea turtle is noted in proximity to the vessel; and
    - avoid critical habitat for the North Atlantic Right Whale and Northern Bottlenose Whale.
- Manage offshore waste discharges and emissions in accordance with relevant regulations, including the *Offshore Waste Treatment Guidelines* and the *International Convention for the Prevention of Pollution from Ships* (MARPOL).

Proposed follow-up measures include:

- assess in consultation with the appropriate authorities the potential for undertaking an acoustic monitoring program during the first phase of the drilling program to collect field measurements to verify predicted underwater sound levels. Identify objectives in collaboration with Fisheries and Oceans Canada and the CNSOPB and in consideration of lessons learned from the underwater sound monitoring program to be undertaken by Shell Canada Limited as part of the Shelburne Basin Venture Exploration Drilling Project in 2016;
- employ marine mammal observers to monitor and report on sightings of marine mammals and sea turtles during vertical seismic profiling surveys. Include visual observations and the use of passive acoustic monitoring to inform decisions related to mitigation actions required during vertical seismic profiling operations when baleen whales, sea turtles, or any marine mammal listed on Schedule 1 of SARA are detected within a minimum 650 m predetermined exclusion zone;
- in marine mammal observer duties, include watching for and identifying marine mammals and sea turtles; recording their numbers, distances, and behaviour relative to the vertical seismic profiling survey; initiating mitigation measures when appropriate (e.g. shutdown); and reporting results. Following the program, copies of the marine mammal and sea turtle observer reports would be provided to Fisheries and Oceans Canada and CNSOPB;
- provide passive acoustic monitoring data to Fisheries and Oceans Canada so that this information can be used to help inform understanding of marine mammals in the area;
- consult with Fisheries and Oceans Canada regarding relevant findings from the 2014 Canadian Science Advisory Secretariat review that examined mitigation and monitoring measures for seismic survey activities in and near habitat for cetacean species at risk; and
- in the event that a vessel collision with a marine mammal or sea turtle occurs, contact the Marine Animal Response Society or the Canadian Coast Guard to relay incident information.

Predicted Residual Effects

The proponent predicted that the effects of project-related underwater noise, waste discharges, and vessel collisions on marine mammals and sea turtles would be adverse, low-magnitude, occur within the regional assessment area (or local assessment area in the case of vessel collisions), and be reversible.

It predicted that, with the application of proposed mitigation and environmental protection measures, the residual environmental effects of the Project on marine mammals and sea turtles, including species at risk, are not likely to be significant.

6.2.2 *Views Expressed*

Federal Authorities

Fisheries and Oceans Canada raised concerns about the effects of underwater noise from vertical seismic profiling on marine mammals, and potential effects on the endangered Northern Bottlenose Whale, particularly in Logan Canyon at the eastern edge of the project area. Fisheries and Oceans Canada recommended that it be consulted during the development of the Marine Mammal Monitoring Plan to be implemented during vertical

seismic profiling surveys. The proponent committed to providing details of the vertical seismic profiling survey method in the Marine Mammal Monitoring Plan and to provide specific details on marine mammal observation and effects mitigation that would be employed during the survey. It also committed to adopt a pre-ramp-up watch of 60 minutes whenever survey activities are scheduled to occur in areas where beaked and other deep-diving whales, such as the Northern Bottlenose Whale, may be present.

Fisheries and Oceans Canada also raised concerns about the sound of helicopters potentially disturbing marine mammals. The proponent indicated that sound levels from helicopter overflights are not expected to reach thresholds to cause injury or mortality of marine mammals and sea turtles.

Fisheries and Oceans Canada indicated that additional mitigation measures for avoiding marine mammals and sea turtles should be considered, including maintaining a watch for nearby marine mammals during vessel transits. The proponent indicated that vessel crews on the platform supply vessels would carry out opportunistic visual monitoring during vessel transit and record and report any sightings to Fisheries and Oceans Canada. Fisheries and Oceans Canada advised that it was satisfied with this commitment. The proponent also committed to avoiding transiting designated critical habitat for all routine activities.

Fisheries and Oceans Canada advised the Agency that the proposed mitigation measures, monitoring commitments, and follow-up programs would adequately address the potential effects of the Project on marine mammals and sea turtles, including species at risk.

Public

There were no comments received from the public in relation to the project's potential effects on marine mammals and sea turtles.

Indigenous Peoples

Mi'gmawe'l Tplu'taqnn Incorporated expressed concern about the potential effects on individual whale species, in particular the endangered North Atlantic Right Whale, which is a culturally-significant species to the Mi'gmaq. There is concern that underwater sound may interfere with whale navigation and communication if it is in the same frequency ranges used by whales. The proponent assessed the potential effects of the Project on marine mammals, including the North Atlantic Right Whale, and predicted that the effects of drilling operations on marine mammals, taking into account its proposed mitigation measures, would not be significant. The proponent stated that baleen whales, including the North Atlantic Right Whale, vocalize primarily in lower frequencies, of which ambient levels may increase due to noise from the mobile offshore drilling unit and platform supply vessels, but noted studies indicating that this species will adjust its vocalizations in the presence of vessel sound. The proponent also noted that North Atlantic Right Whales are present primarily in the summer months when oceanographic conditions reduce the extent that sound travels, compared to in winter, and that conservative noise modeling indicates that noise levels that could cause effects would not reach Roseway Basin, where there is North Atlantic Right Whale Critical Habitat.

The Maliseet Nation in New Brunswick noted that some species, such as the North Atlantic Right Whale, forage on zooplankton (e.g. copepods); and that the proponent did not provide baseline data on the distribution of zooplankton inside the project area. The proponent indicated that a decrease in zooplankton availability could mean there would be less food available for foraging species. However, this effect would likely occur in a

localized area and be of short duration due to the high fecundity and short generation time of zooplankton, and ability of foraging species to seek food in other locations.

The Maliseet Nation in New Brunswick indicated that while extensive discussion was provided about marine mammals, underwater sounds, and the drilling noise expected, there was no direct comparison between expected frequencies of the drilling noise and overlap with marine mammal hearing ranges for the potentially-affected species. The proponent provided additional information and indicated that, given the wide range of frequencies expected from project activities and the wide hearing ranges for most species, most of the underwater sound generated by the Project would be audible to various species.

The Maliseet Nation in New Brunswick expressed concern about how the proponent plans to monitor potential sub-lethal or longer-term effects of vertical seismic profiling or drilling activities in the marine environment. While the proponent assessed potential sub-lethal effects such as behavioural changes or effects on habitat quality, it did not assess longer-term effects that could be linked to behavioural or habitat changes because it expects these to be negligible. The proponent predicted that the change in risk of mortality or physical injury as a result of vertical seismic profiling operations or drilling activities would be low-magnitude, restricted to the project area, and reversible. The proponent indicated that it would not be technically or economically feasible to undertake long-term monitoring or follow-up measures for this Project.

The Maliseet Nation in New Brunswick questioned the effectiveness of the proponent's proposed 650-metre observation zone for marine mammals and sea turtles listed on Schedule 1 of the *Species at Risk Act*, to be monitored during vertical seismic profiling operations. The proponent indicated that visual monitoring and passive acoustic monitoring during vertical seismic profiling activities are among the industry-standard measures that would be implemented to detect mammals and mitigate potential effects on them.

A summary of all issues raised by Indigenous peoples is presented in Appendix D.

6.2.3 *Agency Analysis and Conclusion*

Analysis of Effects

The Project may adversely affect marine mammals and sea turtles, including species at risk. The proponent's commitment to implement measures consistent with the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* when conducting vertical seismic profiling reflects current best practice of how to best mitigate the effects of seismic sound. Fisheries and Oceans Canada would be involved in the design of the Marine Mammal Monitoring Plan to help the proponent implement effective measures to avoid or reduce effects of underwater noise on marine mammals during vertical seismic profiling surveys. Passive acoustic monitoring would be utilized in addition to visual monitoring.

The Agency is aware that noise from the mobile offshore drilling unit could result in noise exceeding the National Oceanic and Atmospheric Administration's behaviour thresholds for marine mammals (120 dB re 1 µPa root-mean-square sound pressure level) to a distance of greater than 150 kilometers in the winter and 50 kilometers in the summer based on the most conservative (in the context of the location of the mobile offshore drilling unit) modelling results. Some species of marine mammals and sea turtles are present year-round, while others are present in higher abundance during summer and fall. The proponent committed to requiring supply vessel and drilling unit contractors to have a maintenance management system to reduce excess noise.

Nonetheless, it would be important that the proponent verify predicted underwater sounds levels through its acoustic monitoring program and provide results to Fisheries and Oceans Canada, which has expertise on marine mammals and responsibility for applicable species at risk. Additional discussion of potential noise effects, including additional mitigation and monitoring requirements related to effects of noise, are discussed in Section 6.4 Special Areas.

Following submission of EIS, there were a number of North Atlantic Right Whale deaths in the Gulf of St. Lawrence. The incident report suggested trauma from vessel collisions as one of the causes. At the time of this writing no incidents have been reported on the Scotian Shelf. The slight increase in shipping traffic due to the Project is unlikely to substantially increase the probability of collisions. The proponent has committed to limit the speed of platform supply vessels to 12 knots and to further reduce speed in the event that a marine mammal or sea turtle is observed near the vessel. The proponent did not specify a reduced speed when mammals are present. However, the Agency is aware that a 10-knot speed limit has been imposed on vessels 20 metres or longer traveling in the western Gulf of St. Lawrence. The Agency also notes that the Notices to Mariners annual edition 2017 (https://www.notmar.gc.ca/publications/annual-annuel/annual-notices-to-mariners-eng.pdf), Section A2 (Marine Mammal Guidelines and Marine Protected Areas 5 *General Guidelines for Aquatic Species at Risk and Important Mammal Areas* in the Vicinity of Marine Mammals) recommends that vessel speed be reduced to 7 knots (approximately 13 kilometres per hour) when within 400 metres of the nearest marine mammal. The Agency recommends that the proponent reduce vessel speed to 10 knots when operating in the project area and to 7 knots when a whale or sea turtle is observed or reported within 400 meters of a vessel.

The proponent would be required to determine whether modified or additional mitigation measures are required based on the results of its monitoring programs, including those listed above. Additional mitigation could be also be prescribed by Fisheries and Oceans Canada 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 the mitigation measures proposed by the proponent, expert federal advice from federal authorities, and comments from Indigenous groups, and identified the following key measures to mitigate the project's effects on marine mammals and sea turtles:

- Conduct vertical seismic profiling surveys in accordance with or exceeding the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*, including:
    - establishing a safety (observation) zone of 650 metres around the sound source;
    - implementing cetacean detection technology such as passive acoustic monitoring, concurrent with visual observations;
    - gradually increasing the sound source intensity over a period of at least 30 minutes (ramp-up) and adopting a pre-ramp up watch of 60 minutes whenever survey activities are scheduled to occur in areas where beaked and other deep-diving whales may be present; and
    - shutting down the sound source upon observing or detecting an endangered or threatened marine mammal or sea turtle within the safety zone.

- Implement a Marine Mammal Monitoring Plan during vertical seismic profiling surveys which includes a marine mammal observer program using qualified individuals and passive acoustic monitoring to detect vocalizing marine mammals. The proponent shall:
    - submit the Marine Mammal Monitoring Plan including specific passive acoustic monitoring configuration to the CNSOPB for review 30-days prior to conducting the survey to enable verification that species that may occur within the safety zone can be detected and to ensure that operators can effectively monitor for all marine mammal vocalization frequencies that may occur within the project area.

  The Agency understands that Fisheries and Oceans Canada would be consulted by the proponent in developing the plan, including the specific passive acoustic monitoring configuration.

- To reduce risks of collisions with marine mammals and sea turtles, particularly North Atlantic Right Whales, the proponent shall, except during an emergency:
    - limit platform supply vessels movement to established shipping lanes where available (e.g. approaches to Halifax Harbour);
    - limit platform supply vessel speed to 12 knots (22 kilometres per hour), and to further reduce speed to 10 knots (19 kilometres per hour), when operating outside existing shipping lanes and within the project area, and to 7 knots (13 kilometres per hour) when a whale or sea turtle is observed or reported within 400 metres of the vessel;
    - avoid currently-identified critical habitat for the North Atlantic Right Whale (Roseway Basin) and Northern Bottlenose Whale (the Gully Marine Protected Area , Shortland and Haldimand Canyons) during transiting activities except as needed in case of an emergency. The Agency notes that normal routes between the onshore supply base and the project area would not pass near or through these special areas; and
    - require platform supply vessels to maintain a two-kilometre buffer around Sable Island.
- Helicopters are required to maintain a flying altitude of at least 300 metres except during landing and take-off, or except during an emergency.
- Helicopters are required to maintain a two-kilometre buffer around Sable Island except during an emergency. The Agency notes that normal routes between the onshore supply base and the project area would not pass near or through Sable Island.

Additional measures to mitigate potential effects on marine mammals are described in Section 6.2 Marine Mammals and Sea Turtles.

Follow-up

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

- record and report the results of the marine mammal observer program (including sea turtle observations) to the CNSOPB and Fisheries and Oceans Canada; and

- promptly report any collisions with marine mammals or sea turtles to the CNSOPB, the Canadian Coast Guard Environmental Emergencies Reporting Number (1 800 565-1633) and to the Marine Animal Rescue Society (MARS) (1-866-567-6277).

The recommended verification of predicted underwater noise levels identified as a follow-up measure for fish and fish habitat (Section 6.1.3) also applies for marine mammals and sea turtles.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on marine mammals and sea turtles would be low to moderate in magnitude, would occur in the local assessment area, could occur continuously or regularly during drilling operations (typically 120 days per well), and would be reversible.

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

6.3 Migratory Birds

This section discusses the potential effects of routine project activities on migratory birds. Potential routine effects on species at risk and associated critical habitat are discussed in this section and in Section 6.4 Special Areas, respectively; these are also acknowledged in Section 6.5 Species at Risk. The effects of potential accidents and malfunctions are described in Section 7.

6.3.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

The proponent reported that over 30 million seabirds use eastern Canadian waters each year. Large numbers of breeding marine birds and millions of migrating birds from the southern hemisphere and northeastern Atlantic can be found in Canadian waters throughout the year. During the fall and winter, significant numbers of overwintering alcids, gulls, and Northern Fulmars can be found in Atlantic Canadian waters. In the summer, species assemblages are dominated by shearwaters, storm-petrels, Northern Fulmars, and gulls. The proponent noted that the waters of the regional assessment area are known to support at least 19 pelagic seabird species, 14 neritic seabird species, 18 waterfowl species, and 22 shorebird species. More species occur in the area from time to time; these are sometimes referred to as vagrants or accidentals. While many of these species have a coastal affinity, they are not expected to regularly occur in the project area. The proponent identified nine bird species protected by the SARA that are known to occur on the Scotian Shelf and Slope and therefore may be present in the regional assessment area: Peregrine Falcon, Ivory Gull, Piping Plover, Roseate Tern, Red Knot, Harlequin Duck, Red-necked Phalarope, Savannah Sparrow (Ipswich subspecies), and Barrow's Goldeneye. Of these, all but Peregrine Falcon and Barrow's Goldeneye are also protected under the *Migratory Birds Convention Act*.

The proponent noted that during summer months, the coastline of the regional assessment area supports over a hundred colonies of nesting seabirds, ranging in size from a few individuals to thousands of breeding pairs. These colonies are known to support Atlantic Puffins, Black-legged Kittiwakes, Common Eiders, cormorants, Leach's Storm-Petrels, Great Black-back Gulls, Herring Gulls, Razorbills, and terns. Leach's Storm-Petrel is the

most numerous breeding seabird in the regional assessment area with the vast majority breeding on Bon Portage Island near Cape Sable Island.

Recovery strategies and management plans for migratory bird species at risk, including Ivory Gull, Barrow's Goldeneye, Harlequin Duck, and Piping Plover, have identified a potential threat from oil and gas contamination. There is critical habitat within the regional assessment area along the Nova Scotia coastline for both Piping Plover, and critical habitat on Sable Island and specific coastal islands off Nova Scotia (i.e. Country Island and South and North Brother Islands) for Roseate Tern.

Appendix E contains a list of the migratory birds in the regional assessment area and their conservation status.

The proponent identified the thirteen Important Bird Areas along the coast of Nova Scotia, at the edge of the regional assessment area, that have been designated using international criteria under the Important Bird Areas Program, an international conservation initiative coordinated by BirdLife International. It also identified Sable Island as an Important Bird Area. These are summarized in Table 5. They are important for a variety of reasons including the presence of breeding habitat for species at risk, important shorebird migration habitat, important coastal waterfowl habitat, or the occurrence of regionally significant marine bird colonies.

Table 5 Important Bird Areas within the Regional Assessment Area

Name	Status	Bird Species	Description	Distance from project area (approximate)
Sable Island	Globally Significant; Nationally Significant: Threatened Species, Restricted Range Species	Ispwich Savannah Sparrow (ssp. princeps), Herring Gull, Great Black-backed Gull, Common Tern, Roseate Tern, Arctic Tern, Leach's Storm-Petrel, Least Sandpiper	Supports the Sable Island population of Ispwich Savannah Sparrow (*ssp. princeps*), Roseate Terns, and large numbers of nesting colonial waterbirds.	48 kilometres
Eastern Shore Islands	Globally Significant: Congregatory Species; Continentally Significant: Congregatory Species; Nationally Significant: Threatened Species, Waterfowl Concentrations	Common Eider (*spp. dresseri*), Harlequin Duck, White-winged, Black and Surf Scoter, Leach's Storm-Petrel	Supports breeding, and large fall and spring congregations of Common Eiders. Also represents an important overwintering habitat for Harlequin Ducks and other waterfowl.	185 kilometres
Country Island Complex	Globally Significant: Congregatory Species, Colonial Waterbirds/Seabird Concentrations; Nationally Significant: Threatened Species	Roseate Tern, Common Tern, Arctic Tern, Leach's Storm-Petrel	Supports an important nesting habitat for Roseate Terns and Common and Arctic Terns.	189 kilometres
Musquodoboit	Continentally Significant: Congregatory Species	Canada Goose, American Black Duck, Piping Plover	Supports migration and overwintering habitat for large congregations of geese, and breeding grounds for Piping Plovers.	200 kilometres
Basque Island and Michaud Point	Globally Significant: Congregatory Species	Great Cormorant, Common Eider, Canada Goose and a variety of shorebirds (Semi-palmated, Spotted and Least Sandpiper, Willets and Common Snipe).	Basque Island supports large congregations of Great Cormorants. Point Michaud supports a variety of shorebirds and provides nesting habitat for Common Eiders. The vicinity of Point	230 kilometres

Name	Status	Bird Species	Description	Distance from project area (approximate)
			Michaud supports migration habitat for geese and other waterfowl.	
Grassy Island Complex	Nationally Significant: Threatened Species, Congregatory Species	Roseate Tern	Complex of three islands regularly support Roseate Terns.	237 kilometres
South Shore (East Queens County Sector)	Globally Significant: Congregatory Species, Nationally Significant: Threatened Species, Congregatory Species	Piping Plover, Semi-palmated Plover and other shorebirds, Harlequin Duck.	Supports nesting Piping Plovers, important shorebird migration habitat, occasional overwintering grounds for Harlequin Ducks.	245 kilometres
Rocks off Fourchu Head	Globally Significant: Congregatory Species	Great Cormorant	Supports large congregations of Great Cormorants.	247 kilometres
South Shore (Port Joli Sector)	Continentally Significant: Congregatory Species, Nationally Significant: Threatened Species	Piping Plover, Harlequin Duck, Canada Goose, American Black Duck, Common Goldeneye, Common Loon, Common Eider, Black-bellied Plover, Semi-palmated Sandpiper, Willet, Least Sandpiper, Pectoral Sandpiper.	Supports nesting Piping Plovers, important shorebird migration habitat, overwintering grounds for Harlequin Ducks and other waterfowl.	258 kilometres
South Shore (Roseway to Baccaro)	Nationally Significant: Threatened Species, Congregatory Species	Piping Plover, scoters, eiders, American Black Duck.	Includes four Piping Plover beaches and provides important habitat for migrating waterfowl.	293 kilometres
Eastern Cape Sable Island	Globally Significant: Congregatory Species, Shorebird Concentrations; Nationally Significant: Threatened Species, Congregatory Species	Piping Plover, Semi-palmated Sandpiper, Short-billed Dowitcher, Black-bellied Plover, Sanderlings, Ruddy Turnstone, Least Sandpiper, White-rumped Sandpiper,	Nesting Piping Plover and important migratory habitat for a diversity of avifauna.	311 kilometres

Name	Status	Bird Species	Description	Distance from project area (approximate)
		Greater Yellowleg, Willet, Black-bellied Plover, Sanderling, Red Knot, American Oystercatcher, Brant, Short-eared Owl, as well as loons, herons, egrets, cormorants, seaducks, bay ducks, alcids, pelagic species, warblers, vireos, tanagers and sparrows.		
South Shore (Barrington Bay Sector)	Nationally Significant: Threatened Species, Congregatory Species	Piping Plover, sea ducks and shorebirds	Supports an important number of Piping Plovers and important migratory habitat	312 kilometres
Bon Portage Island	Globally Significant: Congregatory Species, Colonial Waterbirds/Seabird Concentrations	Leach's Storm-Petrel, Great Blue Heron, Black-crowned Night Heron, Snowy Egret	Supports the largest known Leach's Storm-Petrel colony in the Maritimes and a mixed species heronry. A monitoring station for migrating birds is also established on the island.	325 kilometres
The Brothers	Globally Significant: Congregatory Species; Nationally Significant: Threatened Species	Roseate Tern, Arctic Tern, Common Tern	Supports approximately half of the Canadian Roseate Tern population.	333 kilometres

Predicted Effects

The proponent predicted that migratory birds may experience increased risk of mortality or physical injury, or change in habitat quality or use during routine project activities.

Change in Risk of Mortality or Physical Injury

The proponent stated that the presence and operation of the mobile offshore drilling unit, platform supply vessels, and helicopters have the greatest potential to result in changes to the risk of mortality or physical injury for migratory birds because birds are known to aggregate around these components and activities. Birds may be attracted by vessel lighting or other visual cues, such as flares, as well as by sanitary, domestic, and food waste. Other sources of injury may result from exposure to residual hydrocarbons associated with drill muds and cuttings, other discharges and emissions, and through exposure to underwater sound (diving birds) from vertical seismic profiling operations.

The proponent stated that migratory birds that are attracted to offshore installations may experience mortality through direct collision with the drilling unit or may be disoriented by lights and become stranded. Flaring from the drilling unit during testing, if conducted, may attract migratory birds and increase risk of mortality. Seabirds may be attracted to and circle flares for days, eventually dying of starvation. The proponent identified a number of factors that could influence the potential severity of marine bird interactions with flares, including the time of year, location, height, light, cross-sectional areas of the obstacle, and weather conditions. The proponent stated that the attraction from artificial lights on drilling vessels and flares can vary based on meteorological conditions (e.g. rain, visibility), season, age of the birds, lunar phase, and light composition (e.g. wavelength, intensity). For exploration drilling, flaring may occur during the well testing phase as part of flow test activities or for operational purposes, such as flushing or bleeding activities. Flaring for operational purposes is anticipated to be carried out over a one- to six-hour period, while flaring for well flow testing, if conducted, could last up to two or three days.

The proponent stated that drill cuttings associated with synthetic-based muds may cause small sheens to form under calm conditions. Birds that land in or otherwise come into contact with a sheen may have their thermal insulation compromised, possibly leading to hypothermia and death. The proponent noted that the potential for sheen formation would be low for wastes discharged in accordance with the *Offshore Waste Treatment Guidelines* and due to the fact that discharges of synthetic-based muds occurs below the water surface. It further noted that any oily sheen that arises from discharges of synthetic-based muds would be temporary and limited to the immediate area.

Deck drainage and bilge water may contain the presence of residual hydrocarbons, however the proponent stated that, after treatment, these residual hydrocarbons are generally not present in sufficient concentration to cause sheens to form and therefore would be unlikely to cause a measurable effect on migratory birds.

The proponent stated that marine birds react to low-level helicopter flights; helicopter flights at 300 metres altitude failed to elicit responses while flights at 100 metres altitude resulted in short-term avoidance responses. The proponent stated that large nesting colonies can be affected by helicopter transportation; aircraft passing over nesting colonies can cause birds to panic, leave their eggs and young unprotected from predators and inclement weather, and deplete their energy reserves. The proponent noted that there are no such colonies

along its anticipated helicopter route and therefore characterized this as a multiple irregular event that may occur during inclement weather, when pilots may need to alter their route to avoid unsafe flying conditions, or other unplanned events that require helicopters to deviate from their anticipated flight paths during breeding season for colonial waterbirds.

Change in Habitat Quality or Use

The proponent stated that underwater and atmospheric noise from the mobile offshore drilling unit may provoke behavioural responses such as temporary habitat avoidance. The proponent noted that due to the drilling unit being stationary at the drilling location, the spatial extent of changes to habitat quality for migratory birds would be limited to the immediate area.

The proponent noted that the discharge point for cuttings produced while drilling with synthetic-based muds would be below the sea surface and therefore not interact with surface waters. As well, the proponent committed to treating synthetic-based mud drill cuttings in accordance with the *Offshore Waste Treatment Guidelines* prior to discharge. The proponent stated that the discharge of synthetic-based muds adhered to treated cuttings would result in temporary elevated levels of total suspended solids in the upper water column, which could result in temporary avoidance of a localized area by migratory birds.

The proponent observed that there are few data on the effects of underwater sound on marine birds and the studies that have been done regarding seismic testing have observed little behavioural effect. Information on the underwater hearing abilities of birds is also lacking.

The proponent stated that platform supply vessels may disturb bird colonies; however, the only colonies in the vicinity of travel routes are located in Halifax Harbour, where there is already a significant amount of existing shipping activity. The proponent stated that platform supply vessels would not come close to any critical habitat for marine birds or important bird areas, the closest being Sable Island at 48 kilometres from the project area.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent proposed measures to mitigate effects on birds, including:

- reduce lighting on the drilling unit and platform supply vessels through avoidance of unnecessary lighting, shading, and directing lights toward the deck;
- in the event that flaring is required, consider the use of a water curtain for heat suppression from the gas flare and oil burner;
- select drilling chemicals in accordance with *Offshore Chemical Selection Guidelines* to reduce the potential for environmental effects;
- manage all discharges and emissions from the mobile offshore drilling unit (i.e. drill cuttings, cement, produced water, deck drainage, ballast water, sewage, cooling water, blowout preventer fluids, and food waste) in accordance with the *Offshore Waste Treatment Guidelines*;
- manage all discharges from platform supply vessels in accordance with the *International Convention for the Prevention of Pollution from Ships* (MARPOL);

- waste discharges that do not meet the *Offshore Waste Treatment Guidelines* or MARPOL standards would not be discharged into the ocean; they would be brought to shore for disposal;
- undertake a gradual ramp-up of sound levels by the drilling unit to reduce the potential for auditory injury to migratory birds;
- ensure that platform supply vessels follow established shipping lanes in proximity to shore. During transit to and from the project area, vessels speeds would not exceed 22 kilometres per hour (12 knots) except as needed in case of an emergency. Platform supply vessels would also maintain a 2-kilometre avoidance buffer around active bird colonies and Sable Island; and
- restrict helicopter transits to altitudes greater than 300 metres with the exception of approach and landing activities and at a lateral distance of two kilometres from active bird colonies and Sable Island.

Proposed follow-up measures include:

- provide plans for well testing, including planned flaring, to the CNSOPB for approval prior to testing. Report any flaring activity to the CNSOPB.
- conduct routine checks for stranded birds on the mobile offshore drilling unit. Appropriate procedures for release would be implemented. These activities would comply with applicable requirements for documenting and reporting any stranded birds or bird mortalities to Environment and Climate Change Canada during the drilling program.

Predicted Residual Effects

The proponent predicted that:

- the effects of flaring and artificial lighting on migratory birds would be adverse, of low to moderate magnitude, restricted to the project area, continuous throughout the Project, medium-term in duration, and reversible;
- the effects of supply and servicing (e.g. helicopters and platform supply vessels) would be adverse, low in magnitude, occur within the local assessment area, occur more than once at regular intervals, medium-term in duration, and reversible;
- the effects of vertical seismic profiling operations would be adverse, low in magnitude, restricted to the project area, occur more than once at irregular intervals, short-term in duration, and reversible;
- the effects of waste discharges on migratory birds would be adverse, of negligible magnitude, restricted to the project area, occur more than once at regular intervals, of medium-term duration, and reversible; and
- the effects of the presence and operation of the drilling unit would be low-magnitude, restricted to the project area, continuous throughout the Project, of medium-term duration, and reversible.

The proponent predicted that, with the application of the proposed mitigation measures, the residual environmental effects of routine project activities on migratory birds, including species at risk, are not likely to be significant.

6.3.2 *Views Expressed*

Federal Authorities

Environment and Climate Change Canada challenged the proponent's conclusion that stranded bird data from the Sable Offshore Energy Project (Sable Project) and the Deep Panuke Environmental Effects Monitoring programs has shown little to no effect of flaring on birds transiting to and from Sable Island or the Scotian Slope. It stated that the conclusion is not well supported by those data because they were not collected to test for effects of flaring on birds. Environment and Climate Change Canada noted that recent unpublished data indicate that many of the largest colonies are showing substantial population declines, and that recent studies tracking foraging patterns of Leach's Storm-Petrels from breeding colonies in Nova Scotia and Newfoundland are showing foraging areas overlapping with current oil and gas production areas. The proponent noted that although data were collected only opportunistically during those effects monitoring programs, results did not indicate a high degree of bird mortality caused by those projects. It acknowledged that there is uncertainty regarding the effects of flaring in the offshore environment of the Scotian Shelf on migratory birds, and that there are concerns regarding the populations of some pelagic species such as Leach's Storm-Petrels; consequently the proponent revised its degree of confidence in its effects prediction from "high" to "moderate". It also noted that bird stranding data from the recent Shelburne Basin Venture Offshore Exploration Project that, while not specific to flaring (no flaring was conducted for that project), indicated relatively low numbers of birds affected.

Environment and Climate Change Canada requested that certain species that have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) be considered in the EA, specifically Buff-breasted Sandpiper (SARA-listed, Special Concern), Bank Swallow (COSEWIC, Threatened), Eastern Lilaeopsis (SARA-listed, Special Concern), Sable Island Sweat Bee (COSEWIC, Threatened), and Eastern Baccharis (COSEWIC, Threatened). The proponent assessed effects on these species, as well as the Horned Grebe. The proponent indicated that residual environmental effects described for migratory birds remain unchanged with consideration of Buff-breasted Sandpiper, Bank Swallow, and Horned Grebe. Because of the coastal distribution of these species, they are unlikely to interact with routine project operations in the offshore environment. Similarly, routine project operations are not expected to interact with Sable Island Sweat Bee, Eastern Lilaeopsis, or Eastern Baccharis.

Environment and Climate Change Canada also identified two Globally Endangered (International Union for Conservation of Nature (IUCN) Red List) seabird species, the Bermuda Petrel and Black-capped Petrel, both protected under the *Migratory Birds Convention Act*, that have been observed in slope waters off Nova Scotia. Environment and Climate Change Canada indicated that both species have very small global population sizes and restricted ranges, and are extremely vulnerable. Neither the Bermuda Petrel nor the Black-capped Petrel have been listed under SARA or assessed by COSEWIC. The proponent indicated that although Canada is considered to be within the range of the Bermuda Petrel, there is considerable uncertainty regarding its status within the region. Data indicates that the Bermuda Petrel may forage in waters of the Scotian Shelf and Slope; however, data obtained from the Eastern Canada Seabirds at Sea (ECSAS) and Programme Intégré de recherches sur les oiseaux pélagiques (PIROP) does not include records for this species which suggests it occurs infrequently or in low numbers within the regional assessment area. Environment and Climate Change Canada noted that Black-capped Petrel has been reported in slope waters off Nova Scotia. The proponent stated that this species is not

expected to regularly occur in the regional assessment area, noting that the breeding and primary foraging range for Black-capped Petrel is restricted to more southern locations and the Project is unlikely to interact with an important proportion of this species' population.

Environment and Climate Change Canada advised the Agency that the proposed mitigation measures, monitoring commitments, and follow-up programs would adequately address the potential effects of the Project on migratory birds, including species at risk.

Indigenous Peoples

The Maliseet Nation in New Brunswick, in particular, identified bird species with IUCN at-risk designations that may occur in the regional assessment area, including the Bermuda Petrel and Black-capped Petrel (also identified by Environment and Climate Change Canada), and others including Zino's Petrel and Yelkouan Shearwater. The Agency required the proponent to consider these species in its assessment of effects. The proponent advised that these species have the potential to occur within the regional assessment area, but information from the IUCN indicates that their range is primarily outside of Canadian waters and most may be considered accidental transients to the region. The proponent's conclusions were unaffected by the addition of these species.

The Maliseet Nation in New Brunswick disagreed with the proponent's reliance on existing baseline data to assess effects on migratory birds, as opposed to gathering new data. The proponent stated that the data sets used are the largest ones available for information on offshore observation of seabirds associated with the Scotian Shelf and Slope, and that additional data would not likely affect its effects conclusions. The Maliseet Nation in New Brunswick asked for more information about the mitigation measures to be implemented on the drilling unit and platform supply vessels. The proponent provided an enhanced description of its mitigation measures.

Mi'gmawe'l Tplu'taqnn Incorporated expressed concern about sensory disturbance to migratory birds due to underwater noise and atmospheric sound from the drilling unit. The proponent stated that sound from the mobile offshore drilling would be at a continuous but less intense nature than from vertical seismic profiling activities. It maintained that noise from the drilling unit may result in effects to migratory birds such as temporary habitat avoidance or changes in feeding, resting, or travelling; however, that the mobile offshore drilling unit would remain on-site during drilling activities so the spatial extent of changes to habitat quality would be minimal. The proponent's literature review did not identify specific information on effects of sound from drilling units on migratory birds, and the proponent noted that seabirds are known to occur around and roost on offshore production platforms and therefore noise levels associated with the drilling unit are not expected to be a deterrent.

A summary of all issues raised by Indigenous peoples is presented in Appendix D.

Public

There were no public comments received concerning the effects of the Project on migratory birds.

6.3.3 *Agency Analysis and Conclusion*

Analysis of Effects

Bird collisions at lit and floodlit structures are a known problem, particularly for nocturnal migrants and night-flying seabirds such as storm-petrels. Attraction to lights may also result in collision with other birds. Disoriented birds are prone to circling a light source and may deplete their energy reserves and die of exhaustion, drop into the ocean and perish, or drop to the ground (or a hard surface) where they are at increased risk of predation.

Over the course of approximately eight months of exploration drilling in 2015 and 2016, for the Shelburne Basin Venture Exploration Drilling Project, located immediately west of the proposed Scotian Basin Exploration Drilling Project, Shell Canada Limited found 158 birds stranded on the mobile offshore drilling unit and platform supply vessels, including two individuals of species at risk: Least Bittern (found dead) and Peregrine Falcon (rehabilitated and released). It is likely that some birds were injured or died and were not found.

If flaring is conducted for the Project (i.e. hydrocarbons have been discovered in potentially commercial quantities and testing is required), it would pose a risk to birds for the duration of the flaring, which would likely be a maximum of two or three days, potentially on several occasions toward the end of drilling operations, per tested well. The proponent indicated that testing would likely not be conducted on either of the first two wells but assessed the possibility that it would. This is quite different from the situation on production platforms, where flaring may occur continuously.

Birds attracted to the mobile offshore drilling unit may be adversely affected, and individuals could die. The limited spatial and temporal nature of the drilling program and any well-testing activities such as flaring would limit the potential for extensive bird attraction. The project area occupies a very small portion of the natural ranges of migratory bird species, many of which span vast portions of the Atlantic Ocean. There is no critical habitat identified within the project area. Nevertheless, it is possible that a migratory bird species at risk could encounter and be harmed by the Project; therefore it is important for the proponent to implement mitigation and verify its predictions.

Discharge of treated synthetic-based muds may alter water quality (e.g. increased turbidity, or creation of oily sheens in calm conditions). The discharge location for cuttings produced with synthetic-based muds is below the water surface and most of the material would settle to the bottom, limiting effects on water quality to the immediate area of the discharge.

Helicopters and platform supply vessels may disrupt bird colonies within the local assessment area. However, the incremental increase in marine traffic in the local assessment area, which is already substantial, would likely not be sufficient to cause a significant effect. The Agency also recognizes that, in general, birds are considered to be a hazard to aviation and that areas of high bird presence may be avoided by helicopters when possible for safety reasons. The Agency notes that the nearest Important Bird Area is Sable Island, approximately 48 kilometres northeast of the project area and is not predicted to be affected by routine project activities.

Key Mitigation Measures to Avoid Significant Effects

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

- notify the CNSOPB at least 30 days in advance of planned flaring to identify whether it would occur during periods of bird vulnerability (identified in consultation with Environment and Climate Change Canada), and to identify any measures that are needed to prevent harm to migratory birds;
- restrict flaring to the minimum required to characterize the well's hydrocarbon potential and as necessary for the safety of the operation. This includes opportunities to reduce night-time flaring such as by starting flaring for shorter periods in the morning as opposed to at night;
- operate a water-curtain barrier around the flare during flaring; and
- restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) and to a lateral distance of two kilometres from active bird colonies and Sable Island. Platform supply vessels should also maintain a two-kilometre buffer from active colonies and Sable Island. These restrictions would not apply in emergency situations.

In addition, certain measures listed in Section 6.1 are also expected to mitigate potential effects on migratory birds.

Follow-up

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

- prepare a follow-up program, in consultation with relevant authorities, to monitor effects on migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures;
- document and report results of any monitoring carried out, including a discussion of whether the mitigation measures were proven effective and if additional measures are required.

Agency Conclusion

The Agency determined that the adverse residual environmental effects of the Project on migratory birds would be negligible to moderate in magnitude and localized. The effects would occur continuously or regularly during drilling operations, which could take place at any time of year until the expiry of the Exploration Licences in 2022, but would cease and be reversible upon well abandonment.

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

6.4 Special Areas

This section describes the potential effects of routine project activities on special areas. Potential routine effects on species at risk critical habitat are discussed in this section and are also acknowledged in Section 6.5 Species at Risk. The effects of potential accidents and malfunctions are described in Section 7.1.

6.4.1 *Proponent's Assessment of Environmental Effects*

The proponent's analysis of special areas includes:

- areas on the Scotian Shelf and Slope which have been recognized as being ecologically unique or sensitive and include a *National Parks Act* park, an *Oceans Act* Marine Protected Area, including candidate Marine Protected Areas;
- SARA Critical Habitat areas;
- *Fisheries Act* closure areas (e.g. significant spawning areas and coral conservation areas); and
- Ecologically and Biologically Significant Areas (EBSAs).

Special areas are important due to their ecological and socio-economic value, and stakeholder and regulatory interests. They are also often valued by the general public. Special areas may provide important habitat that is more vulnerable to project-related effects than other areas. Adverse environmental effects on a special area could degrade its ecological integrity such that it is not capable of providing the same biological or ecological function for which it was designated (e.g. protection of sensitive or commercially important species).

Existing Environment

Table 6 lists the special areas in the regional assessment area and their approximate distance from the project area.

Table 6 Proximity of Special Areas to the Project Area

Special area	Distance from project area
Scotian Slope/Shelf Break EBSA	Overlaps with project area and would be transited by platform supply vessels enroute between the on-shore supply base and the mobile offshore drilling unit.
Haddock Nursery Closure, Emerald and Western Bank (Haddock Box)	A small portion (about 0.01 percent of its total area) overlaps with project area and may be transited by platform supply vessels enroute between the on-shore supply base and the mobile offshore drilling unit. No project well locations will be located within the Haddock Box.
Sable Island National Park Reserve	48 kilometres
The Gully Marine Protected Area	71 kilometres
Northern Bottlenose Whale Critical Habitat: The Gully (also noted above), Shortland Canyon, Haldimand Canyon	81, 139 and 171 kilometres, respectively
Emerald Basin Sponge Conservation Area	126 kilometres
Juvenile Redfish Protection Area (Closed January 1 to June 30)	221 kilometres
Sambro Bank Sponge Conservation Area	130 kilometres. May be transited by platform supply vessels.
Lophelia Conservation Area	248 kilometres. May be transited by platform supply vessels.

Special area	Distance from project area
Lobster Fishing Area 40 (Georges Bank)	284 kilometres
North Atlantic Right Whale Critical Habitat / Area to be Avoided (Roseway Basin)	264 kilometres
St. Anns Bank Marine Protected Area	270 kilometres
Georges Bank Oil and Gas Moratorium Area	300 kilometres
Northeast Channel Coral Conservation Area	306 kilometres
Laurentian Channel (Area of Interest)	317 kilometres
Hell Hole (Northeast Channel)	336 kilometres
Seamount and Coral Protection Zone (No bottom-fishing zone)	455 kilometres
Canso Coastal Barrens Wilderness Area	197 kilometres
Bonnet Lake Barrens Wilderness Area	199 kilometres
Musquodoboit Harbour	203 kilometres
Terence Bay Wilderness Area	213 kilometres
Kejimkujik National Park (Seaside Adjunct)	260 kilometres
Duncan's Cove Nature Reserve	396 kilometres

The majority of special areas are located well outside the project area and are not expected to be affected by the Project during routine operations. The Scotian Slope/Shelf Break EBSA and the Haddock Box, given their overlap with the project area, and the Gully Marine Protected Area given it contains critical habitat for the endangered Northern Bottlenose Whale, were identified by the proponent as areas with the greatest potential to be affected by the Project.

- **Scotian Slope/Shelf Break EBSA**: This very large area (approximately 68,000 square kilometres) spans the length of the Scotian Slope and is recognized for its unique geology, high finfish and squid diversity, value as a migratory route for large pelagic fishes, cetaceans, and sea turtles, overwintering habitat for a number of shellfish (e.g. lobster) and finfish (e.g. Atlantic Halibut), foraging area for Leatherback Sea Turtles, feeding and overwintering area for seabirds, and habitat for Greenland Sharks. Approximately 87 percent of the project area falls within the Scotian Slope/Shelf Break EBSA. Conversely, the project area comprises approximately 17 percent of the Scotian Slope/Shelf Break EBSA. Critical habitat for the endangered Northern Bottlenose Whale and important habitat for many marine species is found within the Shortland and Haldimand Canyons, both located on the Scotian Slope.
- **The Haddock Box:** An important nursery area for the protection of juvenile haddock, the Haddock Box is closed year-round to commercial groundfish fisheries and no project wells will be located within it. Approximately 153 hectares of the Haddock Box (about 0.01 percent of its total area) lies within the project area.

