

EXXONMOBIL CANADA LTD. EASTERN NEWFOUNDLAND OFFSHORE EXPLORATION DRILLING PROGRAM, 2018-2030

Environmental Assessment Project Description

Pursuant to the Requirements of the *Canadian Environmental Assessment Act* (2012)

FINAL REPORT

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LIST OF ACRONYMS AND ABBREVIATIONS

2D	Two-dimensional
3D	Three-dimensional
Accord Acts	<i>Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act and the Canada-Newfoundland and Labrador Atlantic Accord Implementation Act</i>
ADW	Approval to Drill a Well
AHTS	Anchor Handling Tug Supply vessel
bbls	barrels
BOP	Blow-out Preventer
CAPP	Canadian Association of Petroleum Producers
CCO	Chief Conservation Officer
CEAA 2012	<i>Canadian Environmental Assessment Act (2012)</i>
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CO	Carbon monoxide
CO ₂	Carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPAWS	Canadian Parks and Wilderness Society
CTD	Conductivity / Temperature / Depth
DFO	Fisheries and Oceans Canada
DP	Dynamic Positioning
EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area
ECMP	Environmental Compliance Monitoring Plan
ECSAS	Eastern Canadian Seabirds at Sea
EEM	Environmental Effects Monitoring
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EL	Exploration Licence
EPP	Environmental Protection Plan
EU	European Union
ExxonMobil	ExxonMobil Canada Ltd.
FFAW	Fisheries, Food and Allied Workers Union
FLO	Fisheries Liaison Officer
FPSO	Floating Production, Storage and Offloading

GBS	Gravity Based Structure
GHGs	Greenhouse Gases
HMDC	Hibernia Management and Development Corporation
IBAs	Important Bird Areas
LWD	Logging / Testing While Drilling
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-Beam Echo-Sounder
NAFO	Northwest Atlantic Fisheries Organization
NL ESA	Newfoundland and Labrador <i>Endangered Species Act</i>
NL	Newfoundland and Labrador
nm	nautical mile
No _x	Nitrogen oxides
NOIA	Newfoundland and Labrador Oil and Gas Industry Association
NRA	NAFO Regulatory Area
OA	Operating Authorization
OIMS	Operations Integrity Management System
OL	Operating Licence
OSRP	Oil Spill Reference and Oil Spill Response Plan
OSVs	Offshore Supply Vessels
OWTG	Offshore Waste Treatment Guidelines
PL	Production License
psi	pounds per square inch
PSV	Platform Supply Vessel
ROV	Remotely Operated Vehicle
RV	Research Vessel
SARA	Canadian <i>Species at Risk Act</i>
SBM	Synthetic-based Drilling Mud
SBP	Subbottom Profiler
SDHA	Shallow Drilling Hazard Assessment
SDL	Significant Discovery License
SEA	Strategic Environmental Assessment
SHE&S	Safety, Health, Environmental and Security
So _x	Sulphur oxides
Statoil	Statoil Canada Ltd.
UXO	Unexploded Ordnance

VC	Valued Component
VSP	Vertical Seismic Profile
WBM	Water-based Drilling Mud

1 INTRODUCTION

Project Name: ExxonMobil Canada Ltd. Eastern Newfoundland Offshore Exploration Drilling Program, 2018-2030

ExxonMobil Canada Ltd. (ExxonMobil) and its co-venturers are planning to conduct a program of petroleum exploration drilling and associated activities in the eastern portion of the Canada-Newfoundland and Labrador Offshore Area over the period 2018 to 2030 (hereinafter also referred to as the Project). The proposed Project Area (Figure 1.1) covers a number of Exploration Licences (ELs) in the Flemish Pass and Jeanne d'Arc regions for which ExxonMobil is currently the Operator (ELs 1135 and 1137) or is a co-venturer (ELs 1139, 1140, 1141 and 1142) and which have not yet been subject to exploration drilling activity to date. The Project Area also includes any ELs that ExxonMobil may acquire through the C-NLOPB's 2016 Call for Bids. Planned Project components and activities will include exploration drilling within these ELs, possible delineation drilling in the case of a hydrocarbon discovery, wellsite seabed surveys, vertical seismic profiling (VSP), well testing, eventual well abandonment procedures, and associated logistical and supply and service activities.

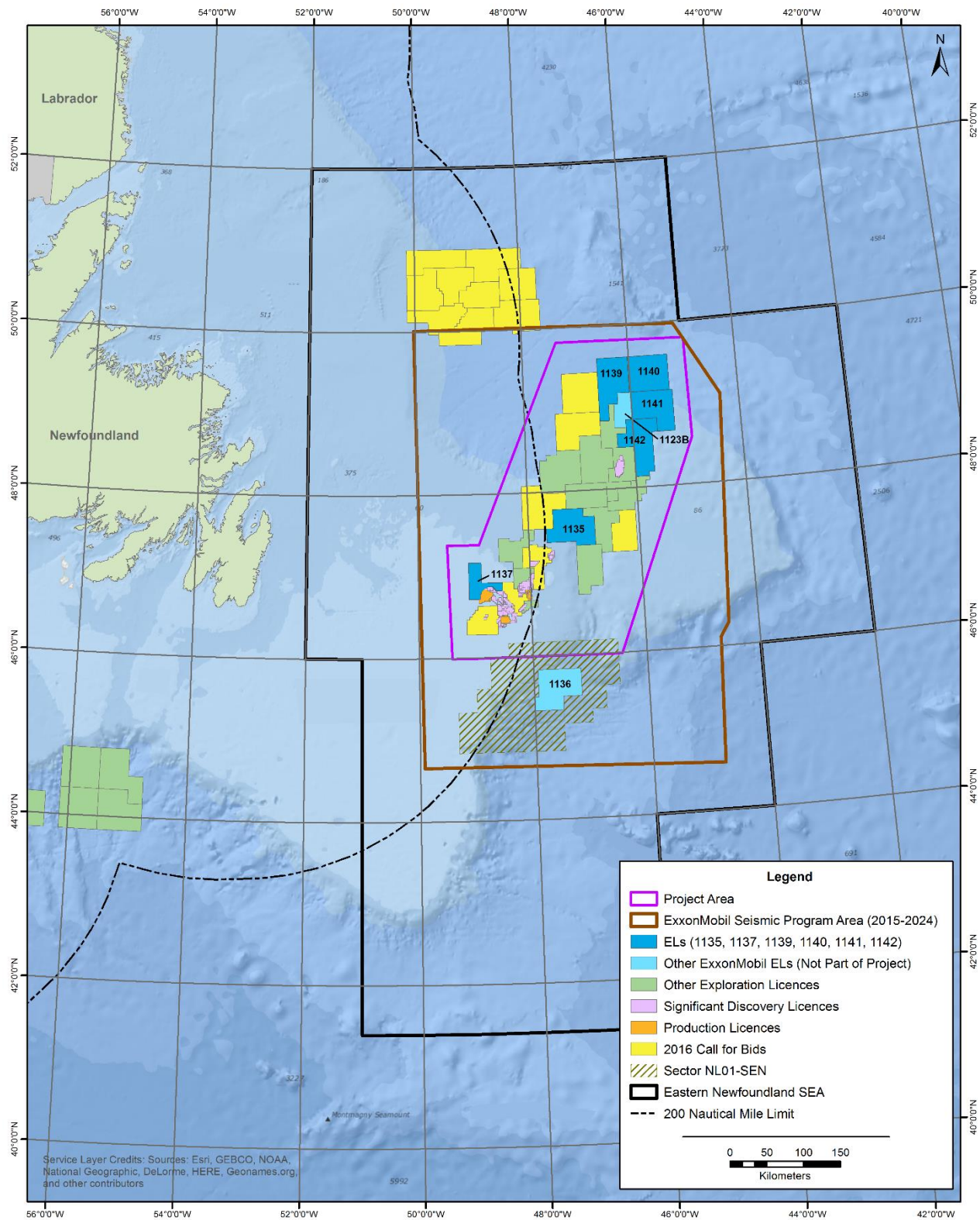
The proposed Project requires review pursuant to the requirements of the *Canadian Environmental Assessment Act* (CEAA 2012), as it has been determined to constitute a "designated project" under the associated *Regulations Designating Physical Activities*. This document comprises a Project Description under CEAA 2012, and has been prepared and submitted by ExxonMobil (as Proponent) for review by the Canadian Environmental Assessment Agency and other relevant departments, agencies, organizations and the public to help inform a governmental decision regarding whether a federal environmental assessment (EA) review of the Project is required. It is also intended to assist other government departments and agencies, Aboriginal and stakeholder groups and the public to determine their potential interest in the Project and any such EA review. This Project Description has been planned and developed in accordance with, and contains the prescribed information set out in, the *Prescribed Information for the Description of a Designated Project Regulations* under CEAA 2012 and associated guidance (see Appendix A).

1.1 Project Overview and Background

Exxon Mobil Corporation (which includes ExxonMobil Canada Ltd. (ExxonMobil) and ExxonMobil Canada Properties) is actively evaluating potential oil and gas resources off the east coast of the Island of Newfoundland on both its existing and possible future land holdings in this region.

At present, Exxon Mobil Corporation holds an interest in eight Exploration Licences (ELs, for which it is the Representative for three), 24 Significant Discovery Licences (SDLs, Representative for 16) and six Production Licences (PLs, for which it is the Representative for three of these within the defined Project Area) (Figure 1.1).

Figure 1.1 ExxonMobil Canada Ltd. Eastern Newfoundland Offshore Exploration Drilling Program, 2018-2030: Project Area and its Relationship to Eastern Newfoundland SEA Study Area



The proposed Project encompasses ExxonMobil's current ELs in the Flemish Pass and Jeanne d'Arc areas on which the first exploration well could be drilled (Table 1.1). Offshore exploratory wells in the first drilling program on either of the ELs listed in Table 1.1 below are a designated project and would require the submission of a Project Description under CEAA (2012). This may include various ELs in which ExxonMobil holds an interest (as operator or co-venturer, Table 1.1).

The purpose of this Project is to drill prospective oil and gas targets identified from the interpretation of existing well logs and 2D and 3D seismic survey data, in order to help determine the potential presence of hydrocarbons at these locations. As not all of the required and relevant seismic data have been fully interpreted or acquired, the number and specific locations of potential drill sites have not been selected and finalized at this early stage of Project planning, nor have the various drilling and support services required for the Project been finalized.

As illustrated in the Table below, ExxonMobil and its co-venturers have varying participating interests in a number of recently awarded ELs, including ELs 1135 and 1137 where ExxonMobil has a sole or majority share and is therefore the Operator. In addition, the Project Area also encompasses licences for which ExxonMobil is a co-venturer (namely, ELs 1139, 1140, 1141 and 1142), where, should a change in licensing ownership or operatorship occur on either of these ELs, it may become Operator (Table 1.1). All drilling operations carried out as part of the scope of this Project will be conducted within the defined boundaries of the ELs themselves (see Figure 1.1 and Table 1.1 below).

Table 1.1 Exploration Licences and ExxonMobil's Participating Interests

Exploration Licence *	Owners	Participating Interest (%)	Effective Date *	Expiry Date * (Periods 1 and 2, respectively)	Previous Drilling Activity
1135	ExxonMobil Canada Ltd.	40	January 15, 2015	January 15, 2021 January 15, 2024	No exploration drilling to date under this EL
	Suncor Energy Offshore Exploration Partnership	30			
	Statoil Canada Newfoundland Partnership	30			
1137	ExxonMobil Canada Ltd.	100	January 15, 2015	January 15, 2021 January 15, 2024	No exploration drilling to date under this EL
1139	Statoil Canada Ltd.	40	January 15, 2016	January 15, 2022 January 15, 2025	No exploration drilling to date under this EL
	ExxonMobil Canada Ltd.	35			
	BG International Limited	25			
1140	Statoil Canada Ltd.	34	January 15, 2016	January 15, 2022 January 15, 2025	No exploration drilling to date under this EL
	ExxonMobil Canada Ltd.	33			
	BP Canada Energy Group ULC	33			
1141	Statoil Canada Ltd.	34	January 15, 2016	January 15, 2022 January 15, 2025	No exploration drilling to date under this EL
	ExxonMobil Canada Ltd.	33			
	BP Canada Energy Group ULC	33			

Exploration Licence *	Owners	Participating Interest (%)	Effective Date *	Expiry Date * (Periods 1 and 2, respectively)	Previous Drilling Activity
1142	Statoil Canada Ltd.	34	January 15, 2016	January 15, 2022	No exploration drilling to date under this EL
	BP Canada Energy Group ULC	33		January 15, 2025	
	ExxonMobil Canada Ltd.	33			
* ELs have the maximum nine year (9) term consisting of two consecutive periods referred to as Period I and Period II. The interest owner is required to drill or spud and diligently pursue one exploratory well on or before the expiry date of period I as a condition precedent to obtaining tenure to period II. Failure to drill or spud a well will result in reversion to Crown reserve of the licence, and forfeiture of the security deposit or any balance thereof. If the licence requirement is fulfilled, the interest owner is entitled to obtain tenure to period II.					

The Project Area also accounts for the possible acquisition of additional ELs through the current (2016) Calls for Bids issued by the C-NLOPB (NL16-CFB01, NL16-CFB02), which close in early November 2016. Should the proposed Project require an EA under CEAA (2012), and in the event that ExxonMobil bids on and acquires additional ELs through the 2016 Calls for Bids processes, it is proposed that these new ELs may be included in the scope of the potential EA. Should it be determined that a federal EA is required, additional information on the specific ELs comprising the Project will be provided to the Canadian Environmental Assessment Agency prior to submission of the associated Environmental Impact Statement (EIS).