- **The Gully Marine Protected Area:** The Gully Marine Protected Area contains critical habitat, referred to as "the Gully," for the endangered Northern Bottlenose Whale. The CNSOPB has not allowed petroleum activities in the Gully since 1998.

Predicted Effects

The project's potential effects on special areas would primarily be changes in the existing quality and use of natural habitats within them. Underwater noise emissions from drilling unit operation, vertical seismic profiling surveys, platform supply vessel operations, helicopter transportation, and well abandonment activities may temporarily reduce the quality of habitat in the portions of special areas encompassed by the local assessment area and result in sensory disturbance that triggers behavioural responses in marine species within these areas. Artificial lighting and other attractants associated with mobile offshore drilling unit operation, and the localized degradation of water and sediment quality as a result of routine operational discharges and emissions may similarly affect habitat quality and use within these areas. Discharged drill fluids and cuttings may smother marine benthos and cause changes to the composition of the benthic macrofauna community within a highly-localized area of the Scotian Slope and Shelf Break EBSA.

The proponent focused its analysis on the Scotian Slope/Shelf Break EBSA, the Haddock Box, and the Gully Marine Protected Area, but acknowledged that platform supply vessels could potentially cross the Emerald Basin Sponge Conservation Area, and to a lesser likely extent, the Sambro Bank Sponge Conservation Area. The proponent also acknowledged helicopter transportation is not predicted to affect seals that could be feeding, breeding or pupping on Sable Island given flights to and from the mobile offshore drilling unit would be short-term and regular, and except in the case of an emergency, helicopters would avoid flying over Sable Island. The proponent also indicated that helicopters would fly at altitudes greater than 300 meters at a lateral distance of 2 kilometres around active bird colonies when possible. It stated that helicopters would also avoid the critical habitat of marine mammals except as needed in an emergency.

The proponent recognized that there is critical habitat for the Roseate Tern on Sable Island (located approximately 48 kilometres away from the project area) and for the Piping Plover along the shores of Nova Scotia; however, effects from routine project activities are not predicted to interact with these areas. Similarly, no environmental effects are expected on the Roseway Basin, which is critical habitat for the endangered North Atlantic Right Whale. The Roseway Basin would be located approximately 264 kilometres northwest of the project area and would be avoided by vessels.

The proponent acknowledged that the Scotian Slope/Shelf Break EBSA (including critical habitat in Shortland Canyon but not the Haldimand Canyon due to distance), Haddock Box, and the Gully Marine Protected Area (including the Gully critical habitat), could potentially experience effects from the presence and operation of the mobile offshore drilling unit. Despite scientific reviews of the issues, the proponent acknowledged that uncertainty around acoustic disturbances and the effect on species using the Gully remains. However, to be conservative, it assumed that a change in habitat quality could potentially occur in the Gully Marine Protected Area and Shortland Canyon (located 81 kilometres and 139 kilometres respectively from the project area) during the winter season when sound propagates farther than in the summer months. Sound levels above 120 dB re 1 µPa RMS SPL (the interim threshold value for sensory disturbance to marine mammals identified by the National Oceanic and Atmospheric Administration) could extend to portions of Bottlenose Whale critical habitat.

However, the proponent indicated that this change would be temporary and is not predicted to result in permanent or irreversible loss of critical habitat.

The proponent indicated that based on the extent of predicted effects on marine mammals, and the distance of the project area to special areas, it is assumed that a change in habitat quality as a result of vertical seismic profiling operations would be restricted to the Scotian Slope EBSA. No other critical habitat is expected to be affected by vertical seismic profiling.

The proponent maintained that supply vessels would not come in close proximity to any critical habitat for marine birds and would follow established shipping lanes in proximity to shore. It also stated that discharges would have a negligible effect on water quality and species use of the Scotian Slope and Haddock Box but no critical habitat or other special areas are predicted to be affected by waste management.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent's proposed mitigation measures, monitoring and follow-up are described in the sections related to fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3).

Predicted Residual Effects

The proponent predicted that effects on special areas would be adverse, low to moderate in magnitude, restricted to the local assessment area, occur more than once at regular intervals, be short to medium term in duration, and be reversible. It further predicted that, overall, and with the application of proposed mitigation and environmental protection measures for the Project, the residual environmental effect of routine project activities on special areas is not likely to be significant.

6.4.2 *Views Expressed*

Federal Authorities

Fisheries and Oceans Canada indicated that two new Sensitive Benthic Areas were designated for protection in December 2016 under its *Policy for Managing the Impact of Fishing on Sensitive Benthic Areas*. These are Corsair and Georges Canyons Conservation Area (south of Georges Bank) and Jordan Basin Conservation Area (100 kilometres west of Yarmouth). Both of these areas are now closed to bottom-contact fishing and Fisheries and Oceans Canada is working with ocean users and other regulators to minimize bottom disturbances in these areas. The proponent indicated that given the distance from the project area (approximately 320 kilometres southwest for Corsair and Georges Canyons Conservation Area and approximately 440 kilometres northwest for Jordan Basin Conservation Area), routine project activities would not affect these special areas or their benthic communities.

Fisheries and Oceans Canada noted that underwater acoustic modelling completed for the Project predicted that sound from the mobile drilling unit during winter would exceed the National Oceanic and Atmospheric Administration's acoustic threshold for behavioural disruption of marine mammals within critical habitat of the Endangered Northern Bottlenose Whale. It stated that there is potential for adverse residual behavioural effects during winter because Northern Bottlenose Whales reside in critical habitat year-round and sound from drilling could persist over several months. Fisheries and Oceans Canada also noted that there is uncertainty about the

behavioural response of Northern Bottlenose Whales to drilling sound as well as uncertainty with respect to the interpretation of the modelling results in the real environment, making adverse behavioural effects unlikely. An environmental effects monitoring program would verify the accuracy of effects predictions.

Fisheries and Oceans Canada advised the Agency that the proposed mitigation measures, monitoring commitments, and follow-up programs would adequately address the potential effects of the Project on special areas that are important to marine fish species, including marine mammals and sea turtles, and their critical habitat.

Environment and Climate Change Canada advised the Agency that the proposed mitigation measures, monitoring commitments, and follow-up programs would adequately address the potential effects of the Project on special areas that are important to migratory birds, including their critical habitat.

Indigenous Peoples

The Agency did not receive any comments specific to special areas from Indigenous peoples.

Public

The Agency did not receive any comments specific to special areas from the public.

6.4.3 *Agency Analysis and Conclusion*

Analysis of Effects

The project area occupies 17 percent of the Scotian Slope and Shelf Break EBSA. The project area corresponds to the size of the Exploration Licences; the drilling area itself, where the mobile offshore drilling unit would be located, represents a very small portion of the Exploration Licence area. For example, the 500-metre radius safety zone, within which the majority of effects are predicted to occur, would imply a circle with an area of about 0.8 square kilometres. In comparison the Exploration Licences have a total area of approximately 14,000 square kilometres.

Designated critical habitat for Northern Bottlenose Whale, North Atlantic Right Whale, Piping Plover, and Roseate Tern occur within the regional assessment area, as well as areas of high productivity such as the Emerald Bank and Western Bank in the Haddock Box. The proponent however committed to not drilling within the Haddock Box. The Agency notes that due to the location of the project area, normal routes between the onshore supply base and the project area would not pass near or through these special areas. Routine project activities are not predicted to result in effects on the critical habitat of the North Atlantic Right Whale, Piping Plover, and Roseate Tern given distances from the project area.

Critical habitat for the Northern Bottlenose Whale in The Gully, Shortland Canyon, and Haldimand Canyon is located 81 kilometres, 139 kilometres, and 171 kilometres away from the Project. The Agency considered the potential for effects on the critical habitat of this species. Based on advice from Fisheries and Oceans Canada, the Agency understands that there are some uncertainties about the effects of noise from offshore activities on marine mammals and the accuracy of sound modeling. During summer months, modeling predicted that sound from the mobile offshore drilling unit would be above the threshold for behavioral disturbance for marine mammals extending up to approximately 50 kilometres from the project area. This is not predicted to overlap with critical habitat for any marine mammal. Modeling predicted that during winter months, sound from the

mobile offshore drilling unit would be above behavioral thresholds for marine mammals greater than 150 kilometers from the project area and, depending on well location, could potentially overlap with critical habitat for the Northern Bottlenose Whale.

It is understood that toothed whales, such as the Northern Bottlenose Whale, would likely be less susceptible to the effects of underwater noise from the mobile offshore drilling unit compared to baleen whales, which vocalize primarily in lower frequencies. If drilling activities occur in the summer months, when sound propagation is more limited, effects on the critical habitat of the Northern Bottlenose Whale are not predicted to occur. If wells are drilled during the winter (December 1 to March 30) such that there is a potential for effects in critical habitat for the Northern Bottlenose Whale, the proponent would be required to contact Fisheries and Oceans Canada to discuss additional environmental effects monitoring and the potential need for potential permitting requirements under SARA.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponent and expert advice from Fisheries and Oceans Canada. The Agency determined that the measures to mitigate impacts on fish and fish habitat (Section 6.1), marine mammals (Section 6.2), and migratory birds (Section 6.3) would also mitigate potential significant adverse effects on special areas.

Follow-up

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

- If Project operations are proposed from December 1 to March 30, consult Fisheries and Oceans Canada on additional monitoring of sound levels and environmental effects in Northern Bottlenose Whale critical habitat.

Agency Conclusion

The Agency concludes that the adverse residual environmental effects of the Project on special areas would be low occur within the local assessment area, and occur continuously or regularly during drilling operations, which could take place at any time of year until the expiry of the Exploration Licences in 2022. The effects on special areas would be reversible over the long-term.

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

6.5 Federal Species at Risk

Federal species at risk are those that are listed in Schedule 1 of the SARA as endangered, threatened, or of special concern. For SARA-listed threatened or endangered species, sub-section 79(2) of SARA requires the responsible authority for a federal EA, in this case the Agency, to identify the Project's adverse effects on listed wildlife species and their critical habitat. If the Project proceeds, SARA requires that preventative measures be taken in accordance with applicable recovery strategies and action plans to avoid or lessen effects, and to monitor them. For this EA, and as a matter of good practice, the Agency also considered species that have been identified by COSEWIC as being endangered, threatened or of special concern. Collectively, these are referred to as species at risk.

The proponent initially assessed effects on species at risk within their respective valued components. In response to the request for additional information; the proponent provided a stand-alone assessment of effects on species at risk. Potential effects of the Project on the critical habitat of key species were assessed by the proponent in its consideration of Special Areas.

This section of the Draft EA Report lists all species at risk that may be affected by the Project, but were assessed in previous sections of the report (i.e. Section 6.1 Fish and Fish Habitat, Section 6.2 Marine Mammals and Sea Turtles, Section 6.3 Migratory Birds). It also provides a summary of associated critical habitat, where this has been identified under SARA. Potential effects on critical habitat are described in Section 6.4 Special Areas. The potential effects of accidents and malfunctions (e.g. oil spill) are assessed in Section 7.1.

6.5.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

There are 60 species at risk that may occur in the regional assessment area, of which 29 are SARA-listed. Table 7 contains a list of these species, and Appendix E contains more information about them. The list is comprised of 28 fish, seven marine mammal, two sea turtle, and 20 bird species. Eighteen of these species have a recovery strategy or action plan that describes the potential threats to the species. Critical habitat has been designated within the regional assessment area for four species: North Atlantic Right Whale, Northern Bottlenose Whale, Roseate Tern, and Piping Plover. These critical habitat areas are identified in the analysis of effects on special areas (Section 6.4); the closest to the project area being Northern Bottlenose Whale critical habitat within the Gully Marine Protected Area, approximately 81 kilometres northeast of the project area.

Table 7 Species at Risk That May Occur in the Regional Assessment Area

Species	SARA Status (Schedule 1)	COSEWIC Assessment
Fish		
Acadian Redfish (*Sebastes fasciatus*)	Not listed	Threatened
American Eel (*Anguilla rostrata*)	Not listed	Threatened
American Plaice (*Hippoglossoides platessoides*)	Not listed	Threatened
Atlantic Bluefin Tuna (*Thunnus thynnus*)	Not listed	Endangered
Atlantic Cod (*Gadus morhua*) - Laurentian South and Southern populations	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) - Inner Bay of Fundy population	Endangered	Endangered
Atlantic Salmon (*Salmo salar*) - Outer Bay of Fundy population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) - Eastern Cape Breton population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) - Nova Scotia Southern Upland population	Not listed	Endangered
Atlantic Sturgeon (*Ancipenser sturio*) - Maritimes population	Not listed	Threatened
Atlantic (striped) Wolffish (*Anarhichas lupus*)	Special concern	Special concern
Basking Shark (*Cetorhinus maximus*) - Atlantic population	Not listed	Special concern

Species	SARA Status (Schedule 1)	COSEWIC Assessment
Blue Shark (*Prionace glauca*) – Atlantic population	Not listed	Special Concern
Cusk (*Brosme brosme*)	Not listed	Endangered
Deepwater Redfish (*Sebastes mentalla*) - Northern population	Not listed	Threatened
Northern Wolffish (*Anarhichas denticulatus*)	Threatened	Threatened
Porbeagle Shark (*Lamna nasus*)	Not listed	Endangered
Roughhead Grenadier (*Macrourus berglax*)	Not listed	Special concern
Roundnose Grenadier (*Coryphaenoides rupestris*)	Not listed	Endangered
Smooth Skate (*Malacoraja senta*) - Laurentian-Scotian population	Not listed	Special concern
Spiny Dogfish (*Squalus acanthias*) - Atlantic population	Not listed	Special concern
Spotted Wolffish (*Anarhichas minor)*	Threatened	Threatened
Shortfin Mako Shark (*Isurus oxyrinchus*)	Not listed	Threatened
Striped Bass (*Morone saxatilis*) - Southern Gulf of St. Lawrence population	Not listed	Special concern
Striped Bass (*Morone saxatilis*) - Bay of Fundy population	Not listed	Endangered
Thorny Skate (*Amblyraja radiate*)	Not listed	Special concern
White Hake (*Urophycis tenuis*)	Not listed	Special concern
White Shark (*Carcharodon carcharias*)	Endangered	Endangered
Marine mammals and sea turtles		
Blue Whale (*Balaenoptera musculus*) – Atlantic population	Endangered	Endangered
Fin Whale (*Balaenoptera physalus*) – Atlantic population	Special concern	Special concern
North Atlantic Right Whale (*Eubalaena glacialis*)	Endangered	Endangered
Harbour Porpoise (*Phocoena phocoena*) - Northwest Atlantic population	Not listed	Special concern
Killer Whale (*Orcinus orca*) - Northwest Atlantic/Eastern Arctic population	Not listed	Special concern
Northern Bottlenose Whale (*Hyperoodon ampullatus*) – Scotian Shelf population	Endangered	Endangered
Sowerby's Beaked Whale (*Mesoplodon bidens*)	Special concern	Special concern
Leatherback Sea Turtle (*Dermochelys coriacea*)	Endangered	Endangered
Loggerhead Sea Turtle (*Caretta caretta*)	Not listed	Endangered
Birds		
Barrows Goldeneye (*Bucephala islandica*)	Special concern	Special concern
Buff-breasted Sandpiper (*Tryngites subruficollis*	Special concern	Special concern
Canada Warbler (*Cardellina canadensis*)	Threatened	Threatened
Chimney Swift (*Chaetura pelagica*)	Threatened	Threatened
Common Nighthawk (*Chordeiles minor*)	Threatened	Threatened
Eastern Whip-poor-will (*Caprimulgus vociferous*)	Threatened	Threatened

Species	SARA Status (Schedule 1)	COSEWIC Assessment
Eastern Wood-pewee (*Contopus virens*)	Not listed	Special concern
Harlequin Duck (*Histrionicus histrionicus*)	Special concern	Special concern
Horned Grebe (*Podiceps auritus*)	Endangered	Endangered
Ivory Gull (*Pagophila eburnea*)	Endangered	Endangered
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Threatened
Peregrine Falcon (*Falco perigrinus anatum / tundrius*)	Special concern	Special concern
Piping Plover (*Charadrius melodus*)	Endangered	Endangered
Red Knot rufa ssp (*Calidris canutus rufa*)	Endangered	Endangered
Red-necked Phalarope (*Phalaropus lobatus*)	Not listed	Special concern
Roseate Tern (*Sterna dougallii*)	Endangered	Endangered
Rusty Blackbird (*Euphagus carolinus*)	Special concern	Special concern
Savannah Sparrow princeps subspecies (*Passerculus sandwichensis princeps*)	Special concern	Special concern
Short-eared Owl (*Asio flammeus*)	Special concern	Special concern
Wood Thrush (*Hylocichla mustelina*)	Not listed	Not listed

Predicted Effects

The proponent concluded that mitigation measures proposed for the fish and fish habitat, marine mammals and sea turtles, and migratory birds valued components would also protect species at risk.

Fish

There are 28 fish species or populations of conservation concern that may occur in the regional assessment area. Potential effects on these 28 fish species are predicted to be the same as for other fish species and include increased risk of mortality or physical injury and the change in habitat quality and use and are described in Section 6.1

Four species of fish have a recovery strategy, management plan or action plan: Atlantic, Northern and Spotted Wolffish, and Inner Bay of Fundy population of Atlantic Salmon. Critical habitat for marine fish species at risk does not exist within the regional assessment area.

Marine Mammals and Sea Turtles

The proponent identified seven whales and two sea turtles species at risk that may occur in the regional assessment area. Six of these have a recovery strategy, management plan, or action plan: Blue Whale, Fin Whale, North Atlantic Right Whale, Northern Bottlenose Whale, Sowerby's Beaked Whale, and Leatherback Sea Turtle. Potential effects on these mammals and turtles are predicted to be the same as those for other marine mammals and sea turtles and include increased risk of mortality and physical injury and a change in habitat quality and use. These effects are described in Section 6.2.

Critical habitat has been designated within the regional assessment area for both the North Atlantic Right Whale (Roseway Basin, approximately 260 kilometres away from the project area) and the Northern Bottlenose Whale

(The Gully and Haldimand and Shortland Canyons located 81, 139, and 171 kilometres from the project area respectively).

Routine project effects are not predicted to affect Right Whale critical habitat given its distance from the project area. Potential effects on critical habitat for the Northern Bottlenose Whale include change in habitat quality and use (i.e. sound emissions from the mobile offshore drilling unit) for the Gully and the Shortland Canyon. The proponent stated that these effects may occur during the winter months when sound propagates the greatest distance and sound levels above 120 dB re 1 µPa RMS SPL may extend to portions of Northern Bottlenose Whale critical habitat.

No critical habitat for any species of sea turtle has yet been defined under SARA; however, a draft Recovery Strategy for the Leatherback Sea Turtle Atlantic population identified three areas of critical habitat. The closest critical habitat in the draft recovery strategy to the project area is south and southeast of Georges Bank and extending to the southwest boundary of the Canadian exclusive economic zone on the southwestern Scotian Slope, more than 200 kilometres away from any potential disturbance effects.

Birds

There are 23 bird species at risk that may occur in the regional assessment area, including migratory and non-migratory species. Many of these are landbirds or have a high coastal affinity and would not be expected to occur commonly in the project area, although the proponent acknowledged that landbirds may occur in the marine environment during migration and can occur in coastal areas at any time of the year. Eleven of these 28 species have a recovery strategy or action plan. Potential effects on bird species at risk would be the same as for other bird species, and would include the risk of mortality and physical injury and a change in habitat quality and use as described in Section 6.3.

There is critical habitat within the regional assessment area for Roseate Tern on Sable Island, approximately 48 kilometres east of the project area and along specific coastal islands off Nova Scotia, the closest being 189 kilometres from the project area (i.e. Country Island). Piping Plover also has critical habitat located within the regional assessment area along the southern coastline of Nova Scotia. Although Sable Island is closer than some special areas, potential effects of routine project activities were not predicted to interact with the critical habitat of the Piping Plover or the Roseate Tern as the extent of potential effects from routine project activities are not predicted to interact with either of the species' critical habitat.

Proposed Mitigation Measures, Monitoring and Follow-Up

The proponent's proposed mitigation measures, monitoring and follow-up are described in the sections related to fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), and migratory birds (Section 6.3).

Predicted Residual Effects

Taking into account the implementation of the mitigation measures described in Sections 6.1, 6.2, and 6.3, the proponent concluded that the Project is not likely to cause significant adverse environmental effects on fish, marine mammal, sea turtle, and migratory bird species at risk. The proponent concluded that the Project is not likely to cause significant adverse environmental effects on special areas, described in Section 6.4, which includes areas of critical habitat of species at risk.

6.5.2 *Views Expressed*

Federal Authorities

Comments from Environment and Climate Change Canada and Fisheries and Oceans Canada related to fish and fish habitat, marine mammals and sea turtles, and migratory birds, including applicable species at risk and their critical habitat are described in Sections 6.1, 6.2 and 6.3 respectively.

Environment and Climate Change Canada reviewed the proponent's assessment of impacts of the Project on species at risk and critical habitat and confirmed that it satisfies requirements under section 79(2) of SARA. It further confirmed that the mitigation and monitoring measures proposed in the Draft EA Report are adequate.

Fisheries and Oceans Canada reviewed the proponent's assessment of impacts of the Project on species at risk and critical habitat and confirmed that it satisfies requirements under section 79(2) of SARA. It further confirmed that the mitigation and monitoring measures proposed in the Draft EA Report are adequate.

Indigenous Peoples

Comments from Indigenous participants related to marine fish, marine mammals and sea turtles, and migratory birds, including applicable species at risk, are described in Sections 6.1, 6.2, and 6.3. A summary of all issues raised by Indigenous peoples is presented in Appendix D.

Public

The Agency did not receive any comments from the public specific on species at risk or critical habitat.

6.5.3 *Agency Analysis and Conclusion*

Analysis of Effects

The Agency examined the project's potential effects on federal species at risk and their critical habitat in accordance with section 79(2) of SARA, as well as species that COSEWIC has assessed as being endangered, threatened, or of special concern. The Agency consulted with Fisheries and Oceans Canada and Environment and Climate Change Canada, which are the lead agencies for administering SARA within their respective areas of responsibility (aquatic species and birds).

Sixty species at risk potentially occur in the regional assessment area and include fish, marine mammals and sea turtles, and migratory birds. Critical habitat has been designated within the regional assessment area for four species: North Atlantic Right Whale, Northern Bottlenose Whale, Roseate Tern, and Piping Plover. Potential effects on these species and associated critical habitat are described in Sections 6.2., 6.3, and 6.4 of this Draft EA Report.

Key Mitigation Measures to Avoid Significant Effects

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

Follow-up

The Agency determined that the proposed follow-up measures for fish and fish habitat (Section 6.1), marine mammals and sea turtles (Section 6.2), migratory birds (Section 6.3.) and special areas (Section 6.4) are also appropriate for species at risk and critical habitat.

Agency Conclusion

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

6.6 Commercial Fisheries

This section describes the potential effects of routine project activities on commercial fisheries. The effects of potential accidents and malfunctions are described in Section 7.1. The effects of routine project activities on Indigenous fishing are assessed in Section 6.7.

6.6.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

The proponent reported that commercial fishing is concentrated on the Georges Bank outer shelf, Georges Basin, upper Scotian Slope, Scotian Shelf, and Browns Bank. The project area is located within Commercial Fisheries Management Areas for Lobster, Shrimp, Scallop and Crab. The proponent stated that the groundfish fishery is open year-round with the most intensive fishing occurring from July to September and that the area along the Scotian Slope break in the northern portion of the project area is important for groundfish fisheries. It identified Atlantic Halibut, Cusk and Hagfish as the three principal groundfish species harvested within the project area. Cusk was designated as threatened by the COSEWIC due to its decline beginning in the 1970s. The majority of reported Cusk landings come from the groundfish longline fishery and are included in the groundfish landings depicted in Figure 4. Cusk are also known to be caught as bycatch in some lobster fisheries. Figure 4 depicts landings data for groundfish (all gear types) from 2008 to 2012.

The proponent stated that the pelagic fishery is open year round, with the most intensive fishing occurring in the summer and fall along the Scotian Shelf and identified Swordfish, Bigeye Tuna, Yellowfin Tuna, Bluefin Tuna, Albacore Tuna, unspecified tuna and Mahi Mahi as the commercially dominant pelagic species fished in and around the project area. Figure 5 depicts landings data for large pelagic fish from 2008 to 2012.

The proponent identified lobster, crab, Atlantic Sea Scallop, cockles, Iceland Scallop, Northern Shrimp, Propeller Clam, Quahog, sea cucumbers, Stimpson's Surf Clam, Striped Shrimp and whelks as the primary commercial-harvested invertebrate species likely to be harvested in the project area.

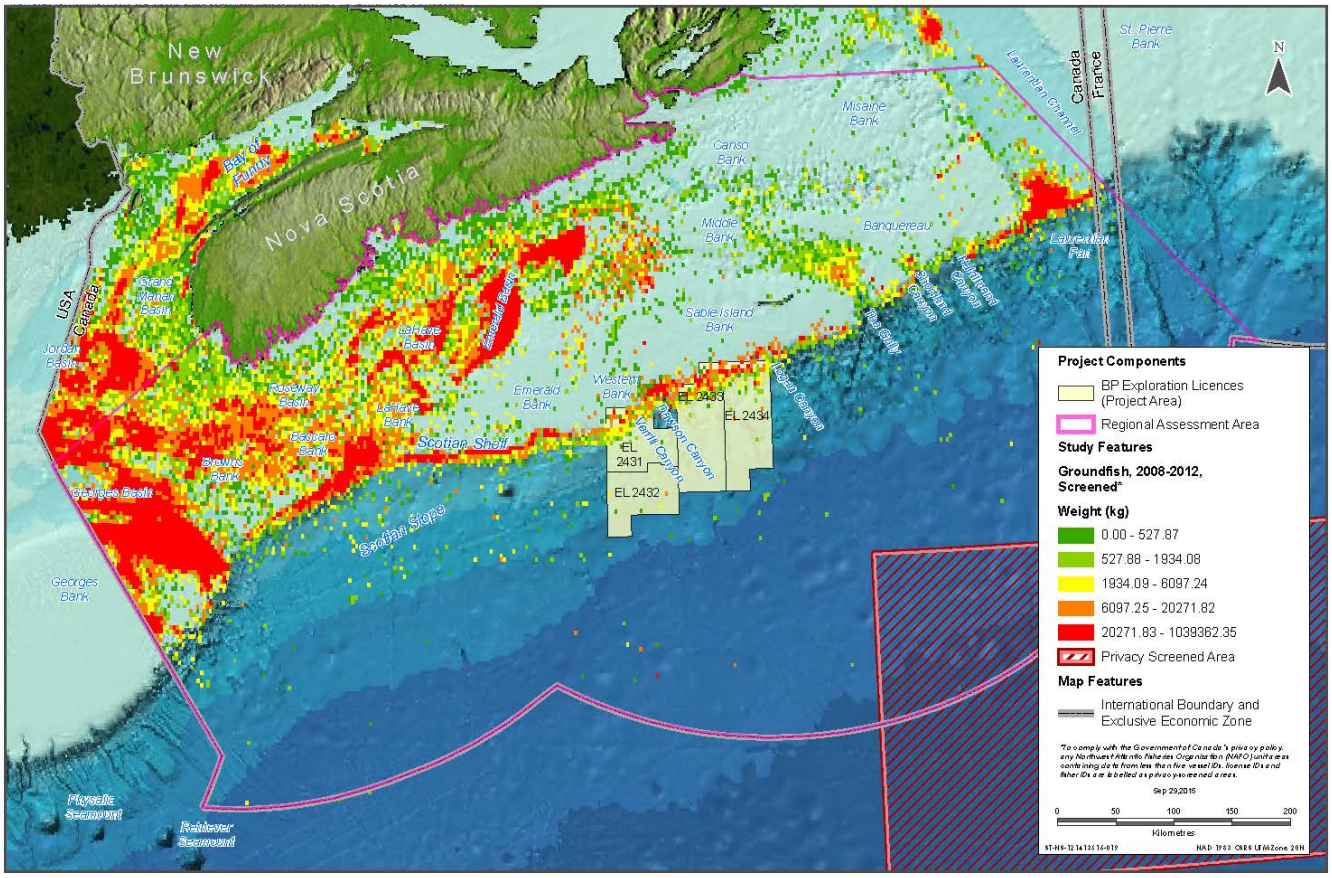

Figure 4 Groundfish Landings, All Gear Types, 2008-2012

Source: BP Canada Energy Group ULC, 2016

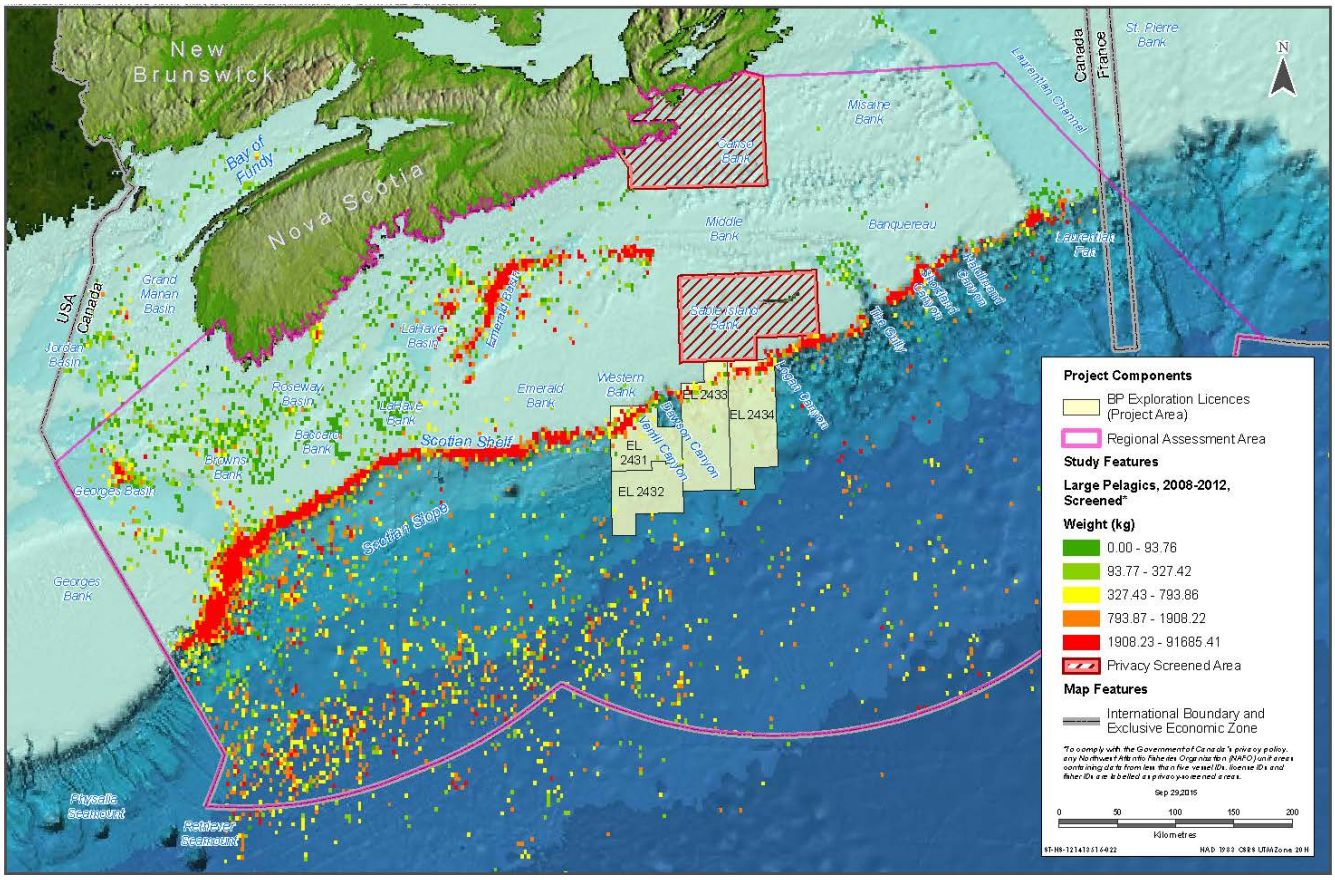

Figure 5 Large Pelagic Landings, 2008-2012

Source: BP Canada Energy ULC

Predicted Effects

The proponent predicted that commercial fisheries may experience adverse effects during routine project activities as a result of change in availability of fisheries resources. Potential effects of routine project operations on fish and fish habitat are assessed in Section 6.1. Some of those effects may in turn affect fishing.

The proponent stated that the mobile offshore drilling unit would have a 500-metre radius safety (exclusion) zone, as required by the *Nova Scotia Offshore Petroleum Drilling and Production Regulations*. The safety zone would have an area of slightly less than 0.8 square kilometres (80 hectares) for the duration of drilling operations (estimated approximately 120 days per well) during which fishing effort would be disrupted. The disruption would likely be temporary and localized and likely not have a substantial effect on the fishing activities and fishing resources.

The proponent predicted that underwater sound emissions generated by the drilling unit could cause fish to avoid the area, temporarily possibly affecting catch rates but that fish would become habituated to the continuous sound levels. It also predicted that noise from vertical seismic profiling would cause localized and temporary behavioural effects on fish, which may vary between and within species, however, is not anticipated to adversely affect commercial fishery species. Noise from vertical seismic profiling may kill fish near the sound

source. The proponent states that noise from seismic is considered to be localized and temporary, therefore effects on fishery species are considered low in magnitude.

The proponent stated that discharge of drill muds and cuttings, and other discharges and emissions from the mobile offshore drilling unit and platform supply vessels, could kill or injure fish and may affect the benthic environment, sediment quality and water quality, in turn affecting fishery species. It predicted that other discharges and emissions such as drilling and testing emissions would cause temporary and localized effects on water quality. The discharges may include organic matter, or substances containing minor amounts of chemicals or residual hydrocarbons. The proponent predicted that these discharges would disperse quickly and would be degraded by bacterial communities. Discharges would be in compliance with the *Offshore Waste Treatment Guidelines*.

The proponent predicted an increase in the traffic within the project area and local assessment area, and that platform supply vessel traffic could strike or otherwise interfere with fishing gear and may restrict fishing vessel navigation.

The proponent stated that if a wellhead is left in place on the seabed after well abandonment, it may interact with commercial fishing activity through a change in fish habitat. The wellhead itself would be the only infrastructure that may potentially remain on the seabed and would be approximately 1.5 to 3.7 metres high and occupy less than one square metre of seabed. The proponent noted that CNSOPB approval is required for well abandonment plans, including a decision to leave a wellhead in place. The proponent indicated that well abandonment activity is not expected to interact with commercial fishing activities, given the temporary nature, localized effects, and water depth.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent proposed mitigation measures to address the potential effects on fishing, including:

- continued engagement with Indigenous and non-Indigenous commercial fishers to share project details and facilitate coordination of information sharing;
- development and implementation of a Fisheries Communication Plan to facilitate coordinated communication with fishers on information such as platform supply vessel traffic and wellsite locations, including the location of a safety (exclusion) zone which would be placed around the mobile offshore drilling unit;
- providing details of the safety (exclusion) zone to the Marine Communication and Traffic Services for broadcast and publication in the Notices to Shipping and Notices to Mariners. Details of the safety (exclusion) zone would also be communicated to commercial fishers;
- compensating for project-related damages to fishing gear in accordance with the *Compensation Guidelines with Respect to Damage Relating to Offshore Petroleum Activity*;
- ensuring that platform supply vessels travelling from mainland Nova Scotia to the project area follow established shipping lanes in proximity to shore, and not travel faster than 12 knots (22 kilometres per hour), except in the case of an emergency; and
- including abandoned well locations on nautical charts as applicable.

Predicted Residual Effects

The proponent predicted that the Project would result in adverse effects to a change in availability of fisheries resources for commercial fisheries. In consideration of the implementation of applicable mitigation measures and adherence to industry standards (e.g. compliance with the *Offshore Waste Treatment Guidelines*, as described in Section 6.1), the residual effect on a change in availability of fisheries resources is considered low in magnitude for various Project components and activities; would occur within the local assessment area; be of short to medium-term duration, and reversible; and would primarily occur within an undisturbed ecological and socio-economic context. The proponent predicted that residual environmental effects on commercial fisheries from project activities are not likely to be significant.

6.6.2 *Views Expressed*

Federal Authorities

The Agency did not receive any comments from federal authorities regarding commercial fisheries.

Indigenous Groups

Comments from Indigenous communities related to fishing are included in Sections 6.7.2 (Current Use of Lands and Resources for Traditional Purposes by Aboriginal People), 6.8.2 (Health and Socio-economic Conditions), and 7.1.2 (Accidents and Malfunctions), as applicable.

Public

The Seafood Producers Association of Nova Scotia stated that the fishing industry is able to coexist off Nova Scotia with the oil and gas industry other than in prolific fisheries areas (e.g. Georges Bank). It was concerned that the *Compensation Guidelines with Respect to Damage Relating to Offshore Petroleum Activity* would not effectively compensate the fishing industry for potential losses. The Agency sought advice from the CNSOPB, which clarified that should a claimant and the proponent be unable to reach a settlement under the *Compensation Guidelines with Respect to Damage Relating to Offshore Petroleum Activity*, either party could refer the claim to the CNSOPB. The CNSOPB also clarified that it has not had a claim referred to it under the guidelines to date.

6.6.3 *Agency Analysis and Conclusion*

Analysis of the Effects

Routine project activities would affect fish and fish habitat, and fishing activities. Potential effects to fish and fish habitat, as described in Section 6.1, include fish mortality or injury through discharge of drilling waste and noise emissions, changes in fish habitat quality caused by light and sound emissions, destruction of habitat, or change in chemical composition of sediment or water. Effects on fishing activity are predicted to be minor, temporary and confined to the immediate area of the drilling operation. The Project would take place in Northwest Atlantic Fisheries Organization (NAFO) Unit 4W, and the project area overlaps with NAFO sub-areas 4Wm, 4Wj, 4Wg, and 4Wf. The area of the safety exclusion zone (0.8 square kilometres) is extremely small in comparison to the NAFO sub-areas, the smallest of which are in the order of 10 000 to 20 000 square kilometres. Fishers would be displaced from the safety exclusion zone around the mobile offshore drilling unit, but should be able to continue fishing in surrounding areas. Effective communication between the proponent and fishing operators would reduce the potential for usage conflicts. Fishing gear could be damaged or lost through interactions between

platform supply vessels and fishing activity but there is a process in place to deal with claims arising from such incidents. The CNSOPB advised that it has not had a claim referred to it under the guidelines to date (i.e. any potential issues have been successfully resolved between parties), attesting to the effectiveness of this process.

Abandonment plans for individual wells would be developed case-by-case and would require approval by the CNSOPB. The CNSOPB considers potential interference with fishing (e.g. wellheads left in place) when assessing proponents' abandonment plans.

If the proponent proposes to abandon a wellhead on the seafloor in a manner that may interfere with fisheries, consultation on a wellhead abandonment strategy would be required. In determining whether an abandoned wellhead could interfere with fisheries, the CNSOPB would consider geographic location and water depth, and may consult Fisheries and Oceans Canada, if there is any uncertainty regarding this determination. If it is determined that interference with fisheries is unlikely to occur, commercial and Indigenous fishers would be notified of the wellhead abandonment strategy as per the Fisheries Communication Plan.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponent, and comments received from Indigenous peoples and the public, and identified the following key measures to be implemented to mitigate the Project's effects on commercial fisheries:

- Develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include procedures to notify fishers a minimum of two weeks prior to the start of each well, and procedures to communicate with fishers in the event of an accident or malfunction.
- Ensure that details of safety exclusion zones, and the locations of abandoned wellheads if left on the seafloor, are published in Notices to Mariners, provided in Notices to Shipping, and communicated to fishers.
- Prepare a well abandonment plan, including a wellhead abandonment strategy and consult with Indigenous and non-Indigenous commercial fishers if it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with fishing activity. Submit the well abandonment plan to the CNSOPB for approval 30 days prior to abandonment of each well.
- Providing information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning.

The Agency expects that mitigation measures to prevent potential for significant effects on fish and fish habitat (Section 6.1) would also mitigate potential significant effects on commercial fisheries. It acknowledges the proponent's commitment to adhering to the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activities*.

Follow-up

The Agency did not identify any follow-up measures specific to commercial fisheries, but notes the identification of follow-up measures for fish and fish habitat (Section 6.1). The Agency also notes that the envisioned Fisheries Communication Plan would provide a means of identifying issues that may arise.

Agency Conclusion

The Agency concludes that the adverse residual environmental effects of the Project on commercial fisheries would be low-magnitude, occur locally, and occur regularly during drilling operations, which could occur at any time of year up to the expiry of the Exploration Licences in 2022. The effects on commercial fisheries would be reversible at the end of drilling operations.

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

6.7 Current Use of Lands and Resources for Traditional Purposes by Aboriginal Peoples

This section describes the potential effects of routine Project operations on the current use of lands and resources for traditional purposes by Aboriginal peoples. The effects of potential accidents and malfunctions are described in Section 7.1.

6.7.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

The Nova Scotia offshore is an important area for Indigenous food, social, and ceremonial fishing and Indigenous commercial fishing. In the EIS, the proponent identified that there are 17 First Nations communities that hold communal food, social, and ceremonial licences within the regional assessment area, including eleven communities in Nova Scotia, five in New Brunswick, and the Native Council of Nova Scotia. As well, the proponent provided information on the communal commercial licenses in or near the project area held by 34 Indigenous communities and organizations across the Atlantic provinces.

The proponent commissioned a Traditional Use Study to gather information on fishing undertaken by Indigenous peoples in the regional assessment area, focusing on waters surrounding the project area. The study included a background review of communal commercial licences, and food, social, and ceremonial fishing, and interviews with fishers and fisheries directors from First Nations in Nova Scotia and New Brunswick, and the Native Council of Nova Scotia. The Traditional Use Study included information on target species, general fishing areas, and fishing seasons, and additional information pertaining to fish and sensitive areas. Figure 6 shows the locations of Indigenous communal commercial and food, social, and ceremonial fisheries in the regional assessment area. The Traditional Use Study included a caveat that it should not be considered an absolute measure of Indigenous ecological knowledge and use of the land and sea, and acknowledged that some fishing activity may not have been reported due to the small interview sample size.

According to the Traditional Use Study, there is communal commercial fisheries access in the project area. The Traditional Use Study interviews identified fishing for food, social and ceremonial purposes in both the local and regional assessment areas, typically close to the coast, but not in the project area. However, for the purpose of the effects assessment, the proponent assumed that food, social, or ceremonial fisheries potentially occur in the project area and acknowledged that species fished for food, social, and ceremonial purposes harvested outside the regional assessment area could still interact with the Project, if the species migrates through the project area or local assessment area. The Traditional Use Study emphasized the importance of the project area for

food, social and ceremonial fishing through its connection to other ecosystems through which culturally-significant species, such as Salmon, Eel and Tuna migrate. Information on communal commercial licences, and food, social, and ceremonial fishing, as described in the Traditional Use Study, is provided below.