Current Project plans would involve drilling between one and possibly up to five wells on some ELs (both existing and potential), with potential wellsite locations being determined and refined as Project planning activities continue based on existing and new seismic survey data and information from previously drilled wells. It is therefore currently anticipated that the Project may involve the drilling of up to 35 wells within the identified ELs over its duration, with the specific number, location and type (exploration or delineation) of these wells being dependent upon the results of previous wells. It is also anticipated that the Project will include associated wellsite seabed surveys, VSP surveys, well testing and eventual abandonment procedures, and associated logistical and supply and service activities required to support drilling activities. Existing shore-based support facilities operated by third party contractors will be used for the Project. It is proposed that the scope of the Project for EA purposes will comprise the planned offshore exploration activities within the Project Area itself, and will not include these ancillary support and supply facilities and activities including associated supply transits to and from the Project Area. ExxonMobil recognizes that should an EA be required under CEAA (2012), the scope of the Project and its EA will be established by the Canadian Environmental Assessment Agency.

The most likely first drilling prospect as part of this Project is EL 1135, which is located in the northwestern portion of the Flemish Pass. ExxonMobil is the current Operator of EL 1135 (40 percent share). If a suitable prospect is identified through the available 3D seismic data and existing well information, drilling operations could begin in 2018 depending on the availability, quality and economic viability of drilling targets, availability of suitable drilling units and pending the receipt of required regulatory and corporate approvals.

1.2 Proponent Information

Name of Corporate Body: ***ExxonMobil Canada Ltd.***

Address: 100 New Gower Street, Suite 1000
St. John's, Newfoundland and Labrador
Canada A1C 6K3

1.2.1 Corporate Overview

ExxonMobil Canada Ltd. and its Canadian affiliates, which include ExxonMobil Canada Properties, are actively involved in on-going operations and petroleum exploration on Canada's East Coast, with interests that include PLs, SDLs and ELs in the Jeanne d'Arc, Flemish Pass, and Carson / Salar basins offshore eastern Newfoundland. ExxonMobil Canada Properties is a leading developer and operator of oil and gas in the region, including lead owner of Hibernia Management and Development Company Ltd. (HMDC) the operator of the Hibernia Project, the operator of the Hebron Project as well as a co-venturer in the Terra Nova Project.

1.2.2 ExxonMobil Safety, Health, Environment and Security Management

ExxonMobil conducts its business in a responsible and ethical manner that protects the safety and health of employees, others involved in its operations, its customers and the public. Furthermore, it is committed to conducting its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. This commitment requires compliance with all applicable laws and regulations, facilities that are designed and operated to a high standard, and the systematic identification and management of safety, security, health, and environmental risks. These commitments are documented in ExxonMobil's safety, health, environmental, product safety and security policies and systems, a brief overview of which is provided below.

ExxonMobil has a variety of environmental policies, plans and procedures in place that pertain to its activities, including associated environmental management systems and other processes to ensure the effective and efficient implementation and monitoring of these. This includes general policies, principles and corporate systems that relate to its overall operations worldwide (see, for example, <http://corporate.exxonmobil.com/en/>) and/or which relate to its activities in a particular jurisdiction or operating environment or on a project-specific basis.

Environmental management for this Project will be guided by ExxonMobil's Environment Policy, its "Protect Tomorrow. Today." initiative, and relevant corporate management systems. These systems provide a systematic, structured and disciplined approach to environmental management.

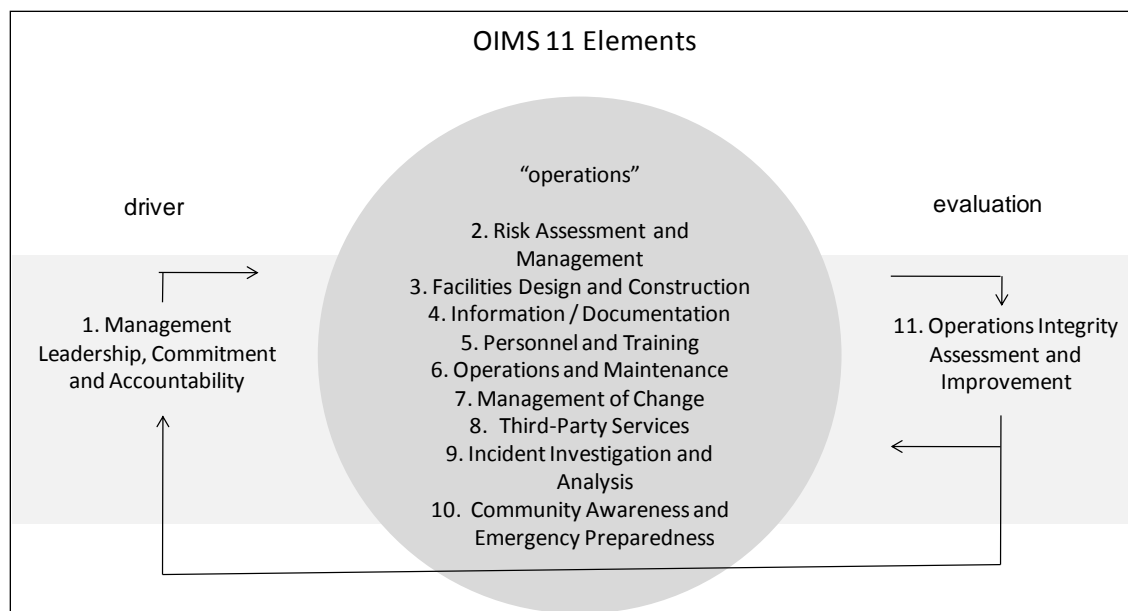
ExxonMobil's approach to environmental protection is guided by the ExxonMobil Corporation's Environment Policy, as shown below. ExxonMobil Canada has adopted those policies.

It is ExxonMobil Corporation's policy to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. The Corporation is committed to continuous efforts to improve environmental performance throughout its operations.

Accordingly, the Corporation's policy is to:

- comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist;
- encourage concern and respect for the environment, emphasize every employee's responsibility in environmental performance, and foster appropriate operating practices and training;
- work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs, and benefits, including effects on energy and product supply;
- manage its business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels; design, operate, and maintain facilities to this end;
- respond quickly and effectively to incidents resulting from its operations, in cooperation with industry organizations and authorized government agencies;
- conduct and support research to improve understanding of the impact of its business on the environment, to improve methods of environmental protection and to enhance its capability to make operations and products compatible with the environment;
- communicate with the public on environmental matters and share its experience with others to facilitate improvements in industry performance;
- undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.

These concepts are put into practice through a disciplined management framework called the Operations Integrity Management System (OIMS), which is a standard framework to manage Safety, Health, Environmental and Security (SHE&S) risks to achieve consistent, reliable and incident free results. OIMS includes 11 elements, as illustrated below, each with an underlying principle and a set of expectations. The OIMS framework establishes common worldwide expectations for controlling operations integrity risks inherent in the company's business activities.



ExxonMobil seeks to deliver superior environmental performance, and in this spirit, an Environmental Management Process has been developed, which is integrated with project design and operations processes and procedures and has been deployed consistently around the world. This process allows ExxonMobil to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. ExxonMobil is committed to continuous efforts to improve environmental performance.

ExxonMobil's structured Environmental Management Process ensures that a variety of tools, plans and processes are in place to safeguard the environment - its biodiversity, cultural heritage and value. These features are a priority in business planning throughout any project's life cycle. The Environmental Management Process requires an early engagement approach to identifying environmental issues and alternatives, even before the project concept is determined. In a project's early stages, alternatives analyses guide project concepts and decisions as more knowledge about site characteristics and facility designs become known. Decisions early in a Project's life can lead to an overall reduced environmental footprint.

In addition, ExxonMobil has a variety of applicable plans and procedures in place that pertain to its activities, including associated environmental management systems and other processes to manage SHE&S issues. These plans include (but are not limited to) the following, which apply to both ExxonMobil as well as its contractors:

- Risk Management Plan;
- Safety Management Plan;
- Health Plan;
- Environmental Management Plan;
- Security Management Plan;
- Regulatory Compliance Plan;
- Competency Assurance System;
- Facility Integrity Management System (FIMS);
- Maintenance and Reliability Program;
- Wellbore Management Plan;
- Waste Management Plan;
- Emergency Response Plan;
- Emergency Communications Plan;
- Oil Spill Response Plan;
- Environmental Effects Monitoring Plan;
- Ice Management Plans;
- Marine Incident Plan; and
- Abandonment / Decommissioning Plan.

Plans related to ice management, waste management, oil spill response, contingency planning and other issues and requirements are also often developed and implemented on a project- or activity-specific basis, and build on programs currently in place for ExxonMobil's activities off eastern Newfoundland.

Additional, more detailed information on these and other aspects of ExxonMobil's environmental policy, plans and procedures can be found on the corporate website (<http://corporate.exxonmobil.com/en/>).

ExxonMobil uses a variety of tools that will help to ensure that the environmental commitments and mitigations identified for a project are communicated and followed during its operations. Notwithstanding these internal processes and requirements for managing, monitoring and reporting on its environmental performance, ExxonMobil will also adhere to all of the applicable legislative and regulatory requirements that pertain to this Project, including any terms and conditions imposed as conditions of any associated EA review and approval for the Project, and will monitor and report on these in accordance with applicable regulatory procedures or other relevant requirements.

1.2.3 Proponent Contacts

ExxonMobil Canada Ltd. has an established office at Cabot Place, 100 New Gower Street in St. John's NL, and in conjunction with the other Eastern Canada ExxonMobil affiliates has fully staffed offices and support facilities in the region where appropriate levels of decision-making and support are in place.

The principal ExxonMobil contacts concerning this Project and its EA review are as follows:

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1.3 Regulatory Context

The proposed Project will require a number of approvals and authorizations under applicable regulatory processes, as summarized below.

1.3.1 Environmental Assessment

Proposed oil and gas exploration activities in the Canada - NL Offshore Area may be subject to EA review pursuant to the requirements of the *Canadian Environmental Assessment Act* (CEAA 2012) and its associated *Regulations*.

The federal EA process under CEAA 2012 focuses on potential adverse environmental effects that are within areas of federal jurisdiction, including: fish and fish habitat, migratory birds, federal lands and other changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project. CEAA 2012 also has an associated set of *Regulations Designating Physical Activities*, which identify the physical activities that constitute the "designated projects" that may require

a federal EA. These *Regulations* specify a number of types and scales of oil and gas activities that are subject to federal EA review, including (Section 10):

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

The Minister of the Environment may also require an EA for any project if there is the potential for environmental effects in areas of federal jurisdiction or public concerns about such effects.

If the federal EA process does apply to a proposed project, the review commences with the proponent's submission of a Project Description document. Upon receipt of an adequate Project Description from the proponent of an applicable project, the Canadian Environmental Assessment Agency has up to 45 days (including a 20-day public comment period) to determine whether to require a federal EA. During this "screening" step, government examines whether the project may cause adverse environmental effects on areas of federal jurisdiction or as a result of an associated federal decision.

This proposed Project involves environmental components, issues and requirements that fall within areas of federal jurisdiction. This includes, for example, the fact that Project activities are planned to take place within the offshore marine environment, which, as federal waters, are considered "federal lands" under *CEAA* (2012). The Act specifically defines "federal lands" as including "... (i) the internal waters of Canada, in any area of the sea not within a province, (ii) the territorial sea of Canada, in any area of the sea not within a province, (iii) the exclusive economic zone of Canada, and (iv) the continental shelf of Canada...". The Project also has the potential to affect environmental components such as fish and fish habitat, marine / migratory birds, and marine mammals and sea turtles that fall under federal jurisdiction, and a number of relevant permits, authorizations and/or compliance may be required under the federal *Fisheries Act*, *Migratory Birds Convention Act*, *Species at Risk Act* and possibly others.

No federal funding has been or will be requested or received by ExxonMobil from any federal authority to support this Project.

Petroleum exploration and development activities offshore Newfoundland and Labrador are regulated by the C-NLOPB (see Section 1.3.2). In addition to EA requirements under *CEAA* 2012, the C-NLOPB also requires that project-specific EAs be completed in relation to certain types of petroleum activities in the Canada-NL Offshore Area, as part of their required authorizations pursuant to Section 138(1)b of the *Canada-Newfoundland Atlantic Accord Implementation Act* and Section 134(1)b of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*. The C-NLOPB's EA review process typically involves the Proponent completing an EA Report in compliance with a project-specific Scoping Document issued by the C-NLOPB, with associated input from and review by a group of provincial and federal government agencies and non-governmental organizations. It is anticipated that any required EA review for this Project under *CEAA* 2012 will involve C-NLOPB participation, and that any Environmental Impact Statement (EIS) completed under *CEAA* 2012 will also address the C-NLOPB's EA requirements.

Given the nature, scope and location of the proposed Project, which will take place in the marine environment offshore eastern Newfoundland and will not involve the development and use of any new

on-land or near shore infrastructure, it is not anticipated that provincial environmental regulatory interests will be triggered for this Project. Specifically, it is not expected that EA review and approval will be required under the NL *Environmental Protection Act* (Part X), or that other provincial or municipal permits or authorizations will be required. This will be confirmed through discussions with relevant provincial government departments and agencies as Project planning and regulatory reviews progress.

As described previously in Section 1.1, ExxonMobil and its co-venturers have varying participating interests in a number of ELs within the Project Area, for which ExxonMobil is currently the Operator of ELs 1135 and 1137 and others for which it is a co-venturer with other Operators (Table 1.1). As a result of these integrated and overlapping interests within the Project Area, and given the inherent commonalities between the planned exploration activities by each of these Operators, ExxonMobil and Statoil Canada Ltd. (Statoil) are exploring potential opportunities for collaboration in completing the required EA(s) for their planned exploration drilling programs. This includes, for example, the possible joint conduct of associated consultation and engagement activities with governments, Aboriginal groups, stakeholders and the public, as well as other aspects of the eventual planning and conduct of the EA, including the potential to complete and submit a single, joint EIS (or aspects thereof) that addresses the various exploration activities that would be led by each of these Operators over this timeframe.

This approach is being considered with a view to optimizing coordination, cooperation and associated efficiencies for both the companies as well as other participants in the EA review process (including governments, organizations and the public), as well as to help facilitate a more comprehensive and integrated environmental analysis (both Project specific and cumulative), including the associated description of the existing environment, effects assessment and evaluation, any associated modelling, and the identification and application of mitigation.