Mi'kmaq of Nova Scotia

All thirteen Mi'kmaq First Nations in Nova Scotia have communal commercial fishing licences within the regional assessment area. The eight First Nations included in the Traditional Use Study (Acadia, Eskasoni, Millbrook, Pictou Landing, Glooscap, Membertou, Potlotek and Paq'tnkek Mi'kmaq) reported that all licensed species, except seals, are fished within the regional assessment area. The Traditional Use Study reported that the Mi'kmaq of Nova Scotia commercially fish six species in the project area; 15 species in the local assessment area, and 25 species in the regional assessment area.

The Mi'kmaq of Nova Scotia reported harvesting Eel, Salmon, Mackerel, Brown Trout, Flounder, Gaspereau, Tuna, Lobster, Clams (Bar, Surf and Softshell) and Scallops for food, social and ceremonial purposes within the regional assessment area. Of these, only Lobster was reported as being fished in the local assessment area. No food, social and ceremonial fishing was reported in the project area.

Mi'gmaq and Wolastoqiyik of New Brunswick

The New Brunswick First Nations of Fort Folly, St. Mary's, and Woodstock participated in the Traditional Use Study and have communal commercial fishing licences within the regional assessment area. The Traditional Use Study reports that one species was commercially fished in the project area, nine species in the local assessment area, and 16 species within the regional assessment area. One species (lobster) was identified as being harvested for food, social and ceremonial purposes outside the project area (in the Bay of Fundy).

The Native Council of Nova Scotia

The Native Council of Nova Scotia has communal commercial fishery access to seven species in the project area, nine species in the local assessment area and 19 species in the regional assessment area. It reported harvesting 22 fish species within the regional assessment area and five fish species in the local assessment area for food, social and ceremonial purposes. No food, social and ceremonial fishing was reported in the project area.

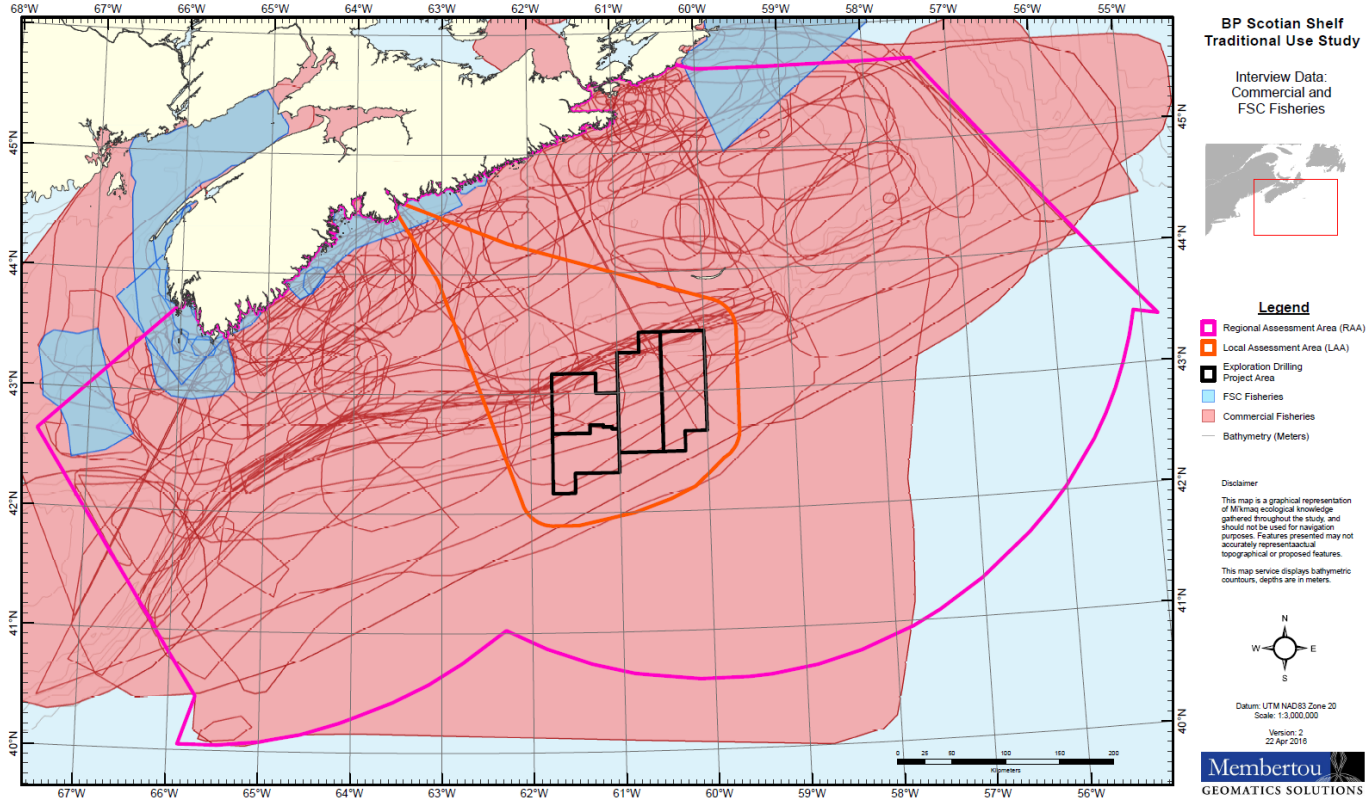

Figure 6 Location of Communal Commercial and Food, Social, and Ceremonial Fisheries in Relation to the Project

Source: Traditional Use Study, Membertou Geomatics Solutions and UINR (2016)

Predicted Effects

The proponent stated that fishing is the only known current use of resources for traditional purposes by Indigenous peoples in areas that could be affected by the Project. It acknowledged that the Project could affect fisheries resources and related traditional use via direct or indirect effects on fished species, effects on fishing activity from displacement from fishing areas, or fishing gear loss or damage. The proponent predicted that effects could occur due to:

- the presence and operation of mobile offshore drilling unit, including well drilling and testing operations and associated lights, safety exclusion zone, and underwater sound;
- waste management (including discharge of drill muds and cuttings and other drilling and testing emissions);
- vertical seismic profiling operations; and
- supply and servicing operations, including helicopter transportation and platform supply vessel operations.

Project activities could affect the marine environment and cause a number of changes to traditional use. Fish may avoid areas where project activities cause changes in fish habitat quality and use, temporarily affecting the number of fish available to catch. Effects on water and sediment quality along with sensory disturbance may trigger behavioural responses in targeted species, and may affect catch rates for Indigenous fishers who may be fishing near the drilling unit or vertical seismic profiling operations.

Displacement from fishing areas may result from the need to avoid the 500-metre safety (exclusion) zone that would be established around the mobile offshore drilling unit, for an estimated 120 days for each well. The proponent anticipates that any disruption to fishing would be temporary and localized.

Platform supply vessels engaged in transporting personnel and equipment to and from the mobile offshore drilling unit may strike or otherwise interfere with fishing gear along its route, and may restrict fishing vessel navigation when passing through an area. The proponent estimated that there is a low potential for gear loss or damage, but if it occurs, committed to following the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity*.

The proponent stated that it does not expect well abandonment to affect Indigenous fishing given the temporary and localized nature of the abandonment operation, and that water depth in the project area, if left in place, to interfere with fishing operations. The proponent anticipated that if the wellhead is left in place following abandonment, it would provide hard substrate suitable for recolonization by benthic communities.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent stated that the potential environmental effects of the Project on Indigenous fisheries, and associated mitigation measures, would be similar to those for commercial fisheries. It also stated that mitigation of effects on fish and fish habitat would reduce the potential for effects on Indigenous fishing. The proponent committed to a number of measures that would mitigate the Project's effects on fish and fish habitat (Section 6.1) and commercial fisheries (Section 6.6). In addition to the measures outlined in those sections, the proponent committed to continue its engagement with Indigenous fishers to share project details and facilitate coordination of information sharing.

The proponent did not propose to implement any follow-up or monitoring for effects on current use arising from routine project activities.

Predicted Residual Effects

After implementing applicable mitigation measures, best practices, and adhering to industry standards, the proponent predicted that residual environmental effects on the current use of lands and resources for traditional purposes would occur in the local assessment area and be reversible. Given the size of the exclusion zone (an approximate area of 0.8 square kilometres) and generally low fishing activity in the project area, the proponent predicted that this would be a low-magnitude effect. The proponent predicted that residual environmental effects would not be significant.

6.7.2 *Views Expressed*

Mi'gmawe'l Tplu'taqnn Incorporated expressed concerns about the Project's potential effects on resources and on its individual member communities. Mi'gmawe'l Tplu'taqnn Incorporated is concerned that effects of increased vessel traffic, and noise and water and sediment quality degradation due to waste disposal could affect various life functions and migratory routes of species of importance to the Mi'gmaq including American Eel, Atlantic Sturgeon, Bluefin Tuna, Herring, Gaspereau and Atlantic Salmon, whales (of spiritual importance to Mi'gmaq Nations), and migratory birds (which play an important role in Mi'gmaq culture, provide cues for traditional harvesting activities along the coast, and are a food source). The proponent provided additional information about potential effects on these species, including population-level.

Mi'gmawe'l Tplu'taqnn Incorporated requested additional information about the New Brunswick Mi'gmaq Indigenous fishery and use of lands and resources within and beyond the regional assessment area. It stated that each community may be affected differently by the Project and have specific preferences for mitigation approaches. Mi'gmawe'l Tplu'taqnn Incorporated was dissatisfied that the proponent proposed no follow-up or monitoring for effects on Indigenous fishing and recommended that this be developed in consultation with Mi'gmawe'l Tplu'taqnn Incorporated and relevant New Brunswick Mi'gmaq First Nations representatives. Specifically, it recommended that there be follow-up and monitoring plans for the full life cycle of the Project, and include specific reference to the Indigenous fishery. The Maliseet Nation in New Brunswick found it unclear what adaptive management measures (beyond financial compensation) might be available should there be effects in traditional and commercial fishing areas. The proponent indicated that the effectiveness of mitigation for effects of routine drilling activities is well-understood and therefore it did not propose follow-up or monitoring for fisheries, but it noted that monitoring and follow-up programs would be implemented in the event of a spill, based on the circumstances at that time.

Maliseet Nation in New Brunswick also requested more information on the Fisheries Communication Plan to ensure two-way communication and adequate involvement and consultation. The Maliseet Nation in New Brunswick recommended that the Fisheries Communication Plan include regular meetings with the Maliseet Nation in New Brunswick and Woodstock First Nation fisheries directors and fishing captains to verify the proponent's predictions and adjust mitigation measures accordingly. The proponent stated that it would continue to engage with Indigenous and non-Indigenous commercial fishers to share project details as applicable and facilitate coordination of information sharing. The Fisheries Communication Plan would be used to facilitate coordinated communication with fishers. The proponent indicated that it would develop a contact list of fishery managers to support communication during operations, to allow for ongoing dialogue during offshore activities. The Fisheries Communication Plan would clarify the proponent's plans for platform supply vessel traffic and wellsite locations, including the location of a safety (exclusion) zone around the mobile offshore drilling unit. The proponent would appoint Fisheries Liaison Officers to communicate project plans and activities throughout operations.

The Maliseet Nation in New Brunswick expressed concern that the Project may affect traditional resources. It stated that there was inadequate information on harvesting by the Maliseet and it emphasized the need for regular communications with the proponent. The proponent indicated it would continue to engage with Indigenous groups in New Brunswick on the Project and is developing a Fisheries Communication Plan, which would provide a framework for ongoing engagement with Indigenous and non-Indigenous fisheries organizations during the Project.

The Maliseet Nation in New Brunswick expressed concerned about effects on species, specifically Swordfish, in the project area, as well as species that migrate through the area and are used elsewhere, such as Tuna. The proponent included a description of the existing environment for these species and considered them in the effects assessment.

The Maliseet Nation in New Brunswick also stated that the Traditional Use Study was incomplete because it lacked sufficient information about Maliseet harvesting and did not address the importance of country food. The proponent indicated that traditional use information gained through the EA identified food, social, and ceremonial fishing as the only harvesting activity occurring in the assessment area. Only one species (lobster)

was identified as a species harvested for food, social, and ceremonial needs by New Brunswick Indigenous groups, which participated in the Traditional Use Study and this fishing area occurs in the Bay of Fundy (outside the regional assessment area). Traditional Use Study interviewees did not report any food, social, and ceremonial fishing activity within the project area. It noted that while the Traditional Use Study indicated the project area is not currently used for food, social and ceremonial harvesting, it may be used in the future.

A summary of all issues raised by Indigenous peoples is presented in Appendix D.

6.7.3 *Agency Analysis and Conclusion*

Analysis of the Effects

Indigenous groups with communal commercial licences would be potentially most affected by the Project. Those with communal commercial licences for areas within or overlapping the project area (Acadia, Fort Folly, Glooscap, Membertou, Millbrook, Sipekne'katik, St. Mary's, Wagmatcook, We'koqma'q, Woodstock, and the Native Council of Nova Scotia) are most likely to be affected by the presence of the safety exclusion zone and platform supply vessels. Effects of routine project activities on communal commercial fishing would be temporary (approximately 120 days for each of a maximum of seven wells) and the exclusion zone confined to an area of 0.8 square kilometres.

The project area overlaps with NAFO Unit Areas 4Wm, 4Wj, 4Wg and 4Wf. The area of the safety exclusion zone (0.8 square kilometres) is extremely small in comparison to the NAFO areas, the smallest of which are in the order of 10 000 to 20,000 square kilometres. No unique fishing grounds or concentrated fishing effort that occurs exclusively in the local assessment area was identified during the EA, and similar alternative sites are available within the immediate area.

Swordfish, and other large pelagic species, may be targeted by Indigenous groups both inside and outside the project area. The Project may impact availability of the species due to safety (exclusion) zones or fish avoiding areas of project activity. However, effects are considered localized, and are discussed in Section 6.1 and Section 6.6.

No food, social, and ceremonial fishing was reported in the project area, but it occurs in other areas, including coastal regions that are within the regional assessment area. Food, social and ceremonial fishing in those areas could be affected if fish passing through the project area are unable to complete their migration due to injury or mortality, or if nearshore fishing gear is damaged or lost through interactions between platform supply vessels and fishing activity. The proponent committed to restricting the passage of platform supply vessels to shipping lanes, where they exist (e.g. approaching and departing Halifax Harbour). Effects of routine activities on fishing for food, social, and ceremonial purposes are predicted to be temporary and reversible.

Abandonment plans for individual wells would be developed case-by-case and would require approval by the CNSOPB. The CNSOPB considers potential interference with fishing (e.g. wellheads left in place) when assessing proponents' abandonment plans. If it is proposed that a wellhead be abandoned on the seafloor in a manner that may interfere with fisheries, the proponent would be required to consult on a well abandonment strategy. If it is determined that interference with fisheries is unlikely to occur, commercial and Indigenous fishers would be notified of the wellhead abandonment strategy as per the Fisheries Communication Plan.

As described in Section 6.1., effective communication between the proponent and all stakeholders, including Indigenous groups would reduce the potential for usage conflicts. The proponent's Fisheries Communication Plan is one approach to fostering this communication.

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 received from Indigenous peoples when identifying key mitigation measures to be implemented to prevent significant adverse effects on the current use of lands and resources for traditional purposes by Aboriginal peoples. The Agency determined that the measures outlined to mitigate effects on fish and fish habitat (Section 6.1) and commercial fisheries (Section 6.6) would also mitigate effects on the current use of lands and resources for traditional purposes by Aboriginal peoples.

The Agency also recognizes the proponent's commitment to applying the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity*, in the unlikely event that any claims for damages arise.

Follow-up

The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes by Aboriginal peoples and notes that there are related measures proposed for fish and fish habitat (Section 6.1.3).

Agency Conclusion

The Agency concludes that the adverse residual environmental effects of the Project on current use of lands and resources for traditional purposes by Aboriginal peoples would be low in magnitude, occur locally, and would be reversible. Any disruption to fishing as a result of drilling, testing and abandonment of a well, which could take place at any time of year until the expiry of the Exploration Licenses in 2022, would be limited to the durations of those activities and would predominantly be confined to the safety exclusion zone around the wellsite.

Taking into account the implementation of the mitigation measures described above, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes by Aboriginal peoples.

6.8 Health and Socio-economic Conditions of Aboriginal Peoples

The proponent did not initially select health or socio-economic conditions as a valued component, given the Project's remote offshore location at least 230 kilometres from land. The area has no permanent human presence and experiences intermittent human presence associated with fishing or other marine traffic. First Nations communities in New Brunswick raised concerns related to health and socio-economic conditions, and how they might be affected by accidents such as a blowout. Based on those concerns, the Agency requested additional socio-economic baseline information and analysis from the proponent about Indigenous communities. The Agency then conducted its own analysis, which is summarized in this section. This section describes the potential effects of routine project operations on health and socio-economic conditions of Aboriginal peoples. The effects of potential accidents and malfunctions are described in Section 7.1.

6.8.1 *Proponent's Assessment of Environmental Effects*

Existing Environment

Communal commercial fishing is culturally important and provides financial benefits to Indigenous communities. According to the proponent, 1529 Indigenous people are employed in communal commercial fishing, generating direct annual employment benefits of $40 million in the Atlantic region annually and contributing to an overall value of $100 million to Indigenous communities. Revenue generated from communal commercial fishing is an important source of funding for health care, education and infrastructure programs.

Table 8 First Nations Fishing Revenue as Percentage of Non-Governmental Revenues

Community	2013	2014	2015	2016
Abegweit	Not available	Not available	Not available	Not available
Acadia	Not available	Not available	Not available	11%
Annapolis Valley	27%	57%	16%	Not available
Bear River	Not available	Not available	Not available	Not available
Buctouche	13%	12%	7%	12%
Chapel Island (Potlotek)	44%	46%	48%	45%
Eel River Bar	Not available	Not available	Not available	18%
Elsipogtog	28%	26%	26%	Not available
Esgenoôpetitj	Not available	Not available	Not available	Not available
Eskasoni	26%	20%	19%	Not available
Fort Folly	56%	57%	77%	47%
Glooscap	Not available	Not available	Not available	Not available
Indian Island	Not available	Not available	Not available	Not available
Kingsclear	Not available	Not available	Not available	Not available
Lennox Island	44%	57%	66%	54%
Madawaska	Not available	Not available	Not available	Not available
Membertou	3%	7%	7%	Not available
Miawpukek	7%	4%	5%	Not available
Millbrook	11%	13%	13%	12%
Oromocto	Not available	Not available	Not available	Not available
Pabineau	25%	13%	8%	12%
Passamaquoddy	Not available	Not available	Not available	Not available
Paq'tnkek (Afton)	9%	14%	18%	21%
Pictou Landing	33%	30%	Not available	Not available
Sipekne'katik	8%	14%	16%	21%
St. Mary's	Not available	Not available	Not available	Not available
Tobique	Not available	Not available	Not available	Not available
Wagmatcook	Not available	Not available	Not available	Not available
We'koqma'q (Waycobah)	17%	14%	15%	15%
Woodstock	Not available	Not available	Not available	Not available

Community	2013	2014	2015	2016
Note: Fisheries revenues for 2013-2016 were either taken from the proponent's supplemental information for Information Request 114 (August 2, 2017) or were compiled by the Agency from audited statements available on the Indigenous and Northern Affairs Canada Internet site.				

Predicted Effects

The proponent provided baseline information on species harvested for food, social and ceremonial, and commercial purposes for Indigenous communities in Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland and Labrador. The proponent noted that although commercial fisheries may appear in some cases to provide a nominal amount of overall revenue for a First Nation community, all communities informed it that communal commercial fisheries represent an important source of income. An adverse effect on commercial communal fishing could therefore affect the quality of life in communities.

Food, social, and ceremonial fisheries are culturally important. The proponent indicated that although traditional food may currently be a small portion of a community's diet, it is considered highly important, especially since some community members face food insecurity. An adverse effect on food, social, and ceremonial fishing would affect quality of life within communities.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent did not assess effects of the routine project operations on health and socio-economic conditions of Indigenous or non-Indigenous people or communities in the EIS and as a consequence did not identify any specific measures to mitigate or monitor these effects. In subsequent information provided by the proponent, they identified measures to mitigate effects on the current Indigenous use of lands and resources for traditional purposes (as described in 6.7) when considering potential effects to socio-economic conditions in Indigenous communities.

Predicted Residual Effects

The proponent concluded that with the application of proposed mitigation and environmental protection measures and given the low magnitude of effects associated with routine operations on traditional use (e.g. fisheries), the residual environmental effects of a change in traditional use and socio-economic conditions of First Nation communities from Project activities and components are not likely to be significant.

6.8.2 *Views Expressed*

Mi'gmawe'l Tplu'taqnn Incorporated stated there was a lack of information on New Brunswick Mi'gmaq First Nations socio-economic conditions and interests. As well, the Maliseet Nation in New Brunswick stated that the proponent could not adequately assess the Project's potential socio-economic effects because it lacked a well-grounded understanding of how local economies are structured and how they function in Indigenous communities. The Maliseet Nation in New Brunswick emphasized the importance of providing baseline information on the importance of country food and the relative monetary importance of commercial fishing to the various communities, in order to understand potential effects of the Project. The proponent conducted additional engagement during the summer of 2017 to gather information about socio-economic conditions and interests. The proponent provided community-specific data, where available, indicating the percentage of total

non-government community income gained from fishing. Due to the unavailability of community-specific landings data, the proponent indicated that it did not carry out a separate socio-economic impact assessment for each Indigenous organization. It made worst case assumptions upon which to base a prediction of the significance of environmental effects and commitments for mitigation and emergency response.

Mi'gmawe'l Tplu'taqnn Incorporated noted the lack of information pertaining to contemporary resource-based livelihoods and stated that there are other land-based and resource-based operations that reflect New Brunswick Mi'gmaq First Nations' rights and interests, including eco-tourism or other recreational operations. The proponent stated that eco-tourism and recreation does not occur in the project area, and that routine project activities are not predicted to interact with eco-tourism and recreation which may be occurring within the regional assessment area closer to shore. The proponent's spill model results demonstrated that the geographic extent of an unmitigated spill would most likely be limited to within the regional assessment area, but it is possible that some unmitigated blowout spill scenarios could result in some oil extending beyond the boundaries of the regional assessment area. Modelling of oil spilled from blowout scenarios indicated a low probability (0 to 10 percent) for shoreline oiling along the Nova Scotia coastline and therefore recreational activity (including eco-tourism) in the nearshore waters of Nova Scotia would have a low probability of effects from accidental events. In the unlikely event of a blowout, spill response measures would reduce the magnitude and duration of a spill thereby limiting the geographic extent and magnitude of potential environmental effects.

Mi'gmawe'l Tplu'taqnn Incorporated outlined possible health and socio-economic effects of the Project. It emphasized that any adverse effect on fisheries could have negative impacts on livelihoods, increased costs of living, loss of culturally important traditional knowledge, and changes to community social fabric associated with sharing the proceeds of traditional use amongst community members. The proponent provided information that accidental events, although unlikely to occur, could result in contamination of fish species commonly harvested for human consumption for food social and ceremonial purposes. In an actual incident, spill response measures would limit the geographic extent and magnitude of potential environmental effects. Fisheries closures and the imposition of an exclusion zone in areas where a visible sheen of oil is present would prevent human contact with contaminated food sources.

A summary of all issues raised by Indigenous peoples is presented in Appendix D.

6.8.3 *Agency Analysis and Conclusion*

Analysis of the Effects

Available data indicate that the portion of commercial fisheries revenue in relation to other non-governmental revenue varies widely by community. Between 2013 and 2016, fisheries revenues provided between three percent (Membertou in 2013) to 77 percent (Fort Folly in 2015) of non-governmental revenue (Table 8) in the 17 Indigenous communities for which data was available.

As previously noted, the greatest potential for adverse effects on health and socio-economic conditions of Indigenous communities is associated with accidents and malfunctions. However, given that routine operations may affect fishing (Section 6.6) and current use of lands and resources for traditional purpose by Aboriginal peoples (Section 6.7), the Agency has examined the potential for these changes to lead to effects on health and socio-economic conditions.

A change to socio-economic conditions of Aboriginal peoples could occur due to the following project activities and related changes to traditional use:

- the presence and operation of the mobile offshore drilling unit, including well drilling and testing operations and associated lights, approximately 500-metre-radius safety exclusion zone around the mobile offshore drilling unit and underwater sound;
- waste management (including discharge of drill muds and cuttings and other drilling and testing emissions);
- vertical seismic profiling operations; and
- supply and servicing operations, including helicopter transportation and platform supply vessel operations.

Socio-economic conditions in Indigenous communities may be affected if Indigenous fishers experience decreased catch rates, displacement from fishing areas, or disturbance of fishing gear and restrictions to fishing vessel navigation. Decreased catch rates could result in decreased incomes for Indigenous commercial fisheries that provide revenue for community initiatives such as health and education programs. Displacement from fishing areas, disturbance of fishing gear and restrictions to fishing vessel navigation could result in additional expenses and replacement of damaged gear for individual fishers. Socio-economic effects could occur over the four year drilling period. Compensation for decreased income, gear damage, and additional expenses may be available through the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity.*

During drilling activities, only platform supply vessels would be permitted to enter the safety zone around the mobile offshore drilling unit. Fishing boats in the area may have to alter activity to avoid the safety zone. While this may affect individual boats, the Agency expects that it would have a negligible effect on socio-economic conditions in communities, due to the safety zone being very small (approximately 0.8 square kilometres) in comparison to the total area available for fishing. The proponent has also indicated that the presence and the location of the mobile offshore drilling unit would be made known to fishers through its Fisheries Communication Plan, as well as through Notices to Mariners.

Health conditions in Indigenous communities could be affected if project-related changes in the marine environment cause decreased catch rates for commercial or food, social, and ceremonial fisheries, or a decrease in fish quality for human consumption. The Agency notes that there are no predicted effects to catch rates from routine drilling operations. Project-related changes in the marine environment, such as discharge of drill muds and cuttings and other drilling and testing emissions, are not anticipated to greatly affect fish and fish habitat, and therefore would also be unlikely to affect fish quality for human consumption. The CNSOPB has advised the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* extends to project-related loss of food, social and ceremonial fisheries, including replacement of food and sharing within communities.

Key Mitigation Measures to Avoid Significant Effects

The Agency determined that mitigation measures identified for fish and fish habitat (Section 6.1) and commercial fishing (Section 6.6) (e.g. Fisheries Communication Plan and compensation as per the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*) would also mitigate potential effects on the health and socio-economic conditions of Aboriginal peoples.

Follow-up

The Agency determined that follow-up measures identified for fish and fish habitat (Section 6.1) would also mitigate potential effects on the health and socio-economic conditions of Aboriginal peoples.

Agency Conclusion

The Agency concludes that the adverse residual environmental effects of routine project activities on health and socio-economic conditions of Aboriginal peoples would be low-magnitude, could occur within communities outside of the regional assessment area, and would be reversible.

Taking into account the implementation of the above-referenced mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the health and socio-economic conditions of Aboriginal peoples.

7 Other Effects Considered

7.1 Effects of Accidents and Malfunctions

Paragraph 19(1)(a) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) requires that a federal Environmental Assessment (EA) take into account the environmental effects of malfunctions and accidents that may occur in connection with the Project.

7.1.1 *Proponent's Assessment of Environmental Effects*

Description of Accident Scenarios

The proponent identified a number of accident and malfunction scenarios that may occur during exploration drilling including offshore vessel collisions, dropped objects, loss of stability of the mobile offshore drilling unit or structural integrity, fuel spills, synthetic-based mud spills, and loss of well control (i.e. blowout). Of these scenarios, the proponent identified the release of hydrocarbons or chemicals (i.e. spill) as posing the greatest risk to the valued components. The proponent evaluated the following scenarios as being the most credible spill event scenarios:

- minor spills and leaks during operations and maintenance of the mobile offshore drilling unit or platform supply vessels;
- batch spills of hydrocarbons from the mobile offshore drilling unit or platform supply vessels (e.g. during refuelling, vessel collision);
- spills of drilling fluids; and
- well blowout.

The proponent used a project-specific three-dimensional oil spill fate and trajectory model to support its evaluation of potential effects from a blowout and batch spills, and relied on a model from the Shelburne Basin Venture Exploration Drilling Project for accidental releases of synthetic-based drilling fluid (mud) originating from the sea surface or marine riser. For the modeled scenarios, the proponent assumed no response measures would be undertaken to mitigate effects. It stated that in a real event, response measures would be implemented immediately and emphasized that the Project would incorporate features and procedures to reduce the probability of occurrence of accidents. The project-specific modelling examined the results of spills from two sites within the project area.

Spill Fate and Behaviour

The proponent identified three modelling effects thresholds through which it assessed the probability or likelihood of potential effects of a spill.

- The threshold for surface oil thickness was selected at 0.04 micrometres as this recognizes the potential socio-economic effects (e.g. fisheries closure) in the presence of a barely visible or silver sheen on the water surface. The proponent stated that this is a conservative threshold as a continuous true oil colour is visible at 200 micrometres and oil thickness that may result in harm to seabirds ranges from 10 micrometres to 25 micrometers.

- The threshold for shoreline hydrocarbon mass was selected as 1.0 grams per square metre as this threshold would conservatively trigger the need for shoreline clean-up. The proponent stated that this is a conservative threshold as 100 grams per square metre can have lethal impacts to invertebrates.
- The threshold for in-water concentration for both dissolved and entrained hydrocarbons in the top 100 metres was selected at 58 parts per billion. This threshold was selected as research has identified this threshold as having five percent effect on acute exposure to various aquatic species. The proponent stated the lethal concentration threshold for fish embryos varies from 200 to 5,000 parts per billion.

Minor Spills During Operations and Maintenance

The proponent determined that the most probable spill events that could occur would be small volume, instantaneous events which could arise where hydrocarbons are handled, stored, or transferred. The proponent provided data from 1999 to 2013 showing that, historically, the average spill volume from offshore oil and gas operations has been 0.4 barrels (1 barrel = 159 litres), and that the most common causes are leaks from pipes, hoses, connections, flanges or valves.

An operational diesel spill of 10 barrels from the mobile offshore drilling unit was modeled to simulate the effects of a hose failure. Modeling concluded that a spill in the summer would have a greater effect than a winter spill with a maximum surface emulsified oil thickness (i.e. 0.4 to 5.0 micrometres) over an area of approximately 0.82 square kilometres. The modeling indicated that the maximum exposure time for emulsified oil on the surface exceeding the 0.04 micrometres threshold would be less than one day.

Batch Spills and Spills from Platform Supply Vessels - Oil

The proponent modeled an accidental discharge of marine diesel simulating a tank failure (i.e. 100-barrel batch spill). The modeling results indicated that approximately 65 percent of the spill would evaporate within the three days with the remaining proportions dispersing or biodegrading within the same period. Modeling concluded that a spill in the summer would have a greater effect than a winter spill with a maximum surface emulsified oil thickness (i.e. 0.4 to 5.0 micrometres) over an area of approximately 4.4 square kilometres. In-water dispersed and dissolved oil threshold exceedance of 58 parts per billion for total hydrocarbons concentration was not exceeded in any of the simulations and no oil from the batch spills reached the coastline of Sable Island or Nova Scotia. The modeling predicted that the only scenario where a batch spill could reach the coastline of Nova Scotia or Sable Island would be from a release from a project supply vessel in the nearshore area.

Batch Spills of Drilling Fluid

The proponent stated that synthetic-based drilling mud could be released from a surface tank discharge, riser flex joint failure, or a blowout preventer disconnect. The size of the release, mode of release, and the ocean currents at the time of release would influence the spill deposition footprint. Given the project's proximity to and similarities with the recently-completed Shelburne Basin Venture Exploration Drilling Project, the proponent based its predictions of synthetic-based mud deposition on modeling conducted for the Shelburne project. Two scenarios were modeled: a spill of 377.4 barrels (60 000 litres) representing a full mud tank release at surface, and a spill of 3604.2 barrels (573 000 litres) representing a full riser release associated with a disconnection at the seabed. The modelling predicted that a spill of 60 000 litres at the surface would not contribute to mass accumulation on the seabed, while a spill of 573 000 litres at the seabed would result in an increase of less than

10 millimetres to the seabed; the overall maximum area of deposition was predicted to be 0.27 hectares. In the event of a spill of synthetic-based drilling fluid, the proponent predicted that the sediment plume could extend up to 9620 metres and that the suspended solids concentration in the water column would return to ambient conditions (less than 1 milligram per litre) within 30 hours of the release.

Blowout

A blowout is an uncontrolled release of hydrocarbons from a wellbore that can occur following a loss of well control. The proponent used well drilling data from the period from 1980 to 2004 to illustrate that the probability of a blowout incident is approximately 0.031 percent per well. The proponent predicted that the additional controls and mitigation measures used for well control since the Deepwater Horizon incident in 2010 would reduce the probability of an event to below 0.031 percent, although it did not provide a revised estimate.

The proponent carried out three-dimensional oil spill fate and trajectory modeling and analyses to support its evaluation of the potential effects of accidental spills associated with a blowout from the drilling unit. The proponent consulted with the CNSOPB, Environment and Climate Change Canada, and Fisheries and Oceans Canada regarding the appropriateness of the model used, input parameters (e.g. oil type, weather and oceanographic conditions), modeling scenarios, and thresholds. Subsurface blowout scenarios were developed for two locations, chosen to be representative of the expected water depths that may be drilled within the project area and situated in proximity to sensitive receptors around the exploration licences (e.g. Sable Island). The model incorporated surface spreading, slick transport, water column entrainment, evaporation, emulsification, and shoreline interactions. It simulated water column, horizontal, and vertical transport by currents, dissolution, adsorption, settling, and degradation. The model was used to simulate the range of weather conditions that could be experienced throughout the year and to generate probability maps showing how likely it would be that spilled oil would reach a given location (e.g. Sable Island, Georges Bank, coast of Nova Scotia). This is referred to as stochastic modeling. The proponent also selected individual, or deterministic, trajectories from the stochastic results that represented the maximum shoreline oiling for each well site and season. These representative worst credible case scenarios were then rerun deterministically to establish near-field and far-field fate and transport. The deterministic simulations provide insight to the individual trajectories, oil weathering behavior, the mass of oil in each environmental compartment (air, water, surface, land and sediment) and other information (area of oil slick, length of shoreline oiled etc.) related to each single spill at a given location and time. The modelling involved an unmitigated release duration for 30 days, after which the well was capped. The model continued for an additional 90 days to show the fate and trajectory of oil (i.e. for 120 days in total).

The modeled scenarios as described above reflected the worst-case credible discharge and were run until the oil concentrations fell below the significant threshold levels established for the Project. In reality, oil spill response, containment and recovery or dispersion and shoreline protection operations would be undertaken to reduce adverse effects on marine and coastal resources. The model assumed it would take 30-days to cap and contain the spill. In an actual incident, the proponent would respond immediately, and in the unlikely event of a blowout, the proponent predicted that the well could be capped and contained in 13 to 25 days, the upper limit allowing for weather-related or other delays.

The proponent's modeling of surface oiling and oil dissolved in the water column from blowout scenarios indicated that oil generally travels to the east and southeast of spill sites, the majority of the time. The

predominately westerly winds would transport surface oil away from the coast and variable surface currents do not continuously transport surface oil in any one specific direction for significant periods of time. While the above is true over most time periods, modelling showed a summer seasonal trend of oil being transported to the northeast farther offshore, and showed a winter seasonal trend of oil being transported in a uniform multi-directional pattern. The model also predicted that oil is more likely to be transported further towards the south and southwest under winter conditions, due to the stronger southwesterly surface currents. Higher percentages of oil were found within the water column during winter months attributed to increased wind and wave action which entrains surface oil droplets into the water column. Conversely, the greatest surface oiling occurred during summer months, with calmer conditions reducing entrainment from wind and waves. Figures 6 and 7 depict stochastic modeling results for probabilities of sea surface oiling from a 30-day unmitigated blowout at the two modeled sites. Summer scenarios are displayed, as there is a great chance of sea surface oiling in the summer months.

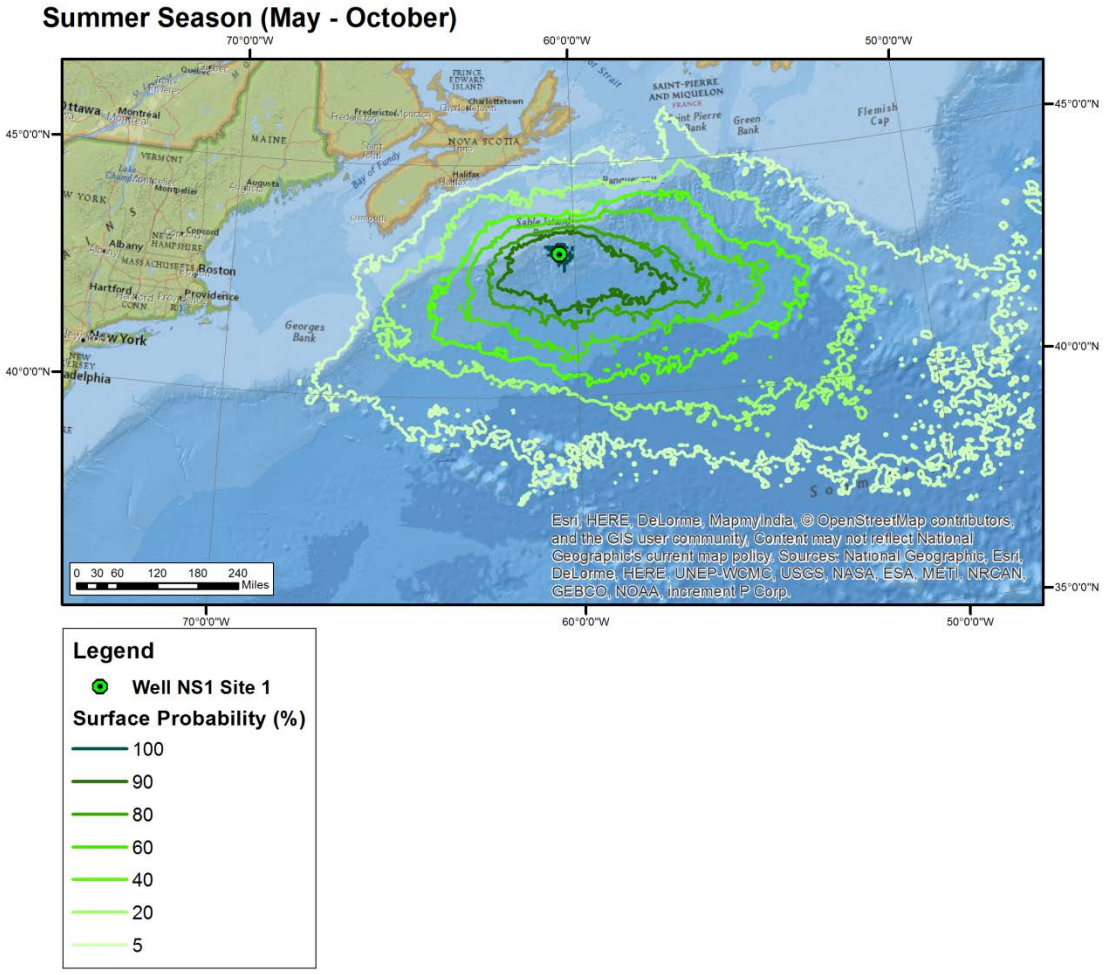

Figure 7 Sea Surface Oiling Probabilities Exceeding Thickness Threshold- 30-day Unmitigated Summer Blowout - Model Site 1

Source: Stantec, 2016

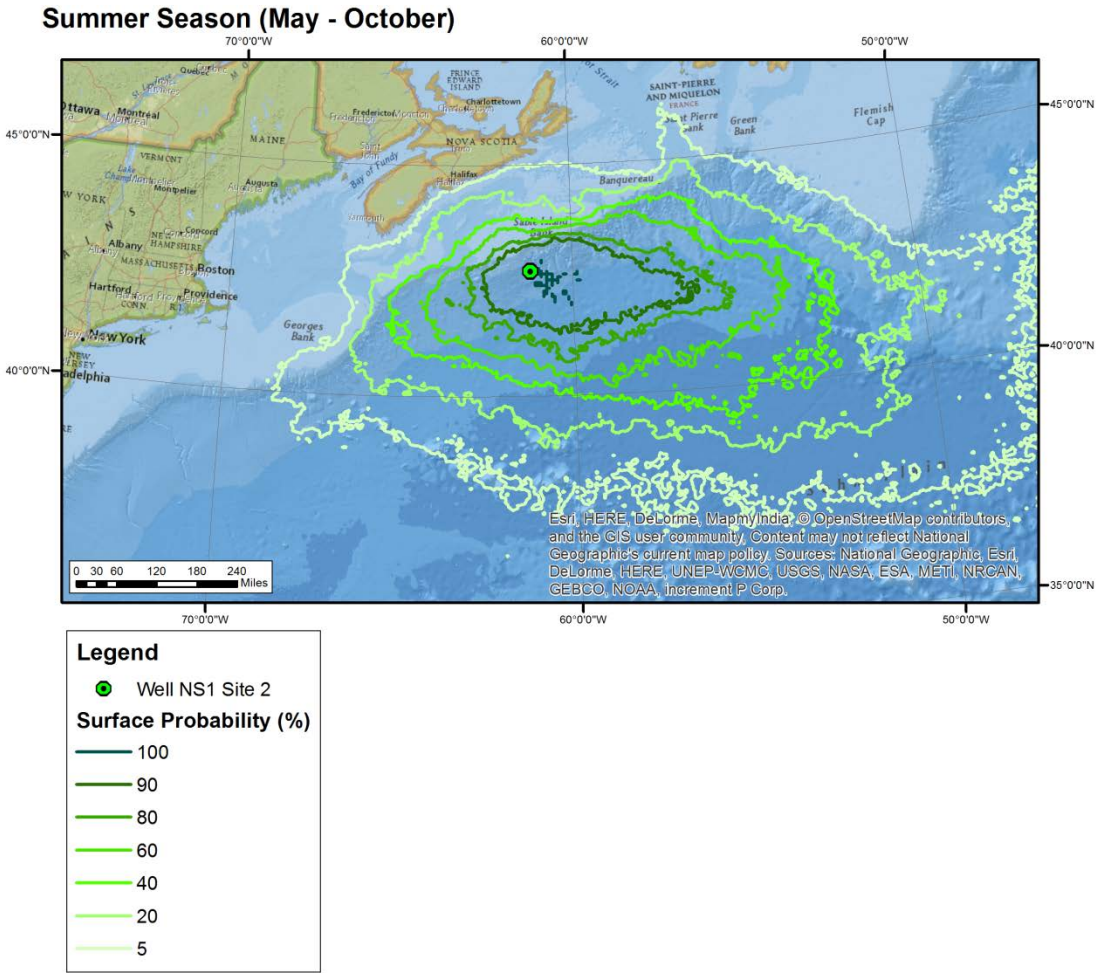

Figure 8 Sea Surface Oiling Probabilities Exceeding Thickness Threshold - 30-day Unmitigated Summer Blowout - Model Site 2

Source: Stantec, 2016

Following an unmitigated release, the model predicted that the majority of oil would remain offshore. The probability of surface oil in nearshore waters along mainland Nova Scotia would be less than 20 percent, with a thickness between 0.04 and 0.3 micrometres for both summer and winter scenarios. In-water oil concentrations above the established threshold of 58 parts per billion are not predicted to reach the nearshore waters of mainland Nova Scotia. Oil would need to remain on the surface for one month or more (30 to 50 days) to reach shore from the spill site.

The modeling indicated a low probability (0 to 10 percent) of shoreline oiling along mainland Nova Scotia with the probability of reaching most predicted contact locations being less than 1 percent. Shoreline oiling may occur along portions of the Eastern Shore and Southern tip of Nova Scotia including the Yarmouth, Barrington, Shelburne region, Brier Island and the Canso Coastal Barrens although the likelihood of this occurring is low (less than 5 percent in most cases). The only heavy oiling (greater than 10 millimetres of emulsified oil on the shoreline) that is potentially predicted to occur on the mainland is associated with the Site 2 scenario in the summer season, with occurrences in southwest Nova Scotia. In this scenario, the average minimum timeframe for oil to reach these areas is approximately 30 days.

The probability of shoreline oiling of Sable Island (exceeding the one gram per square metre threshold) would be up to 50 percent and could occur within 3.8 days (in summer) to 5.8 days (in winter). Also, although the winter scenario predicted that no in-water oil (above the threshold) would reach Sable Island, there is a 5 per cent chance that in-water oil concentrations would exceed the threshold of 58 parts per billion around Sable Island for the summer scenario within 10 to 20 days.

Spill Prevention and Response

The proponent describes in its EIS their approach to risk management that involves: day-to-day risk management, business and strategic risk management, and oversight and governance. The proponent has worked with industry partners to improve the strength of the barriers used in deep water drilling to prevent and manage risk, taking into consideration lessons learned from the Deepwater Horizon incident and response in 2010. The proponent's internal investigation into the Deepwater Horizon incident concluded with eight key findings and 26 associated recommendations to prevent a similar accident.

The proponent's approach to risk management uses a combination of equipment, processes, and procedures carried out by competent personnel to prevent conditions that could allow a hazard to become an undesirable event, and to limit the consequences of an undesirable event should one occur. Prevention and response barriers, in place to manage hazards and consequences, would be monitored and tested throughout the duration of the Project. Response capabilities and contingency plans would provide the ability to manage and respond to any spill that could occur.

The Project would operate under an Incident Management Plan that would define the response to incidents, including practices and procedures for responding to an emergency event. It would include reference to a number of contingency plans for responding to specific emergency events, including spills and well blowout events, and designed to ensure efficient and timely response. Emergency exercises and drills would be conducted to test the plans to ensure readiness.

The Incident Management Plan would include a Spill Response Plan, which would contain:

- a risk assessment and detailed description of how the proponent's preventative measures reduce the likelihood of spills occurring;
- response information for a variety of potential spill scenarios;
- mobilization and deployment of equipment and personnel;
- details of spill trajectory modeling and ongoing spill monitoring;
- management of oiled wildlife and oil waste;
- the response organization structure, roles and responsibilities; and
- procedures for notification and reporting.

The proponent indicated that information about source control would be included in the Incident Management Plan and Spill Response Plan, describing how resources would be deployed to respond to a loss-of-well-control incident. Information about environmental and socio-economic sensitivities and potentially affected Indigenous groups and stakeholders would also be included in the plans.

The proponent uses an Incident Command System for emergency response management in cases such as a spill. It would work with local and federal government bodies (e.g. CNSOPB, Canadian Coast Guard, Joint Rescue Coordination Centre, Nova Scotia Emergency Management Office, Fisheries and Oceans Canada, and Environment and Climate Change Canada) and organizations and agencies that can provide resources to support a spill response effort. The proponent is a member of Oil Spill Response Limited, an international organization that provides resources and expertise for oil spill response clean-up, and is therefore able to access and use specialist equipment, including subsea intervention capabilities (e.g. subsea dispersant equipment and capping and containment equipment), and technical advisors in the event of a spill.

Depending on the nature and location of a spill, response strategies may include:

- spill surveillance and tracking;
- containment and recovery from the sea surface (e.g. skimmers, booms);
- surface application of dispersants to remove oil from the ocean surface (i.e. to reduce effects on birds, marine mammals, and shorelines);
- subsea application of dispersants to reduce or prevent oil from reaching the surface;
- in-situ burning;
- shoreline protection and clean-up;
- oiled wildlife response; and
- well control and intervention (e.g. blowout preventer intervention, capping and containment, relief well).

In the case of an emergency such as a spill, the proponent's incident management team would assess the situation as it evolves through response efforts to ensure that the response strategy is appropriate for the specific conditions. Depending on the size and nature of an incident, specific monitoring (e.g. environmental effects monitoring) and follow-up programs may be required and would be developed in consultation with applicable regulatory agencies (e.g. Environment and Climate Change Canada, Fisheries and Oceans Canada). This may involve monitoring various aspects of the marine environment until specific endpoints are achieved and residual hydrocarbons reach acceptable background levels. In addition, records of marine mammal, sea turtle, and birds with visible oiling would be maintained. The proponent indicated that further information would be provided in the spill response plan.

The proponent is conducting a net environmental benefits analysis, also referred to as a spill impact mitigation assessment, to evaluate the risks and benefits of chemically dispersing oil into the water column in the case of a spill event from a blowout. It would seek regulatory approval from the CNSOPB for any use of dispersants should it be determined that the trade-off between the potential toxic effects of the dispersed oil in the water column relative to the advantages of removing oil from the sea surface and preventing environmental effects on shorelines are acceptable for their use.

A subsea capping stack is a specialized piece of equipment that can be used to cap (i.e. stop or redirect) well flow from a blowout while work is undertaken to permanently stop the flow of hydrocarbons. A capping stack can be deployed to the wellhead as part of a response to a well blowout incident. Mobilization would include

preparing and testing the capping stack, transferring it to a specialized vessel, and transporting it to the wellsite. Mobilization of capping stack and associated equipment to the wellsite is estimated to take 12 to 19 days depending on weather conditions and vessel availability. The proponent noted that under good conditions it would take approximately 24 hours to install a capping stack, once at a wellsite. A more complicated installation, with potential weather-related downtime, could take longer.

If a blowout occurred, the proponent would mobilize a capping stack located in Norway. The proponent stated that altering the location of the capping stack would not significantly affect the sequence or duration of well intervention operations (i.e. installation of the capping stack) because there are a number of critical steps that are required at a wellsite prior to capping stack installation that can occur concurrently with capping stack mobilization (e.g. debris clearance via remotely operated vehicle).

The proponent also noted that installing a cap on a well would be a secondary response measure. The primary response would be direct intervention of the blowout preventer, which contains multiple options (e.g. shear rams) to close the well. Concurrent with capping stack mobilization, the proponent would undertake activities and well intervention measures in an effort to stop the flow of oil (e.g. use of shear ram from blowout preventer). Where well control cannot be re-established, a relief well would be drilled to permanently kill the well. A mobile offshore drilling unit would be mobilized to Nova Scotia waters should a relief well be required. The proponent has agreements in place for specialist assistance to help with engineering and operational support for a relief well.

Well control strategies and measures would be detailed in the Incident Management Plan.

Proponent's Assessment of Environmental Effects

The proponent assessed the effects of four potential unmitigated accidental event scenarios on fish and fish habitat, marine mammals and sea turtles, migratory birds, species at risk, special areas, commercial fisheries, the current use of lands and resources for traditional purposes by Aboriginal peoples, and the health and socio-economic conditions of Aboriginal peoples. The proponent's assessment of accidental events relied extensively on spill modeling it conducted for the Project. In line with the precautionary principle, spill modeling work was based on worst-case credible scenarios. Of the incidents modeled, the greatest level of concern and potential for significant effects is associated with a large-scale blowout.

Fish and Fish Habitat, including Species at Risk

The proponent stated that risk of exposure of fish and shellfish to oil would depend on the type of oil and the extent of the spill, and also on the habitat they occupy, their behaviour, the time of year, their life history, and the general health of the stock at the time of the spill. Fish kills are typically brief and localized following a discrete spill event. This is due to the rapid loss of the acutely lethal low-molecular-weight components of oil due to dilution and weathering, the ability of mobile species to detect and avoid impacted areas, and the ability of phytoplankton, zooplankton, and adult fish to metabolize hydrocarbons. In general, the proponent indicated that:

- adult pelagic and benthic fish occurring in relatively deep waters would have low exposure risk because they are highly mobile and able to avoid oiled areas;

- larval and juvenile pelagic and benthic fish species may be at a greater risk of exposure as they are often less mobile than adults and their detoxification systems may not be fully developed;
- fish that spawn or occur in nearshore intertidal and subtidal zones and in shallow reef zones would be at higher risk of exposure where there is shoreline oiling;
- shellfish would have a moderate to high risk of exposure, depending on their mobility and use of contaminated sediments (i.e. species that burrow into sediments that may become contaminated, would be at higher risk of exposure);
- effects on phytoplankton and zooplankton would be species dependent, where mortality can occur in some species while resistance is demonstrated in others; at sub-lethal levels, hydrocarbons accumulated in zooplankton after a spill can be depurated within days of moving to clean water; and
- if fish eat contaminated zooplankton, they can accumulate hydrocarbons themselves; however, fish are also able to metabolize hydrocarbons and hydrocarbons do not typically biomagnify in the food web as they can be readily metabolized by vertebrate species.

When there is a spill of hydrocarbons, naturally occurring bacteria capable of bio-degradation proliferate and multiply quickly in response to the influx of a new energy source. Along with other physical processes including evaporation, dissolution, dispersion, and photo-oxidation, bacteria would eventually clean up oil spills by consuming the hydrocarbon compounds which are bio-degradable. Studies have shown that bacterial respiration, through biodegradation of hydrocarbons, has the potential to cause oxygen depletion, eventually leading to hypoxia in areas near oil spills.

Diesel Fuel Spill from Platform Supply Vessels

Fuel (i.e. diesel) spills from platform supply vessels or the mobile offshore drilling unit may cause adverse effects on fish and fish habitat. Diesel is known to have immediate toxic effects on many intertidal (e.g. molluscs, amphipods) and benthic organisms, with sessile and early life stages (i.e. eggs, larvae) being the most at risk because they are unable to avoid the diesel or are in sensitive life stage development periods. Benthic invertebrates, including commercial species, have experienced sub-lethal effects resulting from low-level exposure to hydrocarbons, with crustaceans being the most sensitive taxa. There is a risk of mortality of phytoplankton and zooplankton (food sources), and sub-lethal and lethal effects on larval and juvenile fish species present in the mixed surface layer of the water column; however, the effects of a diesel spill from the Project would likely only be felt in a highly localized area. Adult fish species in surface waters would largely be unaffected due to avoidance mechanisms; bottom dwelling species are unlikely to be exposed to harmful concentrations of dissolved aromatics.

The proponent predicted that the majority of diesel from a spill would evaporate and disperse within the first three days. The proponent stated that this would create temporary, localized, and reversible potential effects, and as such predicted that the residual environmental effects from a diesel spill from the mobile offshore drilling unit would not be significant. Residual effects following a near-shore diesel spill from a platform supply vessel would likely include localized mortality and sub-lethal effects on fish eggs, larvae, and juveniles. Depending on the location and extent of the spill, near-shore spawning and nursery areas could be affected. However, given

the expected small spill volume, the proponent predicted that effects on nearshore areas would not be significant.

Spill of Drilling Fluid

An unintended bulk release of drilling fluid would increase risk of mortality for immobile individuals and benthic prey species within tens of metres from the spill site. Previous modeling results indicate that deposits from a subsurface drilling fluid spill would be less than ten millimetres thick. Sediment thickness contours of one millimetre were predicted to extend up to 690 metres from the release sites, and cover a maximum area of 0.27 hectares of the seabed. This thickness is well below the thickness known to cause smothering (approximately 10 millimetres).

Elevated total suspended solids levels resulting from a spill of drilling fluids can cause physiological stress, reduced growth, and adverse effects on survival. However, in the case of a spill of drilling fluid from the Project, the proponent predicted that the levels of total suspended solids required to affect fish and fish habitat would be very temporary and limited to within tens of meters of the spill site. In addition, accidental releases of synthetic-based drilling fluid at the surface may create a small, thin surface sheen, with effects similar to those discussed above for hydrocarbon spills, but more limited. Previous modelling predicted that plumes from a surface or subsea spill could extend from 5080 metres to 9620 metres from the site and conditions would return to background levels within 30 hours of the spill. Overall, the proponent predicted that the residual environmental effects of a spill of drilling fluids would not be significant.

Blowout

Spill modeling results show that the geographic extent of an unmitigated spill (i.e. blowout) would most likely be limited to the regional assessment area. However, there is a low probability of some oil extending beyond the boundaries of the regional assessment area. The proponent predicted that greater concentrations of total hydrocarbons near the surface may result in mortalities and sub-lethal effects on fish eggs, larvae, and juveniles following an incident during winter conditions. The majority of adult fin fish would be able to avoid exposure by swimming away. In the event of that the spill encompasses areas where fish eggs or larvae are located, lethal and sub-lethal effects could occur. In the unlikely event that dissolved hydrocarbons are transported towards nearshore waters, residual effects on fish may include lethal and sub-lethal effects on the eggs, larvae, and juveniles of demersal species and other fish species within nearshore areas, including spawning and nursery areas.

In the event of a blowout, the proponent predicted that there would be a temporary decline in the abundance of phytoplankton in the immediate area of the spill. Some zooplankton communities may be able to avoid exposure. Zooplankton that are unable to avoid exposure and sub-lethal effects would depurate once the spill had subsided due to spill response activities and natural weathering processes.

The majority of fish species on the Scotian Shelf and Slope, including species at risk, spawn in multiple locations, so that a large blowout would not affect all spawning locations for any given species. Some species (e.g. Smooth Skate and Sand Lance) tend to spawn in a smaller area, but they may spawn over many months or the entire year, rendering it unlikely that their spawning window would be completely lost within the time period of a blowout. Because most species spawn in multiple locations or over long time periods, the proponent predicted

that it would be unlikely that an entire year class would be lost due to the toxic effects of oil on early life stages of fish as a result of a blowout, and natural recruitment of juvenile organisms would re-establish the population to its original level within one generation.

Based on modeling results, the proponent predicted a low probability of elevated water-column hydrocarbon concentrations (i.e. concentrations above 58 parts per billion) occurring in the Haddock Box (7 to 11 percent) and Emerald, Western, and Sable Banks (9 to 13 percent). While the modeling suggests that a potentially large area could be affected, there are low probabilities of oil reaching many parts of that area and results are based on an unmitigated release. In an actual incident, emergency response measures would likely limit the magnitude and duration of the spill thereby reducing the size of the area affected and the potential environmental effects. The model showed that an unmitigated spill is unlikely to reach the shoreline (except for Sable Island) or nearshore environments and the implementation of mitigation measures would further reduce this likelihood. The proponent predicted that effects of a blowout on fish and fish habitat would not likely be significant.

Marine Mammals and Sea Turtles, including Species at Risk

The effects of oil on marine mammals and sea turtles depend on the extent of exposure to toxic components of oil. Exposure may be derived from external coatings of oil (e.g. interaction with surface slicks when animals surface for air, clogging of baleen plates), inhalation of aerosols of particulate oil and hydrocarbons, and ingestion of contaminated prey. Hydrocarbon exposure may affect several physical and internal functions causing behavioural changes, inflammation of mucous membranes, pneumonia, and neurological damage.

The proponent stated that whales exposed to an oil spill are unlikely to ingest enough oil to cause serious internal damage. While hydrocarbons consumed through eating contaminated prey can be metabolized and readily excreted, there is concern associated with the storage of hydrocarbons in blubber and other fat deposits. In baleen whales, crude oil could coat the baleen and reduce filtration efficiency, but these effects are considered reversible. Absorbed oil can cause toxic effects such as minor kidney, liver, and brain lesions. The proponent stated that when returned to clean water, contaminated animals can depurate this internal oil.

Most marine mammals can withstand some oiling without toxic or hypothermic effects. Whales and seals use blubber to maintain core body temperature, which is not affected by a surface covering of oil. However, exposure to oil may possibly contribute to hypothermia, for example if a young seal pup is covered in oil, because it takes several months to develop sufficient blubber to maintain body heat. Oil fouling might affect seal locomotion, with heavy oiling causing flippers to stick to the body. Direct contact with oil can cause fouling in fur-bearing marine mammals, such as seals, reducing the insulation value of hair, but in healthy seals this is not likely to be a major problem as they rely primarily on blubber for insulation. In the absence of repeated exposure to surface oil, an oiled seal will recover over time.

Studies indicate that some cetaceans can detect oil spills, but they may or may not consistently avoid contact with most oil types. Monitoring studies of marine mammals following oil spill events in different parts of the world have provided evidence implicating oil spills with the mortality of cetaceans.

It is unknown if sea turtles are able to detect oil spills but evidence suggests that they do not avoid oil at sea. In addition to surface oiling, sea turtles are particularly vulnerable to prolonged exposure to petroleum vapours as a consequence of their diving behaviour, which requires rapidly inhaling large volumes of air prior to diving and

continually resurfacing. Juveniles and adult sea turtles spend less time at the sea surface than hatchlings, which may reduce their exposure to smaller oil slicks. Sea turtle exposure to oil has been shown to result in histologic lesions as well as a reduction in lung diffusion capacity, decrease in oxygen consumption or digestion efficiency, or damage to nasal and eyelid tissue.

Turtles occurring within the zone of influence of an accident connected with the Project may be exposed to oil and experience related health effects. As the turtles occurring in the regional assessment area would be juveniles and adults, the potential for mortality as a result of oil exposure would be lower than for hatchlings. Turtles would also experience a short-term reduction in habitat quality, during which they have the potential to ingest oil or oiled prey.

Spill of Drilling Fluids

A spill of drilling fluid at both the surface or at the seabed could temporarily reduce local habitat quality for marine mammals and sea turtles due to increased levels of total suspended solids and possibly thin sheen associated with the spill. Modeling shows that the plume would travel with ambient currents until dispersion and turbulence cause the total suspended solids concentrations to fall below 1 milligram per litre. Previous modelling predicted that plumes resulting from a spill at the surface and seabed would extend from 5080 metres to 9620 metres from the site and conditions would return to background levels within 30 hours of the spill. Any risk of physical injury would be limited to individuals in the immediate vicinity of the spill. A sub-sea release of synthetic-based mud at the wellsite would likely not affect sea turtles, given the water depth. In summary, the proponent predicted that effects are not likely to be significant.

Diesel Spills from Platform Supply Vessels

Modeling carried out for the Project indicated that the majority of diesel from a spill of 10 and 100 barrels from either the drilling unit or supply vessel would evaporate and disperse within three days of the release, creating a temporary and reversible degradation in habitat quality. Depending on the location and extent of the spill, it could directly and indirectly reduce the amount of habitat available to marine mammals and sea turtles for foraging and other life history activities. These effects would be short-term, lasting until the oil disperses and diesel content in the area returns to background levels. The proponent stated that a batch spill of diesel is not expected to create permanent or irreversible changes to habitat quality or use.

Diesel fuel has the potential to affect various physical and internal functions of marine mammals and sea turtles, leading to potential physical injury or mortality. Fur-bearing marine mammals are the most susceptible to contact with hydrocarbons. Except in the case of a vessel spill of diesel during transit to the nearshore, the likelihood of seals coming into contact with oil from a Project-related diesel spill are very low. Diesel fuel would disperse faster than crude oil, limiting the potential for surface exposure, although there would be increased toxicity associated with this spill and risk of inhalation of toxic fumes is present for either type of spill (crude oil or diesel). Overall, marine mammals and sea turtles are not considered to be at high risk from a diesel spill; it is probable that only a small proportion of a species population would be within the limited area affected by the spill. It is expected that most marine mammals would be able to avoid surfacing in areas of harmful hydrocarbon concentrations.

Blowout

The extent of the potential effects of a blowout would depend on how the spill trajectory and marine mammals and sea turtles overlap in both space and in time. Based on the thickness threshold of 0.04 micrometres, the risk of mortality from a blowout is considered low for non-fur-bearing individuals. However, based on an understanding of critical habitat for species at risk and important breeding locations in the regional assessment area for certain marine mammals and predicted well blowout incident modeling results, population level effects are possible.

The proponent's stochastic modelling predicted the average probability of surface oiling (exceeding a thickness threshold of 0.04 micrometres) reaching the Gully Marine Protected Area (designated critical habitat for the Northern Bottlenose Whale) from an unmitigated worst-case credible scenario event to be approximately 61 percent during the summer season (May to October). The maximum exposure time for surface oil exceeding the 0.04-micrometre threshold in the Gully is four to seven days. The maximum time-averaged thickness of surface oil predicted in the Gully Marine Protected Area may reach more than 200 micrometers; however, the average time-averaged thickness is predicted to be less than 50 micrometers. Therefore there is potential for adverse environmental effects on species (including Sowerby's Beaked Whale, Blue Whale, North Atlantic Right Whale, Killer Whale, Fin Whale, and Harbor Porpoise) present in this area in the unlikely event of a well blowout incident. There may be physiological effects associated with direct oiling or ingestion of prey or indirect effects associated with a change in behaviour, including habitat use.

Based on its stochastic modelling, the proponent predicted that the average probability of surface oiling (exceeding a thickness of 0.04 micrometres) reaching the Roseway Basin (designated critical habitat for the North Atlantic Right Whale) from a worst-case credible scenario to be approximately 20 percent during the winter season (November to April) and 6.5 percent in the summer (May to October). The proponent predicted that a well blowout could increase the risk of mortality or physical injury and adversely affect habitat quality and use for marine mammals and sea turtle species at risk.

Based on modelling, fur-bearing seals inhabiting Sable Island have a 28-percent probability of coming into contact with a surface oiling (0.04 micrometre thick layer of oil) and a 55-percent average probability of stranded oil (one micrometre) on the coastline, while the likelihood of other seals coming into contact with oil from a project-related spill is low. Given the predicted relatively high potential for shoreline oiling on Sable Island, short minimum arrival time, and average degree of oiling, and the known aggregations of breeding seals on Sable Island (including the world's largest breeding colony of grey seals), a blowout could cause population level effects.

Modeling of offshore spills indicated a 0 to 10 percent chance of oil reaching the Nova Scotia coastline, with most predicted contact locations having probabilities of less than 1 percent. The minimum arrival time ranged from 20 to 100 days, providing time to mobilize spill response efforts. Although individual seals on the Nova Scotia coastline may be physically affected or even die in the unlikely event that oil reaches the nearshore and shoreline region, population level effects are not anticipated.

A significant adverse residual environmental effect on marine mammals and sea turtles is predicted in the unlikely event of a well blowout incident in recognition of the probability of interaction with breeding seals on

Sable Island and marine mammal and sea turtle species at risk inhabiting the affected area. Given the very low probability of a well blowout incident or other releases, and that the predictive modeling referred to above assumes an unmitigated release, the likelihood of effects on marine mammals and sea turtles is considered low.

Migratory Birds, including Species at Risk

The proponent reported that migratory birds, and especially marine birds, are among the most vulnerable and visible species to be affected by oil spills. Reported effects vary with species, type of oil, weather conditions, time of year, volume of the spill, and duration of the spill. Mortality or physical injury can occur from external exposure to oil (oil coating on feathers), inhalation of particulate oil and volatile hydrocarbons, and ingestion. External exposure to oil occurs when birds land in oil, surface from beneath oil, or swim into oil. Oiling of feathers causes thermal and buoyancy deficiencies that typically lead to death from a combination of heat loss (hypothermia), starvation, and drowning. Feather oiling can also affect flight.

Ingestion of oil as a result of preening or consumption of contaminated food or water can cause longer-term physiological and pathological issues, possibly leading to death. Sub-lethal effects of hydrocarbons ingested by marine birds may persist for a number of years, depending on generation spans of affected species and the persistence of any spilled hydrocarbons. Most marine birds are relatively long-lived. Adult marine birds foraging offshore to feed their young may become oiled and bring hydrocarbons on their plumage back to the nest to contaminate their eggs or nestlings, causing embryo or nestling mortality. The extent of bioaccumulation of the chemical components of oil in birds is limited because vertebrate species are capable of metabolizing them at rates that minimize bioaccumulation.

Nesting seabirds that have survived oil contamination generally exhibit decreased reproductive success. Further, when oiled birds return to nests, they risk exposing eggs to oil and causing high mortality of embryos. Mortality and developmental defects have been documented in avian embryos exposed to even small quantities of oil.

Diving species are considered the most susceptible to the immediate effects of surface slicks. Other birds (e.g. Northern Fulmar, terns) are also vulnerable to oil because they feed over wide areas and make frequent contact with the water's surface.

Although some birds may survive these immediate effects, long-term physiological changes may eventually result in lower reproductive rates or premature death. It is generally agreed that the survival rate for oiled birds is very low, regardless of rescue and cleaning attempts.

The proponent indicated that the scientific literature is divided with respect to long-term population effects on migratory birds as a result of oil spills. Several studies suggest that oil pollution is unlikely to have major long-term effects on bird productivity or population dynamics. Conversely, others show long-term effects of oil pollution on bird populations, e.g. birds having ingested oil no longer contribute to the reproductive output of a species.

Pelagic species that come inshore only to nest, and shorebirds and other coastal water birds could be at risk. There are eight marine-related bird species at risk that occur within the regional assessment area: Ivory Gull, Piping Plover, Red-necked Phalarope, Buff-breasted Sandpiper, Roseate Tern, Red knot, Harlequin Duck, and Barrow's Goldeneye. Of these, Ivory Gull and Roseate Tern are the most likely to occur within the project area. The Roseate Tern is a diving species known to breed on Sable Island, which based on modelling results, would be

susceptible to shoreline and surface oiling as a result of an unmitigated blowout incident. Although a landbird, Savannah Sparrow (princeps subspecies) breeds almost exclusively on Sable Island and the habitat of this species could be affected by an oil spill.

Spill of Drilling Fluid

An accidental release of drilling fluid at the surface or at the seabed could create a sediment plume extending up to 9620 metres from the site; with the affected area returning to background conditions within 30 hours of the spill. A release at the surface could also create a small, thin sheen of oil and cause effects similar to those discussed above for hydrocarbon spills, but more limited in magnitude. Scientific investigations into the effects of thin oil sheens on the feathers of pelagic seabirds found that feather weight and microstructure changed significantly after exposure, concluding that a plausible link exists between even operational discharges of hydrocarbons and increased seabird mortality. If the wind and wave conditions at the time of a spill were such that a sheen formed, it would be temporary and limited in size, and it is likely that only birds in the immediate area of the spill would be affected. Furthermore, given the low surface oil thickness required to cause sheen (0.04 micrometres), it is expected that effects would be minor and unlikely to cause seabird mortality. The risk of mortality for individual birds coming into contact with sheen would be increased from those that do not interact with the sheen, but the proponent predicted that the limited nature of this sheen and the likely number of birds affected would be such that the residual effect would not likely be significant.

Batch Spills, Spills from Platform Supply Vessel, or Blowout

Modeling predicted a low probability (1 to 5-percent) of shoreline oiling resulting from an unmitigated blowout along the coasts of Bay of Fundy, Scatarie island, Gulf of Maine, and St. Pierre et Miquelon, with a maximum length of affected coastline (above the one micrometre thickness threshold) to be 79.5 kilometres along Sable Island and mainland Nova Scotia. In the event of a blowout, Sable Island, which has been identified as a migratory bird sanctuary and important bird area, including a breeding area for the Roseate Tern, could be expected to see heavy oiling (greater than 10 millimetres thick) and parts of mainland Nova Scotia may experience shoreline oiling above 1-gram-of-oil-per-square-metre threshold.

There are several seabird colonies and important bird areas along the coast of Nova Scotia (including small coastal islands) which could be affected by a well blowout. The modeling indicated that the average minimum time required for oil to potentially reach these areas (30 days for mainland) would allow for response measures and containment equipment to be placed in advance to reduce or avoid effects. Response measures could disrupt nesting birds and cause reproductive failure. The average minimum arrival time for shoreline emulsion mass exceeding one micrometre at Sable Island would be five days which would greatly reduce the opportunity for implementation of response measures to avoid or mitigate adverse effects on birds nesting there. A threshold of 100 micrometres is used as the threshold thickness for oiling mortality of wildlife, including shorebirds. The proponent stated that it would have additional response time than the 30 days predicted for oil to reach the mainland to intervene prior to shoreline emulsion reaching levels predicted to result in shorebird mortality. Although potential of effects on nesting habitat is possible, there is greater potential for effects on foraging habitat at sea.

The proponent predicted a significant adverse residual environmental effect on migratory birds in the unlikely event of a well blowout, large batch spill, or vessel spill. Given the low probability of a large spill event to occur, and that the predictive modeling referred to above assumes an unmitigated release, the likelihood of effects to migratory birds is considered low. The proponent predicted that the effects of infrequent small spills would not be significant.

In general, the proponent predicted that although hydrocarbon spills could result in some mortality at the individual level, residual adverse environmental effects are predicted to be reversible at the population level. However; effects could be significant if the consequences carried over more than one generation or if recovery goals for a listed species are jeopardized.

Special Areas

All of the identified accidental events have the potential to affect habitat quality in special areas. The nature and extent of the effects would vary depending on the type and magnitude of the event, the proximity to the special area to the event, and the ecological importance of the special area. Adverse effects on a special area could degrade its ecological integrity to the point that it is not capable of providing the same ecological function for which it was designated (e.g. protection of sensitive or commercially important species). Special areas and their respective distances from the project area are provided in Table 6 (Section 6.4)

The special areas with the greatest potential to receive some surface oiling as a result of a vessel spill (based on proximity to the likely vessel routes) are the Scotian Slope/Shelf Break Ecologically and Biologically Significant Area, the Haddock Box, Sable Island National Park Reserve, the Gully Marine Protected Area, Shortland Canyon and Haldimand Canyon, Emerald Basin Sponge Conservation Area, the Sambro Bank Sponge Conservation Area, North Atlantic Right Whale Critical Habitat, and Northern Bottlenose Whale Critical Habitat. Coastal special areas that could be affected by an accidental event include the Kejimkujik National Park – Seaside Adjunct, Bonnet Lake Barrens Wilderness Area, Canso Coastal Barrens Wilderness Area, Duncan's Cove Nature Reserve, Musquodoboit Harbour, and the Terence Bay Wilderness Area. The potential for a spill to affect any of these areas would depend on the nature, volume, and location of the spill; not all of these areas would be affected by a single spill. Effects would most likely be temporary, but could affect species sensitive to surface oiling.

Spills of Drilling Fluids, Fuel Batch Spills and Spills from Platform Supply Vessels

A spill of drilling mud, and a 10-barrel (1590-Litre) batch spill would be limited in magnitude, duration and geographic extent, affecting a small portion of the Scotian Slope/Scotian Shelf Ecologically and Biologically Significant Area. Due to the limited (patchiness) and temporary nature of any surface oiling, the proponent did not predict permanent alteration or destruction of habitat in these special areas. Also, diesel would rapidly spread to a thin sheen and mostly evaporate. The residual environmental effect of a spill of drilling fluid or a 10-barrel (1590-Litre) batch spill on special areas is predicted to be not significant with a high level of confidence in recognition of the limited spatial and temporal extent of effects and limited interaction with special areas other than the Scotian Slope/Shelf Break Ecologically and Biologically Significant Area.

The proponent indicated that a swath of surface oiling in excess of the visible sheen threshold from a 100 barrel (15 900-Litre) diesel spill could migrate to the Haddock Box and the Gully Marine Protected Area. Additionally, a spill from a vessel in transit could potentially occur anywhere along the transit route between the mobile offshore drilling unit and the supply base in Halifax Harbour, and therefore would have the potential to impact

Sambro Bank Sponge Conservation Area, Emerald Sponge Conservation Area, and shoreline habitat (if a spill should occur close to port). Dissolved hydrocarbons from spilled diesel would be limited to the surface and mixed layer of the water column, therefore the potential for deeper sponges to be exposed is considered low. With respect to the Haddock Box, the proponent note that while Haddock is a bottom-dwelling species, sub-lethal and lethal effects can occur to eggs and larvae present in the mixed surface layer of the water column. The proponent concluded that the relatively limited zone of influence of a spill would prevent any wider spread and potentially significant adverse effects from occurring; further adverse effects would be considered temporary and reversible.

The residual environmental effect on habitat quality of special areas for drilling fluid spills and the batch diesel (10 and 100 barrel) and vessel spill scenarios is predicted to be not significant.

Blowout

Modeling results of surface oiling exceeding 0.04 micrometres and the associated exposure time are provided in Table 9. The 0.04 micrometre threshold corresponds to a visible oil sheen on the surface. A precautionary approach was taken in choosing this threshold. The quality of habitat of the special areas would be compromised such that harm to marine mammals, sea turtles and seabirds may be expected at a threshold of 10 micrometres.

Table 9 Surface Oiling Interactions with Special Areas Resulting from a Blowout

Special Area	Average probability of surface oiling exceeding 0.04 micrometres in a portion of the special area (percent)	Total intersect area of surface oiling exceeding 0.04 micrometres (square kilometres)	Average maximum exposure time (days)
Coastal			
Duncan's Cove Nature Reserve	1.9	0.05	1
Musquodoboit Harbour Ramsar Site	1.0	0.42	1
Terence Bay Wilderness Area	0.7	4.90	1
Canso Coastal Barrens Wilderness Area	0.7	24.25	1
Kejimkujik National Park (Seaside Adjunct)	0.5	0.85	1
Scatarie Island Wilderness Area	0.5	1.60	1
Offshore			
Gully Marine Protected Area	61.1	2,371.28	9
Sable Island National Park Reserve of Canada	28.4	14.45	4
Haddock Box	55.0	12,797	8
Stone Fence coral conservation area	25.7	15	5

Special Area	Average probability of surface oiling exceeding 0.04 micrometres in a portion of the special area (percent)	Total intersect area of surface oiling exceeding 0.04 micrometres (square kilometres)	Average maximum exposure time (days)
(Lophelia Coral Conservation Area)			
Sambro Bank Sponge Conservation Area	25.0	63	6
Emerald Sponge Conservation Area	22.9	197	4
Northeast Channel Coral Conservation Area	16.8	425	4
Lobster Broodstock Closure Area	7.7	6,561	2
North Atlantic Right Whale - Roseway Basin	6.58	3,319	2
Laurentian Channel Area of Interest	4.6	12,647	2
St Anns Bank Area of Interest	0.9	527	1
North Atlantic Right Whale - Grand Manan Basin	0.48	31	1

The greatest probabilities of surface oiling from an unmitigated spill exceeding 0.04 micrometres thick are estimated for offshore protected areas such as the Gully Marine Protected Area (61.1 percent) and Sable Island National Park Reserve (28.4 percent). There are lower probabilities (less than 2 percent) for surface oiling exceeding 0.04 micrometres in coastal protected areas within Nova Scotia. Modeling predicted that surface oiling can also be expected to occur within the Haddock Box and sponge/coral conservation areas. Exposure to oil within these areas would be mostly limited to the surface and mixed layer of the water column therefore, the potential for sponges and corals on the seafloor to be exposed to in-water oil is considered low. While Haddock is a demersal species, sub-lethal and lethal effects to eggs and larvae that drift in the mixed surface layer of the water column may result following exposure to in-water oil, above the 58 parts per billion and 200 parts per billion in-water concentrations, respectively.

Sable Island National Park Reserve has the highest probability of stranded oil exceeding thresholds, with the remaining designated protected areas having a low (less than 5 percent) probability of stranded oil interaction. Modeling predicted heavy oiling (greater than 10 millimetres thick) for Sable Island, with a minimum arrival time of 5 to 10 days to reach the one micrometre thickness. The recovery rate of sand beaches (e.g. recovery of vegetation or structure) following oiling is variable, depending on conditions and initial disturbance during spill response, but is assumed to occur within approximately three years. Modeling also predicted heavy oiling for Duncan's Cove, moderate oiling for Canso Coastal Barrens, Kejimkujik National Park (Seaside Adjunct) and Scatarie Island, light oiling for Terence Bay, and oil staining for Bonnett Lake Barrens.

The residual environmental effect on habitat quality of special areas is predicted to be significant for an unmitigated well blowout incident in recognition of potential effects on Sable Island. However, the likelihood of a significant adverse effect occurring is considered low given the extremely low probability of a well blowout, based on historical statistics and the spill prevention and response measures to be implemented for this Project.

Commercial Fisheries

A spill could affect availability of fisheries resources, access to fisheries resources, and fouling of fishing or cultivation gear. Although the Project is not located within an area of high harvesting activity, hydrocarbons could reach an active fishing area on the Scotian Shelf or shelf break where harvesting activity is more concentrated. Under some circumstances (e.g. nearshore supply vessel spill, well blowout incident), oil could reach coastal locations, potentially interacting with nearshore fisheries and aquaculture operations. Effects on fisheries resources can vary depending on the spill location, seasonal timing, and how much oil reaches the fisheries resource.

Physical and chemical characteristics of oil products, along with environmental and biological factors influence the degree to which commercially important species may become contaminated. The uptake of oil and polycyclic aromatic hydrocarbons by exposed fish poses a potential threat to human consumers and affects the marketability of catches. Market perceptions of poor product quality (e.g. tainting) can persist even when results demonstrate safe exposure levels for consumption, thereby prolonging effects for fishers. The presence of taint can be influenced by the type of oil, species affected, extent and duration of exposure, hydrographical conditions, and water temperature. The hydrocarbon concentrations at which tainting can occur are very low, based on sensory testing. Reduced demand for seafood that is perceived to be tainted can also lead to depressed market prices. As demonstrated in the Gulf of Mexico following the Deepwater Horizon oil spill, lack of consumer confidence in seafood quality and in the validity of government testing methods can have effects that persist beyond the period of actual effects. Even after federal and state testing showed Gulf seafood to be safe to eat, sales remained depressed due to lack of consumer confidence.

Physical contamination of boats, fishing gear, and aquaculture facilities can also occur following a spill, with floating equipment (e.g. buoys, nets, fixed traps) and shoreline cultivation facilities at higher risk. Fouling of gear can result in oil being transferred to the catch or produce.

Fishery closures may be imposed after a spill to prevent gear from being contaminated and to protect or reassure seafood consumers. Based on experience with the Deepwater Horizon, closures typically remain in place until an area is free of oil and oil sheen on the surface, there is low risk of repeat exposure based on predicted trajectory modeling, and seafood has passed sensory sampling (smell and taste) for oil exposure (taint) and chemical analysis for oil concentration (toxicity). The implementation of a fishery closure would prevent localized or area-specific harvesting of fish, and potentially alleviate concerns about marketing of tainted product, but it also represents a material concern for fishers.

Spill of Drilling Fluid

Previous studies have shown little or no risk of drilling base chemicals to bio-accumulate to potentially harmful concentrations in tissues of benthic animals or to be transferred through marine food webs to fishery species. Given the size of predicted affected area (up to 9620 metres), temporary period of measurable effects on water quality (up to 30 hours), and low toxicity of the product, effects of a synthetic-based drilling fluid spill are predicted to be not significant for commercial fisheries.

Batch Spills and Spills from Platform Supply Vessels

Modeling results indicated that batch spills from the mobile offshore drilling unit would not likely affect fish over a large area. Models predicted that around 65 percent of a spill would evaporate within three days. The maximum exposure time for emulsified oil thickness on the sea surface that exceeds 0.04 micrometres was predicted at one day.

Diesel fuel is considered to cause moderate to high risk of seafood contamination because of its relatively high content of water-soluble aromatic hydrocarbons. However, given its high evaporation rates, exposure of fisheries resources to diesel following a spill event would be short-term, thereby reducing risk of contamination of fisheries resources.

In the case of a diesel spill from a platform supply vessel, this risk of exposure and subsequent contamination could be greater if it occurred in an area of higher density of fisheries resources. A small spill (10 barrels) offshore is unlikely to measurably affect fisheries occurring outside the operational safety (exclusion) zone around the mobile offshore drilling unit and therefore would not likely cause significant adverse environmental effects on commercial fisheries. A 100-barrel diesel spill from a supply vessel would likely cause a significant adverse environmental effect on commercial fisheries, however, this spill scenario is unlikely to occur.

Blowout

An unmitigated blowout incident would be expected to adversely affect commercial fisheries, with surface and in-water oil expected to predominantly move to the east and southeast of the project area. Predictive modeling indicated that the length of time for an unmitigated blowout to reach an effects-threshold thickness (0.04 micrometres for surface oiling) at Emerald Basin or Georges Bank where fishing effort is considerably more concentrated, would be from about 6 to 20 days for Emerald Basin and 30 to 50 days for George's Bank. This would provide time to notify fishers of the spill and prevent the setting or hauling of gear in the affected area, therefore reducing or avoiding gear fouling or catching contaminated resources. Predictive modelling identified Northwest Atlantic Fisheries Organization (NAFO) units 4VS, 4W and 4X as having the highest probability of oil exceeding the 0.04 micrometres threshold for surface oiling. Following a blowout, depending on the duration and volume of the release following a blowout incident, and the effectiveness of mitigation measures, closure areas may not be widespread and fishers may also be able to fish in alternative areas. Given the very low probability of a well blowout incident or other release, and that the predictive modeling referred to above assumes an unmitigated release, the likelihood of effects to these important fisheries areas is considered low.

Modeled blowout scenarios during the summer resulted in the potential for shoreline oiling, including portions of the Eastern and Southern Shore of Nova Scotia, although the likelihood of this occurring was predicted to be low (less than five percent in most cases). These coastal areas are known to support aquaculture operations that could also be affected by oiling from either an unlikely blowout scenario or a diesel spill from a supply vessel. While the effects of oil on aquaculture are similar to other commercial fisheries, aquaculture operations are unique in the type and variety of mitigation that can be used to limit effects of spills if operators are notified in a timely manner. This can include moving floating facilities to avoid slicks, temporary sinking of specially designed cages to allow oil to pass over, and transfer of stock to other areas. However, mitigation measures can be technically, logistically, or financially challenging depending on the circumstances.