Therefore, and although separate Project Descriptions have been submitted by ExxonMobil and Statoil to initiate the EA review process under *CEAA 2012*, the companies are interested in continuing to discuss and explore opportunities for such coordination with the Canadian Environmental Assessment Agency and other relevant federal authorities.

1.3.2 The Accord Acts

The C-NLOPB is responsible, on behalf of the Governments of Canada and Newfoundland and Labrador, for petroleum resource management in the Canada – NL Offshore Area. The *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act* and the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* (the *Accord Acts*), administered by the C-NLOPB, provide for joint management of the Canada – NL Offshore Area and govern all oil and gas activities in the region. The Board's responsibilities under the *Accord Acts* include: the issuance and administration of petroleum and exploration and development rights; administration of statutory requirements regulating offshore exploration, development and production; and approval of Canada-NL benefits and development plans.

The Canada-NL Offshore Area, as defined in the *Accord Acts*, includes those lands within Canada's 200 nautical mile Exclusive Economic Zone (EEZ) or to the edge of the continental margin, whichever is greater.

The proposed Project Area includes marine areas (lands) that are located both within and beyond Canada's EEZ on the outer continental shelf (see Figure 1.1).

1.3.2.1 Land Tenure and Licencing

The C-NLOPB administers a scheduled land tenure system in relation to rights issuance in the Canada-NL Offshore Area. The rights issuance process commences with an initial nomination of "sectors", after which there is a period of time appropriate to the cycle for exploration efforts to be undertaken. This is followed by the issuance of an eventual call for nomination of parcels for lands within an identified sector. A Call for Bids is then issued for specific parcels, from which successful bidders are issued an EL. Nominations may otherwise be received for lands that are not offered in a scheduled cycle and a Call for Bids may be issued. Normally, the interest owner of an EL will explore that licence and, upon finding a discovery, be issued a SDL to further delineate the discovery in anticipation of finding commercial resources which may lead to the issuance of a Production Licence.

Of particular relevance to the proposed offshore exploration activities that are the subject of this Project Description, once issued by the C-NLOPB an EL confers: 1) the right to explore for, and the exclusive right to drill and test for, petroleum; 2) the exclusive right to develop those portions of the offshore area in order to produce petroleum; and 3) the exclusive right, subject to compliance with the other provisions of the *Accord Acts*, to obtain a PL. As noted previously, ELs have a maximum nine year term consisting of two consecutive periods. The interest owner is required to drill or spud and diligently pursue one exploratory well on or before the expiry date of Period I as a condition of obtaining tenure to Period II. Period 1 may be extended with the filing of a drilling deposit.

1.3.2.2 Authorizations and Approvals

The C-NLOPB's regulatory responsibilities also include the issuing of a number of authorizations and approvals pertaining to offshore oil and gas exploration and development projects and activities in the Canada-NL Offshore Area. Indeed, the issuance of an EL for a particular portion of this Offshore Area does not, in and of itself, authorize the licence holder to carry out physical exploration activities (fieldwork) within that licence area. The drilling of an exploration well, for example, requires various project-specific regulatory approvals and authorizations, through which the Operator must present detailed information on its planned exploration activities, and in doing so, demonstrate that they can undertake such work in a manner that is in keeping with applicable requirements and standards for safety and environmental protection.

Before carrying out any work or activity respecting oil and gas operations, an Operator must, for example, obtain an Operating Licence (OL) which is a prerequisite for any oil and gas activity in the Canada-NL Offshore Area that involves fieldwork. Various authorizations and approvals are also required for particular activities and other matters, which may - depending on the specific nature and scope of the activity being planned - include applying for and obtaining an Operating Authorization (OA) from the C-NLOPB. In accordance with the *Accord Acts* and Section 6 of the *Newfoundland Offshore Petroleum Drilling and Production Regulations*, prior to the issuance of an OA the following information must be submitted by the Operator and approved by C-NLOPB:

- EA Report (completed under *CEAA* 2012, as applicable, or under the *Accord Acts*, see above);
- Canada-Newfoundland and Labrador Benefits Plan;

- Safety Plan;
- Environmental Protection Plan;
- Emergency Response and Spill Contingency Plans;
- Appropriate Financial Security; and
- Certificate of Fitness for the proposed equipment / facilities to be used to carry out drilling activities

Other required C-NLOPB approvals may also involve the approval of certain documents, plans or other matters as specified by the relevant legislation or regulations, or the approval of specific activities conducted under an earlier authorization. Of particular relevance to this Project, an Approval to Drill a Well (ADW) is required for operations involving drilling within or under the marine environment. A separate ADW is required for each well in a proposed drilling program, with the process involving the provision and review of specific details about the drilling program and well design. An ADW covers the operations on a well up to, and including, the termination of the well, which itself could include suspension, abandonment or completion. A wellsite-geohazard seabed survey must be completed prior to the issuance of such an ADW. The type of wellsite-geohazard survey required and completed will be dependent upon such factors as site water depth and type of drilling unit being used. Other approvals, notifications or records are also required to undertake well testing, abandonment, suspension, completion or termination, of to alter the condition of a well.

An important aspect of the C-NLOPB's mandate is the administration of the various provisions of the *Accord Acts* that pertain to industrial and employment benefits resulting from the exploration for, and development of, oil and gas resources in the Canada-NL Offshore Area. This includes the creation and optimization of such benefits for Canada in general and the Province of Newfoundland and Labrador in particular. The *Accord Acts* require that before any work or activity is authorized in this area, a Canada-Newfoundland and Labrador Benefits Plan must be submitted to, and approved by, the Board. This Plan must identify and describe the measures to be taken regarding the employment of Newfoundlanders and Labradorians and other Canadians, as well as providing manufacturers, consultants, contractors and service companies in the province and other parts of Canada with full and fair opportunity to participate on a competitive basis in the supply of goods and services to such a project. ExxonMobil is committed to creating and optimizing opportunities and benefits for Newfoundland and Labrador and Canadian workers and companies as part of its activities and operations in the Canada-NL Offshore Area, and to carrying out its business in full compliance with relevant *Canada-Newfoundland and Labrador Benefits Plan Guidelines* and other applicable requirements.

There are also a number of associated Regulations under the *Accord Acts* which govern particular exploration or development activities, as well as various Guidelines (some of which have been jointly developed with other agencies) that are intended to address specific environmental, health, safety and economic issues related to offshore petroleum exploration and production. Of particular relevance to this Project and its EA are the *Offshore Waste Treatment Guidelines*, *Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands*, *Environmental Protection Plan Guidelines*, *Canada-NL Benefits Plan Guidelines*, and various others.

As noted above, this Project Description has been prepared in accordance with the requirements of CEAA (2012) and the C-NLOPB's EA review process, and it is expected that any EIS that may be required for the Project under CEAA (2012) will be carried out with the involvement of the C-NLOPB and will address the Board's EA requirements under the *Accord Acts*.

1.3.3 Other Potential Regulatory Requirements and Interests

Various other federal and provincial government departments and agencies also may have regulatory responsibilities, information and advice and/or other interests regarding the proposed Project and its environmental setting and potential effects, pursuant to their associated legislation and mandates. These include the following:

- Fisheries and Oceans Canada (DFO);
- Environment Canada;
- Transport Canada;
- Department of National Defence;
- NL Department of Environment and Climate Change;
- NL Department of Fisheries, Forestry and Agrifoods; and the
- NL Department of Natural Resources

Legislation and associated regulations that are or may be relevant to the Project and its EA therefore include the:

- *Accord Acts* and associated *Regulations* and *Guidelines* (as discussed above);
- *Canadian Environmental Assessment Act*;
- *Fisheries Act*;
- *Canadian Environmental Protection Act*;
- *Oceans Act*;
- *Navigation Protection Act*;
- *Canada Shipping Act*;
- *Migratory Birds Convention Act*; and the
- *Species at Risk Act* (Canada) and *Endangered Species Act* (NL).

In planning and conducting its oil and gas exploration activities, ExxonMobil will comply with these and all relevant provincial and federal legislation, regulations and guidelines, as well as applicable international conventions and standards.

As described in Section 1.2.2, the Company also has in place its own comprehensive SHE&S policies, plans and procedures for planning and conducting its oil and gas exploration and development activities, and requires its contractors to adhere to these as applicable.

2 PROJECT DESCRIPTION

The following sections provide an overview description of the proposed Project, including its planned location, equipment, activities and schedule, as well as various associated environmental planning and management considerations.

2.1 Project Area and Its Location

The proposed Project will take place in a marine area offshore eastern Newfoundland, the western edge of which is located over 250 km east of St. John's NL. The Project Area itself (Figure 2.1, Table 2.1) covers an area of approximately 100,820 km², and encompasses various, recently awarded ELs and possible future ELs in the Flemish Pass and Jeanne d'Arc regions where ExxonMobil may conduct exploration drilling activities between 2018 and 2030 (Table 2.2). This includes ELs 1135 and 1137, where ExxonMobil has a sole or majority share and is therefore the Operator. In addition, the Project Area also encompasses Licences for which ExxonMobil is a co-venturer (namely, ELs 1139, 1140, 1141 and 1142), where, should a change in licensing ownership or operatorship occur on either of these ELs, it may become Operator. The Project Area also accounts for the possible acquisition of additional ELs as a result of the current (2016) Calls for Bids issued by the C-NLOPB (NL16-CFB01, NL16-CFB02), which close in early November 2016. Should the proposed Project require an EA under CEAA (2012), and in the event that ExxonMobil bids on and acquires additional ELs through the 2016 Calls for Bids, it is proposed that these new ELs may be included in the scope of the potential EA. Again, should it be determined that a federal EA is required, additional information on the specific ELs comprising the Project will be provided to the Agency prior to submission of the associated EIS.

Although the overall Project Area has been defined as a single polygon encompassing each of the ELs and Call for Bids Areas in question (Figure 2.1), all drilling operations carried out as part of the scope of this Project will be conducted within the defined boundaries of ELs themselves (Figure 2.1). Current Project plans would involve drilling between one and possibly up to five wells on some ELs, up to a maximum of 35 wells (exploration or delineation), with specific wellsite numbers, types and locations being determined and refined as Project planning activities continue based on existing and new seismic survey data and information from previously drilled wells. The Project Area also includes an area surrounding those licences to accommodate the location and extent of ancillary activities that are often carried out in support of drilling activities. For wellsite surveys, for example, the survey area must address the requirements of applicable C-NLOPB guidelines and be sized to accommodate the turning of vessels towing streamers. Therefore, the Project Area also includes a 20 km buffer area surrounding the outer boundaries of ELs and Call for Bids areas in question.

Table 2.1 Project Area Corner Coordinates

Point	Easting	Northing	Latitude	Longitude
A	762440	5525202	49° 49' 18.334" N	47° 21' 4.077" W
B	935562	5533101	49° 47' 31.003" N	44° 56' 47.837" W
C	948190	5398059	48° 34' 29.722" N	44° 55' 20.940" W
D	853605	5103218	45° 59' 28.446" N	46° 26' 2.107" W
E	622584	5094695	45° 59' 41.500" N	49° 25' 1.294" W
F	615122	5248990	47° 23' 3.192" N	49° 28' 29.132" W
G	658314	5249404	47° 22' 44.044" N	48° 54' 9.763" W
UTM Coordinates in NAD83 UTM Zone 22N.				

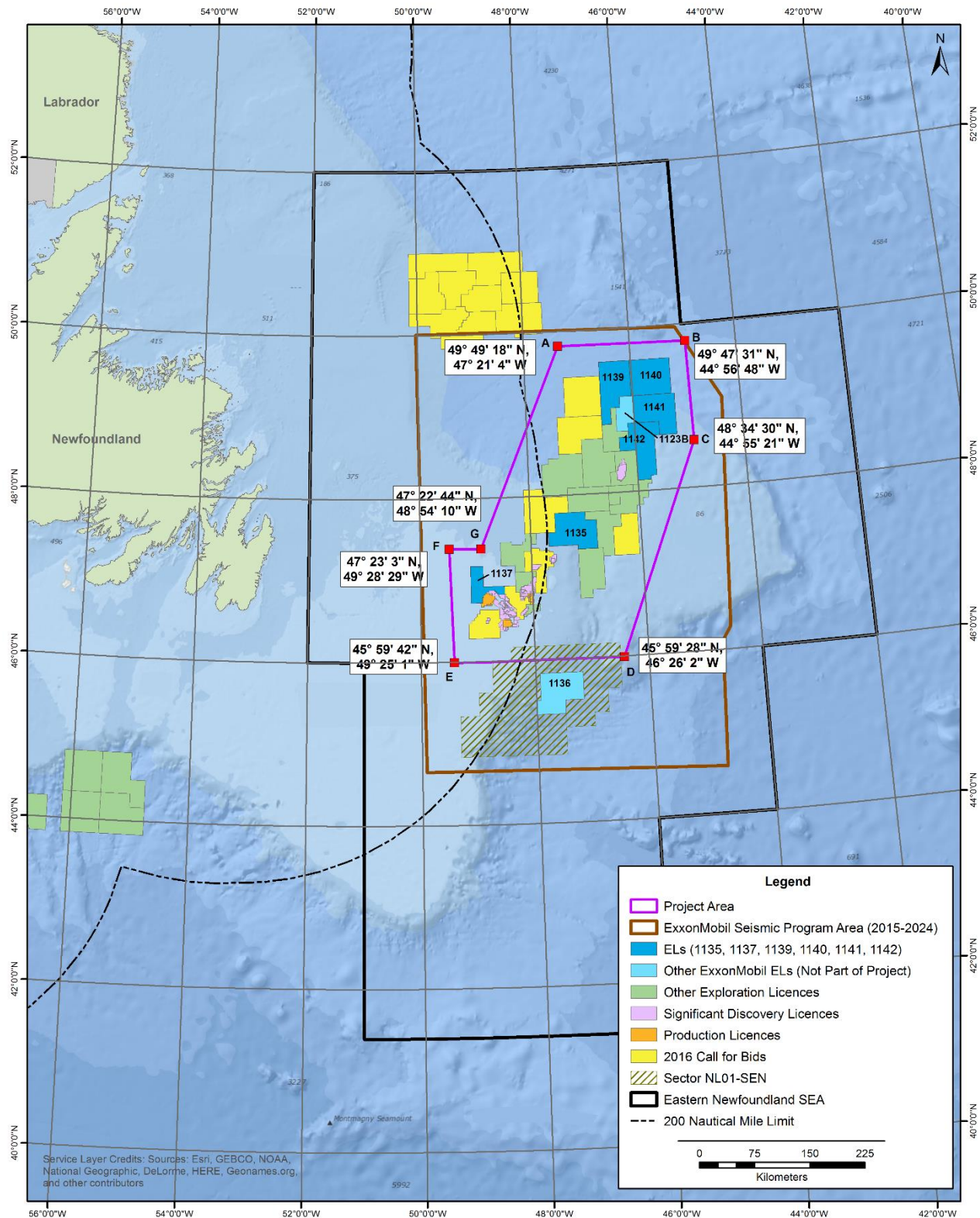
Figure 2.1 Project Area and Associated Licences and Call for Bids Areas