Because of the wide-spread nature of the worst-case unmitigated blowout incident, a significant adverse effect is predicted for commercial fisheries in the unlikely event of a blowout. This prediction reflects a precautionary approach. The likelihood of this significant effect occurring is considered low, given the low potential for a blowout and given the response measures that would be in place to mitigate potential effects. A blowout incident could affect aquaculture operators in Nova Scotia; however the likelihood of oil reaching the coast is very low and the time required for oil to reach the shore would give time to implement mitigation against oiling of cultivation gear.

Current Use of Lands and Resources for Traditional Purposes by Aboriginal Peoples

All accident scenarios considered in the proponent's assessment could adversely affect the current Aboriginal use of lands and resources for traditional purposes, similar to commercial fisheries. An accidental event could affect the fisheries resource (direct or indirect effects on fished species affecting fisheries success) or fishing activity (displacement from fishing areas, gear loss or damage) resulting in a change in traditional use.

Although the Traditional Use Study indicated food, social, and ceremonial fisheries were not currently identified to occur in the vicinity of the Project Area, in the event of a spill, there could be effects on nearshore fisheries, or food, social, and ceremonial fishing activities taking place offshore or on species that could be migrating through or otherwise using the affected area. An effect on species fished for traditional (e.g. communal gathering of fish for feasts) or commercial purposes, a change in habitat traditionally fished by Aboriginal peoples, or area closures could affect traditional use of marine waters and resources.

The proponent considered various accident scenarios in its assessment, including a small and medium-sized diesel release, a bulk release of diesel from a platform supply vessel, a release of synthetic-based mud and a well blowout. A small spill would be unlikely to measurably affect fisheries occurring outside the 500-metre operational safety (exclusion) zone around the mobile offshore drilling unit and would not result in a significant adverse environmental effect on current use. A spill in the nearshore environment could affect nearshore fisheries, potentially displacing fishers from traditional fishing grounds for all or most of a fishing season, depending on the volume, location, and timing of the spill.

Batch Spills from Platform Supply Vessel or Mobile Offshore Drilling Unit

Modeling results showed that diesel spills from a platform supply vessel or the mobile offshore drilling unit would not likely result in effects on fish over a large area. Diesel fuel is considered to result in a moderate to high risk of seafood contamination because of the relatively high content of water-soluble hydrocarbons. However, they are semi-volatile and evaporate slowly, therefore the impact area would be localized. However, if a fisheries closure was implemented due to the spill, this could result in a temporary loss of access to fish for Indigenous commercial or food, social, and ceremonial purposes. Modelling predicted that for a 10-barrel diesel spill, the area in excess of the 0.04 micrometre threshold would be 0.82 square kilometres and for a 100-barrel diesel spill it would be 4.4 square kilometres. In the event of a 10-barrel diesel spill, adverse environmental effects were predicted to be not significant, while a 100-barrel diesel spill and a platform supply vessel spill were predicted to potentially result in a significant adverse environmental effect.

Drilling Fluid Spill

Modeling for a spill of synthetic-based mud conducted for the Shelburne Basin Venture Exploration Drilling Project, showed little or no risk of drilling base chemicals to bio-accumulate to potentially harmful concentrations in tissues of benthic animals, or to be transferred through marine food webs to fishery species. The predicted affected area would be limited to the local assessment area (up to 9620 metres), any measurable effect on water quality would be temporary (up to 30 hours), and the drilling fluid is considered to be of low toxicity. A fisheries closure would not likely be necessary, and fouling of gear would be unlikely given the relatively small spatial and temporal footprint a spill of 3604 barrels of drilling fluid and limited harvested activity within the local assessment area. The proponent predicted that the potential effects of a synthetic-based mud spill would not be significant.

Blowout

The proponent stated that Indigenous groups were primarily concerned about the effects of an unmitigated well blowout, the worst case scenario. The effects of an unmitigated blowout incident would be of a higher magnitude, in a larger geographic area, and last for a longer duration that other spill scenarios. Consistent with the proponent's predictions for Commercial Fishing, predictive modeling indicated that the length of time for oil from an unmitigated blowout to reach threshold concentration (0.04 micrometres for surface oiling) at Emerald Basin or Georges Bank, where fishing effort is considerably more concentrated, would be between approximately 6 to 20 days for Emerald Basin and 30 to 50 days for George's Bank. This would provide time to notify fishers of the spill and prevent the setting or hauling of gear in the affected area. Gear fouling or catch of contaminated resources could therefore be reduced or avoided.

The proponent used stochastic modeling to provide probabilities of oiling for each of the fishing management zones with First Nations communal commercial or food, social, and ceremonial licences in the event of a worse-case blowout. All First Nations except for Bear River have communal commercial licences in NAFO Unit 4X, one of the fish management areas with the highest probability of oiling. Many other First Nations have communal commercial licences in NAFO Units 4Vs and 4W, the other areas of highest probability oiling.

An offshore oil spill could affect nearshore fishing and resource use along the Nova Scotia coastline. The proponent conducted stochastic modeling to determine probability of an offshore spill to result in oiling along the Nova Scotia coastline. Modeling results indicated that the probability of oil reaching most predicted contact locations was less than 5 percent with a slightly higher probability predicted during the summer season. The proponent stated the minimal arrival time for oil to reach the Nova Scotia coastline would be between 20 and 100 days, which would provide sufficient time to mobilize spill response and prevent damage to shorelines and cultivation gear at aquaculture sites.

Health and Socio-economic Conditions of Aboriginal Peoples

In supplementary information provided in response to an information request, the proponent considered the potential for adverse effects on socio-economic conditions in First Nation communities should communal commercial fisheries be affected by an oil spill. First Nation communities alerted the proponent to the cultural importance of the communal commercial fishery, to communities in addition to its economic importance. For many communities, the fishery is considered an important source of revenue for community programs. The

proponent was advised that communities perceive that a spill would cause a negative effect on the communal commercial fishery and would affect their quality of life.

The proponent stated there is also a potential for adverse effects on socio-economic conditions in First Nation communities should food, social, and ceremonial fisheries be affected by an oil spill. First Nation communities advised the proponent about the cultural importance of the food, social, and ceremonial fishery to them. Although traditional food may be a small portion of a community's diet, it is considered highly important since some community members face food insecurity. The proponent stated that communities perceive that a spill would cause a negative effect on the food, social, and ceremonial fisheries and would affect their quality of life.

In the event of a spill, a fishery closure may be imposed to prevent gear from being contaminated and to protect or reassure seafood consumers. The implementation of a fishery closure during an oil spill would prevent localized or area-specific harvesting of fish, and potentially alleviate concerns about marketing of tainted product. Closures typically remain in place until: an area is free of oil and oil sheen on the surface; there is low risk of future exposure based on predicted trajectory modeling; and seafood has passed sensory sampling (smell and taste) for oil exposure (taint) and chemical analysis for oil concentration (toxicity). From a socio-economic perspective, although studies indicate that dispersants have relatively low toxicity to fish species, dispersant use may increase public concern over seafood safety, thereby potentially prolonging effects on commercial and Indigenous fisheries. Additional testing to confirm the safety of seafood harvested after such a spill would reduce the potential for long term impacts to fishers.

The proponent stated that socio-economic effects of an accidental spill on recreational tourism would be similar to effects on fishing but of a smaller magnitude. The proponent stated recreational tourism has been a small component of the current economy or cultural identity for First Nations communities, but recognized that the Maliseet Nation in New Brunswick and Mi'gmawe'l Tplu'taqnn Incorporated view recreational tourism as a potential future economic development opportunity, and that other First Nations communities in Prince Edward Island and Nova Scotia are pursuing recreational tourism opportunities related to fishing (e.g. tuna charters) and/or whale watching.

The proponent indicated that mitigation to minimize effects of an oil spill on the current use of lands and resources for traditional purposes by Aboriginal peoples would also serve to mitigate related socio-economic effects.

The proponent concluded that a 10 barrel diesel spill, 100 barrel diesel spill, or blowout would result in significant adverse effects on the current use of lands and resources for traditional purposes including potential socio-economic effects. It did not specifically assess residual effects of a worst-case accidental spill on health.

Proponent's Mitigation Measures, Monitoring and Follow-up

The proponent proposed the following mitigation measures to address potential effects of accidents and malfunctions:

- Submit the following plans to the CNSOPB for review and approval:
    - Environmental Protection Plan
    - Safety Plan
    - Incident Management Plan

    - Spill Response Plan
    - Canada-Nova Scotia Benefits Plan

- Implement multiple preventative and response barriers to manage risk of incidents occurring and mitigate potential consequences.
- Operate under an incident management plan which would include a number of specific contingency plans for responding to specific emergency events, including potential spill or well control events.
- Pressure test the blowout preventer stack prior to installation on the well, and then again following installation on the well to test the wellhead connection with the blowout preventer. The blowout preventer would be pressure tested periodically throughout the drilling program in line with the CNSOPB's Drilling and Production Guidelines.
- Mobilize a shoreline clean-up and remediation team to the affected areas in the event that oil reaches the shoreline. A Shoreline Clean-up Assessment Technique survey would be conducted to inform shoreline clean-up and remediation as applicable. Engagement of specialized expertise to deflect oil from sensitive areas, and recover and rehabilitate wildlife species would occur as needed.
- Transfer of hazardous wastes would be conducted according to the *Transportation of Dangerous Goods Act*. Any applicable approvals for the transportation, handling, and temporary storage of these hazardous wastes would be obtained as required.
- Procedures would be put in place to ensure that hoses are inspected and operated correctly to minimize the risk of an unintended release. Platform supply vessels, mobile offshore drilling unit, and supply base would be equipped with primary spill contingency equipment to deal with spills in the unlikely event that they occur.
- Platform supply vessels selected for the Project would be equipped for safe all-weather operations, including stability in rough sea conditions and inclement weather. In addition, measure to reduce superstructure icing hazards on platform supply vessels would be implemented as necessary and could include:
    - reducing vessel speed in heavy seas;
    - placing gear below deck and covering deck machinery, if possible;
    - moving objects that may prevent water drainage from the deck;
    - making the ship as watertight as possible; and
    - manual removal of ice if required under sever icing conditions.
- Platform supply vessel and mobile offshore drilling unit contractors would have a Maintenance Management System designated to ensure that the platform supply vessels and the mobile offshore drilling unit, and all equipment, are well maintained and operated efficiently.
- A platform supply vessel would remain on standby at the mobile offshore drilling unit at all times in the event that operational assistance or emergency response support is required.
- Undertake a net environmental benefit analysis as part of the Operations Authorization process with the CNSOPB to evaluate risks and benefits of dispersing oil into the water column, and obtain regulatory approval for any use of dispersants as required.

- Include procedures for informing fishers of an accidental event and appropriate response within the Fisheries Communication Plan.

Proposed follow-up measures include:

- Reporting incidents in accordance with the Incident Reporting and Investigation Guidelines.
- Submitting a report to the CNSOPB documenting the implementation schedule (prior to drilling) and the outcome of follow-up and monitoring programs (post-abandonment) of each well, along with any additional conditions of approval, as applicable. The implementation schedule would be made available online for public information.
- In the unlikely event of a spill, specific monitoring (e.g. environmental effects monitoring) and follow-up programs may be required and would be developed in consultation with applicable regulatory agencies.

7.1.2 *Views Expressed*

Federal Authorities

Environment and Climate Change Canada requested outlines of the proponent's Incident Management Plan, Spill Response Plan, and Environmental Protection Plan and an accounting of key commitments, including those related to incident prevention, emergency preparedness, mitigation, and follow-up. The proponent provided a summary and outline of the above mentioned plans.

Environment and Climate Change Canada listed a number of additional terrestrial species (e.g. Eastern Lilaeopsis (SARA-listed, Special Concern), Sable Island Sweat Bee (COSEWIC, Threatened), and Eastern Baccharis (COSEWIC, Threatened)) that are species at risk and their critical habitat should be considered in oil spill response. It recommended that efforts be made to avoid adverse effects on these species and their habitat during oil spill response. The proponent provided further discussion and characterization of the expected results of accidental events, particularly a well blowout incident, on species at risk. It acknowledged that although routine project operations are not expected to interact with the Sable Island Sweat Bee, Eastern Lilaeopsis, or Eastern Baccharis, these species and important habitat elements could be adversely affected by a well blowout incident. Environment and Climate Change Canada noted that the EIS did not provide details of how the proponent proposes to mitigate effects in the event of a spill. It further indicated that it expects this information to be provided in the emergency response plan, and that it would be available to provide advice on mitigation to avoid harm to species at risk.

Environment and Climate Change Canada noted that while the Sable Island Migratory Bird Sanctuary is mentioned in the EIS, other migratory bird sanctuaries that could be affected in the event of accidents or malfunctions are not included. There are five migratory bird sanctuaries within the regional assessment area: Sable Island, Port Joli, Port Hebert, Haley Lake, and Sable River. While Sable Island is located offshore Nova Scotia, the other four sanctuaries are located in southwestern Nova Scotia, within the boundaries of the South Shore (Port Joli Sector) Important Bird Area. The proponent indicated that routine project operations are not expected to affect migratory bird sanctuaries, with the potential exception of unforeseen helicopter traffic during periods of severe inclement weather or other unplanned events.

Fisheries and Oceans Canada questioned the proponent's conclusion that the effects of a blowout on fish and fish habitat were not likely to result in significant environmental effects, noting the proximity of the Haddock

Box and other spawning areas in the regional assessment area to the Project and the adverse effects of major releases on fish eggs and larvae. The proponent revised its conclusion and acknowledged that these unlikely effects could be significant.

The Agency requested additional information on the potential for a marine riser-loss and an assessment of associated environmental effects. The proponent stated that, in the unlikely event of a marine riser loss, approximately 50 barrels of blowout preventer fluid could be released. It advised that this fluid would be comprised primarily of freshwater (approximately 95 percent) but would also contains glycol-based antifreeze and soluble lubricants with corrosion inhibitors. The proponent indicated that a 3604 barrel release of synthetic-based mud was assessed in the EIS as a credible worst case scenario due to a marine riser loss. Given the composition of blowout preventer fluid and adherence to the *Offshore Waste Treatment Guidelines* and *Offshore Chemical Selection Guidelines*, the proponent predicted that environmental effects associated with this loss would be of lower magnitude than those predicted as a result of a synthetic-based mud release

The Agency asked the proponent to provide additional information on the potential environmental effects of dispersants on valued components. The proponent responded that dispersants, also known as spill treating agents, may be used to accelerate the dispersion of oil released into the environment should a spill occur. In general, dispersants will change the fate of oil, increasing the surface area of oil exposed to the environment, which helps to accelerate oil biodegradation, and typically reduces the extent of surface and onshore oiling.

Dispersants are applied during oil spills to decrease the amount of oil reaching, or floating on the water surface; therefore reducing risk to surface species including seabirds, marine mammals, and sea turtles, as well as reducing oiling of sensitive shoreline habitats. While the intent of dispersion is to rapidly reduce the risk of oil slicks and dilute oil concentrations in the water column, adverse effects may also be associated with their use. For example, the use of dispersants can temporarily increase exposure of small organisms to dispersed oil droplets in the water column due to natural turbulent mixing. Increased concentrations of dispersed oil components may be acutely toxic to sensitive life stages of small fish and invertebrates, especially larvae and eggs, however, exposure would generally be within the top ten meters of the water column, and would be short term.

The proponent indicated that acute mortality to early life stages of fish could be extensive in the event of a well blowout directly in the area of a continuous oil release and dispersant use would likely increase the chance of fish species coming into contact with oil; however, substantial effects on fish populations are not expected. When dynamic, rapidly decreasing concentrations of dispersed oil are present, short-term exposures above laboratory derived toxicity thresholds are usually limited in duration, and occur only in the upper layers of the water column for treated surface slicks. For sub-sea injection of dispersants at well control incidents, concentrations exceeding mortality thresholds would be limited to areas near the dispersant injection site. With respect to chronic toxicity, the proponent cited work that indicated that in some instances survival and growth of fish declined relative to test controls, however chronic effects were at concentrations that were rarely observed in the water column from samples following the Deepwater Horizon incident.

The proponent also provided information on the effects of dispersant use on marine mammals and corals, as well as information on the potential for bioaccumulation in the food web.

The CNSOPB noted that dispersants alone have relatively low toxicity. Dispersants work by transferring oil from one area (i.e. surface water) to another area (i.e. the water column). By using dispersants, oil would be removed from the water's surface, thereby protecting marine mammals and birds, and would be dispersed through the water column where it may pose a short-term risk to fish. However, when oil is dispersed into smaller droplets, it is able to undergo biodegradation more efficiently, so that it's potential effects would be temporary compared to the effects of un-dispersed oil at the water's surface.

Indigenous Peoples

First Nations expressed concern about the potential effects of oil spills, particularly a large spill that could result from a blowout. This includes concerns about overall effects on the marine environment and species of importance to them for commercial, traditional or spiritual reasons such as Atlantic Salmon, Atlantic Bluefin Tuna, Winter Skate, American Eel, Atlantic Sturgeon, Herring, Swordfish, Silver Hake, North Atlantic Right Whale and migratory birds. The proponent provided additional information on potential effects on the above-listed species and predicted that associated residual adverse environmental effects would not result in significant effects.

First Nations expressed concerns about potential loss of fishing access and associated income, and compensation in the event of a major incident. The proponent indicated that its Fisheries Communication Plan would facilitate communication with Indigenous groups and fishers regarding potential economic and cultural effects associated with a spill and disruption in food, social, and ceremonial harvest and appropriate response measures. The proponent also noted that any damages would be compensated for in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

First Nations questioned assumptions used in spill modelling and the appropriateness of scenarios used. They expressed interest in building capacity in spill response, and suggested they be consulted on spill response plans and equipment storage. The proponent provided additional information regarding the assumptions used in the spill modelling including additional information on the assumptions used for flow rates and information on how they were reviewed and validated by the CNSOPB prior to conducting the modelling work. The proponent also referred back to information in the EIS for information such as the capping stack, regarding spill model assumptions. The proponent also provided additional information on spill response including equipment mobilization and location of spill response equipment.

Mi'gmawe'l Tplu'taqnn Incorporated and Sipekne'katik First Nation expressed concern about the length of time it would take to mobilize a capping stack to the site in the event of a loss of well control (blowout). The proponent provided additional explanation of the timeframes and noted that the capping stack is one of a number of measures available to regain control of a well or stop a blowout and that many of those measures are industry-standards, such as intervention via a blowout preventer that would be installed on every well while drilling.

Mi'gmawe'l Tplu'taqnn Incorporated expressed concern about the proponent's conclusion that in the unlikely event of an accidental spill (including a well blowout), the Project would not cause adverse residual effects on Indigenous ocean resource use and the Indigenous fishery in the Gulf of Maine and Bay of Fundy. Mi'gmawe'l Tplu'tagnn Incorporated was concerned that the conclusion was based on insufficient data collection, scoping and consultation with community and traditional knowledge holders. It requested that the proponent provide it

with capacity to undertake traditional knowledge and land and water use studies in order to sufficiently characterize the adverse residual effects on Indigenous ocean resource and the fishery. The proponent stated that spill prevention and response measures would reduce the likelihood and severity of environmental effects from accidental events. It indicated that spill modeling carried out for the Project did not show oil potentially reaching the Gulf of Maine or the Bay of Fundy.

Mi'gmawe'l Tplu'taqnn Incorporated described the importance of considering the effects of an oil spill on human health and socio-economic conditions. The proponent provided additional information about the potential effects of the Project on Indigenous fishing and relative economic importance of fishing to individual communities (revenue generation as a proportion of total non-governmental revenue), as a means of indicating how severely communities could be affected in the event of loss of fishing access. The proponent stated that the additional information showed some potential differences in Indigenous fishing practices in the Scotian Basin for both food, social, and ceremonial fishing and commercial communal fishing activity.

The Maliseet Nation in New Brunswick stated that use of spill-treating chemicals (dispersants) could affect its food, social, and ceremonial fishing. It stated that short- and long-term effects of potential spills and remediation efforts (such as dispersant use) could affect the sustainability of tuna, Swordfish and Silver Hake from both population and human health (toxin bioaccumulation) contexts as they relate to commercial fisheries, including Aboriginal commercial fisheries. The proponent provided additional information about the effects of dispersants. It noted that bioaccumulation of hydrocarbons is not typical as hydrocarbons are readily metabolized by vertebrate species, including tuna, Swordfish and Silver Hake. The proponent also noted that in the event of a spill that a fisheries closure area would remain in place until: an area is free of oil and oil sheen; there is low risk of future exposure; and seafood has passed sensory sampling (smell and taste) for taint.

The Maliseet Nation in New Brunswick, Woodstock First Nation, and Mi'gmawe'l Tplu'taqnn Incorporated all expressed concerns about economic losses both due to fisheries closure in the event of a spill, and associated reduced consumer confidence in seafood from the affected area. They emphasized the importance of the fisheries as a source of income and were concerned an oil spill could affect abundance or quality of fisheries. They stated that the proponent would need to identify the degree to which New Brunswick First Nation communities rely on fishing for income in order to develop appropriate mitigation and compensation measures. The proponent stated that the implementation of a fishery closure during an oil spill would prevent localized or area-specific harvesting of fish, and potentially alleviate concerns about marketing of tainted product. It maintained that additional testing to confirm the safety of seafood harvested after such a spill would reduce the potential for long term impacts to fishers. The proponent also responded that its Fisheries Communication Plan would facilitate communication with Indigenous groups and fishers regarding potential economic and cultural effects associated with a spill and disruption in food, social, and ceremonial harvest and appropriate response measures. It also noted that any damages would be compensated for in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

A summary of all issues raised by Indigenous peoples is presented in Appendix D.

Public

The Seafood Producers Association of Nova Scotia raised concerns about the effects of spills on Georges Bank. The proponent's analysis indicated that neither batch spills nor spills from platform supply vessels were expected to reach Georges Bank, due to its distance from the project area. In the event of an unmitigated 30-day blowout, the proponent predicted that there is a 0 to 30 percent chance of surface oiling exceeding the 0.04-micrometre thickness threshold for adverse effects reaching George's Bank in 30 to 50 days.

The Seafood Producers Association of Nova Scotia also requested that there be additional follow-up and consultation with stakeholders regarding the net environmental benefit analysis that would be part of the spill response plan, along with its implication for approval of dispersants. The proponent has indicated that it has consulted and would continue to consult stakeholders, including the fishing industry on spill response planning.

7.1.3 *Agency Analysis and Conclusion*

Analysis of the Effects

The Agency is aware that the proponent operates globally and has substantial experience in offshore drilling, including in deep water. The CNSOPB, which has expertise in health and safety, has facility safety and emergency prevention requirements with which the proponent must comply. The CNSOPB has advised the Agency that authorization of drilling activities is contingent on its confidence that the proponent has a satisfactory approach to risk management and that the proponent would take all reasonable measures to minimize the probability of malfunctions and accidents to occur. Further, the CNSOPB will base its authorization on the proponent's preparedness to appropriately respond in the unlikely event of an accident or malfunction.

The Agency understands that the probability of a blowout occurring is approximately 0.031 percent per exploration well drilled. The proponent would implement multiple preventative and response barriers to manage risk of incidents occurring and mitigate potential consequences. In addition, the proponent would be required to prepare spill response plans that would include contingency plans for responding to oil spills. The spill response plan would be required to meet the CNSOPB's regulatory standards and be appropriate for the scenarios that could occur. In the event of a blowout, the proponent would be required to begin the immediate mobilization of a capping stack and associated equipment to the project area. In the unlikely event that oil reaches a shoreline, the proponent would be required to mobilize a shoreline clean-up and remediation team to the affected area. This would include rehabilitation of wildlife species, as needed.

The Agency understands that Indigenous peoples have substantive fishing interests in the regional assessment area and are concerned about accidental spills that could affect communal commercial and food, social, and ceremonial fisheries. To ensure that Indigenous groups are able to contribute information to the proponent's spill response procedures, the proponent would be required to engage Indigenous groups on its spill response plan and provide them with the approved version. Any damages, including the loss of food, social and ceremonial fisheries would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

Key Mitigation Measures to Avoid Significant Effects

The Agency considered the mitigation measures proposed by the proponent, expert federal advice from federal authorities, and comments from Indigenous groups and the public, and identified the following key measures to prevent or mitigate significant adverse effects of accidents and malfunctions:

- 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.
- Prepare a Spill Response Plan and submit to the CNSOPB for acceptance 90 days prior to drilling. The Plan must include procedures to respond to an oil spill (e.g. oil spill containment, oil recovery). It must also contain or be accompanied by:
    - Well control strategies and measures, including the drilling of a relief well, in the event that well control cannot be re-established following a sub-sea well blowout.
    - Measures for wildlife response, protection, and rehabilitation (e.g. collection and cleaning of marine mammals, birds, and sea turtles, including species at risk) and measures for shoreline protection and clean-up, developed in consultation with the CNSOPB.
- Conduct a desktop exercise of the Spill Response Plan prior to the commencement of project activities and adjust the plan to address any deficiencies identified during the exercise.
- The Spill Response Plan shall be reviewed and updated as required during drilling and before commencing a new well.
- Undertake a net environmental benefit analysis to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the CNSOPB for review. Relevant federal government departments would provide advice to the CNSOPB through the Environment and Climate Change Canada Environmental Emergency Science Table.
- Consult with Indigenous groups regarding the details of the Spill Response Plan and provide the approved version to Indigenous groups.
- In the event of a well blowout, begin the immediate mobilization of a capping stack and associated equipment to the project area.
- 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*.

Follow-Up

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

- Monitor the environmental effects of oiling on components of the marine environment to be accepted by the CNSOPB until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include:

- sensory testing of seafood for taint, and chemical analysis for oil concentrations;
- measuring levels of contamination in fish species with results integrated into a human health risk assessment to determine the fishing area closure status; and
- monitoring for marine mammals, sea turtles, and birds with visible oiling and reporting results to the CNSOPB.

The Agency has determined that the effects of a major accident or malfunction from the Project on fish and fish habitat, marine birds, current use of lands and resources for traditional purposes by Aboriginal peoples, health and socio-economic conditions, and commercial fisheries would likely be significant. The Agency also recognizes that the probability of occurrence for a major event is very low and thus its effects are unlikely to occur. The Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions. Notwithstanding this conclusion, the Agency recommends that the mitigation measures and follow-up program elements identified above be included as conditions of the decision statement, if the Project proceeds.

7.2 Effects of the Environment on the Project

Extreme environmental conditions or events can increase the probability of an accident or malfunction that in turn could affect the environment. For this reason, the effects of the environment on the Project are considered.

7.2.1 *Proponent's Assessment of Environmental Effects*

The Project could be affected by environmental phenomena such as fog, extreme weather events, lightning, sea ice and superstructure icing, seismic events and tsunamis, and sediment and seafloor stability.

Fog

Fog reduces visibility, which can hinder platform supply vessels and helicopter transportation, potentially resulting in delays in delivery of supplies and delayed crew changes. The proponent noted that a work stoppage as a result of fog would be unlikely.

Extreme Weather Events

The proponent stated that high wind and wave conditions could delay cargo transfer operations and, in the event of a spill, could hamper spill response operations. The proponent noted that extreme wind and wave conditions could also increase the probability of accidental spills, suspension or delay of project activities, evacuation of the drilling unit and in extreme cases, loss of life. The proponent noted that the mobile offshore drilling unit would be designed for harsh weather conditions; meteorological conditions would be monitored and stop-work procedures would be implemented should conditions become unsafe. The proponent also noted that prior to commencing operations the mobile offshore drilling unit would require a certificate of fitness from an independent certification authority, as prescribed in the *Nova Scotia Offshore Certificate of Fitness Regulations* of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.

Lightning

The proponent identified that lightning can pose a safety risk to personnel and potentially affect electronic systems. The mobile offshore drilling unit and platform supply vessels would be equipped with lightning protection systems, and safe work practices would be implement to reduce the exposure of personnel to lightning strikes.

Sea Ice and Superstructure Icing

The proponent noted that sea ice is very rare in the Nova Scotia offshore environment and potential effects are unlikely.

The proponent does not consider ice an important factor affecting project operations; however states that vessels operating in later fall and winter are likely to experience some degree of icing. Accumulation of ice is sometimes referred to as “superstructure icing” and can result from freshwater moisture (e.g. fog, freezing rain) or from salt water associated with freezing spray or wave wash. The rate of superstructure ice accumulation depends on weather conditions and individual vessel characteristics. The accumulation of ice on a ship’s structure can raise the centre of gravity, lower vessel speed and cause difficulty in maneuvering.

The proponent predicted that the effects of superstructure icing would be low given that the drilling unit would be designed for harsh weather conditions, meteorological conditions would be monitored and stop-work procedures would be implemented should conditions become unsafe.

Seismic Events and Tsunamis

The proponent identified that the Scotian Shelf is known to be seismically active, however events tend to be low-magnitude. The proponent noted that given the short duration of project activities, the probability of a major seismic event occurring during exploration drilling is low. The proponent noted that the well design during the drilling phase and after abandonment considers earthquake potential, based on geophysical data for Nova Scotia. The proponent concluded that due to the absence of fixed offshore infrastructure and for the low probability of occurrence of seismic activity and tsunamis, as well as the limited duration of offshore activities (i.e. approximately 120 days to drill a well), the risk associated with seismic events and tsunamis would be minimal.

A tsunami would not be expected to pose a serious risk to the Project, because it would generate only low-amplitude waves with long wave periods at the proposed project location (approximately 250 kilometres from land).

Sediment and Seafloor Instability and Other Geo-hazards

The proponent noted that sediment scour, liquefaction of sediments from seismic events, and slope failure on the seafloor could adversely affect exploration drilling activities. The proponent noted that in the worst case, these geo-hazards could cause loss of the wellhead, conductor and other casing strings. The proponent stated that avoidance of geo-hazards reduces the risk of accidental events and it has collected geo-hazard baseline data that would be confirmed on-site prior to drilling.

Proposed Mitigation Measures, Monitoring and Follow-up

The proponent proposed the following mitigation measures to address potential effects of the environment on the Project:

- Obtaining a Certificate of Fitness from an independent third party Certifying Authority for the mobile offshore drilling unit prior to the commencement of drilling operations, as required by the *Nova Scotia Offshore Certificate of Fitness Regulations* of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.
- Forecasting, observing, and reporting physical environment data in accordance with the CNSOPB's *Offshore Physical Environment Guidelines*.
- Regularly monitoring weather forecasts to alert platform supply vessels, helicopters and the mobile offshore drilling unit of inclement weather or heavy fog before it poses a risk. Extreme weather conditions would be avoided where possible. Captains and pilots would have the authority and obligation to suspend or modify operations in case of adverse weather or poor visibility that compromises the safety of operations.
- Monitoring icing conditions on the platform supply vessels, helicopters and drilling during the fall and winter, particularly when gale-force winds may occur with air temperatures below minus 2 degrees Celsius.
- Implementing safe work practices to reduce exposure of personnel to lightning risk.
- Prior to any drilling, conducting a comprehensive geo-hazard baseline review followed by a detailed geo-hazard assessment for each proposed wellsite.
- Conducting an imagery-based seabed survey in the vicinity of well sites to ground-truth the findings of the geo-hazard baseline review prior to drilling. If any environmentally or anthropogenically-sensitive feature is identified during the survey, the well site would be moved to avoid affecting it, if it is feasible to do so. If it is not feasible, the CNSOPB would be consulted in order to determine an appropriate course of action.
- Maintaining obstruction lights, navigation lights and foghorns in working condition on board the drilling unit and platform supply vessels. Radio communication systems would be in place and in working order.
- Equipping platform supply vessels for safe all-weather operations, including stability in rough sea conditions and inclement weather. Measures to reduce superstructure icing may include:
    - reducing vessel speed in heavy seas;
    - placing gear below deck and covering deck machinery if possible;
    - moving objects that may prevent water drainage from the deck;
    - making the ship as watertight as possible; and
    - manually removing ice if required under severe icing conditions; and
    - conducting internal verification as well as external inspections and audits of platform supply vessels.

7.2.2 *Views Expressed*

Federal Authorities

Environment and Climate Change Canada provided additional wind and wave data to supplement the analysis conducted by the proponent, and to ensure that the data accurately represents expected conditions. The proponent noted that the data provided by Environment and Climate Change Canada did not change the outcome of the residual environmental effects analysis.

Environment and Climate Change Canada also commented on the possibility of seismic events and seafloor stability. The proponent clarified how it calculated the probability of these events. Natural Resources Canada advised the Agency that the proponent has characterized seismic risk appropriately and that the risk is low due to the lack of proposed fixed infrastructure and the short duration of the proposed activities.

Indigenous Peoples

The Agency did not receive any comments from Indigenous peoples regarding the effects of the environment on the Project.

Public

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

7.2.3 *Agency Analysis and Conclusion*

The proponent has adequately designed for the Project to account for potential effects of the environment on the Project. There are no permanent or fixed offshore facilities proposed for the Project. The mobile offshore drilling unit and platform supply vessels would be selected to meet international standards of fitness for year-round operations in the North Atlantic Ocean. The drilling unit must also comply with the *Nova Scotia Offshore Certificate of Fitness Regulations*. The Agency notes that the drilling unit selected to drill the first well (the semi-submersible West Aquarius) has been operating safely in the North Atlantic (off Newfoundland) for several years. Regardless of the drilling unit used, the proponent would have operating plans in place for weather-related shut-downs, including weather thresholds (e.g. forecast wind speed and wave height) that would trigger a shut-down. Site-specific weather and sea-state observation and forecasting services are standard requirements for operators in the Canadian offshore.

7.3 Cumulative Environmental Effects

This section describes cumulative environmental effects that are likely to result from the Project in combination with the environmental effects of other physical activities that have been or would be carried out.

7.3.1 *Proponent's Assessment of Environmental Effects*

The proponent assessed cumulative environmental effects by selecting the valued components, defining their spatial and temporal boundaries, identifying any past, present and future (i.e. certain or reasonably foreseeable) physical activities that overlap spatially and temporally with the Project, and applying criteria for the determination of significance for residual cumulative environmental effects. The proponent assessed cumulative environmental effects on:

- fish and fish habitat
- marine mammals and sea turtles
- migratory birds
- special areas
- commercial fisheries
- current Aboriginal use of lands and resources for traditional purposes

The proponent identified past, present, and future (i.e. certain or reasonably foreseeable) physical activities that could affect the above valued components and therefore could contribute to a cumulative effect, including:

- offshore gas development projects on the Scotian Shelf (e.g. Sable Offshore Energy Project and Deep Panuke Project);
- offshore exploration petroleum projects (e.g. Shelburne Basin Venture Exploration Drilling Project);
- commercial, Indigenous, and recreational fisheries; and
- other ocean uses, such as shipping, scientific research, and military activities.

The proponent did not consider the Cohasset-Panuke Project that was carried out in the 1990s due to the lack of spatial and temporal overlap with the Project; or the BP Tangier 3D Seismic Survey (2014) due to the lack of temporal overlap with the Project.

The proponent carried out its effects assessment in three stages:

1. establishing the context for the cumulative effects,
2. determining if project-specific environmental effects interact with the environmental effects of other physical activities, and then
3. assessing the cumulative environmental effects and the Project's contribution to them.

In deciding whether the Project had the potential to interact with another physical activity to contribute to cumulative effects, the proponent considered:

- whether the Project could result in a demonstrable or measurable residual environmental effect on a valued component; and
- whether the residual environmental effect of the Project is likely to act cumulatively with the residual environmental effect of another past, present or future physical activity.

The proponent assessed cumulative environmental effects on valued components for which both criteria were satisfied.

Other Physical Activities Considered

Offshore Gas Development

The Sable Offshore Energy Project (Sable Project) and the Deep Panuke Project are both currently producing natural gas and are operating in the regional assessment area. Both are located near Sable Island and are approximately 11 and 35 kilometres from the local assessment area, respectively. The Sable Project has been producing natural gas since 1999 and has an estimated 25-year life. The operator for the Sable Project, ExxonMobil, recently announced that it may begin plugging wells in 2017, and that it has commenced decommissioning studies. The Deep Panuke Project began producing natural gas in 2013 and has a projected 13-year life; however, the project operator, Encana Corporation, has recently decreased its reserve estimate and announced it would move to seasonal production. The proponent stated that these past and present offshore gas development projects comprise similar physical activities and components to the Project (albeit on a larger spatial and temporal scale).

Typical activities associated with production projects include presence and operation of offshore production platforms and subsea pipelines, platform supply vessels, operational discharges, helicopter transportation, and decommissioning. These activities could cause a change in risk of mortality and physical injury, as well as a change in habitat quality and use affecting fish and fish habitat, marine mammals and sea turtles, and migratory birds; a change in habitat quality for special areas; a change in availability of fisheries resources affecting commercial fisheries; and a change in traditional use affecting Indigenous fisheries. The proponent stated that the potential residual effects of offshore gas developments would be felt primarily in proximity to the platforms.

Exploration Drilling Projects

Shell Canada Limited's Shelburne Basin Venture Exploration Drilling Project commenced on October 23, 2015 with the drilling of the Cheshire L-97 well. A second well (Monterey Jack E-43) has been drilled since the submission of the proponent's EIS. Depending on the results of the initial wells, an additional five wells may be drilled before 2019. Project components and activities would be very similar to those of the Shelburne Basin Venture Exploration Drilling Project, located approximately eight kilometres west of Scotian Basin project area.

Fisheries

Commercial, recreational and Indigenous fisheries exist within the regional assessment area, targeting a diverse range of species including groundfish, large pelagic fishes, small pelagic fishes, and invertebrates. Different types of gear are employed in these fisheries and include otter trawl, seine, longline, and gillnet, among others.

Other Ocean Uses

Other ocean uses that occur in the regional assessment area, include shipping, scientific research, and military activities.

Potential Cumulative Effects on Fish and Fish Habitat

The proponent assessed the potential for cumulative effects resulting in a change in habitat quality and use, and a change in risk of mortality or physical injury.

Change in Habitat Quality or Use

The proponent noted that cumulative environmental effects may temporarily reduce the amount of habitat available within the regional assessment area, potentially disrupting reproduction, foraging and feeding, or migratory behaviour. Species whose ranges extend beyond the regional assessment area may be exposed to discharges from one or more physical activities, as well as underwater sound from multiple sources. It noted that fish may temporarily avoid localized areas of degraded water quality or that are noisy. The proponent stated that the routine discharges from the Project and other third party physical activities would be in compliance with requirements as applicable (e.g. *Offshore Waste Treatment Guidelines*); and that routine discharges are predicted to disperse quickly in the open ocean and therefore not affect water quality other than close to discharge points. The proponent predicted that discharges would not cause a substantial cumulative change in habitat quality and use.

Modelling results for drill cuttings dispersion show the potential for a maximum extent of 1367 metres from the well location (at a deposition thickness of 0.1 mm), the thickness of sediment deposit associated with benthic smothering (approximately 10 millimetres) is predicted to be confined to within 116 metres of the release site. The proponent notes that with the predicted effects confined to within the 500-metre exclusion zone, the drill cuttings dispersion from the Project and from the Shelburne Basin Exploration Drilling Project could result in patchy distributions on the sea floor on the Scotian Slope within the respective project areas, however, the proponent predicted that any cumulative alteration would be negligible and temporary.

The proponent noted that underwater sound would be generated from the Project, the Shelburne Basin Venture Exploration Drilling Project, Sable Island Offshore Energy Project, and Deep Panuke Project, and that these sound emissions may cause behavioural responses such as temporary habitat avoidance or changes in activity. It was stated that given the distance of the project area from the other third party sound sources, and from special areas designated for fish spawning, sound emissions are not anticipated to interact cumulatively and would not result in a cumulative change in habitat quality and use.

The proponent predicted that the residual cumulative change in habitat quality and use to be adverse, low to moderate in magnitude, occur within the local assessment area, sporadic to regular in frequency, short to medium-term in duration, and reversible. The proponent stated that with the application of Project-related mitigation, the residual cumulative environmental effect of change in habitat quality and use for fish and fish habitat is not predicted to be significant.

Change in Risk of Mortality or Physical Injury

The proponent noted that underwater sound generated from the project and from third party physical activities may generate sounds that are harmful to fish at close ranges. Vertical seismic profiling conducted for the Project as well as the Shelburne Basin Venture Exploration Drilling Project would generate sound levels that may result in physical damage to fish at close proximity to the sound source. The implementation of a ramp up procedure would mitigate the potential underwater sound effects in close proximity.

The proponent noted that fish eggs and larva are more susceptible to harm in close proximity to sound sources because they are immotile. Vertical seismic profiling operations conducted for the Project and for the Shelburne Basin Venture Exploration Drilling Project may have some temporal overlap but there would be no spatial overlap, however, at the time of this writing, there is no drilling occurring or planned for the Shelburne project.

The proponent predicted that the residual cumulative change in risk of mortality or physical injury would be adverse, low to moderate in magnitude, occur within the local assessment area, sporadic to regular in frequency, short to medium-term in duration, and reversible. The proponent concluded that with the application of project-related mitigation, the residual cumulative environmental effect of change in risk of mortality or physical injury for fish and fish habitat is predicted to be not significant.

Potential Cumulative Effects on Marine Mammals and Sea Turtles

The proponent assessed the potential for cumulative effects resulting in a change in habitat quality and use and change in risk of mortality or physical injury.

Change in Habitat Quality and Use

The proponent noted that similar cumulative interaction as described for fish and fish habitat (Section 7.3.1) may temporarily reduce habitat availability for marine mammals and sea turtles within the regional assessment area. This could result in a cumulative change in habitat quality and use through the disruption of reproduction, foraging and feeding, or migratory behaviour of those species. The proponent stated that the likelihood of this cumulative interaction is low due to the distance of which project and non-project activities take place.

The proponent stated that the underwater sound generated by the Project activities would add to the underwater sound produced by other physical activities in the regional assessment area. The increase in ambient sound levels may adversely affect marine mammals through the masking of biologically significant sound, as well as by evoking avoidance behaviour. The proponent stated that sound levels from project activities are predicted to be above the thresholds associated with behavioural effects for cetaceans and that this continuous sound could interact cumulatively with transient and intermittent sound from project and non-project vessels.

The proponent stated that the presence and sound of helicopter traffic has the potential to elicit temporary diving responses in marine mammals, and that the presence and sound of project-related helicopter traffic may trigger additional diving responses in individual marine mammals exposed to the presence and sound of helicopter traffic from other offshore projects or ocean users. The proponent indicated that project-related helicopters would avoid flying over Sable Island and Roseway Basin, except in the case of an emergency, to reduce the potential for cumulative interaction of helicopter traffic. It stated that the residual effects from helicopter traffic would be spatially and temporally limited, thereby limiting the potential for cumulative interaction with residual effects from non-project helicopter traffic.