Table 2.2 ExxonMobil Exploration Licences (Operator / Co-Venturer)

Exploration License	Approximate Distance from St. John's NL (km)	Licence Area (km ²)	Water Depth (m)		
			Max	Min	Range
EL-1135	420	2,661.39	1,154	234	920
EL-1137	310	1,089.38	114	69	45
EL-1139	510	2,674.03	3,325	2,691	634
EL-1140	560	2,622.30	3,403	2,177	1,226
EL-1141	550	2543.21	2,921	1,073	1,849
EL-1142	518	2,687.55	2,587	718	1,869

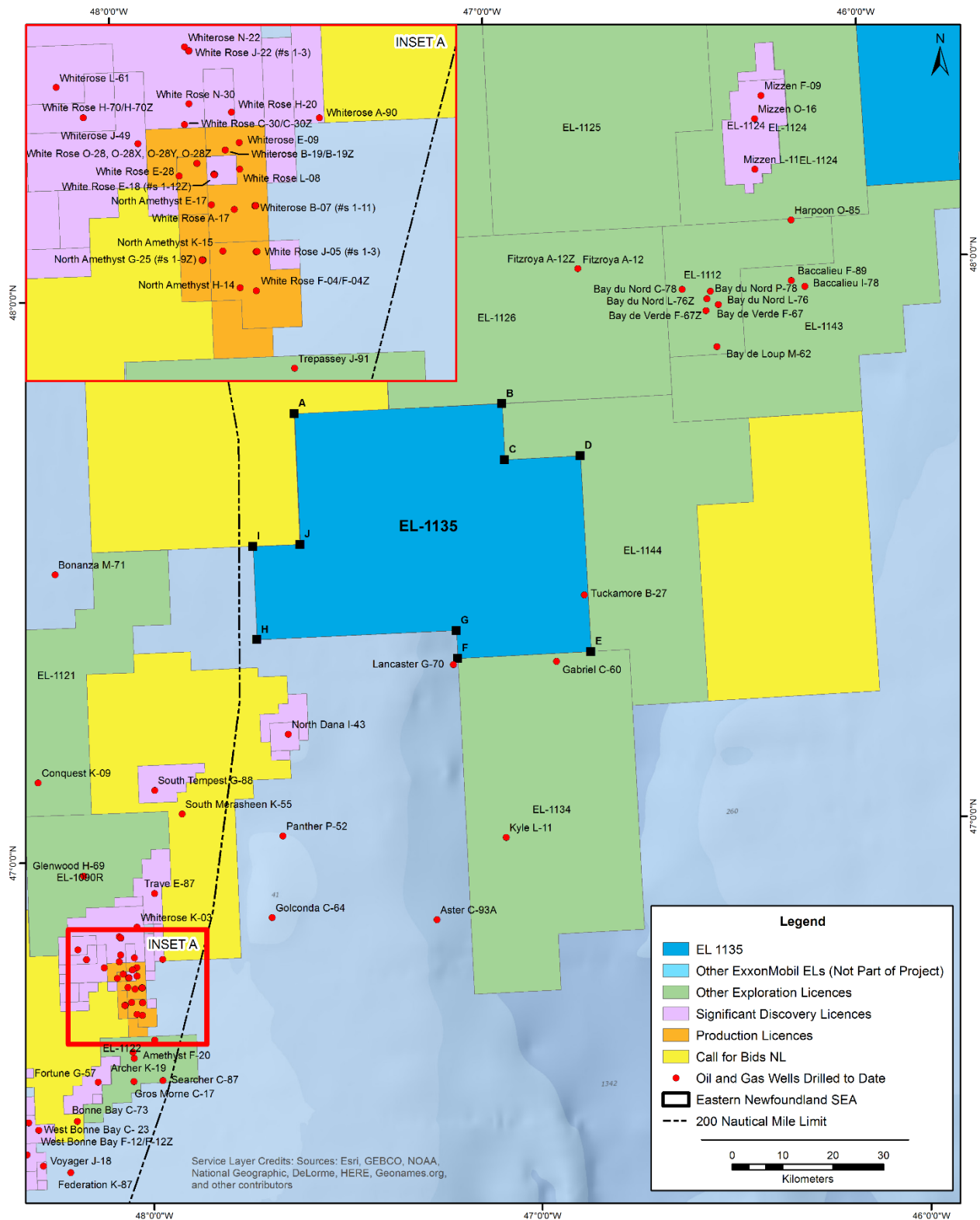
As also illustrated in Figure 2.1, the Project Area is located entirely within the Study Area for the “Eastern Newfoundland Strategic Environmental Assessment (SEA)” completed by the C-NLOPB in August 2014 (Amec 2014) and the recent Eastern Newfoundland Geophysical, Geochemical, Environmental and Geotechnical Program (2015-2024) completed by ExxonMobil (Amec 2015).

It is currently anticipated that the initial area of focus for this multi-year exploration drilling program will be EL1135, for which ExxonMobil is the Operator. This Licence is located in the Flemish Pass (centered at approximately 47°35'N, 47°15'W), approximately 400 km offshore of St. John's, NL and approximately 100 km northeast of the Hibernia Development, and includes water depths ranging from approximately 234 m to 1,154 m (Table 2.3 and Figure 2.2).

Table 2.3 Exploration Licence 1135 Block Corner Coordinates

Corner Point	Easting	Northing	Latitude	Longitude
A	758507.4	5297978.0	47° 46' 59.651" N	47° 32' 55.592" W
B	799699.3	5299964.0	47° 46' 59.630" N	46° 59' 55.531" W
C	800274.3	5288853.0	47° 40' 59.630" N	46° 59' 55.539" W
D	815281.4	5289648.0	47° 40' 59.623" N	46° 47' 55.517" W
E	817387.2	5250760.0	47° 19' 59.625" N	46° 47' 55.547" W
F	790948.6	5249392.0	47° 19' 59.638" N	47° 8' 55.585" W
G	790673.6	5254947.0	47° 22' 59.638" N	47° 8' 55.581" W
H	751051.7	5253119.0	47° 22' 59.658" N	47° 40' 25.639" W
I	750258.8	5271639.0	47° 32' 59.657" N	47° 40' 25.625" W
J	759662.9	5272050.0	47° 32' 59.652" N	47° 32' 55.612" W
EL 1135 Bounding Coordinates in NAD83 UTM Zone 22N. Locations are approximate and are not legally defined (see C-NLOPB block EL 1135 legal description)				

The location and spatial extent of a Study Area for any required EIS for the Project will be determined as part of the planning and design phase of that document. This will be defined based on consideration of the nature and extent (including movement patterns, as relevant) of the various environmental components that may be affected by the Project and upon which the EIS is focused, as well as the potential geographic zone of influence of Project components and activities (both planned and potential accidental events) and their environmental interactions.

Figure 2.2 Exploration Licence 1135 Location

2.2 Project Timing and Schedule

As noted previously in Section 1.3.2, ELs issued by the C-NLOPB have a maximum nine year term (consisting of two consecutive periods), where the interest owner is required to drill or spud and diligently pursue one exploratory well on or before the expiry date of Period I as a condition of obtaining tenure to Period II. The proposed temporal scope of this Project (which covers a 12 year period from 2018 to 2030), has been defined in order to address the terms of the existing ELs identified previously (within which EA and other associated regulatory approvals must be obtained and drilling planned and commenced within that timeframe), as well as to allow for exploration drilling on any additional ELs that ExxonMobil may acquire through the current (2016) Calls for Bids by the C-NLOPB over that period, any possible approved extensions to these ELs, and the associated stages of well drilling, testing and abandonment as required.

Within this period, the planned exploration activities that comprise this Project will occur at various times of the year for each and all years of the proposed drilling program.

Detailed logistical planning and drilling unit and services procurement processes for the Project will commence in 2016 and continue throughout the life of the Project. If a prospective wellsite is identified and pending the receipt of applicable regulatory and corporate approvals, exploration drilling could commence in EL 1135 in 2018 with an initial well. Upon completion evaluation of the first well and the analysis of its results, a potential second well location site will be determined, and it is currently anticipated that up to five wells (exploration and possibly delineation) may be drilled over the term of this EL.

Table 2.4 EL1135 Project Exploration Drilling Schedule (Tentative)

Component			2016			2017			2018			2019			2020			2021						
			2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
Drilling Environmental Assessment (DEA)																								
	Project Description																							
	Environmental Impact Statement																							
	CEAA Review																							
	Potential EA Addendum																							
Consultation and Engagement																								
Regulatory Permitting- detailed below																								
Drilling Procurement																								
	Benefits Plan																							
	Wellsite Geohazard																							
	Rig- Procurement / Certification																							
Drilling OA, ADW and drilling																								
	EL1135 Prospect 1																							
	Drilling OA																							
	Drilling ADW																							
	Drilling																							
Planning for future wells																								

Based on the phased planning and drilling approach outlined previously, the Project may also involve drilling from one, and potentially up to five, wells (exploration and possibly delineation) on some of the other ELs as defined previously. It is anticipated that each well will require approximately 80 days for drilling and testing, which will be followed by well abandonment. At times there may be multiple drilling units working in different areas simultaneously for reasons of efficiency and if synergistic opportunities arise through, for example, the presence and availability of suitable equipment working in the region.

The temporal boundaries established for any future EIS for the Project will include and encompass the overall timing of Project related activities in the offshore environment, as well as the likely timing and duration of any resulting environmental interactions and effects. In conducting the environmental effects assessment, consideration will be given to the relevant temporal characteristics of the affected environment, including the timing of presence of relevant environmental components (e.g., species and activities) within the EIS Study Area, any particularly sensitive or critical periods, likely response and recovery times to potential effects, and any natural (without-Project) variation in the baseline environment.

2.3 Project Components and Activities

The objective of this proposed exploration drilling program is to help determine the potential presence of hydrocarbons in various existing recently awarded ELs offshore eastern Newfoundland and in potential future ELs that may be issued under the C-NLOPB's 2016 Calls for Bids. In the case of a discovery, delineation wells may be drilled to help further define its geographic extent, and the Project will also include associated wellsite seabed surveys, VSP surveys, well testing and eventual abandonment, and associated supply and service activities.

2.3.1 Drilling

Pending the receipt of all required regulatory and corporate approvals (including determination of a prospective drilling location) for the Project, ExxonMobil currently anticipates drilling in 2018. As indicated previously, it is currently expected that exploration drilling could initially take place on EL 1135, and depending on the results of the initial well, potentially up to four additional wells may be drilled at other (as yet undefined) locations over the term of this EL. The Project may also involve drilling between one and potentially up to five wells on some of the other ELs defined earlier for which ExxonMobil is Operator or a co-venturer. The scope of the Project may therefore involve the drilling of up to 35 wells (exploration or delineation) over its 12 year duration.

Specific wellsite locations will be selected as Project planning and design activities move forward, based on existing and new seismic survey data and information derived from previously drilled wells in the region. It should be noted that the planning process for an offshore well commences early in the wellsite selection process, and involves close coordination between the geoscience and drilling teams. Geoscience personnel focus on the rock formation physical properties and pore pressure prediction and provide this information to the drilling team to determine the well drilling plan, equipment design and other associated considerations. During the well planning exercise, each depth interval is evaluated and re-evaluated to design the wellbore, drilling fluid density, casing to be run and cement to be used. A multi-disciplinary team also completes a detailed risk analysis focusing on well control once the preliminary drilling plan has been completed.

Prior to drilling at an identified wellsite location a wellsite seabed survey will be completed in order to complete a Shallow Drilling Hazard Assessment (SDHA). In less than 500 m water depth, a full wellsite geohazard survey (including high resolution 2D seismic) may be required. In water depths greater than 500 m, the upper volume of 3D seismic data will be the primary information used for this purpose. In all cases, seabed inspections of the drilling location and anchor locations will be completed using a remotely operated vehicle (ROV) to identify any potential hazards and/or environmentally sensitive habitats. ROV survey lines will be appropriately spaced to provide a representative overview of the seafloor at the drilling location for these purposes. In preparation for drilling unit arrival at the drilling location, positioning transponders will be placed on the seabed and met ocean equipment (wave rider and current meters) will be deployed.

Wells may be drilled using either a semi-submersible drilling unit or a harsh environment drillship (Figure 2.3), and it is again possible that at times there will be multiple drilling units involved in Project-related drilling activities in different locations simultaneously. The type of rig chosen is often based primarily on the characteristics of the physical environment at the proposed drill site, particularly water depth, expected drilling depth and expected weather and ice conditions and associated mobility requirements, as described below (CAPP 2006, cited in Amec 2014).

Semisubmersible Drilling Units are typically used in relatively deep waters (70-1,000 m on anchor or at greater depths using dynamic positions systems) or in areas where increased mobility is required due to ice or other factors and operational risks. These units can either be towed to the drill site or move under their own power, and are designed for drilling in rougher seas. The main deck of the unit is supported by a series of vertical columns, which in turn sit atop steel pontoons that float below the water surface during operations. The pontoons are filled with water so that the unit floats with the main deck above water and the remainder below the surface, and the platform can be raised or lowered by adjusting the amount of ballast water they contain. Because much of the mass of the rig is below water, these units are relatively stable in rough seas. On site, the unit is moored to the bottom with a series of large anchors, and in deeper waters (over 1,000 m), these units utilize a dynamic positioning system in which thrusters position the vessel and keep it steady (Figure 2.3).

Drill Ships are the most mobile type of drilling installation, and are also typically used in areas of relatively deep water. These are ships which contain complete drilling systems, and are almost entirely self-contained and can therefore operate at remote sites with limited support. Drill ships can be anchored to the bottom in water depths of approximately 200-1,000 m, with dynamic positioning systems allowing some drill ships to operate in waters depths of over 1,000 m. Drill ships typically have a derrick near the centre of the vessel hull which contains and operates the drilling equipment, where a moon pool provides access from the deck surface through the centre of the ship to the water surface (Figure 2.3).

Jack-Up Drilling Units are typically used in shallow water depths of between 10 and 100 m. These units are towed to a drill site, at which time the rig's 3-4 retractable legs are placed above the hull structure. Once on site, the legs are lowered until they come into contact with and rest upon the sea floor, and the drilling barge or unit platform is elevated up the legs until it is at the desired height above the sea surface (Figure 2.3). Although not excluded, there is a very low potential that a jack-up drilling unit would be utilized for this Project due to the water depths and environmental conditions present in the ELs located within the proposed Project Area.

Figure 2.3 Typical Offshore Drilling Units: Semisubmersible Drilling Unit (Top), Drill Ship (Middle), Jack-Up Drilling Rig (Bottom)



Any drilling unit proposed to be operated off Newfoundland and Labrador must first be evaluated and granted an Operations Authorization by the C-NLOPB.

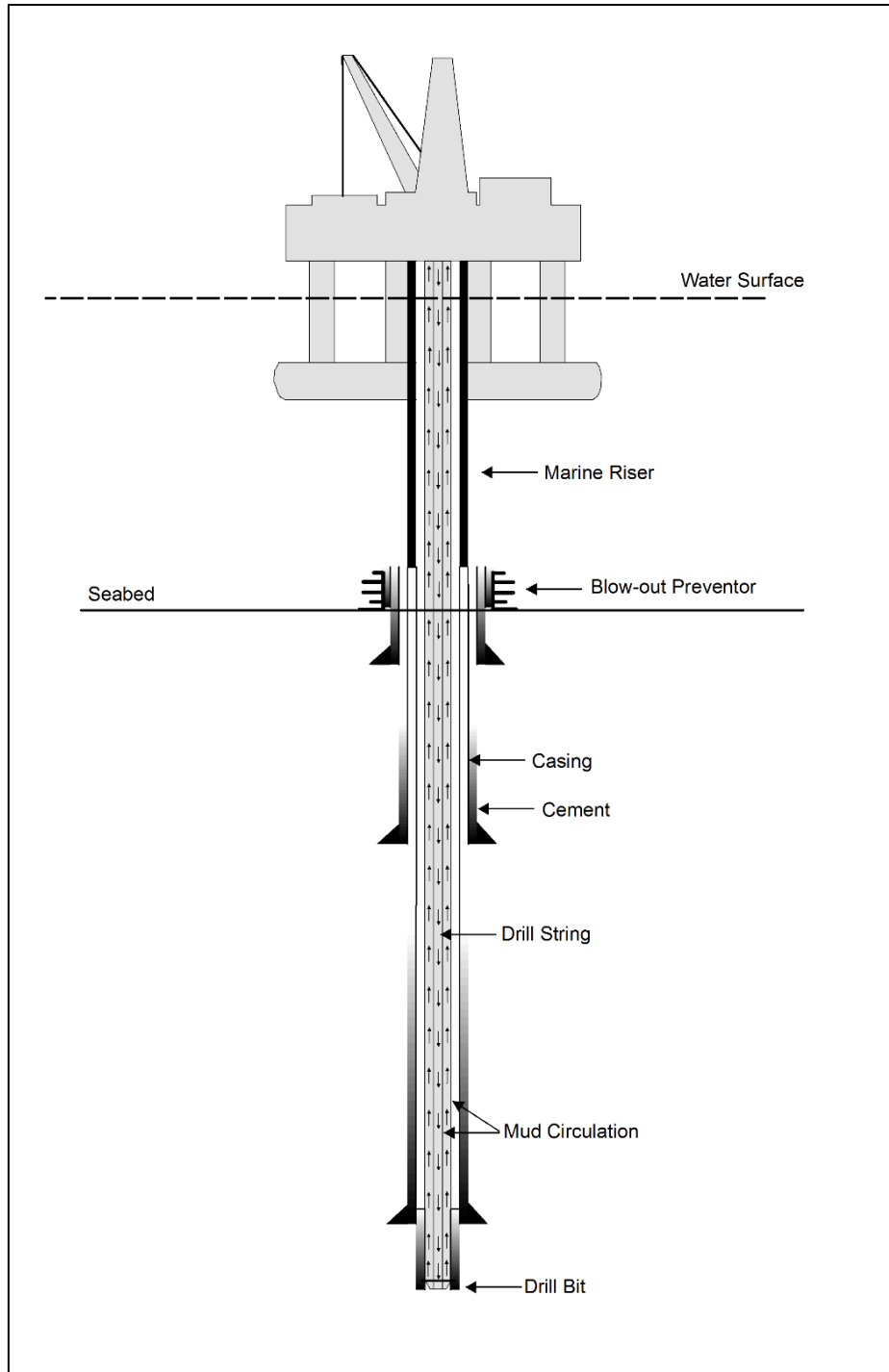
A semi-submersible rig would either be anchored (in depths of less than approximately 500 m) or will maintain its station through dynamic positioning (DP) systems in deeper water, whereas a drillship would utilize DP technology.

Figure 2.4 provides a generalized schematic of a typical offshore well and summarizes the typical drilling sequence for the upper section of a well and associated well head, blow-out preventer (BOP), casing and riser installation for wells such as those being proposed as part of this Project.

For the planned exploration drilling activities being undertaken as part of this Project there will be no excavated drill centers and no required underwater construction activities. The installation of seabed or near-seabed components would be restricted to the wellhead, BOP and riser, and the wellheads themselves would protrude a maximum of five metres above the seabed.

Drilling muds are fluids which lubricate and cool the drill bit and hole, circulate cuttings and carry them back to the surface, and help to maintain appropriate pressure in the well. A number of types of drilling muds will be utilized, with water-based muds (WBM) primarily being used for the uppermost sections of a well, and synthetic-based muds (SBMs) being used once the riser has been installed. Drilling muds are also used to provide hydrostatic pressure to prevent high pressure formation fluids from rising to the surface through the wellbore, and are the primary barrier in well control (the BOP is the second barrier).

Once the drill site clearance has been completed and the drilling unit has been positioned the initial top hole drilling commences, which is a large diameter hole that is drilled without a riser in place. The initial sections are drilled using a WBM, where mud and cuttings are returned to the seabed as permitted by, and in accordance with, the *Offshore Waste Treatment Guidelines*. When top section drilling has been completed to the depth where the rock formation strength is sufficient, the structural casing is run and cemented and the wellhead is installed at seabed. The BOP and riser are then installed. Once the riser has been installed, drilling mud and cuttings are then returned to the rig deck in a closed loop system, where the drilling fluids and cuttings are separated and treated. Cutting and drilling mud fluid use, treatment and eventual disposal is discussed further in a later section of this Chapter.

Figure 2.4 Schematic of a Typical Offshore Well and Associated Drilling Sequence

1	Drill riserless large diameter hole using water based muds and return cuttings to seafloor
2	Drill pipe recovered and stored on drill deck to run casing
3	Run and cement casing, taking returns back to the seafloor
4	Run wellhead
5	Install BOP and riser
6	With installation of riser and BOP complete, continue drilling through casing with either water or synthetic based muds, cuttings and mud returned to rig deck for processing and disposal

NOTE: For general illustration only, Drilling unit and well components not to scale

2.3.2 Vertical Seismic Profiling

In obtaining and interpreting the results of oil and gas exploration drilling activities, the correlation of time-based depth information from 3D seismic data to the actual drilling depth is critical. VSP enables the acquisition of time, depth, and velocity information for the formations in which drilling has been completed, with a number of techniques being available for acquiring VSP data. In the marine environment, receivers are typically placed in the borehole and a sound source is deployed, usually from the drilling platform crane into the water column at a predetermined depth (approximately 5-20 m) to achieve a near zero offset. Walk-away VSP surveys may also be undertaken, which involve placing a sound source on a vessel which then moves away while firing the seismic source at pre-determined distances from the borehole receiver.

VSP acquisition surveys are typically short term activities of several days duration, with seismic source firing often limited to just a few hours. In undertaking any required VSP surveys as part of this Project, ExxonMobil will apply seismic source recommended environmental mitigation measures as outlined in the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment (DFO 2007).

2.3.3 Well Testing

During offshore exploration drilling programs, well formation logging is typically an ongoing process to identify the rock types encountered and to identify any possible zones where hydrocarbons are present. Mud logging, evaluation of drill cuttings and mud gases, are the primary well formation zone logging methods. Additional evaluation is accomplished by logging / testing while drilling (LWD) / wireline well logging techniques which provide detailed rock formation and rock properties information.

If there is sufficient indication of hydrocarbon presence, well flow testing may also be undertaken to sample and identify formation fluids and to measure flow rates. During this procedure, potential zones are isolated and samples are acquired, and if gas is present flaring is required. The duration of the well testing process is dependent upon the complexity of the subsurface rock formations, and if encountered, the potential for establishing the extent of hydrocarbon reservoir. As part of this Project, flaring activities will be kept to a minimum, and will only be carried out if a drill stem test is required. The likely duration of flaring during a drill stem test is approximately one to two days. Section 2.4.1 provides a discussion of the various atmospheric emissions that may be associated with any required flaring activity. If required any associated flaring will be closely monitored and carried out as per the Formation Flow Test Program outlined in the ADW.

2.3.4 Well Abandonment

Well suspension and abandonment will adhere to the requirements set out under the *Newfoundland Offshore Petroleum Drilling and Production Regulations*. Upon completion of any required test data acquisition and well evaluation the wells will be plugged and abandoned to prevent the escape of formation fluids to the marine environment. Well abandonment for this Project will be carried out as per ExxonMobil's standard internal procedures for same, as well as applicable industry practice and in compliance with relevant regulatory requirements. Well abandonment procedures will ensure that the well bore, and especially the hydrocarbon zones, will be isolated, after which the wellhead will be removed and the surface casing will be cut below the seafloor. As part of this procedure, casing details

will be confirmed and a seabed debris survey will be completed by ROV. Equipment located on the seabed will be removed.

In the event that planned, conventional well abandonment techniques are ineffective for a particular well, alternative approaches may be required and will be investigated and implemented in consultation with relevant regulatory authorities and in compliance with applicable authorizations. Wells will be monitored and inspected in accordance with applicable regulatory requirements at the time of abandonment.

2.3.5 Logistics and Supply and Servicing

All drilling units and vessels that are used for this Project will meet the operational and environmental capabilities needed for the associated exploration activities, including for implementing relevant environmental mitigations and safety and emergency response procedures. All vessels will be in compliance with applicable legislation and regulations, and will be inspected by Transport Canada and approved for operation by the C-NLOPB before beginning any Project-related work. They will have appropriate oil spill / pollution prevention and emergency response plans in place, and each will be MARPOL compliant.

It is anticipated that offshore supply vessels (OSVs) and helicopter services for the Project will be based in St. John's NL. ExxonMobil's activities off Newfoundland and Labrador are supported through an existing marine facility (the A. Harvey Marine Base) located at the Port of St. John's, which is used for loading and offloading required supplies and equipment. This and/or other existing facilities in eastern Newfoundland will be utilized for these purposes for this Project, as well as for the supply and disposal of drilling fluids and for fueling. Aircraft support for the Project will be based at the St. John's International Airport. These shore-based facilities are owned and operated by independent third party service providers. They service multiple operators and their activities in Newfoundland and Labrador, and were developed and operate in accordance with relevant regulatory requirements and approvals. The Project will not require or result in any upgrades or the development and use of new infrastructure at these established shore base facilities.

It is anticipated that with a single drilling unit up to four vessels could be required to support the drilling program, including two to three Anchor Handling Tug Supply (AHTS) vessels or Platform Supply Vessels (PSVs) and one standby vessel, as well as two helicopters. An additional seabed survey vessel could also be used occasionally to complete short duration ROV inspections, environmental and/or geohazard surveys as required. During the ice management season the number of vessels required could increase.