The proponent predicted that the residual cumulative change in habitat quality and use would be adverse, low to moderate in magnitude, within the regional assessment area, sporadic to regular in frequency, short to medium-term in duration, and reversible. The proponent stated that with the application of Project-related mitigation, the residual cumulative environmental effect of change in habitat quality and use for marine mammals and sea turtles is predicted to be not significant.

Change in Risk of Mortality or Physical Injury

The proponent noted that underwater sound emissions related to vertical seismic profiling would add to the underwater sound emissions of other third party activities, potentially causing a cumulative change in the risk of mortality or physical injury. The discussion of cumulative environmental effects of underwater sound and operation discharges on fish and fish habitat (Section 7.3.1) is also applicable to marine mammals and sea turtles.

The proponent noted that there would be a cumulative change in risk of mortality or physical injury due to increased potential for marine mammal and sea turtle strikes. Project activities and third party physical activities all have the potential to occur in different parts of the regional assessment area at the same time, thereby cumulatively increasing the risk of mortality or physical injury. The proponent noted that the operation of the drilling unit and platform supply vessels will only represent a small increase in existing marine traffic in the regional assessment area, and has stated that marine traffic would be kept to a maximum speed of 22 kilometres per hour (12 knots) and would avoid known important marine mammal areas. It was further noted that platform supply vessels will avoid critical habitat for the Northern Bottlenose Whale and the North Atlantic Right Whale. The proponent stated that the transient and short-term nature of its marine traffic would limit the opportunities for vessel strikes.

The proponent predicted that the residual cumulative change in risk of mortality or physical injury for marine mammals and sea turtles would be adverse, low in magnitude, confined to the local assessment area, sporadic to regular in frequency, medium-term in duration, and reversible. The proponent stated that with the application of project-related mitigation, the residual cumulative environmental effect of change in risk of mortality or physical injury for marine mammals and sea turtles is predicted to be not significant.

Potential Cumulative Effects on Migratory Birds

The proponent assessed the potential for cumulative effects resulting in a change in habitat quality and use and change in risk of mortality or physical injury.

Change in Habitat Quality and Use

The proponent noted that the Project, in combination with other third party physical activities, would temporarily reduce migratory bird habitat available within the regional assessment area due to the temporary avoidance of multiple areas; which could disrupt reproduction, foraging and feeding, or migratory behaviour. The proponent stated that the affected areas represent a very small portion of the total bird habitat available in the regional assessment area.

The proponent noted that given the mitigation measures for helicopter transits, the resulting cumulative effects will be spatially and temporally limited and are not expected to result in a substantial change in habitat quality or use for migratory birds.

The proponent predicted that the residual cumulative change in habitat quality and use for migratory birds would be adverse, low to moderate in magnitude, confined to the local assessment area, sporadic to regular in frequency, short to medium-term in duration and reversible. The proponent stated that with the application of project-related mitigation, the residual cumulative environmental effect of a change in habitat quality and use for migratory birds is predicted to be not significant.

Change in Risk of Mortality or Physical Injury

The proponent noted that underwater sound emissions (e.g. vertical seismic profiling) will contribute to the underwater sound emissions of other third party physical activities. The proponent stated that based on current scientific literature it appears that diving marine birds are less sensitive than marine mammals or sea turtles to sound, and therefore would be less susceptible to a potential cumulative change in risk of mortality or physical injury from underwater sound.

The proponent stated that non-routine discharges from the Project could contribute to a cumulative change in risk of mortality or physical injury; however routine discharges are expected to comply with government standards and requirements (e.g. *Offshore Waste Treatment Guidelines*) and are unlikely to cause a measurable cumulative change in risk of mortality or physical injury.

Helicopter transits may contribute to a cumulative change in risk of mortality or physical injury due to potential collisions with migratory birds. The proponent suggested that with the mitigation measures to be implemented for helicopter transits (e.g. two kilometre buffer from bird colonies and Sable Island, flight altitude of 300 metres) that the residual environmental effects of other helicopters traffic in the regional assessment area would be minimal and are not expected to result in substantial change in risk of mortality of physical injury for migratory birds.

The proponent noted that artificial lighting associated with the Project would contribute to the total amount of night lighting from various sources. Artificial lighting, including flaring, can attract or disorient migratory birds, thereby resulting in a cumulative change in risk of mortality or physical injury due to potential stranding and increased opportunities for predation, collisions, exposure to vessel based threats, and emissions. The proponent predicted that with mitigation measures applied for residual lighting and flaring, there would not be a substantive cumulative increase in mortality or injury affecting migratory birds.

The proponent predicted that the residual cumulative change in risk of mortality or physical injury for migratory birds would be adverse, low to moderate in magnitude, confined to the local assessment area, sporadic to continuous in frequency, medium-term in duration, and reversible. With the application of the proposed mitigation measures, the residual cumulative environmental effect of change in risk of mortality or physical injury is predicted to be not significant.

Potential Cumulative Effects on Special Areas

Parts of the Scotian Slope Ecologically and Biologically Significant Area and the Haddock Box overlap with the project area, while other special areas are located within the regional assessment area (Table 6).

Change in Habitat Quality

The proponent stated that the potential cumulative interactions would be limited to localized areas of project activity. Given the importance of special areas such as the Haddock Box, Sambro Bank and Emerald Basin Sponge Conservation Areas, and Scotian Slope Ecologically and Biologically Significant Area for fish, marine mammals, sea turtles and migratory birds, much of the analysis of cumulative environmental effects provided for these other valued components is also applicable to Special Areas. The proponent predicted that the residual cumulative change in habitat quality would be low to moderate in magnitude, occur within the local assessment area, sporadic to regular in frequency, short to medium-term in duration, and reversible. With the application of

the proposed mitigation measures, the residual cumulative environmental effect of change in habitat quality for special areas is predicted to be not significant.

Potential Cumulative Effects on Commercial Fisheries

Changes in Availability of Fisheries Resources

The proponent stated that the 500-metre safety (exclusion) zone required around the drilling unit will occupy 0.0003 percent of the approximately 237 763 square kilometres of fishing area available in NAFO Division 4W. The proponent predicted that effect of this temporary loss in fishing area would be negligible given the total area available for fishing.

The proponent stated that fishers who may experience a change in access to their customary fishing areas may adversely affect another fisher through direct competition. This additional pressure on nearby fishing areas may cause a cumulative change in availability of fisheries resources. The proponent noted that the fishing effort within and surrounding the project area is low, and that there are no unique fishing grounds or concentrated fishing effort exclusively within the local assessment area. The proponent noted that the temporary loss of access is anticipated to be negligible and unlikely to have a discernable effect on the fishing effort in the regional assessment area.

The proponent predicted that the residual cumulative change in availability of fisheries resources for commercial fisheries would be adverse, negligible in magnitude, occur within the local assessment area, continuous in frequency, medium term in duration, and reversible. With the application of the proposed mitigation measures, the residual cumulative environmental effect of change in availability of fisheries resources for commercial fisheries is predicted to be not significant.

Potential Cumulative Effects on Current Use of Lands and Resources for Traditional Purposes by Aboriginal Peoples

The proponent assessed the potential for cumulative effects resulting in a change in traditional use with respect to current Aboriginal use of lands and resources for traditional purposes.

Change in Traditional Use

The proponent stated that the analysis of cumulative effects on commercial fisheries is also applicable for Indigenous fisheries and that the analysis of potential cumulative effects related to fish and fish habitat and special areas should also be referred to, given that these valued components were identified by Indigenous groups as important for traditional use. The proponent predicted that the residual cumulative effect would be adverse, negligible in magnitude, occur within the local assessment, continuous in frequency, medium-term in duration, and reversible. With the application of the proposed mitigation measures, the residual cumulative environmental effect of change in traditional use for Aboriginal peoples is predicted to be not significant.

7.3.2 *Views Expressed*

Federal Authorities

The CNSOPB asked for re-analysis of the cumulative environmental effects related to the decommissioning of the Sable Offshore Energy Project, considering that decommissioning activities would be more akin to exploration drilling than to production, as the proponent had assumed in its original analysis. The proponent

clarified that if activities related to decommissioning are more similar to existing offshore exploratory drilling (e.g. plugging and abandonment of wells) then its earlier predictions remain valid.

Environment and Climate Change Canada asked for clarification on the characterization of cumulative effects to migratory birds due to a change in risk of mortality or physical injury as reversible. The proponent acknowledged that many seabirds have a long life span but low reproductive rates. They further acknowledged that although effects are anticipated to be reversible, there is potential that this recovery would not occur until after project completion (well abandonment).

Environment and Climate Change Canada and Fisheries and Oceans Canada advised the Agency that the proposed mitigation, monitoring commitments and follow up programs would adequately address the potential cumulative effects of the Project.

Fisheries and Oceans Canada did not comment on the cumulative effects of the Project.

Indigenous Peoples

Concerns were raised about cumulative effects on migratory birds, as well as about cumulative effects on benthic habitat related to drilling waste disposal, and potential cumulative effects on fishing.

The Maliseet Nation in New Brunswick requested that the proponent discuss how adjusting the spatial scope for migratory birds based on an ecological perspective that takes into account their full ranges and breeding locations could influence the analysis of cumulative effects on migratory birds. If it was found to affect conclusions, they requested that additional effects analysis be provided. The proponent stated that the spatial boundaries for the assessment of migratory birds are established based on the potential extent of Project related effects. The regional assessment area provides regional context, used to account for effects from other physical activities potentially overlapping with Project effects, and was defined to accommodate the relatively large area that could be affected in the unlikely event of a substantial spill. The proponent acknowledged that the range of migratory birds extends beyond the regional assessment area and there is potential for individuals of these species to be affected by the combined residual environmental effects of the Project and effects from other stressors within the area. However, the proponent stated that adjusting the spatial scope for migratory birds to take into account their full ranges and breeding locations, would be impractical because the diversity of species and the extent of their ranges would necessitate a regional assessment area that is global in nature, thereby weakening the characterization of residual effects for magnitude and may dilute the ability of the EIS to identify a significant adverse residual environmental effect.

Mi'gmawe'l Tplu'taqnn Incorporated expressed concerns with the cumulative effect on water quality as a result of discharges of drill muds and cuttings, and the limited mitigation for the reversal of degraded sediment quality and water quality, given the impact that water quality could have on the availability of fishery resources or change traditional use and Aboriginal commercial fishing. The proponent provided information supporting that discharges from the mobile offshore drilling unit are expected to be temporary, non-bio-accumulating, and non-toxic. They indicated that results from other environmental effects monitoring programs undertaken for drilling programs in Atlantic Canada have concluded that these discharges have had negligible effects on fish and fish habitat. The proponent stated that since long-term effects are not anticipated, longer term impacts to traditional fisheries species targeted by Indigenous peoples would not occur.

Mi'gmawe'l Tplu'taqnn Incorporated inquired about cumulative impacts of the projects with effects of other activities, including other offshore gas development and petroleum exploration projects, commercial fisheries, and other ocean users. The Mi'gmawe'l Tplu'taqnn Incorporated were interested on the impacts to American Eel in particular. In response, the proponent stated an increase of waste discharges, and increased exposure to underwater sound, may result in cumulative effects that may impact American eels. The proponent states that these impacts may result in eel mortality, injury, or changes in the quality of habitat used by eels. The proponent notes that effects would be limited to eels that might migrate thought the relatively small area in the vicinity of the mobile offshore drilling unit, or to sound from platform supply vessels when eels pass close to the source. The proponent stated that the cumulative effects of the Project activities would be limited to the project area and would not impact nearshore migration of eels returning to or leaving freshwater environments for life cycle purposes. The proponent stated residual environmental effects of risk of mortality or physical injury, and change in habitat quality on fish and fish habitat are predicted to be not significant, and therefore anticipated to not significantly impact the ability of Indigenous communities to practice traditional use of this species.

Public

The Agency did not receive any comments from the public about cumulative environmental effects.

7.3.3 *Agency Analysis and Conclusion*

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

Fish with ranges beyond the regional assessment area, marine mammals and sea turtles, and migratory birds may be exposed to discharges and noise from multiple sources, which may temporarily reduce habitat quality and use by the above species, potentially disrupting reproduction, foraging and feeding, or migratory behaviour. Discharge effects of the Project would be localized to within the 500 metre exclusion zone, reducing the potential for cumulative interactions with discharges from other offshore activities. The potential for cumulative interaction of underwater sound emissions from the Project is greatest with respect to continuous sound above the threshold for cetacean behavioural effects possibly extending to area of critical habitat. To mitigate this potential cumulative interaction, platform supply vessels would avoid critical habitat for the Northern Bottlenose Whale and the North Atlantic Right Whale. Additionally, Fisheries and Oceans has requested that if drilling is proposed during the winter when under water sound is predicted to travel further, the proponent would be required to consult Fisheries and Oceans Canada on additional mitigation and monitoring of sound levels and environmental effects in Northern Bottlenose Whale critical habitat.

The Project would also contribute to an increase in the total amount of night lighting, helicopter traffic and vessel traffic in the regional assessment area. Residual effects from these project-related activities could cumulatively interact with similar effects from other offshore projects, other activities and ocean users, resulting in increased risk of mortality or injury for migratory birds (lighting effects, helicopter collisions) and marine mammals and sea turtles (vessel collisions). Mitigation identified for lighting and flaring, helicopter and vessel operation (altitude and vessel speed), and avoidance of critical habitat by air and sea traffic, as well as the

intermittent nature of flaring and traffic, would reduce the potential for cumulative interaction with similar effects from other offshore projects and activities.

Recent incidents in the Gulf of St. Lawrence involving North Atlantic Right Whales becoming entangled in fishing gear or being struck by vessels are of concern with respect to the population health of this species. However, and as discussed in Section 6.2.3, the Agency has concluded that the project would not substantially increase the probability of collisions and therefore would not substantially contribute to a cumulative effect on the North Atlantic Right Whale populations.

Key Mitigation Measures to Avoid Significant Effects

The Agency has not identified any specific measures required to mitigate cumulative environmental effects beyond those identified to mitigate project effects on individual valued components.

Follow-up

The Agency has not identified any follow-up requirements specific to cumulative environmental effects.

Agency Conclusion

The Agency accepts the proponent's conclusion that cumulative effects on fish and fish habitat, marine mammals and sea turtles, migratory birds, special areas, commercial fisheries, and current Aboriginal use of lands and resources for traditional purposes are not likely be significant. The Agency concludes that the Project is not likely to cause significant adverse cumulative environmental effects.

8 Impacts on Potential or Established Aboriginal or Treaty Rights

8.1.1 *Potential or Established Aboriginal or Treaty Rights*

The Project is located on the East Coast of Canada, where Peace and Friendship Treaties were signed between the Mi'kmaq, the Maliseet, and British settlers from 1725 to 1779, to help establish peaceful relations. As affirmed by the Supreme Court of Canada, Mi'kmaq and Maliseet people on the East Coast continue to have treaty rights to hunt, fish and gather to earn a moderate livelihood.

Nova Scotia

Nova Scotia First Nations are signatories to Peace and Friendship Treaties from which the right to a moderate livelihood flows. The Mi'kmaq of Nova Scotia assert Aboriginal and treaty rights and title over the entire Province of Nova Scotia, including its offshore. The Mi'kmaq of Nova Scotia have an established right to fish for a moderate livelihood. They assert rights to the marine environment and its resources.

The Governments of Canada and Nova Scotia continue to work with the Mi'kmaq to negotiate outstanding treaty, title, and aboriginal rights questions in Nova Scotia. A Made-in-Nova Scotia Process has been established as a rights-based process to ensure that the interests of Indigenous groups in land, resource management, and environmental protection are realized and that Mi'kmaq share in the benefits of development. On February 23, 2007, a framework agreement was signed between the Mi'kmaq of Nova Scotia, the Province of Nova Scotia, and the Government of Canada to set out the process and list of topics to be negotiated including clarity on Mi'kmaq rights and title, improved relations and reducing economic disparity between Indigenous and non-Indigenous peoples.

A number of Mi'kmaq communities hold communal commercial fishing licences in North Atlantic Fisheries Organization areas 4X, 4W and 4VS, which cover large portions of the Scotian Shelf and Slope and overlap with the project area, local assessment area or regional assessment area, or portions of them.

The Agency consulted Nova Scotian First Nations that hold communal commercial fishing licences in fishing zones that overlap with the local study area, project area and regional assessment area. During this environmental assessment (EA), 11 of the 13 Nova Scotia Mi'kmaq First Nations were represented by the Kwilmu'kw Maw-klusuaqn Negotiation Office for consultation purposes. These are the First Nations of Acadia, Annapolis Valley, Bear River, Eskasoni, Glooscap, Membertou, Paqtnkek (Afton), Pictou Landing, Potlotek (Chapel Island), Wagmatcook and We'koqm (Waycobah). The other two Nova Scotia Mi'kmaq First Nations, Sipekne'katik and Millbrook, chose to represent themselves. Sipekne'katik and Millbrook First Nations each assert the same rights as the other Mi'kmaq communities in Nova Scotia and hold communal commercial fishing licences in the project area.

New Brunswick

New Brunswick First Nations are signatories to Peace and Friendship Treaties from which the right to a moderate livelihood flows. The Mi'gmaq and Maliseet First Nations assert rights to species of importance in the federal waters offshore of Nova Scotia that may be affected by the Project.

The Agency consulted New Brunswick First Nations that hold communal commercial fishing licences in fishing zones that overlap with the project area and regional assessment area (4X, 4W, and 4VS). For consultation purposes, Mi'gmawe'l Tplu'taqnn Incorporated represented the New Brunswick Mi'gmaq First Nations of Buctouche, Eel River Bar, Fort Folly, Esgenoopetitj, Indian Island, and Pabineau. The Maliseet Nation in New Brunswick represented the New Brunswick Maliseet First Nations of Kingsclear, Madawaska, Oromocto, St. Mary's First Nation and Tobique. Woodstock First Nation (Maliseet) was consulted separately.

Prince Edward Island

Prince Edward Island First Nations are signatories to the Peace and Friendship Treaties from which the right to a moderate livelihood flows.

The Agency consulted the two Prince Edward Island Mi'kmaq First Nations (Lennox Island and Abegweit) that hold communal commercial fishing licenses in fishing zones that overlap with the regional assessment area (4X, 4W and 4VS). These First Nations were represented by the Mi'kmaq Confederacy of Prince Edward Island.

8.1.2 *Potential Adverse Impacts of the Project on Potential or Established Aboriginal or Treaty Rights*

This section summarizes how the Project may impact potential or established Aboriginal or treaty rights. Appendix D sets out issues of concern identified by Indigenous peoples during this EA.

Proponent's Assessment

The proponent acknowledged the rights of Indigenous peoples could be potentially affected by the Project. An accidental spill could affect access to fisheries resources which could, in turn, adversely affect fishing rights. The proponent acknowledged although a well blowout is very unlikely, if one occurred its effects on marine resources (i.e. fish, mammals, birds) would likely be considered significant. It stated that a blowout incident could result in effects on availability of fisheries species, access to fisheries resources (e.g. fisheries closure, interruption of fishing rights), and/or fouling of fishing or cultivation gear, which in turn could adversely affect fishing rights. The proponent used well drilling data for the period from 1980 to 2004 to illustrate that the probability of a blowout incident is approximately 0.031 percent per well. The proponent predicted that the additional controls and response measures used for well control since the Deepwater Horizon incident in 2010 would reduce the probability of an event to below 0.031 percent, although it did not provide an estimate.

Views of Indigenous Peoples

Indigenous peoples expressed concerns about the Project's impacts on fishing rights and the marine environment. They indicated that displacement from fishing areas could represent an impact on their treaty right to fish, as would a reduction in the number of fish in those areas. Mi'gmawe'l Tplu'taqnn Incorporated stated that adverse impacts on fisheries, marine mammals and migratory birds would negatively impact their rights and interests. Their concern was primarily focused on the risk of a well blowout to the marine environment. Mi'gmawe'l Tplu'taqnn Incorporated noted a lack of information about New Brunswick Mi'gmaq First Nations' rights and interests, the assessment of impacts to those rights and their involvement in oil spill response planning.. They were especially concerned about the Project's effects on fish species that are traditionally- or commercially-important to the Mi'gmaq, specifically American Eel, Atlantic Sturgeon, Bluefin Tuna, Swordfish, Herring, Gaspereau (alewife), lobster, crab and shrimp. The proponent provided additional

information concerning First Nations' use of fishery resources, such as species fished and associated income for individual communities.

Mi'gmawe'l Tplu'taqnn Incorporated advised that it would have liked to see more information regarding Aboriginal rights and interests carried forward into the effects assessment, with focus on past impacts from cumulative effects of other developments, as well as current use and future or desired use of the lands and resources in the regional assessment area including the Gulf of Maine and Bay of Fundy. The proponent responded that its spill modelling indicated that effects would be limited to the regional assessment area.

Mi'gmawe'l Tplu'taqnn Incorporated requested that the proponent develop its Incident Management Plan, Spill Response Plan, Environmental Protection Plan, Safety Plan, and Net Environmental Benefit Analysis in consultation with Mi'gmawe'l Tplu'taqnn Incorporated to ensure that spill response plans are adequate and minimize adverse effects to their resources, rights, and interests. Mi'gmawe'l Tplu'taqnn Incorporated also noted that its spill response and incident management capacity is limited, and asked that additional support be considered to enhance its role within the Incident Management Plan and Spill Response Plan. The proponent committed to engage Indigenous groups in high-level discussion of environmental protection and emergency response plans for the Project. Mi'gmawe'l Tplu'taqnn Incorporated relayed that it remains concerned about the risk of a spill affecting migration, spawning or feeding grounds of species of importance to Mi'gmaq culture.

Additional comments provided by Indigenous participants during the EA are contained in Appendix D.

Agency Analysis

In analyzing the Project's impacts on potential or established Aboriginal or treaty rights, the Agency relied on information in the proponent's EIS and associated documents, and information provided by Indigenous participants.

The Agency determined that the Project's routine activities would likely cause low impacts to potential or established Aboriginal or treaty rights of First Nations with communal food, social and ceremonial or communal commercial licences in the regional assessment area. These impacts would be due to the Project's effects on fish and fish habitat, minor disruption to access to fishing areas, and possible fishing gear damage or loss. The availability and quality of fish may decrease due to changes in fish habitat, or fish injury or mortality. Specifically, Indigenous fishers may be displaced from the 500 metre safety exclusion zone that would be established around the mobile offshore drilling unit while in operation, but would be able to fish in surrounding areas. Fishing gear could be damaged or lost through interactions between platform supply vessels and fishing activity. In the event of fishing gear damage or loss that is attributable to the Project, the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* would be used to manage claims. The effects of routine project operations would be limited to a small area within the available fishing license area and be reversible after drilling operations cease, with the exception of effects of drilling waste on the sea bottom, which would persist for a period after the well is abandoned, potentially for several years.

In the event of an oil spill, which is discussed in depth in Section 7.1, the Project could seriously impact potential or established Aboriginal or treaty rights of First Nations with communal food, social and ceremonial or communal commercial licences in the regional assessment area. The severity of impact would vary depending on the nature, location and size of the spill. A spill could kill or injure fish, and may cause damage or loss of fishing

gear. A fisheries closure, if imposed, would result in loss of fishing access, and possible loss of livelihood and income for some period of time. Although unlikely, a very large spill could substantially diminish the ability to exercise the right to fish in the local assessment area and parts of the regional assessment area for one or more fishing seasons.

First Nations communities could experience health and socio-economic impacts after a large spill. Community members may change their diet to avoid health risk, whether real or perceived, of eating contaminated food during and after a spill, and may experience mental health impacts if they cannot access healthy ocean resources. They may incur increased living costs if they need to purchase replacement food. There may be changes to community social fabric associated with sharing the proceeds of traditional use amongst community members. The loss of fisheries revenue, unless fully compensated, could mean there would be less funding available for community health, education and infrastructure initiatives.

The Agency acknowledges the possible severity of the consequences of an accidental spill on Indigenous fishers and First Nations communities. Available data shows that a blowout is unlikely to occur and therefore its potential effects would be unlikely to occur. The Agency notes that compensation for impacts attributable to an accident or malfunction during the Project would be managed in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

8.1.3 *Proposed Accommodation Measures*

The proponent's mitigation measures identified for fish and fish habitat (Section 6.1), commercial fisheries (Section 6.6), and current use of lands and resources for traditional purposes (Section 6.7) would also function as accommodation measures to minimize or avoid potential adverse impacts on potential or established Aboriginal or treaty rights. A complete list of mitigation measures committed to by the proponent is provided in Appendix B. Key commitments related to potential impacts on rights include:

- Ensuring that all waste discharges and emissions from the drilling unit into the marine environment are in accordance with the *Offshore Waste Treatment Guidelines* and the *International Convention for the Prevention of Pollution from Ships.*
- Planning and conducting vertical seismic profiling activity in consideration of the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* (Fisheries and Oceans Canada, 2007).
- Continuing to engage commercial fishers to share project details as applicable and facilitate coordination of information sharing.
- Developing and implementing a Fisheries Communication Plan to facilitate coordinated communication with fishers.
- Providing details of the 500-metre safety (exclusion) zone to the Marine Communication and Traffic Services for broadcasting and publishing in the Notices to Shipping and Notices to Mariners. Details of the exclusion zone would also be shared during ongoing consultations with commercial fishers.

- Prepare a well abandonment plan, including a wellhead abandonment strategy and consult with Indigenous and non-Indigenous commercial fishers if it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with fishing activity. Submit the well abandonment plan to the CNSOPB for approval 30 days prior to abandonment of each well.
- Consult with Indigenous groups regarding the details of the Spill Response Plan and provide the approved version to Indigenous groups.

The Agency also recognizes the proponent's commitment to compensate for any project-related damages (e.g. to fishing gear) in accordance with the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity* (C-NLOPB and CNSOPB 2002) The CNSOPB has advised the Agency that this compensation extends to the loss of food, social and ceremonial fisheries opportunities for Indigenous people and the associated value it has within communities.

8.1.4 *Issues to be Addressed During the Regulatory Approval Phase*

The regulatory approval phase, during which any federal permits or authorizations would be considered, would be completed after the EA is complete. In order to proceed, the Project requires authorization by the CNSOPB under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act.* It may also require *Fisheries Act* authorization, a *Species at Risk Act* permit, or both from Fisheries and Oceans Canada. 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. The CNSOPB would carry out the duties of the Crown Consultation Coordinator during the regulatory phase of the Project. The CNSOPB has signed a Memorandum of Understanding with the federal and provincial governments (as represented by Natural Resources Canada and the Nova Scotia Department of Energy) in which the governments can use and rely on, where appropriate, existing CNSOPB practices to assist in discharging the Crown's consultation and accommodation obligations.

8.1.5 *Agency Conclusion*

The Agency concludes that routine project activities would likely have a low impact on the potential or established Aboriginal or treaty rights of First Nations with communal food, social and ceremonial or communal commercial licences in the regional assessment area, after taking into consideration the mitigation and accommodation measures. The Agency expects that these impacts would likely be low-magnitude, short-term, and reversible. Compensation would be available for any gear loss or damage attributable to the Project. Mitigation and accommodation measures would ensure that there is no interruption in the practice of rights and that rights could be practiced in the same or similar manner as before the Project. The Agency acknowledges that a blowout incident could have more serious repercussions, but has a very low probability of occurrence.

Taking into account the analysis of environmental effects of the Project and the related mitigation measures outlined for fish and fish habitat (Section 6.1), commercial fisheries (Section 6.6), and effects of accidents and malfunctions (Section 7.1) and the potential impacts and accommodation measures provided in Section 8.1.3 (above), the Agency concludes that the potential impacts of the Project on potential or established Aboriginal or treaty rights have been adequately identified and appropriately accommodated.

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

9 Agency Conclusion

The Agency considered the proponent's environmental impact statement and responses to information requests from the Agency. Information requests reflected the views of the public, government agencies, and Indigenous peoples. The Agency also considered the measures that would be implemented to mitigate the Project's 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 environmental and socio-economic assessment practitioners, including consideration of the effects of potential accidents and malfunctions.

The Agency concludes that the proposed Scotian Basin Exploration Drilling Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in this draft environmental assessment (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 her decision statement. Following the comment period on this draft EA Report, the Agency will submit the final EA report to inform the Minister's decision whether the Project is likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures. The Agency will also recommend that the Minister establish through her decision statement conditions that the proponent must meet with respect to mitigation and follow-up program requirements in the event that the Project is permitted to proceed

10 References

C-NLOPB, CNSOPB, NEB [Canada-Newfoundland and Labrador Offshore Petroleum Board, Canada-Nova Scotia Offshore Petroleum Board and National Energy Board]. 2002. *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*. http://cnsopb.ns.ca/sites/default/files/pdfs/CompGuidelines.pdf.

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11 Appendices

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

Valued Component	Mitigation	Follow-up
Fish and Fish Habitat (Section 6.1)	• Prior to commencing drilling a well, undertake a video survey of the sea floor using a remotely-operated vehicle to confirm the absence of sensitive environmental features, such as aggregations of habitat-forming corals. A qualified independent marine scientist should be retained to provide advice in real time. If any sensitive environmental features are identified during the survey, or if there are unidentified species, move the wellsite to avoid them if feasible; if not feasible, notify the CNSOPB immediately to discuss an appropriate course of action. No drilling should occur before a decision is made by the CNSOPB, which may consult with other regulatory agencies (e.g. Fisheries and Oceans Canada). • Select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines*. During planning of drilling activities, where feasible, lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements will be preferentially used. Where feasible the chemical components of the drilling fluids will be those that have been rated as being as least hazardous under the Offshore Chemical Notification Scheme and as Pose Little or No Risk (PLONOR) by the Oslo and Paris Commission. • Ensure that all discharges from the mobile offshore drilling unit (i.e. drill cuttings, cement, produced water, deck drainage, ballast water, sewage, grey water (from showers, laundry, etc.), cooling water, blowout preventer fluids and food waste) meet the *Offshore Waste Treatment Guidelines*. • Transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility. • Ensure that all discharges from platform supply vessels meet	• Provide the results of pre-drilling benthic video survey to the CNSOPB within 48 hours of commencing drilling. • Monitor the concentration of synthetic-based mud on drill cuttings to verify compliance with the performance target specified in the *Offshore Waste Treatment Guidelines*. Report results to the CNSOPB. • Collect sediment (drill waste) deposition information after drilling activities and prior to departing the location to determine the thickness and extent of drilling waste and to confirm modelling predictions. The survey coverage should be sufficient to verify the predicted extent of sediment deposition thickness that would cause smothering (9.6 millimetres). Report results to the CNSOPB. • Verify predicted underwater noise levels with field measurements during the first phase of the drilling program. Provide the plan on how this would be conducted to the CNSOPB at least 30 days in advance of drilling, and the monitoring results within 90 days of well abandonment.

Valued Component	Mitigation	Follow-up
	or exceed the standards established in the *International Convention for the Prevention of Pollution from Ships* (MARPOL). • Plan and conduct vertical seismic profiling activity in accordance with the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment,* including implementing a ramp-up procedure (i.e. gradually increasing seismic source energy over a period of approximately 30 minutes until the operating level is achieved) before any vertical seismic profiling operations begin and using only the minimum amount of energy necessary to achieve operational objectives	
Marine Mammals and Sea Turtles (Section 6.2)	• Conduct vertical seismic profiling surveys in accordance with or exceeding the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*, including o establishing a safety (observation) zone of 650 metres around the sound source; o implementing cetacean detection technology such as passive acoustic monitoring, concurrent with visual observations; o gradually increasing the sound source intensity over a period of at least 30 minutes (ramp-up) and adopting a pre-ramp up watch of 60 minutes whenever survey activities are scheduled to occur in areas where beaked and other deep-diving whales may be present; and o shutting down the sound source upon observing or detecting an endangered or threatened marine mammal or sea turtle within the safety zone. • Implement a Marine Mammal Monitoring Plan during vertical seismic profiling surveys which includes a marine mammal observer program using qualified individuals and passive acoustic monitoring to detect vocalizing marine mammals. The proponent shall: • Submit the Marine Mammal Monitoring Plan including specific passive acoustic monitoring configuration to the	• Record and report the results of the marine mammal observer program (including sea turtle observations) to the CNSOPB and Fisheries and Oceans Canada; and • Promptly report any collisions with marine mammals or sea turtles to the CNSOPB, the Canadian Coast Guard Environmental Emergencies Reporting Number (1 800 565-1633) and to the Marine Animal Rescue Society (MARS) (1-866-567-6277)

Valued Component	Mitigation	Follow-up
	CNSOPB for review 30-days prior to conducting the survey to enable verification that species that may occur within the safety zone can be detected and to ensure that operators can effectively monitor for all marine mammal vocalization frequencies that may occur within the project area. • To reduce risks of collisions with marine mammals and sea turtles, particularly North Atlantic Right Whales, the proponent shall, except during an emergency: o limit platform supply vessels movement to established shipping lanes where available (e.g. approaches to Halifax Harbour); o limit platform supply vessel speed to 12 knots (22 kilometres per hour), and to further reduce speed to 10 knots (19 kilometres per hour), when operating outside existing shipping lanes and within the project area, and to 7 knots (13 kilometres per hour) when a whale or sea turtle is observed or reported within 400 metres of the vessel; o avoid currently-identified critical habitat for the North Atlantic Right Whale (Roseway Basin) and Northern Bottlenose Whale (the Gully Marine Protected Area , Shortland and Haldimand Canyons) during transiting activities except as needed in case of an emergency. The Agency notes that normal routes between the onshore supply base and the project area would not pass near or through these special areas; and o require platform supply vessels to maintain a two-kilometre buffer around Sable Island. • Helicopters are required to maintain a flying altitude of at least 300 metres except during landing and take-off, or except during an emergency • Helicopters are required to maintain a two-kilometre buffer around Sable Island except during an emergency. The Agency notes that normal routes between the onshore supply base and the project area would not pass near or through Sable Island.	

Valued Component	Mitigation	Follow-up
Migratory Birds (Section 6.3)	• Notify the CNSOPB at least 30 days in advance of planned flaring to identify whether it would occur during periods of bird vulnerability (identified in consultation with Environment and Climate Change Canada), and to identify any measures that are needed to prevent harm to migratory birds; • Restrict flaring to the minimum required to characterize the well's hydrocarbon potential and as necessary for the safety of the operation. This includes opportunities to reduce night-time flaring such as by starting flaring for shorter periods in the morning as opposed to at night; • Operate a water-curtain barrier around the flare during flaring; and • Restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) and to a lateral distance of two kilometres from active bird colonies and Sable Island. Platform supply vessels should also maintain a two-kilometre buffer from active colonies and Sable Island. These restrictions would not apply in emergency situations.	• Prepare a follow-up program, in consultation with relevant authorities, to monitor effects on migratory birds to verify the accuracy of the predictions made during the EA and to determine the effectiveness of the mitigation measures; • Document and report results of any monitoring carried out, including a discussion of whether the mitigation measures were proven effective and if additional measures are required
Special Areas (Section 6.4)	• The Agency determined that the measures to mitigate impacts on fish and fish habitat, marine mammals, and migratory birds would also mitigate potential significant adverse effects on special areas	• If Project operations are proposed from December 1 to March 30, consult Fisheries and Oceans Canada on additional monitoring of sound levels and environmental effects in Northern Bottlenose Whale critical habitat.
Federal Species at Risk (Section 6.5)	• Measures to mitigate potential effects on fish and fish habitat, marine mammals and sea turtles), and migratory birds would also mitigate potential effects on species at risk and critical habitat. The list of mitigation measures is included above.	• The Agency determined that the proposed follow-up measures for fish and fish habitat, marine mammals and sea turtles, migratory birds and special areas are also appropriate for species at risk and critical habitat. The list of follow-up measures is included above.
Commercial Fisheries (Section 6.6)	• Develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include procedures to notify fishers a minimum of two weeks prior to the start of each well, and procedures to communicate with fishers in the event of an accident or malfunction. • Ensure that details of safety exclusion zones, and the	• The Agency did not identify any follow-up measures specific to commercial fisheries, but notes the identification of follow-up measures for fish and fish habitat. The list of follow-up measures is included above. The Agency also notes that the envisioned Fisheries Communication Plan would provide a means of identifying issues that may arise.

Valued Component	Mitigation	Follow-up
	locations of abandoned wellheads if left on the seafloor, are published in Notices to Mariners, provided in Notices to Shipping, and communicated to fishers. • Prepare a well abandonment plan, including a wellhead abandonment strategy and consult with Indigenous and non-Indigenous commercial fishers if it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with fishing activity. Submit the well abandonment plan to the CNSOPB for approval 30 days prior to abandonment of each well. • Providing information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning.	
Current Use of Lands and Resources for Traditional Purposes by Aboriginal Peoples (Section 6.7)	• The Agency determined that the measures outlined to mitigate effects on fish and fish habitat and commercial fisheries would also mitigate effects on the current use of lands and resources for traditional purposes by Aboriginal peoples. The list of mitigation measures is included above.	• The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes by Aboriginal peoples and notes that there are related measures proposed for fish and fish habitat.
Health and Socio-economic Conditions of Aboriginal Peoples (Section 6.8)	• The Agency determined that mitigation measures identified for fish and fish habitat and commercial fishing (e.g. Fisheries Communication Plan and compensation as per the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*) would also mitigate potential effects on the health and socio-economic conditions of Aboriginal peoples.	• The Agency determined that follow-up measures identified for fish and fish habitat would also mitigate potential effects on the health and socio-economic conditions of Aboriginal peoples
Accidents and Malfunctions (section 7.1)	• Undertake all reasonable measures to prevent accidents and malfunctions that may cause adverse environmental effects and effectively implement emergency response procedures and contingencies developed for the Project. • Prepare a Spill Response Plan and submit to the CNSOPB for acceptance 90 days prior to drilling. The Plan must include procedures to respond to an oil spill (e.g. oil spill	• Monitor the environmental effects of oiling on components of the marine environment to be accepted by the CNSOPB until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include: • sensory testing of seafood for taint, and chemical analysis for oil concentrations; • measuring levels of contamination in fish species with results integrated into

Valued Component	Mitigation	Follow-up
	containment, oil recovery). It must also contain or be accompanied by. • Well control strategies and measures, including the drilling of a relief well, in the event that well control cannot be re-established following a sub-sea well blowout. • Measures for wildlife response, protection, and rehabilitation (e.g. collection and cleaning of marine mammals, birds, and sea turtles, including species at risk) and measures for shoreline protection and clean-up, developed in consultation with the CNSOPB. • Desktop exercise of the Spill Response Plan prior to the commencement of project activities and adjust the plan to address any deficiencies identified during the exercise. • The Spill Response Plan shall be reviewed and updated as required during drilling and before commencing a new well. • Undertake a net environmental benefit analysis to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the CNSOPB for review. Relevant federal government departments would provide advice to the CNSOPB through the Environment and Climate Change Canada Environmental Emergency Science Table. • Consult with Indigenous groups regarding the details of the Spill Response Plan and provide the approved version to Indigenous groups. • In the event of a well blowout, begin the immediate mobilization of a capping stack and associated equipment to the project area. • 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.*	a human health risk assessment to determine the fishing area closure status; and • monitoring for marine mammals, sea turtles, and birds with visible oiling and reporting results to the CNSOPB
Cumulative	• The Agency has not identified any specific measures required	• The Agency has not identified any follow-up requirements specific to

Valued Component	Mitigation	Follow-up
Effects (Section 7.3)	to mitigate cumulative environmental effects beyond those identified to mitigate project effects on individual valued components	cumulative environmental effects.
Impacts on Potential or Established Aboriginal or Treaty Rights (Section 8)	• Ensuring that all waste discharges and emissions from the drilling unit into the marine environment are in accordance with the *Offshore Waste Treatment Guidelines* and the *International Convention for the Prevention of Pollution from Ships.* • Planning and conducting vertical seismic profiling activity in consideration of the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* (Fisheries and Oceans Canada, 2007). • Continuing to engage commercial fishers to share project details as applicable and facilitate coordination of information sharing. • Developing and implementing a Fisheries Communication Plan to facilitate coordinated communication with fishers. • Providing details of the 500-metre safety (exclusion) zone to the Marine Communication and Traffic Services for broadcasting and publishing in the Notices to Shipping and Notices to Mariners. Details of the exclusion zone would also be shared during ongoing consultations with commercial fishers. • Prepare a well abandonment plan, including a wellhead abandonment strategy and consult with Indigenous and non-Indigenous commercial fishers if it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with fishing activity. Submit the well abandonment plan to the CNSOPB for approval 30 days prior to abandonment of each well	• No specific follow-up measures are identified in relation to potential impacts to asserted or established Aboriginal and Treaty Rights, however, the Agency considers follow-up measures outlined for fish and fish habitat, commercial fisheries, and effects of accidents and malfunctions would also be effective in confirming potential impacts to asserted or established Aboriginal and Treaty Rights.

Appendix B Proponent's Mitigation and Monitoring Commitments

This table is adapted from the summary of commitments provided in Table 13.2.1 of the proponent's Environmental Impact Statement and reflects changes arising from the review of the Environmental Impact Statement.