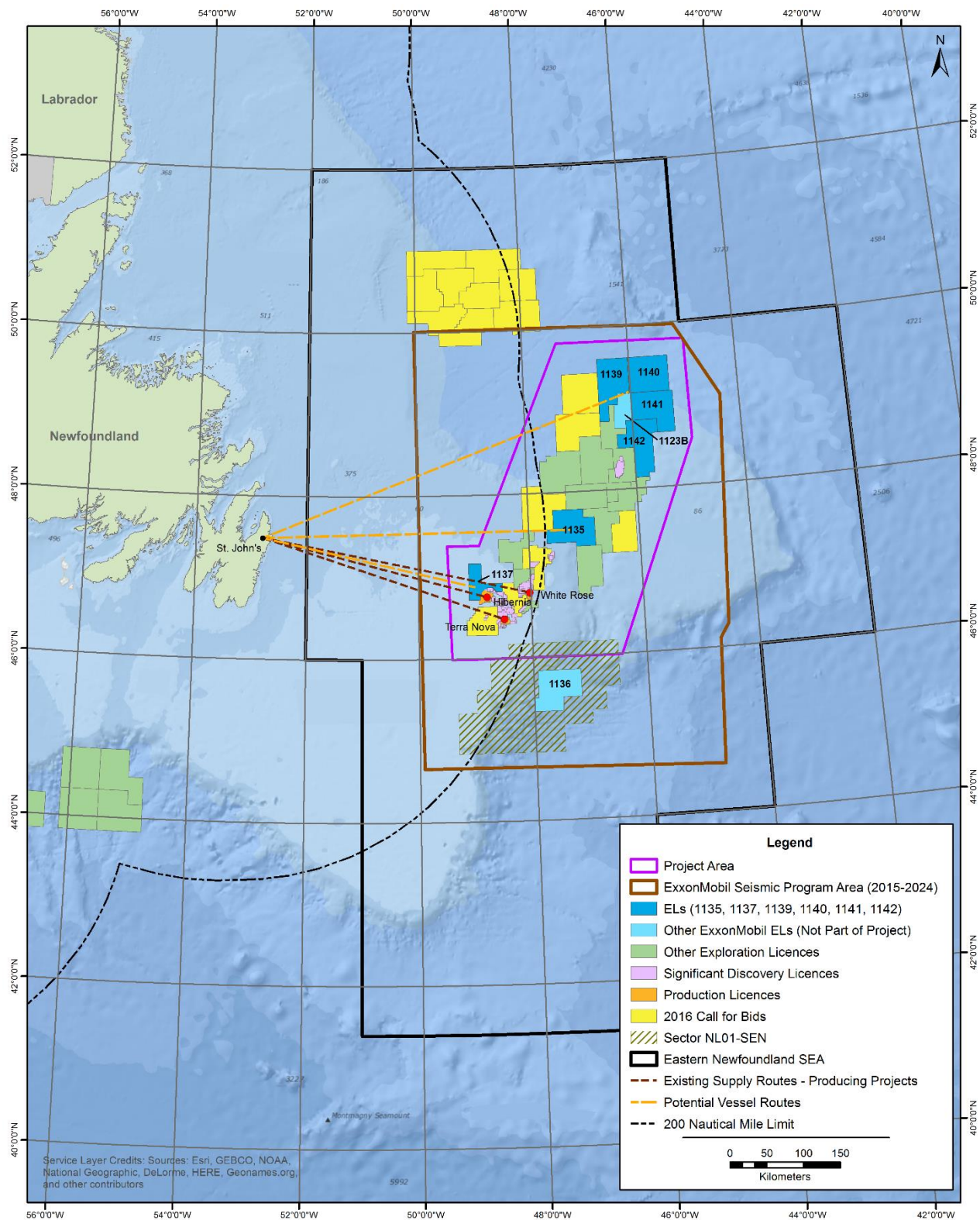
It is anticipated that there will be two to three trips to and from the drilling units by the supply vessels per week during the course of the Project. These services will again be procured from existing, established third party suppliers that service the offshore oil and gas sector. In the case that two drilling units are operating at the same time, the number of offshore supply vessels would increase to between four to five and the number of trips to the onshore marine base would increase to four to five trips weekly.

Supporting vessels that are involved in Project activities will travel in an essentially straight line between a drill rig operating within an EL (see Table 2.1) in the Project Area and an established port facility in Eastern Newfoundland, a practice which is common in the oil and gas industry that has been active in

this region for several decades. Figure 2.5 illustrates a number of key supply and support vessel traffic routes related to the existing oil production facilities off Eastern Newfoundland, as well as potential traffic routes that may be used for this Project. These are again provided for general information and illustrative purposes, recognizing that specific routes may vary at times based on the particular location of the active drilling unit(s), the shore-based support facility being used, environmental conditions (including weather and ice), and other logistical factors.

The planning and conduct of Project-related vessel traffic will be undertaken in consideration of these factors, relevant regulatory requirements, and through established cooperative processes that involve discussions and communications between the oil and gas sector, fishing industry and other ocean users.

Figure 2.5 Existing and Potential Vessel Traffic Routes



2.4 Potential Environmental Emissions, Discharges and Associated Waste Management

Potential environmental emissions and discharges that may be associated with offshore exploration drilling programs include noise, light and other atmospheric emissions (exhaust), liquid discharges, and other waste materials associated with the offshore drilling unit and support vessels and aircraft.

The key regulatory guidance pertaining to emissions and offshore discharges, disposal and treatment for these types of offshore activities is contained in the *Offshore Waste Treatment Guidelines*. Offshore waste discharges for this Project will also be managed in strict compliance with these Guidelines, as well as the International Convention for the Prevention of Pollution from Ships (MARPOL). ExxonMobil will also comply with applicable sections of these and other relevant regulations and guidelines as adopted in the Environmental Protection Plan (EPP) approved by the Chief Conservation Officer (CCO). A comprehensive Waste Management Plan similar to those used by the other Operators will also be developed and implemented for the Project.

ExxonMobil is committed to the establishment of safe and environmentally responsible procedures for the generation, storage, handling, transportation, treatment and disposal of all waste materials generated throughout the course of this Project. The Company will attempt to reduce, reuse and recycle liquid and solid waste and reduce liquid and atmospheric emissions. All onshore and offshore waste discharges will be managed and disposed of as per the Project's Environmental Management Plan, Offshore Chemical Management Plan and the Waste Management Plan. Waste products offloaded at the on-shore supply base(s) will be disposed of by licenced third-party waste disposal companies in accordance with relevant provincial and municipal regulations. Waste types and volumes will be documented as per relevant regulatory requirements.

An ExxonMobil Environmental Compliance Monitoring Plan (ECMP) will be prepared once the drilling unit(s) and OSVs have been selected, which is a key component of the Company's environmental management system. This Plan identifies waste streams, sampling, analysis and reporting requirements for regulated waste streams that are discharged to the marine environment and atmosphere resulting from the drilling activities, as well as those that are released to the sea and do not require compliance monitoring. Once generated, this document will be focused solely on the proposed exploration drilling program and intended to satisfy the requirements specified in subsections 9(i)(j) of the *Newfoundland Offshore Petroleum Drilling and Production Regulations*. The requirements outlined in the ECMP are generally aligned with the *Offshore Waste Treatment Guidelines*.

The following sections provide a further overview of a number of environmental emissions, discharges and waste materials that will or may be generated over the course of Project activities, as well as how these will be managed.

2.4.1 Atmospheric Emissions

Atmospheric emissions during Project activities may include exhaust from the drill rig(s), support vessels and associated equipment (such as on-board power generators), as well as emissions from the storage and flaring of hydrocarbons associated with well testing (if and as required). The primary air emissions, including greenhouse gases (GHGs), that would result from these Project activities include:

- Drill rig, vessel and aircraft traffic (carbon monoxide (CO), nitrogen oxides (NOX), total suspended particulates (TSP), volatile organic compounds (VOCs), GHGs; and

- Power generation (CO, NOX, TSP, VOCs, sulphur dioxide, GHGs).

During any formation flow well testing there could also be short periods of flaring and associated emissions of associated gases (CO, NOX, VOCs, TSP, GHGs)

These air emissions will be in keeping with relevant regulatory requirements and standards, including the *Canadian Environmental Protection Act*, National Ambient Air Quality Objectives and the Newfoundland and Labrador *Air Pollution Control Regulations* for specified criteria air contaminants, as well as relevant regulations under MARPOL. Potential flaring will occur in accordance with the Drilling and Production Guidelines.

For the purposes of this Project Description, a general and preliminary estimate of potential GHG emissions that may be associated with the drilling of a well as part of this Project is provided here. Assuming that it could take up to 80 days to drill a well, it is estimated that CO₂ equivalent emissions associated with operational drilling and associated vessel traffic could be in the range of 5,000 to 15,000 tonnes CO₂ per well. It is currently anticipated that the number of wells drilled in each year of the Project could range from zero to four wells, which would result in total CO₂ emissions ranging from 0 to up to 60,000 tonnes CO₂ annually. It should be noted that these are preliminary estimates only, and specific emission types and volumes will depend on a variety of factors, including drilling unit and support vessel types and classes, time of year, the duration of drilling, and other considerations. An estimate of, and analysis regarding, potential Project-related GHG emissions will be calculated and discussed as relevant and required in the EIS.

Noise emissions into the atmospheric environment associated with an offshore drilling program include those associated with drilling and other activities on the drilling unit itself, as well as from supporting vessel and aircraft traffic.

Light emissions from the drilling platform include platform lighting as well as those which may be associated with any flaring that is required during well testing operations. Light will also be generated by the OSVs, which will be comparable to that from other ships of similar size operating off eastern Newfoundland and elsewhere. Since lights can attract and otherwise affect marine birds and other fish and wildlife, lighting will be kept to a minimum to the extent that it does not affect crew / vessel safety. ExxonMobil will apply for a Migratory Bird Handling Permit from the Canadian Wildlife Service which will enable the crew to salvage and release any seabirds which may become stranded on the drilling platform. A seabird salvage log will be maintained to record any and all seabird interactions as per the permit conditions.

2.4.2 Underwater Sound

Underwater sound will also be generated as a result of the planned Project activities, which will include the noise generated by the drilling unit and supply and standby vessels as well as the sound energy from the source array for any associated VSP data collection. In the case of the former, this will include the sound emitted into the marine environment by the drilling activity itself, as well as from the platform while operating in dynamic positioning mode. Underwater sound generated during VSP operations are periodic and of short term duration (up to several hours or days), with source array volumes ranging from 450-2,400 in³ with operating pressures of approximately 2,000 psi, producing approximate peak-to-peak pressures of 100 to 180 bar-m. Again, the relevant mitigations outlined in the Statement of

Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment (DFO 2007, Appendix 2) will be adhered to in order to address any potential environmental effects.

2.4.3 Drilling Wastes

As described earlier, drilling muds are fluids which lubricate and cool the drill bit and hole, circulate cuttings and carry them back to the surface when the riser is in place, and help to maintain appropriate subsurface pressure in the well. These can be a water-based muds (WBMs) or synthetic-based muds (SBMs). The primary component of WBMs is seawater, with other additives (primarily bentonite (clay), barite and potassium chloride) and approved chemicals also added as required to control and achieve the required mud properties. The initial “riserless” sections of the well bore are generally drilled using WBMs in which case the mud and cuttings are returned to the seabed as permitted by, and in accordance with, the *Offshore Waste Treatment Guidelines*. Once installed, the riser system serves as a conduit to bring mud and cuttings back to the drilling unit in a closed loop system. These deeper sections of the well bore are typically drilled using SBMs, which are returned to the drilling unit’s deck via the riser and then separated and treated before disposal. The SBM itself is reused, and treated SBM cuttings are discharged to the marine environment as specified in the *Offshore Waste Treatment Guidelines*.

The primary environmental issues and interactions that are associated with the disposal of drill wastes (fluids and cuttings) are related to their potential effects on marine habitats and biota, particularly the possible alteration (smothering) or contamination of marine habitats and benthos due to their discharge and deposition on the seabed. Previous EA reviews for proposed projects in the Canada-NL Offshore Area that involve drilling activities have included detailed modelling of drill cuttings deposition on the seafloor based on project and site-specific (oceanographic) factors, often at one or more representative locations within their respective project areas. As described later in Section 3.4, there have been numerous such modelling studies carried out as part of previous EA reviews for planned oil and exploration or production drilling programs off eastern Newfoundland, including sites within and adjacent to the Project Area. In addition, environmental effects monitoring (EEM) programs have also been designed and implemented for the three producing developments (Hibernia EEM initiated in 1998, Terra Nova EEM initiated in 2000, White Rose EEM initiated in 2004), and the planning and design of the Hebron EEM is ongoing. While the specific nature, methods and outcomes of these on-going or planned EEM programs vary somewhat between projects, they each include associated sampling and analysis focused on marine sediments (with a focus on detecting any environmental effects from drill cuttings), seawater and commercial fish species. These EEM programs have generally found any environmental implications for sediment or benthic organisms to be limited to the area immediately surrounding the developments, with no indication of significant adverse environmental effects. Details on EEM study designs, methods and results to date are available at <http://www.cnlopb.ca/environment/projects.php>.

In addition to these project-specific modeling and monitoring studies for drilling projects off Newfoundland and Labrador, a number of other, generic investigations of the environmental implications of drill cuttings and fluids disposal have also been carried out. A recent study published by International Association of Oil and Gas Producers (IOGP 2016) for example, found that the biological effects of ocean discharge of drill cuttings and associated drilling fluids are mainly restricted to the benthic environment, and that the effects of WBM and treated (Group III) SBM cutting accumulations in sediment are usually minor and biological recovery is often well underway within a year of completion of discharge. Similarly, the results of a DFO (2006) study in the Jeanne d’Arc Basin area on the Grand

Banks found that any significant sediment toxicity stemming from the use of IPAR type drilling fluids in this area should be confined to a range of tens of meters from any cuttings pile deposited on the seabed below the drilling unit. The acute toxicity potential in relatively high concentrations of barite were tested and found to be non-toxic to capelin, snow crab larvae or planktonic jellyfish after 24 hours of continuous exposure. Another study by the Society of Petroleum Engineers (SPE 2006) of cuttings and associated fluid disposal and its environmental effects in deep water (950 m) found that cuttings drilled with nonaqueous drilling fluid discharged into deep water had a very limited environmental effect.

2.4.4 Liquid Wastes

Liquid wastes and other materials generated by the proposed Project activities will include storage displacement, bilge, ballast, cooling, gray and black and fire control systems test water, as well as treatment fluids, desalination brines and possibly other liquid materials. Allowable chemical properties for offshore disposal to the marine environment and associated reporting requirements are also specified in the *Offshore Waste Treatment Guidelines*. ExxonMobil will follow these guidelines and incorporate them into the Project Environmental Compliance Monitoring Plan. Liquid discharges that do not meet the applicable standards for ocean disposal will be transported back to shore for disposal at an existing and approved facility.

2.4.5 Solid Wastes

Domestic waste materials will be generated primarily by Project-related personnel housed at accommodations on-board the drilling unit and support vessels. All solid and domestic waste will be collected in dedicated waste receptacles and disposed of on a regular basis, with materials being separated and recycled where possible. Food wastes will be disposed of in compliance with MARPOL 73/78 Annex V (*Food Waste Regulations*). Solid wastes that are intended for disposal will be stored in dedicated waste skips that will be collected dockside by an approved waste contractor for transportation to an existing and approved waste disposal facility. An approved waste management contractor will also collect any used / replaced equipment at dockside and will make the necessary arrangements for its recycling or disposal.

Hazardous waste materials that will or may be generated during Project activities include spent and waste chemicals, chemical containers, spent absorbents and oily rags, batteries, and biomedical waste. These will be stored in dedicated and appropriate waste receptacles for transportation to shore and eventual disposal at an existing and approved facility.

2.5 Potential Accidental Events and Their Prevention and Response

During an offshore oil and gas exploration program, an accidental event or malfunction is an unlikely occurrence, for which there are multiple barriers and safety systems in place. Environmental incidents which may be associated with offshore drilling programs include potential blowouts (subsea and surface), as well as other possible spills of hydrocarbons or other substances from the drilling unit and/or associated vessel activities, which may vary considerably in terms of their nature, scale, duration and potential environmental consequences.

Oil spill prevention is a key focus of ExxonMobil's plans and activities. Oil spill prevention, response and overall preparedness approaches for the Project will be further developed and defined as the various regulatory review and approval processes move forward. The Operator will develop and

implement a Project and site specific Oil Spill Reference and Oil Spill Response Plan (OSRP), which will be submitted to the C-NLOPB as part of the OA application process described in Chapter 1. ExxonMobil's Emergency Response Bridging Document clarifies the emergency response interface between ExxonMobil and drilling platform emergency response systems.

The EA reviews for proposed exploration drilling and production projects in the Canada-NL Offshore Area may include detailed analysis of the probability and eventual fate and behaviour of potential spills based on project and site-specific factors. There have been numerous such modeling studies carried out for projects and locations offshore the eastern coast of the Island of Newfoundland. The most comprehensive oil spill trajectory model was completed for the Hebron Project, which was based on a credible worst case "blowout" scenario while drilling through a producer zone with durations ranging from 30 to 120 days. Oil spill trajectory models for proposed development and exploration drilling activities in the Jeanne d'Arc Basin and Flemish Pass include those listed below:

- a) Hypothetical Spill Trajectory Probabilities from the StatoilHydro 2008 Mizzen Drilling Program (SL Ross 2008).
- b) Oil Spill Fate and Behaviour Modeling in Support of Husky's 2007 Drilling EA (SL Ross 2007).
- c) The Fate and Behaviour of Hypothetical Oil Spills from the Petro-Canada Flemish Pass Exploration Project (SL Ross 2002).
- d) Hebron Project Comprehensive Study Report. Offshore Oil Spill Modeling Report Results from Simulations of Oil Spills at the Hebron Well Site (ExxonMobil and Stantec 2011).

In the instance that a subsea and surface oil spill trajectory model for representative location(s) is required, the trajectory model will incorporate anticipated oil chemical and physical properties, flow rates, time needed to stop the flow, water depths, surface and subsurface currents, seasonal weather conditions, historical storm tracks, containment time-lines and other factors that would affect oil spill trajectories. Existing, and if required additional, oil spill trajectory modeling will be a key aspect of any eventual EIS for the Project, including the associated environmental effects analysis and the development and definition of required mitigation (prevention and response) measures. Any and all such incidents will be managed in accordance with the C-NLOPB Incident Reporting and Investigation Guidelines. The ExxonMobil Incident Notification, Investigation and Reporting procedure will be followed for incident management on the drilling platform and support vessels. The Operator's SSHE Advisor will be responsible for initial incident notification submission to the C-NLOPB. Environmental incident requirements and triggers are also outlined in the ExxonMobil Environmental Compliance Monitoring Plan (see Section 5.1.2).

Ice management is also a required activity that is part of normal offshore operations during the ice season offshore eastern Newfoundland (normally March to June). ExxonMobil conducts dedicated ice monitoring activities (including overflights and mapping) in relation to its activities off eastern Newfoundland, which commence early in the season and continue throughout that period. Should ice pose a threat to the drilling platform and/or other Project equipment, personnel or the environment, an emergency situation may be initiated in which case the established ice management process, as documented in ExxonMobil's Ice Management Plan for Operations, will be implemented. These include established procedures for iceberg towing and deflection, and if required, procedures for the safe disconnect and movement of the drilling unit while leaving the well in a safe condition.

3 ENVIRONMENTAL SETTING

This Chapter provides a description of the existing biophysical and socioeconomic environments that overlap and may interact with the proposed Project, including relevant components of the physical (geology, climate, oceanography, ice), biological (plankton, benthos, fish, marine / migratory birds, marine mammals, sea turtles) and socioeconomic (fisheries, other human activities) environments that characterize the proposed Project Area.

3.1 Previous Environmental Assessments and Studies

Portions of the Canada-Newfoundland and Labrador Offshore Area, including the proposed Project Area, have been subject to previous environmental studies that would be relevant to this Project and any EIS that may be required for it. Offshore oil and gas exploration and development activities have, for example, been occurring off Newfoundland and Labrador for several decades, and the environmental studies and analysis that have been carried out in relation to these projects and activities over that period provide important and valuable sources of information on the existing environmental setting in the region, as well as the potential environmental issues and interactions that may be associated with these activities.

Of particular relevance to this Project and its EA review, in 2014 the C-NLOPB completed a Strategic Environmental Assessment (SEA) for the Eastern Newfoundland Offshore Area (Amec 2014), which involved identifying, reviewing and presenting regional environmental baseline information (physical, biological and socioeconomic), and completing a review and analysis of likely environmental issues and mitigation and planning approaches as input to future exploration licencing decisions by the C-NLOPB in this area. This SEA provides a key source of regional environmental information for the subsequent, project-specific EAs of individual proposed oil and gas exploration and development projects in this area, and will serve as such for any required EIS for this Project.

It is ExxonMobil's understanding that the Project will not take place on lands that have been subject to a regional study as described in Sections 73 to 77 of *CEAA* (2012).

A large number of previous, project-specific EAs have also been completed or are in progress for proposed projects and activities off eastern Newfoundland, including parts of the proposed Project Area and in other adjacent regions. These include the recent and on-going EAs listed below (available on the C-NLOPB's EA website - <http://www.cnlopb.ca/assessments> - which can be consulted for additional information), and others that pre-date those identified here:

- Polarcus UK Ltd. Eastern Newfoundland Offshore 2D, 3D and 4D Seismic Program, 2016 to 2022;
- Seitel's East Coast Offshore 2D 3D 4D Seismic Program 2016-2025;
- CGG Newfoundland Offshore 2D 3D 4D Seismic Program 2016-2025;
- ExxonMobil Canada Eastern NL Geophysical Program 2015-2024;
- WesternGeco Canada Eastern Newfoundland Offshore Seismic Program, 2015 to 2024;
- Suncor Energy's Eastern Newfoundland Offshore Area 2D/3D/4D Seismic Program, 2014-2024;
- Bridgeport Holdings Ltd. and JEBCO Seismic Company North Flemish Pass Gravity Survey, 2015 to 2019;

- Hibernia Management and Development Company Ltd. 2D/3D/4D Seismic Projects for the Hibernia Oil and Gas Production Field, 2013 to Remaining Life of Field;
- GX Technology Canada Ltd. GrandSPAN Marine 2d Seismic Gravity and Magnetic Survey 2014-2018;
- MKI Southern Grand Banks Seismic 2014-2018;
- Electromagnetic Geoservices Canada, Inc. (EMGS) Controlled Source Electromagnetic (CSEM) Survey 2014-2018;
- Husky Oil Operations Limited White Rose Extension Project;
- Multi Klient Invest AS Northeast Newfoundland Slope Seismic Program, 2012-2017;
- Husky Energy Jeanne d'Arc Basin Flemish Pass Regional Seismic Program 2012-2020;
- Statoil Canada Limited 2011-2019 Jeanne d'Arc and North Ridge/Flemish Pass Basin Geophysical Program;
- Chevron Northern Grand Banks Regional Seismic Program;
- ExxonMobil Hebron Field Geohazard Survey Program;
- Petro-Canada Jeanne d'Arc Basin Exploration Drilling Program;
- Hibernia Management and Development Company Ltd - Hibernia Drill Centres Construction and Operations Program;
- StatoilHydro Canada E&P Inc. Jeanne d'Arc Basin Seismic Survey Program;
- StatoilHydro Canada E&P Inc. Exploration / Appraisal / Delineation Drilling Program;
- Husky Energy Jeanne d'Arc Basin Exploration Drilling Program;
- Petro-Canada Terra Nova VSP Program; and
- Husky Energy Drill Centres.

Within the Jeanne d'Arc Basin area off eastern Newfoundland, each of the existing offshore petroleum production projects in this region (see Section 3.3) were subject to comprehensive EA reviews under the applicable legislation and processes, including the collection and presentation of detailed environmental baseline information, as well as on-going data collection and analysis through their respective environmental effects monitoring (EEM) programs. In addition, and as summarized briefly in the sections that follow, there have been numerous other environmental studies and surveys completed on relevant components of the existing biophysical and socioeconomic environments within and adjacent to the Project Area, which provide a useful and informative description and understanding of the existing environmental setting of the region.

In ExxonMobil's opinion, the existing and available information that is provided through these past EAs and other environmental studies in the region is considered to provide adequate and appropriate environmental baseline information for the Project Area for EA purposes, and so no additional and dedicated environmental field work is required or planned in relation to this Project and any EIS that may eventually be required for it. ExxonMobil again recognizes that should an EA be required under CEAA (2012), the scope of the Project and its EA will be set by the Canadian Environmental Assessment Agency.

3.2 Physical Environment

This section gives an overview description of relevant aspects of the physical environment of the Project Area, including its geology, bathymetry, climatology, oceanography and ice conditions.

3.2.1 Geology

The geology of the marine area off eastern Newfoundland is complex and dynamic, and the current bedrock and surficial characteristics of the Project Area and surrounding regions have been shaped by various natural and human factors and processes over time. Located on the eastern continental shelf, this area was formed by extension during the breakup of Pangea and the opening of the Atlantic Ocean during the Late Triassic to mid-Cretaceous and is underlain by pre-rift basement rocks (Fader et al 1989). Rifting, combined with salt tectonics in the area, created a complex series of Mesozoic rift basins that are separated by basement highs along the central to outer shelf. The resulting combination of stratigraphy, structure and timing have been conducive to hydrocarbon generation and entrapment (Bell and Campbell 1990). The main sedimentary basins in the Project Area and other parts of the marine environment off eastern Newfoundland include the Orphan, Flemish Pass, Jeanne d'Arc and Carson Basin (Fader et al 1989). The primary reservoirs are located in the shallow marine and fluvial shale and sandstone deposited during the Late Jurassic and Early Cretaceous periods of the Mesozoic Era. The Late Jurassic Egret member of the Rankin Formation is a world-class source rock that is recognized as the primary source of the oil and gas discovered in the Jeanne d'Arc Basin, which is the only basin off eastern Newfoundland containing presently developed producing oil fields. This rock type has also proven to be widespread in the Flemish Pass Basin (G&G 2003).

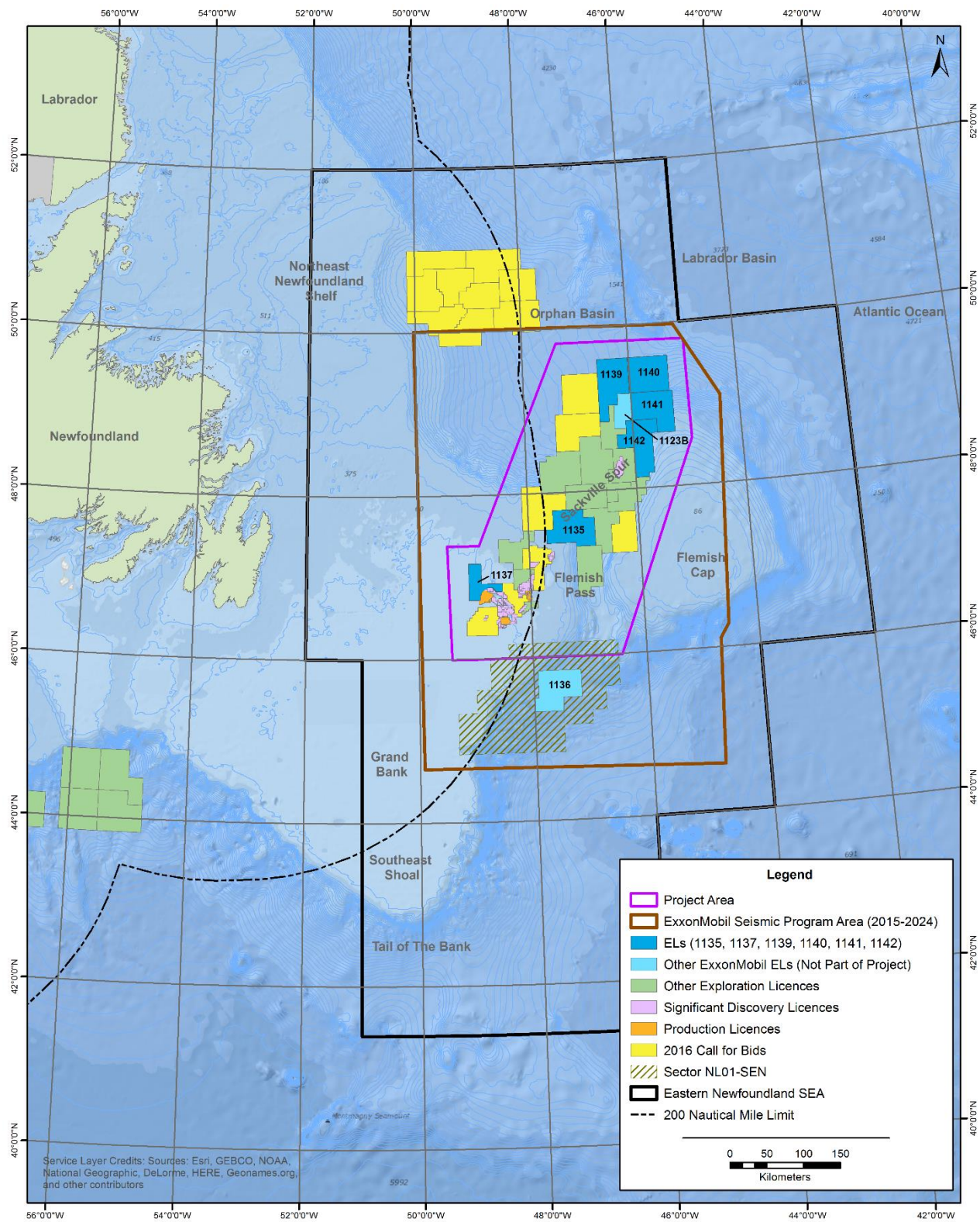
All of the Eastern Canadian continental shelf has been strongly influenced by Quaternary glaciation, which has resulted in an erosional morphology (Piper 1991). This glaciation produced a variety of glacial deposits, including sands and gravels, which are generally present as a veneer, basinal muds, muddy sands and gravels, glaciomarine sediments and glacial drift sediments. In and around the Project Area, the identified deposits have been classified as the Grand Banks Sand and Gravel and Adolphus Sand and Gravel (Piper et al 1988). Seabed features in the area include iceberg scouring, sand ridges and waves, shell beds, pockmarks and seabed depressions of unknown origin (Cameron and Best 1985).