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Fish and fish habitat	Prior to any drilling activity, BP will conduct a comprehensive regional geo-hazard baseline review, followed by a detailed geo-hazard assessment for each proposed wellsite.	BP will conduct a visual survey of the seafloor during and after drilling activities to verify drill waste dispersion modelling predictions. A seabed survey will be conducted at the end of the drilling program using a remotely-operated vehicle to survey the seabed for debris.
Fish and fish habitat	BP will conduct an imagery based seabed survey in the vicinity of wellsites to ground-truth the findings of the geo-hazard baseline review. The survey will be carried out prior to drilling. A survey team will be assembled to review the footage in real time, including at a minimum, a remotely-operated vehicle operator, a shallow-hazards specialist and an independent marine scientist. The marine scientist will be appointed by BP to support the identification and analysis of any potential environmental sensitivities that may be encountered. If any features of interest, such as benthic communities, epifauna, debris or other anthropogenic features are identified during the survey, they will be investigated in greater detail to help the survey team with its assessment. The CNSOPB will be notified immediately if any environmental feature is detected which has been classified as sensitive or is unidentifiable (i.e. habitat forming coral aggregation, epifauna species at risk, epifauna which cannot be identified). Following the notification, BP and the CNSOPB will discuss an appropriate course of action. This may involve further investigation and moving the well location, if it is feasible to do so. A report will be submitted to the CNSOPB within 48 hours of survey completion.	
Fish and fish habitat	No project wells will be located within the Haddock Box.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Fish and fish habitat	Offshore waste discharges and emissions associated with the Project will be managed in accordance with relevant regulations and municipal bylaws as applicable, including the *Offshore Waste Treatment Guidelines* and *International Convention for the Prevention of Pollution from Ships*, of which Canada has incorporated provisions under various sections of the *Canada Shipping Act*. Waste discharges not meeting legal requirements will not be discharged to the ocean and will be brought to shore for disposal.	Information on the releases, wastes and discharges will be reported as part of a regular environmental reporting program in accordance with regulatory requirements as described in the *Offshore Waste Treatment Guidelines*.
Fish and fish habitat	Cooling water will be discharged in line with the *Offshore Waste Treatment Guidelines* which states that biocides used in cooling water are selected in line with a chemical management system developed in line with the *Offshore Chemical Selection Guidelines*.	
Fish and fish habitat	Selection of drilling chemicals will be in accordance with the *Offshore Chemical Selection Guidelines* which provides a framework for chemical selection to reduce potential for environmental effects. During planning of drilling activities, where feasible, lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements will be preferentially used. Where feasible the chemical components of the drilling fluids will be those that have been rated as being as least hazardous under the *Offshore Chemical Notification Scheme* and as *Pose Little or No Risk* (PLONOR) by the Oslo and Paris Commission.	
Fish and fish habitat	Discharges of synthetic-based mud and cuttings will be managed in accordance with the *Offshore Waste Treatment Guidelines*. Synthetic based mud cuttings will only be discharged once the performance targets in the *Offshore Waste Treatment Guidelines* of 6.9 grams per 100 grams retained on “synthetic on cuttings” on wet solids can be satisfied. No excess or spent synthetic based mud will be discharged to the sea. Spent or excess synthetic-based mud that cannot be re-used during drilling operations will be brought back to shore for disposal.	
Fish and fish habitat	Small amounts of produced water may be flared. If volumes of produced water are large, some produced water may be brought onto the drilling unit for treatment so that it can be discharged in line with the *Offshore Waste Treatment Guidelines*.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Fish and fish habitat	Deck drainage and bilge water will be discharged according to the *Offshore Waste Treatment Guidelines* (e.g. residual oil concentration of the water does not exceed 15 milligrams per litre).	
Fish and fish habitat	Ballast water will be discharged according to International Maritime Organization's *Ballast Water Management Regulations and Transport Canada's Ballast Water Control and Management Regulations*. The drilling unit will carry out ballast tank flushing prior to arriving in Canadian waters.	
Fish and fish habitat	Blowout preventer fluids and other discharges from the subsea control equipment will be discharged according to *Offshore Waste Treatment Guidelines* and *Offshore Chemical Selection Guidelines*.	
Fish and fish habitat	Once the riser has been installed, all cement waste will be returned to the drilling unit. Cement waste will then be discharged in line with the *Offshore Waste Treatment Guidelines* or transported to shore for disposal in an approved facility.	
Marine mammals and sea turtles	BP will consult with Fisheries and Oceans Canada regarding relevant findings from the 2014 Canadian Science Advisory Secretariat review, including additional recommended mitigation that would be appropriate for complementation during vertical seismic profiling prior to Project commencement.	
Marine mammals and sea turtles	Marine mammal observers will be used and report on marine mammal and sea turtle sightings during vertical seismic profiling surveys to enable shutdown of delay actions to be implemented in the presence of marine mammals or sea turtles listed on Schedule 1 of the *Species at Risk Act*, as well as all other baleen whales and sea turtles.	
Marine mammals and sea turtles	Ramp-up procedure (i.e. gradually increasing seismic source elements over a period of approximately 30 minutes until the operating level is achieved) will be implemented before any vertical seismic profile activity begins. A pre-ramp up watch of 60 minutes whenever vertical seismic profile activities are scheduled to occur will be conducted	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Marine mammals and sea turtles	BP will use the minimum amount of energy necessary to achieve operational objectives; reduce energy at frequencies above those necessary for the purpose of the survey; and will reduce the proportion of energy that that propagates horizontally.	
Marine mammals and sea turtles	Shutdown procedures (i.e. shutdown of source array) will be implemented if a marine mammal or sea turtle species listed on Schedule 1 of the *Species at Risk Act*, as well as all other baleen whales and sea turtles are observed within the 650-metre safety zone.	
Marine mammals and sea turtles	Passive acoustic monitoring will be used throughout vertical seismic profiling surveys to detect vocalising marine mammals, concurrent with visual monitoring conducted by marine mammal observers.	
Marine mammals and sea turtles	Platform supply vessels travelling from mainland Nova Scotia will follow established shipping lanes in proximity to shore. Vessel speeds will not exceed 22 kilometres per hour (12 knots) except as needed in the case of emergency.	In the event that a collision with a marine mammal or sea turtle occurs, BP will contact the Marine Animal Response Society to relay incident information. BP will notify the Canadian Coast Guard as an injured marine mammal may cause a navigation hazard. BP will notify Fisheries and Oceans Canada if an incident were to occur with a SARA-listed species.
Marine mammals and sea turtles	Platform supply vessels will avoid currently-identified critical habitat for North Atlantic Right Whale (Roseway Basin) and Northern Bottlenose Whale (the Gully, and Shortland and Haldimand canyons), during transiting activities within the Local Assessment Area and outside the project area except as needed in case of an emergency.	
Marine mammals and sea turtles	Vessels will reduce speed in the event that a marine mammal or sea turtle is noted in proximity to the vessel.	
Marine mammals and seas turtles	Should critical habitat be formally designated for Leatherback Sea Turtle or other species at risk within the regional assessment area over the term of the exploration licences, BP will comply with applicable restrictions or mitigations developed for the marine shipping industry to reduce the risks of vessel strikes in these areas.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Marine mammals and sea turtles		BP will implement an acoustic monitoring follow-up program during the first phase of the drilling program (i.e. during the drilling of the first one or two wells). The follow-up program will be designed to monitor sound levels and frequency characteristics of sound generated from the drilling unit at various distances.
Migratory Birds	Lighting on the mobile offshore drilling unit and platform supply vessels will be reduced to the extent that worker safety and safe operations is not compromised. Reduction of light may include avoiding use of unnecessary lighting, shading, and directing lights towards the deck.	Routine checks for stranded birds will be conducted on the mobile offshore drilling unit and platform supply vessels and appropriate procedures for release will be complemented. If stranded birds are found during routine inspections, they will be handled using the protocol outlined in *The Leach's Storm Petrel: General Information and Handling Instructions* (Williams and Chardine 1999), including obtaining the associated permit from Canadian Wildlife Services. Activities will comply with the requirements for documenting and reporting any stranded birds (or bird mortalities) to Canadian Wildlife Services during the drilling program.
Migratory birds	In the event that a well test program is developed, it will be subject to BP's process for well test planning which is designed to promote safe and efficient well test operations. In the event that well testing is required, BP will inform the CNSOPB of any plans for well test flaring as part of the Authorisation to Drill a Well process.	
Migratory birds	Any hydrocarbons that are brought to the surface as part of well test activity will be flared to enable their safe disposal. All flaring will be via one of two horizontal burner booms. Flaring will be optimized to the amount necessary to characterize the well potential and as necessary for the safety of the operation.	
Migratory birds	In the event that well testing is required, BP will inform the CNSOPB of any plans for well testing as part of the process to obtain Authorization to Drill a Well. BP will report any flaring activity to the CNSOPB. In the event that well test is required, BP will consider the use of a water curtain for heat suppression from the gas flare and oil burner.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Migratory birds	Helicopters transiting to and from the drilling until will fly at altitudes greater than 300 metres (with the exception of approach and landing activities) and at a lateral distance of two kilometres around active bird colonies when possible. Helicopters will avoid flying over Sable Island (a two kilometre buffer will be recognized) except as needed in the case of an emergency	
Migratory birds	Platform supply vessels will maintain a two kilometre avoidance buffer around Sable Island and associated bird colonies in that area except in the case of an emergency.	
Special Areas	BP is committed to reviewing the Environmental Protection Plan with the CNSOPB to determine if additional special areas have been identified since the Environmental Protection Plan was filed and if additional mitigation measures are necessary.	
Commercial fisheries Current use of lands and resources by Indigenous peoples	BP will continue to engage commercial and Aboriginal fishers to share project details as applicable and facilitate coordination of information sharing. A Fisheries Communication Plan will be used to facilitate coordinated communication with fishers.	Project-related damage to fishing gear, if any, will be compensated in accordance with the *Compensation Guidelines with Respect to Damages Relating to Offshore Petroleum Activity*.
Commercial fisheries Current use of lands and resources by Indigenous peoples	BP will provide details of the safety zone to the Marine Communication and Traffic Services for broadcasting and publishing in the Notices to Shipping and Notices to Mariners. Details of the safety zone will also be communicated during ongoing consultations with commercial fishers.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Commercial fisheries Current use of lands and resources by Indigenous peoples	To maintain navigational safety at all times, obstruction lights, navigation lights and foghorns will be kept in working condition on board the mobile offshore drilling unit and platform supply vessels. Radio communication systems will be in place and in working order for contacting other marine vessels as necessary.	
Commercial fisheries Current use of lands and resources by Indigenous peoples	Once wells have been drilled to total depth and well evaluation programs completed (if applicable), the well will be plugged and abandoned in line with applicable BP practices and the CNSOPB's requirements. The final well abandonment program has not yet been finalized; however, these details will be confirmed to the CNSOPB as planning for the Project continues.	
Accidents and malfunctions	BP will submit the following plans to the CNSOPB for review and approval: o Environmental Protection Plan o Safety Plan o Incident Management Plan o Spill Response Plan o Canada-Nova Scotia Benefits Plan	Incidents will be reported in accordance with *the Incident Reporting and Investigation Guidelines*. BP will submit a report to the CNSOPB documenting the implementation schedule (prior to drilling) and the outcome of follow-up and monitoring programs (post-abandonment) of each well, along with any additional conditions of approval, as applicable. The implementation schedule will be made available online for public information.

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Accidents and malfunctions	BP will implement multiple preventative and response barriers to manage risk of incidents occurring and mitigate potential consequences. The Project will operate under an incident management plan which will include a number of specific contingency plans for responding to specific emergency events, including potential spill or well control events. The Incident Management Plan and supporting specific contingency plans, such as a Spill Response Plan, will be submitted to the CNSOPB prior to the start of any drilling. The Spill Response Plan will set out tactical response methods, procedures and strategies for safely responding to different spill scenarios. Tactical response methods that will be considered following a spill incident include: offshore containment and recovery; surveillance and tracking; dispersant application; in-situ burning; shoreline protection; shoreline clean up; and oiled wildlife response.	In the unlikely event of a spill, specific monitoring (e.g. environmental effects monitoring) and follow up programs may be required and will be developed in consultation with applicable regulatory agencies.
Accidents and malfunctions	Prior to installation on the well, the Blowout Preventer stack will be pressure tested on the mobile offshore drilling unit deck, and then again following installation on the well to test the wellhead connection with the Blowout Preventer. The Blowout Preventer will be pressure tested periodically throughout the drilling program in line with the CNSOPB's *Drilling and Production Guidelines*.	
Accidents and malfunctions	In the event that oil reaches the shoreline, a shoreline clean-up and remediation team will be mobilized to the affected areas. A Shoreline Clean-up Assessment Technique (SCAT) survey will be conducted to inform shoreline clean-up and remediation as applicable. BP will also engage specialized expertise to deflect oil from sensitive areas, and recover and rehabilitate wildlife species as needed.	
Accidents and malfunctions	Transfer of hazardous wastes will be conducted according to the *Transportation of Dangerous Goods Act*. Any applicable approvals for the transportation, handling and temporary storage, of these hazardous wastes will be obtained as required.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Accidents and malfunctions	Procedures will be put in place to ensure that hoses are inspected and operated correctly to minimize the risk of an unintended release. The vessels, drilling unit and supply base will be equipped with primary spill contingency equipment to deal with spills in the unlikely event that they occur.	
Accidents and malfunctions	Platform supply vessels selected for the Project will be equipped for safe all-weather operations, including stability in rough sea conditions and inclement weather. In addition, measure to reduce superstructure icing hazards on platform supply vessels will be implemented as necessary and may include: • Reducing vessel speed in heavy seas; • Placing gear below deck and covering deck machinery, if possible; • Moving objects that may prevent water drainage from the deck; • Making the ship as watertight as possible; and • Manual removal of ice if required under severe icing conditions.	
Accidents and malfunctions	Platform supply vessel and mobile offshore drilling unit contractors will have a Maintenance Management System designated to ensure that the vessels and the mobile offshore drilling unit, and all equipment, are well maintained and operated efficiently.	
Accidents and malfunctions	A platform supply vessel will remain on standby at the drilling unit at all times in the event that operational assistance or emergency response support is required.	
Accidents and malfunctions	BP will undertake a Net Environmental Benefit Analysis as part of the Operations Authorization process with the CNSOPB to evaluate risks and benefits of dispersing oil into the water column, and will obtain regulatory approval for any use of dispersants as required.	
Accidents and malfunctions	BP will include procedures for informing fishers of an accidental event and appropriate response within the Fisheries Communication Plan.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
Effects of environment on the project	BP will obtain a Certificate of Fitness from an independent third party Certifying Authority for the mobile offshore drilling unit prior to commencement of drilling operations in accordance with the *Nova Scotia Offshore Certificate of Fitness Regulations*.	
Effects of environment on the project	The observation, forecasting and reporting of physical environment data will be conducted in accordance with the *Offshore Physical Environment Guidelines* (NEB *et al.* 2008).	
Effects of environment on the project	BP and contractors working on the Project will regularly monitor weather forecasts to forewarn platform supply vessels, helicopters and the mobile offshore drilling unit of inclement weather or heavy fog before it poses a risk to activities and operations. Extreme weather conditions that are outside the operating limits of platform supply vessels and helicopters will be avoided if possible. Captains and Pilots will have the authority and obligation to suspend or modify operations in case of adverse weather or poor visibility.	
Effects of environment on the project	Icing conditions and accumulation rates on platform supply vessels, helicopters and the mobile offshore drilling unit will be monitored during fall and winter operations, particularly when gale-force winds may be combined with air temperatures below minus two degrees Celsius.	
Effects of environment on the project	Safe work practices will be implemented to reduce exposure of personnel to lightning risk.	
General		BP will submit a report to the CNSOPB documenting the implementation schedule (prior to drilling) and the outcome of follow-up and monitoring programs (post-abandonment) of each well, along with any additional conditions of approval, as applicable. The Implementation schedule and results will be made available online for public information.
General	Once the well design and location have been confirmed, details for the wells will be provided for review and approval to the CNSOPB as part of its Operations Authorization and Authorization to Drill a Well for each well.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
General	Contractors and subcontractors shall be required to demonstrate conformance with the requirements that have been established, including HSSE standards and performance requirements.	
General	The mobile offshore drilling unit will be equipped with local communication equipment to enable radio communication between the platform supply vessels and the drilling unit's bridge. Communication channels will also be put in place for internet access, and enable communication between the mobile offshore drilling unit and shore.	
General	In accordance with the *Nova Scotia Offshore Drilling and Production Regulations*, a safety zone (estimated to be 500-metre radius) will be established around the drilling unit within which non-project related vessels are prohibited.	
General	Air emissions from the Project will adhere to applicable regulations and standards including the *Nova Scotia Air Quality Regulations* under the *Nova Scotia Environment Act*, the *National Ambient Air Quality Objectives* and the *Canadian Ambient Air Quality Standards*.	
General	Ultra-low sulphur diesel fuel will be used for the Project wherever practicable and available.	
General	Sewage will be macerated prior to discharge. Sewage will be macerated so that particles will be less than 6 millimetres in size prior to discharge.	
General	Liquid wastes not approved for discharge in the *Offshore Waste Treatment Guidelines* will be transported onshore for transfer to an approved disposal facility.	
General	All waste generated offshore on the mobile offshore drilling unit and platform supply vessels will be handled and disposed of in accordance with relevant regulations and municipal bylaws. Waste management plans and procedures will be developed and implemented to prevent unauthorized waste discharges and transfers.	

Valued component(s) or section 19 factor	Proponent commitment	
	Mitigation	**Follow-up**
General	Putrescible solid waste will be disposed of according to the *Offshore Waste Treatment Guidelines* and International Convention for the Prevention of Pollution from Ships requirements. There will be no discharge of macerated food waste within 3 nautical miles of land.	
General	Biomedical waste will be collected onboard by the medic or doctor and stored in special containers before being sent to land for incineration.	
General	Platform supply vessels will undergo BP's internal verification process as well as additional external inspections and audits inclusive of the CNSOPB's pre-authorization inspection process in preparation for the Project.	

Appendix C Proponent's Summary of Residual Environmental Effects of Routine Project Operations

Valued Component	Nature of Effect	Residual Environmental Effects Characteristics						Significance	Prediction Confidence
		Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological and Socio-economic Context		
Fish and Fish Habitat	Adverse	Low	LAA	Short-term to Medium-term	Continuous	Reversible	Disturbed	Not significant	Moderate to High confidence
Marine Mammals and Sea Turtles	Adverse	Low to Moderate	RAA	Medium-term	Continuous	Reversible	Disturbed	Not significant	Moderate confidence
Migratory Birds	Adverse	Negligible to Moderate	LAA	Medium-term	Continuous	Reversible	Undisturbed to Disturbed	Not significant	High confidence
Special Areas	Adverse	Low to Moderate	LAA	Short-term to Medium-term	Continuous	Reversible	Undisturbed to Disturbed	Not significant	Moderate confidence
Commercial Fisheries	Adverse	Low	LAA	Short-term to Medium-term	Continuous	Reversible	Undisturbed	Not significant	High confidence
Current Traditional Use by Aboriginal Peoples	Adverse	Low	LAA	Medium-term	Continuous	Reversible	Undisturbed	Not significant	High confidence

KEY:

Magnitude

Negligible: no measurable change in species population, habitat quality or quantity.

Low: measurable change but within the range of natural variability; will not affect population viability.

Moderate: measurable change outside the range of natural variability; but not posing a risk to population viability.

High: measurable change that exceeds the limits of natural variability and may affect long-term population viability.

Geographic Extent

PAA = Effects restricted to wellsite and Project Area.

LAA = Effects restricted to Local Assessment Area.

RAA = Effects restricted to Regional Assessment Area.

Duration

Short-term: effect extends for a portion of the duration of the Project.

Medium-term: effect extends through the entire duration of the Project.

Long-term: effects extend beyond the duration of the Project, after well abandonment.

Frequency

Single Event: effect occurs once.

Multiple Irregular Event: occurs more than once at a not set schedule.

Multiple Regular Event: occurs more than once at regular interval.

Continuous: occurs continuously.

Reversibility

Reversible: will recover to baseline conditions before or after Project completion (well abandonment).

Irreversible: permanent.

Ecological and Socio-economic Context

Undisturbed: area is relatively undisturbed or not adversely affected by human activity.

Disturbed: area has been substantially disturbed by previous human development or human development is still present.

Appendix D Summary of Indigenous Concerns

ACRONYMS

EA: Environmental Assessment

EIS: Environmental Impact Statement

TUS: Traditional Use Study

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
EA Process				
Mi'gmawe'l Tplu'taqnn Incorporated, Maliseet Nation in New Brunswick and Woodstock First Nation	Integration of Traditional Knowledge into EA	Lack of incorporation of traditional knowledge in the EIS. Indigenous knowledge study protocols for New Brunswick Mi'gmaq First Nations were not used.	Traditional knowledge was obtained through Aboriginal engagement, the commissioning of a Traditional Use Study (TUS), and data provided by Fisheries and Oceans Canada. Traditional knowledge obtained through the TUS and Indigenous engagement was incorporated into each valued component. The TUS was designed using both the Mi'kmaq Ecological Knowledge Study Protocol and the New Brunswick Mi'gmaq Indigenous Knowledge Study Process Guide as guidance documents for the study methodology. The proponent continues to engage with Indigenous groups in Nova Scotia, New Brunswick, and Prince Edward Island to inform them of the Project and to better understand their interests and concerns about the Project. With respect to TUS protocols, the proponent used the Nova Scotia Mi'kmaq Ecological Knowledge Study Protocol to develop the TUS for the EIS. The New Brunswick Mi'gmaq Indigenous	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency is satisfied with the proponent's response and their commitment to continue its engagement with Indigenous communities to identify and address concerns. The Agency has proposed EA conditions that would require the proponent to consult with Indigenous communities on the development of key Spill Response Planning documents and the Fisheries Communication Plan.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			Knowledge Study Process Guide is similar and application of this guide would not be expected to change the effects assessment presented in the EIS.	
Mi'gmawe'l Tplu'taqnn Incorporated	Regional Assessment Area Boundaries	Regional assessment area boundaries could be extended to encompass Aboriginal ocean resource use and the Indigenous fishery in the Gulf of Maine and Bay of Fundy to include potential effects on Aboriginal culture, health and socio-economic conditions and current use of lands and resources for traditional purposes.	The proponent predicted that residual effects from routine Project activities would be limited to the local assessment area and therefore are not expected to affect Aboriginal ocean resource use and the Indigenous fishery in the Gulf of Maine and Bay of Fundy. Results of the spill trajectory modelling carried out for the Project demonstrate that the geographic extent of an unmitigated spill would most likely be limited to the regional assessment area and not reach the Gulf of Maine and Bay of Fundy.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency sought advice from government oil spill modeling experts and accepted the results of the proponent's modeling. The Agency has proposed EA conditions to ensure that measures are in place to prevent accidents and malfunctions and to limit their effects if they occur.
Fish and Fish Habitat, Marine Mammals and Sea Turtles				
Mi'gmawe'l Tplu'taqnn Incorporated	Committee on the Status of Endangered Wildlife in Canada Listed Endangered Winter Skate	Concerns related to lack of information on the Committee on the Status of Endangered Wildlife in Canada-listed Endangered winter skate species which could be affected by mobile offshore drilling unit operations.	At the Agency's request, the proponent provided a stand-alone assessment of effects on species at risk and species listed by the Committee on the Status of Endangered Wildlife in Canada, including Winter Skate. The proponent noted that while there may be adverse effects to species at risk, with the implementation of mitigation measures, the residual environmental effects are predicted to be not significant.	The Agency requested an assessment of effects on species at risk from the proponent and incorporated it into its analysis. The Agency determined that the mitigation measures and related proposed EA conditions for fish and fish habitat would also mitigate effects on fish species at risk, including Winter Skate. These are described in Section 6.1.3 and Appendix A. Key mitigation measures include: • selecting chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines*; • ensuring that all discharges from the

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				mobile offshore drilling unit meet the *Offshore Waste Treatment Guidelines*; and • planning and conducting vertical seismic profiling activity in accordance with the Statement *of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment*.
Mi'gmawe'l Tplu'taqnn Incorporated	Project effects from mobile offshore drilling unit operations on *Species at Risk Act*-listed Atlantic Right Whales	Lack of specific assessment of mobile offshore drilling unit operations on North Atlantic Right Whale critical habitat identified in Roseway Basin on the Scotian Shelf within the regional assessment area. The sound generated by the mobile offshore drilling unit would be continuous throughout the drilling program. In addition, the low frequency of increased vessel traffic may affect the ability of North Atlantic Right Whales and other whale species to navigate and communicate. The Atlantic Right Whale is a culturally significant species to MTI.	The proponent provided a stand-alone assessment of effects on species at risk and species listed by the Committee on the Status of Endangered Wildlife in Canada, including North Atlantic Right Whale. Based on acoustic modelling, the proponent noted that North Atlantic Right Whale would have to remain within 140 metres of the mobile offshore drilling unit and platform supply vessel in order for sound levels to exceed the threshold for injury. The proponent noted that critical habitat for North Atlantic Right Whale does not occur within the project area, and that closest critical habitat is sufficiently far from the project area to avoid injury as a result of underwater sound from the mobile offshore drilling unit and platform supply vessel. The proponent predicted that there may be adverse effects on species at risk, but that with the implementation of mitigation measures, the residual environmental effects would not be	The Agency requested an assessment of effects on species at risk from the proponent and incorporated it into its analysis. The Agency also sought advice from Fisheries and Oceans Canada. The Agency is aware that noise from the mobile offshore drilling unit would result in noise exceeding certain behaviour thresholds for marine mammals. Although some species are present year-round, most (including the Atlantic Right Whale would predominantly be present in the summer when effects would be more limited. The Agency has identified mitigation measures, follow-up programs and related proposed EA conditions for marine mammals, including North Atlantic Right Whale. These are described in Section 6.2.3 and Appendix A. Key mitigation measures to reduce the effects on noise on marine mammals include: • conducting vertical seismic profiling surveys in accordance with or exceeding the *Statement of Canadian Practice with Respect to the Mitigation*

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			significant.	*of Seismic Sound in the Marine Environment;* and • implementing a Marine Mammal Monitoring Plan during vertical seismic profiling surveys which includes a marine mammal observer program using qualified individuals and passive acoustic monitoring to detect vocalizing marine mammals. The Agency understands that Fisheries and Oceans Canada would be consulted by the proponent in developing the plan, including the specific passive acoustic monitoring configuration.
Maliseet Nation in New Brunswick	Effects from spills on Atlantic Salmon	Effects from accumulation of spill-related chemicals in the local assessment area and regional assessment area on migratory and transient species, particularly Atlantic Salmon whose migratory routes between breeding and feeding areas may pass through the project area. Spill related effects could lead to change in fish behaviour and mortality affecting Aboriginal food, social and ceremonial fishing.	The proponent conducted oil spill trajectory modeling and predicted that the majority of oil released from a blowout would remain in the offshore, where it could impede or alter the migration of some Atlantic Salmon through avoidance of oiled areas. The proponent noted that nearshore and freshwater fisheries are not expected to be affected as a result of a spill.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified that the mitigation measures and related proposed EA conditions for accident and malfunctions would also mitigate effects on fish and fish habitat, including Atlantic Salmon. These are described in Section 7.1.3 and Appendix A. Key mitigation measures to reduce the likelihood and effects of an accident or malfunction include: • preparing a Spill Response Plan; • conducting a desktop exercise of the Spill Response Plan prior to the commencement of project activities; • undertaking a net environmental benefit analysis to consider all realistic and achievable spill response options and identify those techniques

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				(including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences; and • in the event of a well blowout, beginning the immediate mobilization of a capping stack and associated equipment to the project area.
Mi'gmawe'l Tplu'taqnn Incorporated, Kwilmu'kw Maw-klusuaqn Negotiation Office	Project effects on American Eel	Concerns regarding lack of analysis of the potential impacts from underwater sound, waste disposal and spills on the migration and development of juvenile American Eels. American Eel is a traditional source of sustenance for the Mi'gmaq and is a species of great spiritual and cultural significance.	The proponent indicated that the operation of the mobile offshore drilling unit, with a platform supply vessel nearby, would result in a localized avoidance of 0.5 square kilometres. The proponent acknowledged that American Eel may avoid this area; however, it would not interfere with migration. The proponent noted that any discharges would comply with relevant regulations and guidelines and would be at low volumes and concentrations and likely would not affect American Eel. The proponent acknowledged that larvae and glass eels are more at risk of accidental events due to their limited mobility compared to adult American Eel but predicted that effects would not be significant.	The Agency identified that the mitigation measures and related proposed EA conditions for fish and fish habitat, including American Eel. These are described in Section 6.1.3 and Appendix A. Key mitigation measures include ensuring that all discharges from the mobile offshore drilling unit meet the *Offshore Waste Treatment Guidelines* and planning and conducting vertical seismic profiling activity in consideration of the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* (i.e. including a ramp up procedure that would gradually increase seismic source energy over a period of approximately 30 minutes until the operating level is achieved, before any vertical seismic profiling operations begin) and using only the minimum amount of energy necessary to achieve operational objectives.
Mi'gmawe'l Tplu'taqnn Incorporated	Cumulative effects on fish and fish habitat	Cumulative effect on water quality from changes caused by discharge of drill muds and cutting. Changes in water quality could affect availability of	The proponent provided information showing that discharges from the mobile offshore drilling unit are expected to be temporary, non-bio-accumulating and non-toxic.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions related

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		fisheries resources or a change in traditional use and Aboriginal commercial fisheries. Limited mitigation exists for the reversal of degraded sediment quality and water quality from cumulative discharge of drilling materials.	The proponent noted that results from other environmental effects monitoring programs undertaken for drilling programs in Atlantic Canada have concluded that these discharges have negligible effects on fish health and fish habitat. Long-term effects are not anticipated and therefore long-term impacts to traditional fisheries species targeted by Indigenous peoples would not occur.	to fish and fish habitat. These are described in Section 6.1.3 and Appendix A. Key mitigation measures include ensuring that all discharges from the mobile offshore drilling unit meet the *Offshore Waste Treatment Guidelines.*
Mi'gmawe'l Tplu'taqnn Incorporated	Effects from underwater noise on the Atlantic Herring	Underwater sound could alter the movement of Atlantic Herring populations throughout the regional assessment area. Subsequent impacts on the Indigenous fishery were not adequately considered. The Atlantic herring are an important species culturally for the Mi'gmaq communities as well as an important commercial fishery in the project area.	The proponent provided information on the effects of underwater sound on marine fish, including Atlantic herring. The proponent noted that predicting behavioural responses is challenging due to how fish species perceive different types of sources of sound. Based on acoustic monitoring, Atlantic Herring may avoid an area of 400 metres (0.5 square kilometres) in all directions around the mobile offshore drilling unit during drilling activities. The proponent noted that Atlantic Herring rarely occur within the project area and are known to spawn in coastal waters and areas in Georges Bank. If Atlantic Herring occur within the project area, the localized area of avoidance would not likely affect individual or population behaviour. Platform supply vessels may increase underwater noise. However, because they would be in transit, the sound generated in the coastal zone would be temporary	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency has identified mitigation and follow-up related to potential effects on fish and fish habitat. These are described in Section 6.1.3 and Appendix A. Key mitigation measures include planning and conducting vertical seismic profiling activity in consideration of the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* as well as undertaking an acoustic monitoring program during drilling to verify acoustic modelling predictions.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			and spatially-limited. Underwater sound from project activities is not predicted to affect Atlantic Herring.	
Mi'gmawe'l Tplu'taqnn Incorporated	Effects on fish and fish habitat – proposed well sites	The proponent should conduct additional benthic and coral surveys in order to update distribution data and understand the current state of coral and benthic species at proposed well sites.	The proponent has proposed to conduct an imagery-based seabed survey (using a remotely-operated vehicle with a video camera) in the vicinity of the wellsites to ground-truth the findings of the Geohazard Baseline Review. The survey would involve a live feed of the video footage to be reviewed in real-time by a survey team which would include, at a minimum, an remotely-operated vehicle operator, a shallow hazards specialist and marine scientist. If any features of interest, such as benthic communities, epifauna, debris or other anthropogenic features are identified, they would be investigated in greater detail prior to proceeding. In the event that any habitat forming coral aggregations, epifauna species at risk, or unidentified epifauna are observed by the survey, the proponent would notify the CNSOPB immediately to discuss an appropriate course of action. This may involve further investigation or selection of an alternative wellsite, if it is feasible to do so. The CNSOPB may consult with other regulatory agencies (e.g. Fisheries and Oceans Canada) if necessary. No drilling activity would occur before a decision is made by the CNSOPB.	The Agency requested additional information from the proponent The Agency has identified mitigation measures and related proposed EA conditions that would require site-specific seabed surveys prior to drilling to look for sensitive environmental features such as aggregations of habitat-forming corals. If such features are found, the proponent would be required to notify the CNSOPB immediately to discuss the appropriate course of action (e.g. re-locating the well, if technically feasible). No drilling would occur until a decision has been made by the CNSOPB.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
Mi'gmawe'l Tplu'taqnn Incorporated	Sound on fish and marine mammal behaviour	Concerns regarding the effects of chronic sound on behaviour or migration of fish and marine mammals which are important to Mi'gmaq communities and their Indigenous fishery.	The proponent provided information regarding the acoustic modelling conducted for the Project. The model predicted that fish species may avoid an area extending 400 metres around the mobile offshore drilling unit (0.5 square kilometres) during drilling activities, a relatively small area compared to the total area of the regional assessment area. The proponent predicted that potential localized avoidance of such an area would not affect individual or population behaviour and/or migration patterns. The acoustic model predicted that the behavioural threshold (published by the National Oceanic and Atmospheric Administration) for marine mammals exposed to continuous underwater sound could be exceeded up to 150 kilometres from the drilling unit during winter and approximately 50 kilometres during summer. The proponent stated that most marine mammals are present only from spring to fall, and predominantly in the summer. Long-term displacement of a marine mammal or sea turtle from an area would likely occur at shorter distances. The proponent provided information regarding sounds generated from the mobile offshore drilling unit's dynamic positioning system and updated its effects assessment. It predicted that the effect would be low-magnitude and occur within the local assessment area, occur more than once at irregular intervals, be short-term in duration and wold be reversible.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions for fish and fish habitat and marine mammals and sea turtles. These are described in Section 6.1.3 (fish and fish habitat) and 6.2.3 (marine mammals and sea turtles) and Appendix A. Key mitigation measures and follow-up programs include implementing a ramp-up procedure for vertical seismic profiling, conducting vertical seismic profiling surveys in accordance with the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment* as well as undertaking an acoustic monitoring program during drilling to verify acoustic modelling study results. With respect to marine mammals, Fisheries and Oceans Canada advises that underwater acoustic modelling completed for the Project predicts that sound from the mobile drilling unit during winter is predicted to exceed the acoustic threshold for behavioural disruption of marine mammals within critical habitat of the Endangered Northern Bottlenose Whale. There is potential for adverse residual effects because Northern Bottlenose Whales reside in critical habitat year-round and sound from drilling could persist over several months. . The Agency has proposed EA conditions stating that if drilling is proposed from

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				December 1 to March 30, the proponent would be required to consult Fisheries and Oceans Canada on additional mitigation and monitoring of sound levels and environmental effects in Northern Bottlenose Whale critical habitat.
Migratory Birds				
Mi'gmawe'l Tplu'taqnn Incorporated	Project effects on migratory birds	A complete assessment of potential project effects on migratory birds both inside and beyond the regional assessment area is required. Assessment should include a table or text that summarizes the species composition of the dead birds during the Tangier 3D Seismic Survey.	The proponent clarified its data sources for migratory birds in the project area and detailed how birds in the project area are inferred to be located in the surrounding areas of the Scotian Shelf and Slope. The proponent acknowledged that data coverage is limited in the winter. The proponent provided information regarding the species composition of migratory birds that were encountered during the Tangier 3D Seismic Survey.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions for migratory birds. These are described in Section 6.2.3 and Appendix A. Key mitigation measures include notifying the CNSOPB at least 30 days in advance of planned flaring in order to identify whether it would occur during periods of bird vulnerability.
Mi'gmawe'l Tplu'taqnn Incorporated	Atmospheric sound effects on migratory birds	Concerns regarding the limited mitigation measures specific to atmospheric sound impacts from the mobile offshore drilling unit on migratory birds. Sensory disturbances to migratory birds may lead to habitat avoidance or changes in activity state (e.g. feeding, resting, or travelling).	The proponent could not find information detailing how underwater noise might affect migratory birds. The proponent predicted that noise generated from vertical seismic profiling and the mobile offshore drilling unit may cause migratory birds to avoid the area.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and follow-up requirements for migratory birds. These are described in Section 6.3.3 and Appendix A. Key follow-up includes monitoring effects on migratory birds to verify the accuracy of effects predictions, such as by recording incidents of birds found stranded or dead on the mobile offshore drilling unit or platform supply vessels. The Agency has proposed EA

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				conditions to ensure these measures would be implemented.
Mi'gmawe'l Tplu'taqnn Incorporated, Maliseet Nation in New Brunswick	Lighting effects on migratory birds	Concerns regarding the potential for risk of mortality or physical injury for migratory birds due to the presence and operation of the mobile offshore drilling unit and platform supply vessels. Migratory birds are known to aggregate around drilling features because of night lighting, food, and other visual cues, potentially making them subject to increased risk of mortality due to physical impacts with structures, predation by other marine bird species, and incineration from flares. The proposed mitigation for avoiding lighting-related mortality is limited and should be expanded to include measures to reduce lighting during important migratory periods. Also, blackout curtains and spectral modified lighting should be considered as potential mitigation measures.	The proponent has leased the semi-submersible drilling rig West Aquarius to drill the first well for the Project; therefore the proponent has very limited ability to modify on-board lighting. Further, the proponent is not aware of any mobile offshore drilling units that are equipped with spectral modified lighting that could be used for the Project. The proponent has committed to reduce lighting where possible and where it does not compromise safety. The proponent would consider the use of water curtains around the flare during flaring, if conducted. The presence of the water curtain is predicted to deter birds and reduce the chance that they would be harmed by the flare.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and follow-up requirements for migratory birds. These are described in Section 6.3.3 and Appendix A. Key mitigation measures include notifying the CNSOPB three days in advance of any planned flaring in order to identify if it is occurring in periods of bird vulnerability, reducing lighting to the extent possible, and operating a water curtain barrier. The Agency has proposed EA conditions to ensure these measures would be implemented.
Maliseet Nation in New Brunswick	Stranded birds	Indicate the causes of stranded and dead birds, either associated with nocturnal attraction to lights or alternative causes. Describe what is done with the stranded birds, how the post-encounter survival of the	The proponent stated that the Tangier 3D Seismic Survey did not identify the source of stranding or mortality. The proponent will develop bird handling guidelines in consultation with the Canadian Wildlife Service. The guidelines will include instructions on how to manage and	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions for migratory birds. These are described in Section 6.3.3 and Appendix A. Key

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		stranded birds was determined and provide the post-encounter survival rate of the stranded birds.	document the capture, handling, transport, and release of live and dead birds that may be encountered during the Project. Available literature indicates that on the Grand Banks, released stranded birds died 3% of the time, with the fate of 23% of the birds released unknown due to lack of data. The monitoring program for Tangier 3D Seismic Survey had a post-encounter survival rate of 95%.	mitigation and follow-up measures include reducing lighting to the extent possible without compromising safety, monitoring effects on migratory birds to verify the accuracy of effects predictions, and reporting results of any monitoring carried out. The reporting would include discussion of whether the mitigation measures were proven to be effective and if additional mitigation measures are required.
Current Use of Lands and Resources for Traditional Purposes				
The Assembly of First Nation Chiefs in New Brunswick	Commercial Fisheries protocols	The Mi'gmaq request that the proponent establish protocols, including timelines, that will define how they will engage with the Mi'gmaq with respect to their fishing activities, whether commercial or food, social and ceremonial, in both the project area and in the local assessment area. The protocols should explicitly reference the CNSOPB's guidelines with respect to gear damage or loss and identify how any incident is to be reported and to whom.	The proponent provided information regarding the development of its Fisheries Communication Plan, which is intended to provide a framework for ongoing engagement with Indigenous and non-Indigenous fisheries organization during the Project. The proponent acknowledged that claimed compensation for damages will be managed in accordance with the *Compensation Guidelines with Respect to Damages Related to Offshore Petroleum Activity*.	The Agency requested additional information from the proponent and identified measures to mitigate effects on fishery resources and fishing activity. These are described in Section 6.8.3 and Appendix A. Key mitigation measures include implementing a Fisheries Communication Plan, and compensating for damage to gear in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity.* The Agency has proposed EA conditions to ensure that these measures are implemented.
The Assembly of First Nation Chiefs in New Brunswick	Effects from project on tuna fishery	Concerns raised by the Assembly of First Nation Chiefs in New Brunswick about the project's effects on the tuna fishery and on the following First Nations communities that hold tuna	The proponent provided information relating to Atlantic Bluefin Tuna fisheries. The proponent acknowledged that recent studies have shown Atlantic Bluefin Tuna to spawn in the Slope Sea between the Gulf Stream, although no data currently	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions for accident and malfunctions and fish and fish

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		licences in the New Brunswick offshore: Eel River Bar, Buctouche, Esgenoopetitj, Indian Island and Pabineau.	show that they spawn in the project area. The proponent acknowledged that acute oil exposure to Atlantic Bluefin Tuna eggs and larva may cause heart defects resulting in mortality. Effects of chronic oil exposure on adults are not well understood, but it is predicted that fish would tend to avoid oiled areas, such as from a blowout event.	habitat. These are described in Section 6.1.3 (fish and fish habitat), 7.1.3 (accident and malfunctions) and Appendix A. Key mitigation measures for fish and fish habitat include ensuring that all discharges from the mobile offshore drilling unit meet the *Offshore Waste Treatment Guidelines* and to planning and conducting vertical seismic profiling activity in consideration of the *Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment.* With respect to spills, key mitigation measures include preparing a Spill Response Plan, undertaking a net environmental benefit analysis, and undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project.
Mi'gmawe'l Tplu'taqnn Incorporated	Effects on commercial fisheries outside the exclusion zone	The effects assessment on commercial fisheries from waste dispersal into the open ocean outside the 500-metre safety (exclusion) zone from the mobile offshore drilling unit was limited.	The proponent stated that discharges from the mobile offshore drilling unit are expected to be temporary, non-bio-accumulating and non-toxic. The proponent noted that results from other environmental effects monitoring programs undertaken for drilling programs in Atlantic Canada have concluded that these discharges have negligible effects on fish health and fish habitat. The proponent predicted that long-term effects are not anticipated and therefore long-term impacts to traditional fisheries species targeted by Indigenous	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and follow-up requirements for fish and fish habitat. These are described in Section 6.1.3 and Appendix A. The Agency has proposed EA conditions to ensure these measures would be implemented. Key mitigation and follow up measures include ensuring that all discharges from the mobile offshore drilling unit meet the *Offshore Waste Treatment Guidelines,* and collecting sediment (drill waste) deposition information in order to

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			people are not predicted to occur.	verify the predicted extent of sediment deposition thickness.
Maliseet Nation in New Brunswick and MTI	Current Use – lack of information in the traditional use study	Concerns regarding the lack of information (e.g. socio-economic information and fishing resource information) included in the TUS.	The proponent provided a information on traditional use for Indigenous communities, information about which communities hold licences for areas that overlap the regional assessment area, information regarding species harvested and fish landings value data. The proponent provided a summary of its engagement with Indigenous communities and noted that it would continue its engagement activities throughout the Project. The proponent advised that the new information would not change its conclusion regarding the project's potential effects on the current use of lands and resources for traditional purposes.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and follow-up requirements for current use of lands and resources for traditional purposes by Aboriginal peoples and health and socio-economic conditions of Aboriginal peoples. These are described in Section 6.7.3 and Appendix A. The Agency has proposed EA conditions to ensure these measures would be implemented. Key mitigation measures include implementing of a Fisheries Communication Plan and compensating for damages attributable to the Project in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.
Health and Socio-economic Conditions				
Mi'gmawe'l Tplu'taqnn Incorporated	Health and socioeconomics	A more robust assessment of potential effects to human effects and socio-economic conditions is needed to demonstrate an understanding of potential secondary effects on Indigenous peoples. The analysis should include effects of changes in diet due to avoiding potentially contaminated wild foods. Such secondary effects may adversely	The proponent stated that foods obtained through harvesting (i.e. country foods) are described in the TUS (Appendix B of the EIS). The proponent stated that country foods that would be harvested within the regional assessment area have been considered as part of food, social and ceremonial fishing. The proponent identified food, social and ceremonial fishing as the only harvesting activity occurring in the regional assessment area.	In response to this concern, the Agency requested additional information from the proponent and assessed the Project's potential effects on health and socio-economic conditions (Section 6.8). Health and socio-economic conditions in Indigenous communities could be affected if project-related changes in the marine environment occur (e.g. cause decreased catch rates, or a decrease in fish quality for human consumption). Possible reduced

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		affect livelihoods, increase cost of living, contribute to loss of culturally important traditional knowledge, alter community social fabric associated with sharing the proceeds of traditional use amongst community members, as well as mental health impacts associated with barriers to accessing healthy ocean resources.	The proponent indicated that the mitigation measures proposed in the EIS for biophysical valued components, such as fish and marine mammals, would also mitigate effects on food, social and ceremonial fishing activity and that the Project is not expected to affect to First Nations' access to country food. Although unlikely, accidental events (e.g. spills), could contaminate fish species commonly harvested for human consumption purposes within the regional assessment area. Spill response measures would reduce potential environmental effects such that the Project is not predicted to affect human health. Conservatively, a blowout incident could result in the potential temporary closure of areas to commercial or food, social and ceremonial fishing and associated adverse economic effects. In this conservative scenario, the proponent predicted a potential significant adverse residual effect on the current Aboriginal use of lands and resources for traditional purposes.	availability of healthy country food available for purchase or sharing in the community, may affect the diet of Indigenous communities The Agency considers that mitigation measures identified for fish and fish habitat, accident and malfunction, commercial fishing (e.g. Fisheries Communication Plan and compensation as per the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity)*, would also mitigate potential effects on the health and socio-economic conditions of Indigenous peoples. Furthermore, key mitigation measures include engagement with Indigenous and commercial fishers to minimize conflicts between the Project and fishing activities. The CNSOPB has advised the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* extends to project-related loss of food, social and ceremonial fisheries, including replacement of food and sharing within communities.
Maliseet Nation in New Brunswick	Spill effects on commercial fishing and human health	Concerns raised regarding effects from spill on both population and human health (toxin bioaccumulation) contexts as they relate to commercial fisheries, including Aboriginal commercial fisheries.	The proponent explained how spill response measures would limit the geographic extent and magnitude of potential environmental effects. It noted that bioaccumulation of petroleum hydrocarbons typically does not occur in food webs as vertebrates can readily metabolize them.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and related proposed EA conditions for health and socio-economic conditions of Aboriginal peoples, and for accident and malfunctions. These are described in

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			Fisheries closures would be imposed in areas where a visible sheen is present. The proponent noted that an exclusion zone around the affected areas would prevent human contact and predicted a potential significant adverse residual effect on the current Aboriginal use of lands and resources for traditional purposes. During recent engagement activities with First Nation communities, the cultural importance of the food, social and ceremonial fishery was emphasized. Although traditional food may currently be a small portion of the community's diet, it is considered to be highly important to the diet of community members facing food insecurity.	Section 6.8.3 and Section 7.1.3, respectively. Key mitigation measures to reduce the likelihood and effects of an accident or malfunction include: • preparing a Spill Response Plan; • conducting a desktop exercise of the Spill Response Plan prior to the commencement of project activities; • undertaking a net environmental benefit analysis to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences; and • in the event of a well blowout, beginning the immediate mobilization of a capping stack and associated equipment to the project area.
Potential Impacts to Rights				
Mi'gmawe'l Tplu'taqnn Incorporated	Impacts to Rights	Concerns regarding impacts to rights and interests of MTI caused by a well blow out that would negatively impact all categories of marine resources evaluated, due primarily to the toxic and smothering effects of the oil.	The proponent used well drilling data for the period from 1980 to 2004 to illustrate that the probability of a blowout incident is approximately 0.031 percent per well. The proponent predicted that the additional controls and mitigation measures used for well control since the Deepwater Horizon incident in 2010 would reduce the probability of an event to below 0.031 percent, although it did not provide an estimate.	The Agency acknowledges that a blowout incident could have more serious repercussions, but has a very low probability of occurrence. Taking into account the analysis of environmental effects of the Project and the related mitigation measures outlined for fish and fish habitat (Section 6.1), commercial fisheries (Section 6.6), and effects of accidents and malfunctions (Section 7.1) and the potential impacts and accommodation measures provided in

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			The proponent acknowledged the rights of Indigenous peoples that could be potentially affected by the Project. It stated that an accidental spill could affect access to fisheries resources which could, in turn, adversely affect fishing rights.	Section 8.1.3 (above), the Agency concludes that the potential impacts of the Project on potential or established Aboriginal or treaty rights have been adequately identified and appropriately accommodated. Notwithstanding this conclusion, the Agency has identified mitigation measures, follow-up programs and related potential conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include: • preparing a Spill Response Plan; • undertaking a net environmental benefit analysis as part of the Spill Response Plan; • undertaking all reasonable measures to prevent accidents and malfunctions; and • conducting a desktop spill response exercise to ensure that plans can be effectively implemented.
Follow-up and Monitoring				
Mi'gmawe'l Tplu'taqnn Incorporated, Maliseet Nation in New Brunswick and Woodstock First Nation	Follow-Up and Monitoring	Concerns regarding lack of monitoring with regards to Indigenous fisheries and other Current Aboriginal Use of Lands and Resources for Traditional Purposes. Request to co-develop follow up and monitoring plans with specific references to the	The proponent provided information detailing that the effectiveness of their mitigation on routine drilling activities are well-understood and as such are not proposing follow-up and monitoring for fisheries (both commercial and Indigenous) and Current Aboriginal Use of Lands and Resources for Traditional Purposes. Monitoring and follow-up programs would be implemented in the	The Agency requested additional information from the proponent regarding a potential follow-up program to monitor effects on the current use of lands and resources for traditional purposes and on Indigenous fisheries and incorporated it into its analysis. The Agency identified specific mitigation measures related to Indigenous fisheries and current aboriginal use of lands and

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		Indigenous fisheries.	event of a spill. The proponent stated that it continues to engage with Indigenous groups. The proponent is also developing a Fisheries Communication Plan to support engagement with Indigenous and non-Indigenous fisheries organizations.	resources for traditional purposes. These mitigation measures include the development of the Fisheries Communication Plan and a well abandonment plan (including consultation with Indigenous and commercial fishers), where wellheads that could interfere with Indigenous fisheries are proposed to be left in place after the well is completed.
Native Council of Nova Scotia	Well abandonment	Asked the CNSOPB to share with the Native Council of Nova Scotia its requirements for "deep sea well abandonment" to ensure compliance with United Nations Convention on the Law of the Sea (UNCLOS)	None required.	The Agency received the following response from CNSOPB: As a party to the United Nations Convention on the Law of the Sea (UNCLOS) Canada has implemented various domestic legislation related to ocean management that reflect its international rights and obligations under the treaty. These include the *Oceans Act,* the *Canadian Environmental Protection Act*, the *Fisheries Act* and the Accord Acts. The CNSOPB is of the opinion that the Accord Acts, and the requirements therein, take into consideration and are consistent with UNCLOS requirements. In the case of abandoning deep-water wells (with the wellhead in place), consistent with UNCLOS, the CNSOPB will consider the request. The decision primarily depends on whether or not there is interference with other ocean users. In particular, the CNSOPB will consult with Fisheries and

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				Oceans Canada regarding any potential impacts to the fisheries.
Effects of Accidents and Malfunctions				
Maliseet Nation in New Brunswick	Accidents and spills	Based on the modelled accident scenarios in the EIS, scenarios showing potential environmental consequences resulting from these accidents and how they might be mitigated or minimized depending on the response and recovery strategies used are required. The response should include the range of temporal and spatial conditions considered in the spills models.	The proponent provided information regarding the spill modelling conducted for the Project. The model was run for a total of 210 individual oil releases at both spill sites. Each individual release was run for a 30 day release period and an additional 90 days to show the fate and trajectory of oil after the well has been capped (i.e. total of 120 days). Seasonal summaries of the model results were completed for surface oiling as well as water column dispersed and dissolved oil concentrations. The oiling footprint locations as provided by the modelling results are not the expected extent of oiling from a single release. The locations of the oiling footprints represent the potential areas in which oil could travel in 30 days following an unmitigated release. The model predicts that the majority of oil will remain in the offshore waters, with a less than 20% chance that surface oil exceeding the 0.04 micrometre threshold for surface oil thickness will enter the nearshore waters of Nova Scotia in either the summer or winter. In the event oil does enter into the nearshore waters, it will take a minimum of 30 to 50 days to arrive.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures, follow-up programs and related potential conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include preparing a Spill Response Plan, undertaking a net environmental benefit analysis, and undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project.
Maliseet Nation	Effects of	Provide a list of potential	The proponent acknowledged that a	The Agency identified mitigation measures,

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
in New Brunswick	dispersants	dispersants, with detailed and recent evidence of the observed and potential negative environmental effects associated with their use.	specific list of dispersants has not yet been determined for the Project, noting that under the *Regulations Establishing a List of Spill-treating Agents*, two products have been listed for use in Canada: Corexit® EC9500A and Corexit® EC9580A. The proponent provided additional information on the dispersant Corexit® 9500A, which has been tested by the United States Environmental Protection Agency and Environment and Climate Change Canada.	follow-up programs and related proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include preparing a Spill Response Plan, undertaking a net environmental benefit analysis (including the possible use of dispersants), and undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project. The Agency has also proposed conditions that would require the proponent to consult with Indigenous peoples during the development of key spill response planning documents.
Mi'gmawe'l Tplu'taqnn Incorporated	Spill model – Sable Island	As the licence block extends in relatively close proximity to Sable Island, clarification is requested regarding the range in distance to Sable Island at which drilling could possibly occur. The distance to Sable Island will affect the extent of modelled shoreline impacts and the time to reach shore.	The proponent acknowledged that the well locations are not yet known, but provided additional information about the model and the potential for oil to reach Sable Island. The results showed that the estimated maximum amount of oil to reach Sable Island is 666 tonnes in the summer and 255 tonnes in the winter. The earliest potential arrival time for oil on the shoreline during the summer is 3.8 days. Peak timing for oil accumulation on the shoreline occurs between 20 to 100 days, depending on the blowout location. This is considered a worst case unmitigated scenario.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures, follow-up programs and related proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include preparing a Spill Response Plan, undertaking a net environmental benefit analysis, and undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project. The Agency has also proposed conditions

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
				that would require the proponent to consult with Indigenous peoples during the development of key spill response planning documents.
Mi'gmawe'l Tplu'taqnn Incorporated	Malfunctions and accidents, Response plans	Mi'gmawe'l Tplu'taqnn requests the opportunity to review the Project Incident Management Plan, Spill Response Plan, Environmental Protection Plan, and Safety Plan before they are finalized, and provide comments to the Proponent, CEAA and other relevant regulatory authorities.	The proponent noted that engagement with Indigenous groups will continue. Discussions on the Incident Management Plan, Spill Response Plan, Environmental Protection Plan, and Safety Plan will occur at a high level. These plans will be submitted to, and reviewed by the CNSOPB. The CNSOPB determines the extent of distribution of these plans once they are finalized.	The Agency has proposed conditions that would require the proponent to consult with Indigenous peoples during the development of key spill response planning documents.
Mi'gmawe'l Tplu'taqnn Incorporated	Accidents and malfunctions, oil spill modelling	Concerns regarding the meteorological and oceanographic data dates (January 2006 to December 2010) used in the oil spill model. It is unclear why this time period was selected and does not seem sufficiently long to include extreme weather events. Mi'gmawe'l Tplu'taqnn requests that the oil spill model be rerun using data spanning a longer time period (at least 10 years) to more conservatively account for extreme weather events.	The proponent provided additional information regarding its use of meteorological and oceanographic data from January 2006 to December 2010. It commissioned an independent assurance review of potential meteorological and oceanographic models to use for the Project. The five-year data period captures representative data and was validated through the independent review. The proponent sated that a longer period of time would likely not substantially impact the modelling results.	The Agency sought advice from Environment and Climate Change Canada and concluded that the proponent's response is reasonable.
Sipekne'katik First Nation	Oil Spill Response – capping stack	Concerns and questions regarding the time it may take for the capping stack to arrive and contain a blow-out spill.	The proponent provided information about capping stack mobilization and noted that the primary well intervention would be to use the blowout preventer and these procedures would take two to	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			five days. The proponent would mobilize the capping stack as soon as practicable after a blowout incident to provide additional contingency. Before it could be deployed, preparatory work would need to be carried out. A site survey would be conducted in order to assess the site conditions (e.g. debris). The site would be prepped for the installation of the capping stack. These activities would occur will the capping stack is being mobilised. While having a capping stack in every country or using alternative mobilization means may allow for the capping stack to get to the blowout location more quickly, it is unlikely that it would reduce the total mobilization or installation duration, because of the preparatory work that must be undertaken.	and related proposed EA conditions, specifically detailing the immediate mobilization one or more capping stacks and associated equipment in the case of a well blowout. These are described in Section 7.1.3 and Appendix A.
Mi'gmawe'l Tplu'taqnn Incorporated	Oil spill response	Booms, berms, and other barriers may be used to protect sensitive shorelines in the event of a spill. Insufficient information is provided on whether adequate equipment is available for large spills and whether the equipment could reasonably be deployed before oil reaches shore.	The proponent provided information on available spill response resources and indicated that as part of the proponent's spill response and preparedness arrangements, a net environmental benefit analysis will be completed in order to evaluate the effectiveness and feasibility of certain spill response methods and to consider potential environmental effects associated with spill response methods. Depending on the spill event, equipment may be mobilized using platform supply vessels, helicopters, or vessels of opportunity. The mobilization will	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures, specifically detailing the requirement to undertake a net environmental benefit analysis in order to consider all available spill response options, as well as the immediate mobilization of a capping stack and associated equipment in the event of a well blowout. These are described in Section 7.1.3 and Appendix A. The Agency has proposed conditions that would require the proponent to consult

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			consider: environmental conditions, safety criteria, and potential interactions environmental and social receptors. Mobilization strategies will be considered as part of the net environmental benefit analysis. The proponent would maintain access to spill response equipment to respond to a range of potential scenarios. Some localized equipment (e.g. sorbents) will be maintained on the mobile offshore drilling unit and platform supply vessels. Booms and skimmers will be located in or near Halifax. The contracting arrangements for spill equipment have not been finalized therefore the specific location cannot be confirmed, however this location will be one that allows for rapid mobilization to a spill location.	with Indigenous peoples during the development of key spill response planning documents.
Mi'gmawe'l Tplu'taqnn Incorporated	Spill response capability	MTI capacity should be considered for support within the Incident Management Plan and Spill Response Plan, with options for enhancing MTI spill response and incident management. This can include supporting MTI capabilities to secure the availability of the required capabilities, equipment, supplies and personnel. MTI personnel represent untapped resources for spill response measures that include surveillance and tracking, offshore containment and recovery, dispersant application, in-situ burning, shoreline	None required.	The Agency has forwarded this issue to the Canadian Coast Guard, which has indicated that it is considering the matter of environmental response capacity building in general, and that it has had preliminary discussions with several First Nations that are represented by MTI. The Agency has also forwarded the issue to the CNSOPB for consideration of potential roles for industry.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
		protection, shoreline clean-up, oiled wildlife recovery and waste management		
Mi'gmawe'l Tplu'taqnn Incorporated	Effects of well blowout	Concerns were raised that effects on fish and fish habitat, cetaceans and sponge or coral conservation areas associated with a well blowout have been underestimated	The proponent provided information on an unusual cetacean mortality event in the Gulf of Mexico and indicated that although the mortality of cetaceans has been attributed by some to the Deepwater Horizon spill, a bacterial outbreak and other factors may have played a role and the event is still under investigation. The proponent reconsidered potential duration of residual environmental effects on marine mammals and sea turtles and increased the predicted durations, in consideration of the life history characteristics of marine mammals and sea turtles and the potential of a blowout to influence population levels beyond the lifespan of the Project. The proponent provided additional information on the effects of a large-scale blowout incident on corals. For the Deepwater Horizon event, coral sites more than 20 kilometres from the well did not exhibit any changes that could be attributed to the spill. A coral site located 11 kilometres from the well and located in a documented plume had evidence of stressed, damaged and dead corals. Research has also shown that dispersants are toxic to coral larvae and it has been recommended by researchers that they not be used near coral reefs.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures and follow-up programs and related proposed EA conditions for fish and fish habitat, marine mammals, and accidents and malfunctions. These are described in Section 6.1.3 (fish and fish habitat), 6.2.3 (marine mammals and sea turtles), 7.1.3 (accidents and malfunctions) and Appendix A. Key mitigation measures include undertaking a video survey of the sea floor prior to drilling a well to look for corals and sponges, and immediate mobilization of the capping stack and associated equipment.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			Sponge and coral conservation areas are present in the regional assessment area; however, due to their distance from the project area, a well blowout is unlikely to cause adverse effects on benthic communities in these areas.	
Mi'gmawe'l Tplu'taqnn Incorporated	Oil weathering	The oil spill modelling should use the most current and reliable oil weathering data available to improve accuracy of predictions.	The proponent provided information regarding estimated fluid properties. A crude oil was matched with properties of oil in the OSCAR (Oil Spill Contingency And Response) oil database to identify the best analogue fit. The OSCAR oil database also includes complete weathering information. The Sture Blend oil analogue which was selected had a full oil weathering study completed and is therefore reliable for oil spill weathering predictions.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency confirmed with the CNSOPB that the oil type selected for modeling is appropriate.
Mi'gmawe'l Tplu'taqnn Incorporated	Accidents and malfunctions - spill modelling	Specifics requested related to assumptions used to generate the flow rate assumptions for the oil spill modelling. The flow rates should also be put in the context of measured flow rates from the Deepwater Horizon well blowout.	The proponent provided l information regarding flow rates for the spill model. It described various assumptions made with the model (e.g. two reservoirs exposed, unconstrained flow to the mudline, etc.). It described how flow rate is specific to geological conditions at each location, and therefore the different locations for the spill model represent different flow rates. Flow rates were calculated and sent to the Board for validation prior to conducting spill modelling. The Deepwater Horizon incident is located in different geological conditions than the two basins, and therefore a comparison is not warranted.	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency confirmed with the CNSOPB that the flow rate assumptions used in the modeling are appropriate.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
Mi'gmawe'l Tplu'taqnn Incorporated	Spill modelling	The 58-ppb total petroleum hydrocarbons (TPH) threshold used to estimate adverse effects to biological resources in the water column does not appear to be sufficiently protective. The 58 ppb TPH threshold used to estimate adverse effects to biological resources in the water column is not specific to oil type and is therefore not a credible threshold. This threshold does not adequately account for the significantly greater toxicity of diesel as compared to crude oil.	The proponent provided information as to why 58 ppb total petroleum hydrocarbon threshold was selected through the Management of Produced Water Discharges from Offshore Installations, a harmonised, structured procedure that has been developed and follows European and American technical guidance. The proponent provided additional information regarding the chemical property of diesel, detailing how modelling simulations conducted showed oil concentrations remaining from a diesel spill to be between one to ten ppb, and decreasing to less than one ppb within 36 to 48 hours of a release.	The Agency requested additional information from the proponent and notes that the threshold used was developed collectively by international experts through a recognized process. The Agency confirmed with the CNSOPB that the thresholds used in the modeling are appropriate.
Mi'gmawe'l Tplu'taqnn Incorporated	Accidents and malfunctions – spill modelling	Justification requested for using 30 days of oil flow as a worst-case scenario in the oil spill modelling. In the absence of sufficient justification, we request that the spill models be re-run using a more appropriate and conservative time period.	The proponent explained why 30 days was selected for its spill modelling. The proponent provided information on the spill response measures (e.g. capping stack and relief well) for the Deepwater Horizon incident. The proponent provided information on the areas of improvement that have been made in the field of well control and intervention capability and noted that response resources are now available that were not available at the time of the Deepwater Horizon incident. First response measures were described by the proponent (e.g. closing the rams). The proponent predicted that their intervention response would likely be completed more quickly than the 30 days	The Agency requested additional information from the proponent and incorporated it into its analysis. The Agency identified mitigation measures, follow-up programs and related proposed EA conditions for accidents and malfunctions. These are described in Section 7.1.3 and Appendix A. Key mitigation measures include preparing a Spill Response Plan, undertaking a net environmental benefit analysis, and undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project.

Source	Subject	Comment or Concern	Summary of Proponent's Response	Agency Response
			used for the modelling. The proponent would also immediately commence the mobilization of the capping stack in the event of a blowout incident.	

Appendix E Species Found in the Regional Assessment Area and their Conservation Status

Fish

Species	Likelihood to occur in project area	Time of year present in regional assessment area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment	Commercial, recreational or Aboriginal (CRA) Value?
Groundfish						
Acadian Redfish (*Sebastes fasciatus*)	Low to moderate	Year-round	Not listed	Threatened	Not assessed	Yes
American Plaice (*Hippoglossoides platessoides*)	Low	Year-round	Not listed	Threatened	Not assessed	Yes
Atlantic Cod (*Gadus morhua*) - Laurentian South and Southern populations	Low	Year-round	Not listed	Endangered	Vulnerable	Yes
Atlantic Halibut (*Hippoglossus hippoglossus*)	High	Year-round	Not listed	Not at risk	Endangered	Yes
Atlantic (striped) Wolffish (*Anarhichas lupus*)	Low	Year-round	Special concern	Special concern	Not assessed	
Cusk (*Brosme brosme*)	Moderate	Year-round	Not listed	Endangered	Not assessed	Yes
Deepwater Redfish (*Sebastes mentalla*) - Northern population	Low to moderate	Year-round	Not listed	Threatened	Not assessed	Yes
Haddock (*Melanogrammus aeglefinus*)	Moderate	Year-round	Not listed	Not assessed	Vulnerable	Yes
Atlantic Hagfish (*Myxine glutinosa*)	Moderate	Year-round	Not listed	Not assessed	Least concern	Yes
Monkfish (*Lophius americanus*)	Low to moderate	Year-round	Not listed	Not assessed	Not assessed	Yes
Northern Wolffish (*Anarhichas denticulatus*)	Low	Year-round	Threatened	Threatened	Not assessed	
Pollock (*Pollachius virens*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Red Hake (*Urophycis chuss*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Roughhead Grenadier (*Macrourus berglax*)	Moderate	Year-round	Not listed	Special concern	Not assessed	Yes
Roundnose Grenadier (*Coryphaenoides rupestris*)	Moderate to high	Year-round	Not listed	Endangered	Critically endangered	Yes
Sand Lance (*Ammodytes dubius*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Silver Hake (*Merluccius bilinearis*)	Moderate to high	Year-round	Not listed	Not assessed	Near threatened	Yes

Species	Likelihood to occur in project area	Time of year present in regional assessment area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment	Commercial, recreational or Aboriginal (CRA) Value?
Smooth Skate (*Malacoraja senta*) - Laurentian-Scotian population	Moderate	Year-round	Not listed	Special concern	Endangered	Yes
Spiny Dogfish (*Squalus acanthias*) - Atlantic population	Low	Year-round	Not listed	Special concern	Vulnerable	Yes
Spotted Wolffish (*Anarhichas minor)*	Low	Year-round	Threatened	Threatened	Not assessed	Yes
Thorny Skate (*Amblyraja radiate*)	Low to moderate	Year-round	Not listed	Special concern	Not assessed	Yes
Turbot – Greenland Flounder (*Reinhardtius hippoglossoides*)	Moderate to high	Year-round	Not listed	Not assessed	Not assessed	Yes
White Hake (*Urophycis tenuis*)	Moderate	Year-round	Not listed	Special concern	Not assessed	Yes
Witch Flounder (*Glyptocephalus cynoglossus*)	Low to moderate	Year-round	Not listed	Not assessed	Not assessed	Yes
Yellowtail Flounder (*Limanda ferruginea*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Pelagic Species						
Albacore Tuna (*Thunnus alalunga*)	Low	July to November	Not listed	Not assessed	Near threatened	Yes
American Eel (*Anguilla rostrata*)	Transient	November – silver eel out-migration from NS March to July – larvae and glass eels on the Slope and shelf	Not listed	Threatened	Endangered	Yes
Atlantic Bluefin Tuna (*Thunnus thynnus*)	Low to moderate	June to October	Not listed	Endangered	Endangered	Yes
Atlantic Herring (*Clupea harengus*)	Low	Year-round	Not listed	Not assessed	Least concern	Yes

Species	Likelihood to occur in project area	Time of year present in regional assessment area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment	Commercial, recreational or Aboriginal (CRA) Value?
Atlantic Mackerel (*Scomber scombrus*)	Low	Winter – deep water on the Shelf Spring-summer – migrate to shallower coastal zones	Not listed	Not assessed	Least concern	Yes
Atlantic Salmon (*Salmo salar*) - Inner Bay of Fundy population	Transient	March to November	Endangered	Endangered	Lower risk/least concern	Yes
Atlantic Salmon (*Salmo salar*) - Outer Bay of Fundy population	Transient	March to November	Not listed	Endangered	Lower risk/least concern	Yes
Atlantic Salmon (*Salmo salar*) - Eastern Cape Breton population	Transient	March to November	Not listed	Endangered	Lower risk/least concern	Yes
Atlantic Salmon (*Salmo salar*) - Nova Scotia Southern Upland population	Transient	March to November	Not listed	Endangered	Lower risk/least concern	Yes
Atlantic Sturgeon (*Ancipenser sturio*) - Maritimes population	Low	Year-round	Not listed	Threatened	Critically endangered	Yes
Basking Shark (*Cetorhinus maximus*) - Atlantic population	Low to moderate	Year-round	Not listed	Special concern	Vulnerable	
Bigeye Tuna (*Thunnus obesus*)	Low	July to November	Not listed	Not assessed	Vulnerable	Yes
Black Dogfish (*Centroscyllium fabricii*)	Low	Year-round	Not listed	Not assessed	Least concern	Yes
Blue Shark (*Prionace glauca*) – Atlantic population	Moderate	June to October	Not listed	Special Concern	Threatened	Yes
Capelin (*Mallotus villosus*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Greenland Shark (*Somniosus microcephalus*)	Low	Unknown	Not listed	Not assessed	Near threatened	No
Porbeagle Shark (*Lamna nasus*)	Moderate	Year-round	Not listed	Endangered	Vulnerable	Yes
Shortfin Mako Shark (*Isurus oxyrinchus*)	Moderate	July to October	Not listed	Threatened	Vulnerable	Yes
Striped Bass (*Morone saxatilis*) - Southern Gulf of St. Lawrence population	Low	June to October	Not listed	Special Concern	Least concern	Yes

Species	Likelihood to occur in project area	Time of year present in regional assessment area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment	Commercial, recreational or Aboriginal (CRA) Value?
Striped Bass (*Morone saxatilis*) - Bay of Fundy population	Low	June to October	Not listed	Endangered	Least concern	Yes
Swordfish (*Xiphias gladius*)	Moderate	July to October	Not listed	Not assessed	Least concern	Yes
White Marlin (*Tetrapturus albidus*)	Moderate	July to October	Not listed	Not assessed	Vulnerable	Yes
White Shark (*Carcharodon carcharias*)	Low	June to November	Endangered	Endangered	Vulnerable	
Yellowfin Tuna (*Thunnus albacores*)	Low	July to October	Not listed	Not assessed	Not assessed	Yes
Invertebrates						
American lobster (*Homarus americanus*)	Low	Year-round	Not listed	Not assessed	Least concern	Yes
Jonah crab (*Cancer borealis*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Atlantic sea scallop (*Placopecten magellanicus*)	Low	Year-round	Not listed	Not assessed	Not assessed	Yes
Northern shrimp (*Pandalus borealis*)	Low	October to April – nearshore May to September - offshore	Not listed	Not assessed	Not assessed	Yes
Sea cucumber (*Class Holothuroidea*)	Low	Unknown	Not listed	Not assessed	Not assessed	Yes
Shortfin squid (*Illex illecebrosus*)	High	April to November	Not listed	Not assessed	Least concern	Yes
Snow crab (*Chionoecetes opilio*)	Moderate	Year-round	Not listed	Not assessed	Not assessed	Yes
Stimpson's surf clam (*Mactromeris polynyma*)	Low	Unknown	Not listed	Not assessed	Not assessed	Yes
Striped shrimp (*Pandalus montagui*)	Low	Unknown	Not listed	Not assessed	Not assessed	Yes

Marine Mammals and Sea Turtles

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Mysticetes (Toothless or Baleen Whales)					
Blue Whale (*Balaenoptera musculus*) – Atlantic population	Moderate	Summer to fall	Endangered	Endangered	Endangered
Fin Whale (*Balaenoptera physalus*) – Atlantic population	High	Year-round (highest concentrations in summer)	Special concern	Special concern	Endangered
Humpback Whale (*Megaptera novaeangliae*) – Western North Atlantic population	Moderate	Summer	Not listed	Not at risk	Least concern
Minke Whale (*Balaenoptera acutorostrata*)	Moderate	Spring to summer	Not listed	Not at risk	Least concern
North Atlantic Right Whale (*Eubalaena glacialis*)	Low	Summer	Endangered	Endangered	Endangered
Sei Whale (*Balaenoptera borealis*)	Low to moderate	Summer to early fall	Not listed	Not assessed	Endangered
Odontocetes (Toothed Whales)					
Atlantic Spotted Dolphin (*Stenella frontalis*)	Low	Fall	Not listed	Not assessed	Not assessed
Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)	Moderate to high	Year-round	Not listed	Not at risk	Least concern
Bottlenose Dolphin (*Tursiops truncatus*)	Moderate	Year-round	Not listed	Not at risk	Least concern
Clymene Dolphin (*Stenella clymene*)	Low	Summer	Not listed	Not assessed	Not assessed
Harbour Porpoise (*Phocoena phocoena*) - Northwest Atlantic population	Low	Summer to fall	Not listed	Special concern	Least concern
Killer Whale (*Orcinus orca*) - Northwest Atlantic/Eastern Arctic population	Low	Summer	Not listed	Special concern	Not assessed
Long-finned Pilot Whale (*Globicephala melas*)	High	Year-round	Not listed	Not at risk	Not assessed
Northern Bottlenose Whale (*Hyperoodon ampullatus*) – Scotian Shelf population	High	Year-round	Endangered	Endangered	Not assessed
Pantropical spotted Dolphin (*Stenella attenuata*)	Low	Summer	Not listed	Not assessed	Least concern
Risso's Dolphin (*Grampus griseus*)	Low to moderate	Summer	Not listed	Not at risk	Least concern
Sowerby's Beaked Whale (*Mesoplodon bidens*)	Low	Year-round	Special concern	Special concern	Not assessed
Short-beaked Common Dolphin (*Delphinus delphis*)	High	Summer to fall	Not listed	Not at risk	Least concern

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Sperm Whale (*Physeter macrocephalus*)	High	Summer	Not listed	Not at risk	Vulnerable
Striped Dolphin (*Stenella coeruleoalba*)	Low	Summer to fall	Not listed	Not at risk	Least concern
White-beaked Dolphin (*Lagenorhynchus albirostris*)	Low	Year-round	Not listed	Not at risk	Least concern
Phocids(Seals)					
Grey Seal (*Halichoerus grypus*)	High	Year-round	Not listed	Not at risk	Least concern
Harbour Seal (*Phoca vitulina*)	Moderate	Year-round	Not listed	Not at risk	Least concern
Harp Seal (*Pagophilus groenlandicus*)	Moderate	Winter to early spring	Not listed	Not at risk	Least concern
Hooded Seal (*Cystophora cristata*)	Moderate	Winter to early spring	Not listed	Not at risk	Vulnerable
Ringed Seal (*Pusa hispida*)	Low	Winter to early spring	Not listed	Not at risk	Least concern
Sea Turtles					
Leatherback Sea Turtle (*Dermochelys coriacea*)	High	April to December	Endangered	Endangered	Vulnerable
Loggerhead Sea Turtle (*Caretta caretta*)	High	April to December	Endangered	Endangered	Vulnerable
Kemp's Ridley Turtle (*Lepidochelys kempii*)	Low	Summer	Not listed	Not assessed	Critically endangered
Green Sea Turtle (*Chelonia mydas*)	Low	Summer	Not listed	Not assessed	Endangered

Birds

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Pelagic Seabirds					
Atlantic Puffin (*Fratercula arctica*)	Likely	Year-round	Not listed	Not assessed	Vulnerable
Audubon's Shearwater (*Puffinus lherminieri*)	Likely	Summer to fall and	Not listed	Not assessed	Least concern

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
		spring			
Bermuda Petrel (*Pterodroma cahow)*	Likely	Year-round	Not listed	Not assessed	Endangered
Black-capped Petrel (*Pterodroma hasitata*)	Likely	Year-round	Not listed	Not assessed	Endangered
Black-legged Kittiwake (*Rissa tridactyla*)	Likely	Fall to Spring	Not listed	Not assessed	Least concern
Common Murre (*Uria aalge*)	Likely	Year-round	Not listed	Not assessed	Least concern
Cory's Shearwater (*Calonectris diomedea borealis*)	Likely	Summer to fall and spring	Not listed	Not assessed	Not assessed
Dovekie (*Alle alle*)	Likely	Fall to spring	Not listed	Not assessed	Least concern
Great Shearwater (*Puffinus gravis*)	Likely	Summer to fall and spring	Not listed	Not assessed	Least concern
Great Skua (*Stercorarius skua*)	Likely	Year-round	Not listed	Not assessed	Least concern
Leach's Storm-Petrel (*Oceanodroma leucorhoa*)	Likely	Spring to late fall	Not listed	Not assessed	Vulnerable
Long-tailed Jaeger (*Stercorarius longicaudus*)	Likely	Spring and fall	Not listed	Not assessed	Least concern
Manx Shearwater (*Puffinus puffinus*)	Likely	Summer to fall and spring	Not listed	Not assessed	Least concern
Northern Fulmar (*Fulmarus glacialis*)	Likely	Year-round	Not listed	Not assessed	Least concern
Northern Gannet (*Morus bassanus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Parasitic Jaeger (*Stercorarius parasiticus*)	Likely	Spring and fall	Not listed	Not assessed	Least concern
Pomarine Jaeger (*Stercorarius pomarinus*)	Likely	Spring and fall	Not listed	Not assessed	Least concern
Razorbill (*Alca torda*)	Likely	Year-round	Not listed	Not assessed	Near threatened
Sooty Shearwater (*Puffinus griseus*)	Likely	Summer to fall and spring	Not listed	Not assessed	Near threatened
South Polar Skua (*Stercorarius maccormicki*)	Likely	Year-round	Not listed	Not assessed	Least concern

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Thick-Billed Murre (*Uria lomvia*)	Likely	Year-round	Not listed	Not assessed	Least concern
Wilson's Storm-Petrel (*Oceanites oceanicus*)	Likely	Spring to late fall	Not listed	Not assessed	Least concern
Yelkouan Shearwater (*Puffinus yelkouan*)	Likely	Summer to fall and spring	Not listed	Not assessed	Vulnerable
Neritic Seabirds					
Arctic Tern (*Sterna paradisaea*)	Likely	May to mid-September	Not listed	Not assessed	Least concern
Black Guillemot (*Cepphus grylle*)	Unlikely	Summer	Not listed	Not assessed	Least concern
Black-headed Gull (*Larus ridibundus*)	Unlikely	Year-round	Not listed	Not assessed	Least concern
Bonaparte's Gull (*Larus philadelphia*)	Unlikely	Year-round	Not listed	Not assessed	Least concern
Common Tern (*Sterna hirundo*)	Likely	May to mid-September	Not listed	Not at risk	Least concern
Double-Crested Cormorant (*Phalacrocorax auritus*)	Unlikely	Summer to fall	Not listed	Not at risk	Least concern
Glaucous Gull (*Larus hyperboreus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Great Black-backed Gull (*Larus marinus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Great Cormorant (*Phalacrocorax carbo*)	Unlikely	Summer to fall	Not listed	Not assessed	Least concern
Herring Gull (*Larus argentatus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Iceland Gull (*Larus glaucoides*)	Likely	Year-round	Not listed	Not assessed	Least concern
Ivory Gull (*Pagophila eburnea*)	Likely	Year-round	Endangered	Endangered	Near threatened
Laughing Gull (*Larus atricilla*)	Likely	Year-round	Not listed	Not assessed	Least concern
Little Gull (*Hydrocoloeus minutus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Ring-billed Gull (*Larus delawarensis*)	Likely	Year-round	Not listed	Not assessed	Least concern
Roseate Tern (*Sterna dougallii*)	Likely	May to mid-September	Endangered	Endangered	Least concern
Waterfowl					

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
American Black Duck (*Anas rubripes*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
American Green-winged Teal (*Anas crecca*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Barrows Goldeneye (*Bucephala islandica*)	Unlikely	Fall to winter	Special concern	Special concern	Least concern
Black Scoter (*Melanitta americana*)	Unlikely	Fall to winter	Not listed	Not assessed	Near threatened
Bufflehead (*Bucephala albeola*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Canada Goose (*Branta Canadensis*)	Unlikely	Year-round	Not listed	Not assessed	Least concern
Common Eider (*Somateria mollissima*)	Unlikely	Year-round	Not listed	Not assessed	Near threatened
Common Goldeneye (*Bucephala clangula*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Common Loon (*Gavia immer*)	Unlikely	Fall to winter	Not listed	Not at risk	Least concern
Greater Scaup (*Aythya marila*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Harlequin Duck (*Histrionicus histrionicus*)	Unlikely	Fall to winter	Special concern	Special concern	Least concern
Lesser Scaup (*Aythya affinis*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Long-tailed Duck (*Clangula hyemalis*)	Unlikely	Fall to winter	Not listed	Not assessed	Vulnerable
Mallard (*Anas platyrhynchos*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Northern Pintail (*Anas acuta*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Red-breasted Merganser (*Mergus serrator*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Red-throated Loon (*Gavia stellata*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Surf Scoter (*Melanitta perspicillata*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
White-billed Diver/ Yellow-billed Loon(*Gavia adamsii*)	Unlikely	Fall to winter	Not listed	Not at risk	Near threatened
White-winged Scoter (*Melanitta deglandi*)	Unlikely	Fall to winter	Not listed	Not assessed	Least concern
Shorebirds					
American Golden-plover (*Pluvialis dominica*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Black-bellied Plover (*Pluvialis squatarola*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Bar-tailed Godwit (*Limosa lapponica*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Black-tailed Godwit (*Limosa limosa*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Buff-breasted Sandpiper (*Tryngites subruficollis*)	Transient	Spring and fall	Special concern	Special concern	Near threatened
Curlew Sandpiper (*Calidris ferruginea*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Dunlin (*Calidris alpina*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Eurasian Curlew (*Numenius arquata*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Greater Yellowlegs (*Tringa melanoleuca*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Killdeer (*Charadrius vociferus*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Least Sandpiper (*Calidris minutilla*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Lesser Yellowlegs (*Tringa flavipes*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Northern Lapwing (*Vanellus vanellus*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Pectoral Sandpiper (*Calidris melanotos*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Piping Plover (*Charadrius melodus*)	Unlikely	Spring to fall	Endangered	Endangered	Near threatened
Piping Plover (melodus subspecies) (*Charadrius melodus melodus*)	Unlikely	Spring to fall	Endangered	Endangered	Near threatened
Purple Sandpiper (*Calidris maritima*)	Unlikely	Fall to spring	Not listed	Not assessed	Least concern
Red Knot rufa ssp (*Calidris canutus rufa*)	Unlikely	Spring and fall	Endangered	Endangered	Near threatened (*Calidris canutus*)
Red Phalarope (*Phalaropus fulicaria*)	Likely	Spring and fall	Not listed	Not assessed	Least concern
Red-necked Phalarope (*Phalaropus lobatus*)	Likely	Spring and fall	Not listed	Special concern	Least concern
Red-necked Stint (*Calidris ruficollis*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Ruddy Turnstone (*Arenaria interpres*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Sanderling (*Calidris alba*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Semipalmated Plover (*Charadrius semipalmatus*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Semipalmated Sandpiper (*Calidris pusilla*)	Unlikely	Spring and fall	Not listed	Not assessed	Near threatened
Short-billed Dowitcher (*Limnodromus griseus*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Spotted Sandpiper (*Actitis macularius*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Whimbrel (*Numenius phaeopus*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
White-rumped Sandpiper (*Calidris fuscicollis*)	Unlikely	Spring and fall	Not listed	Not assessed	Least concern
Willet (*Tringa semipalmata*)	Unlikely	Spring to fall	Not listed	Not assessed	Least concern
Landbirds					
Bank Swallow (*Riparia riparia*)	Likely	Year-round	Not listed	Threatened	Least Concern
Blackpoll Warbler (*Setophaga striata*)	Likely	Year-round	Not listed	Not assessed	Least concern
Canada Warbler (*Cardellina canadensis*)	Unknown	Year-round	Threatened	Threatened	Least concern
Chimney Swift (*Chaetura pelagica*)	Unknown	Year-round	Threatened	Threatened	Near threatened
Common Nighthawk (*Chordeiles minor*)	Unknown	Year-round	Threatened	Threatened	Least concern
Eastern Whip-poor-will (*Caprimulgus vociferous*)	Unknown	Year-round	Threatened	Threatened	Least concern
Eastern Wood-pewee (*Contopus virens*)	Unknown	Year-round	Not listed	Special concern	Least concern
Grey-cheeked Thrush (*Catharus minimus*)	Likely	Year-round	Not listed	Not assessed	Least concern
Horned Grebe (*Podiceps auritus*)	Transient	Winter	Endangered	Endangered	Vulnerable
Olive-sided Flycatcher (*Contopus cooperi*)	Unknown	Year-round	Threatened	Threatened	Near threatened
Peregrine Falcon (*Falco perigrinus anatum / tundrius*)	Likely	Year-round	Special concern	Special concern	Least concern
Rusty Blackbird (*Euphagus carolinus*)	Unknown	Year-round	Special concern	Special concern	Vulnerable

Species	Likelihood to occur in project area	Time of year present in Regional Assessment Area	SARA Status (Schedule 1)	COSEWIC Assessment	IUCN Assessment
Savannah Sparrow (*Passerculus sandwichensis*)	Likely	Year-round	Special concern	Special concern	Least concern
Short-eared Owl (*Asio flammeus*)	Unknown	Year-round	Special concern	Special concern	Least concern
Wood Thrush (*Hylocichla mustelina*)	Unknown	Year-round	Not listed	Threatened	Near threatened

Appendix F Comments Received on the Draft Environmental Assessment Report

To be completed after comment period.