Canada's eastern continental margin is tectonically passive and seismicity is relatively quiet throughout much of the region. Natural Resources Canada (NRCan 2016a) estimates that approximately 450 earthquakes occur each year in Eastern Canada, with seismicity generally occurring randomly along the Grand Banks margin (NRCan 2016a, 2016b). The most recent edition of the Seismic Hazard Map prepared by NRCan (2016b) indicates that the Project Area has been classified as having a low seismic hazard.

3.2.2 Bathymetry

The bathymetry of the Project Area and other surrounding regions off eastern Newfoundland includes a number of notable topographic highs, including the Central Ridge, Flemish Cap and Orphan Knoll. The western portion of the Project Area contains the Grand Banks, a region with average depths of about 75 m which extend to about 350 km east of St. John's to the 200 m depth contour and then a farther 50 km to the 1,000 m depth contour. The Flemish Pass has depths of almost 1,300 m. To the east, water depths rise again to the Flemish Cap with depths rising back up about 130 m. To the south, the Southeast Shoal and Virgin Rocks have water depths of about 25 to 50 m. This area lies about 75 to 125 km west of the Tail of the Banks. Numerous canyons run down off the continental slope into the Newfoundland Basin and deep ocean where depths range from 2,000 to 4,000 m. The Grand Banks extend north to the Northeast Newfoundland Shelf, with depths generally of 200 to 300 m. To the northeast of the shelf, the Orphan Basin has water depths ranging from about 1,200 m at the edge of the continental shelf to as deep as 3,500 m (Amec 2014).

Figure 3.1 General Bathymetry and Key Features



3.2.3 Climatology

Existing and available climatological information for sites within and around the Project Area indicate that the prevailing winds over this region are from the west to northwest in winter and from the southwest in summer. Extreme wind gusts greater than 100 knots (51 m/s) have been measured in winter and in association with tropical and post-tropical weather systems (based on available climatology MSC50 data created by Oceanweather, see Amec 2014). Air temperatures in the Project Area overall are coolest in January or February and warmest from July through September for all areas. Rain or drizzle can occur at any time of year throughout the area and is most likely to occur with southerly or southwesterly winds. Snow and freezing rain are possible any time from October through May, and snow can accompany winds of any direction. In general, visibility is the most favourable in fall and winter and most frequently restricted in summer and spring (Amec 2014).

3.2.4 Oceanography

Water circulation in the region, which includes the continental shelf waters off Eastern Canada, is dominated by a generally southward flow of the cold Labrador Current and its two streams: 1) an inshore branch that flows along the coast on the continental shelf, and 2) an offshore branch that flows along the outer edge of the Grand Banks. The inshore branch tends to flow mainly in the Avalon Channel along the coast of the Avalon Peninsula but may sometimes also spread further on the Grand Banks. The offshore branch of the Labrador Current flows over the upper Continental Slope at depth, and through the Flemish Pass with average speeds of approximately 40 cm per second. Over parts of the Grand Banks with water depths less than 100 m, the mean currents are generally weak and flow southward, dominated by wind-induced and tidal current variability. The offshore branch meets with the Gulf Stream south of the Project Area near the Tail of the Grand Banks and flows to the east (Amec 2014).

Average sea surface temperatures generally range from about 0°C to 7°C in February and from about 10°C to 16°C in summer, whereas near-bottom sea temperatures generally range from 8°C to 13°C on average year-round (Amec 2014).

3.2.5 Ice Conditions

The proposed Project Area is, like the rest of the marine environment off eastern Newfoundland, subject to seasonal intrusions of sea ice and icebergs, as well as vessel icing during particular meteorological conditions. Sea ice and iceberg conditions may vary each year and by location, dependent upon fluctuation winter conditions over and seasonal wind patterns. The iceberg season traditionally lasts from January through August with occasional sightings as late as October (Amec 2014).

In the northwestern portion of the region, sea ice can be present as early as the first week of January. By the end of March, most of the ice over the region is thin first year ice. The sea ice begins to retreat over the entire area by mid-April, and by the beginning of May is generally ice free over the Southern Grand Banks and Flemish Cap regions, with ice presence just 1-15 percent of the time in the outermost northwestern areas (CIS 2011).

3.3 Biological Environment

The following sections present an overview of relevant aspects of the biological environment of the area including fish and fish habitat, marine birds, marine mammals and sea turtles.

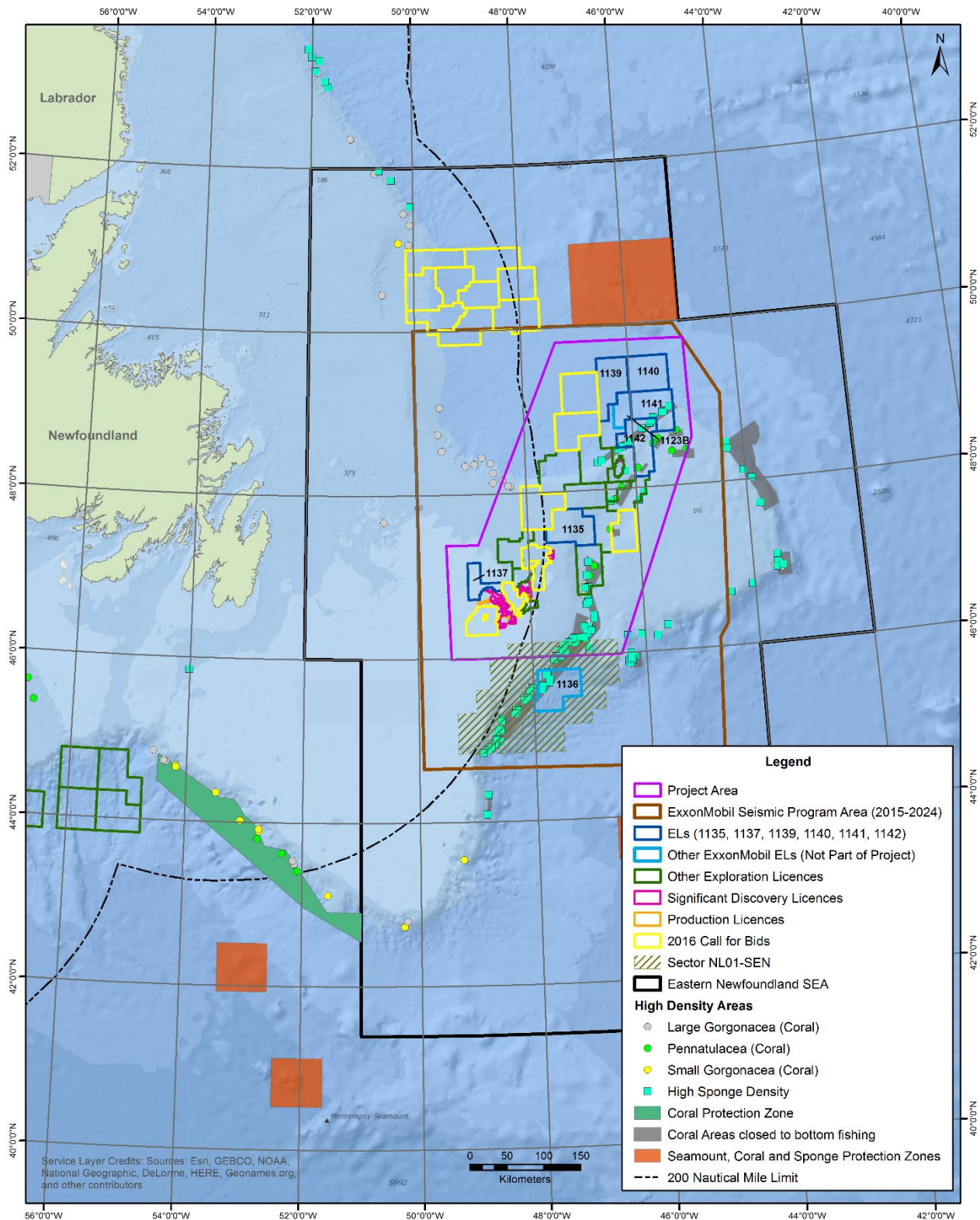
3.3.1 Marine Fish and Fish Habitat

Marine ecosystems are comprised of biological and physical elements that interact to form complex and variable patterns across a seascape. Biological ecosystem elements span primary producers such as phytoplankton to consumers such as zooplankton, benthic invertebrates and fish. The Eastern Newfoundland SEA (Amec 2014) provides a detailed overview of marine fish and fish habitat that are known or considered likely to occur within the overall Project Area and surrounding environments, including relevant habitats, plankton, benthos, deep-water corals, and fish, based on relevant, existing information and datasets.

The Project Area and surrounding marine environments are known to be inhabited by a variety of marine biota, within which the presence, abundance and distribution of specific fish species varies considerably based on habitat characteristics (both abiotic and biotic) and variability across this rather large and diverse marine environment. Key fish assemblages in the region therefore include (Amec 2014):

- a) The “warm water” assemblages (e.g. white hake, argentine, silver hake, Atlantic halibut, longfin hake, butterfish, billfish) that occupy Gulf stream influenced waters along the southern Grand Bank;
- b) The “northern Grand Bank” area, influenced by the cold Labrador Current, is characterized by species usually found further north along the shelf (e.g. Arctic sculpin, Arctic cod, Northern shrimp and snow crab);
- c) Depth-segregated assemblages with “shallow water” groups (yellowtail flounder, sea ravens and longhorn sculpin) give way to “slope” assemblages (Greenland halibut, wolffish and redfish) and finally to “deep slope-abyssal assemblages” (lanternfish, grenadiers, blue hake, deepwater eels, rocklings, Bean’s saw-toothed eels, deep sea lizardfish);
- d) Within depth zones, habitat complexity can be a discriminating factor of assemblages. For example, spotted wolffish and some invertebrate species are found primarily associated with structured habitats, whereas other species avoid habitat complexity (e.g. snub-nosed eels); and
- e) Some species are widely spread across the region (e.g. American plaice, Atlantic cod, thorny skate and striped wolffish) with no strong association to specific habitat characteristics.

Deep-sea corals, sea pens, and sponges are also of particular environmental interest due to the habitat-forming capacity aspects of these benthic invertebrates and their relative sensitivity to anthropogenic stressors. Existing and available information on identified high-density areas and protection zones for corals, seamounts, and sponges in this region (Figure 3.2, adapted from Amec 2014) indicates that portions of the overall Project Area will overlap with several of the identified protection zones and high density areas for these species. Predictive habitat modelling conducted by Knuby et al (2013), for example, indicates that slopes of the Flemish Pass are important for black corals, and the northern Flemish Pass is important for large gorgonians and the slopes of the Flemish Cap (except for southern portion) is important for sea pens. In addition there are several associated protection (fisheries closure) zones located within and adjacent to the Project Area (Figure 3.2). The planned drilling activities are (given their relatively small footprint and short term nature) not likely to occur within and/or directly affect these identified areas, and the various mitigation measures planned (see Chapter 5) will serve to further avoid or reduce the potential for any associated negative environmental effects.

Figure 3.2 Identified High Density and Potential Areas for Corals, Seamounts and Sponges

A variety of existing and available sources provide relevant and useful information related to marine fish and fish habitat in and around the Project Area and other portions of the marine environment off eastern Newfoundland. These include published and unpublished reports, available datasets and other sources, many of which were reviewed and are summarized in the recent SEA completed for this region (Amec 2014). This includes information and mapping describing the presence, distribution and abundance of fish species in the area from the recent DFO Research Vessel (RV) surveys that cover part of the Project Area, as well as Northwest Atlantic Fisheries Organization (NAFO) RV surveys that cover the Flemish Cap (Saborido-Rey and Vazquez 2003; Casas and Troncoso 2013), and other literature that describes marine fish and habitats in other areas (often on a species-specific basis). Information is also available on plankton (e.g., Dalley and Anderson 1998; Maillet et al 2004; Head and Sameoto 2007; Bradbury et al 2008), and benthic invertebrates (Houston and Haedrich 1984; Schnieder et al 1987; Derosiers et al 2000; Kenchington et al 2001; Dawe et al 2012; Frojan et al 2012; Beazley et al 2013; Altuna et al 2013; Gilkinson 2013; Beazley and Kenchington 2015) which has included associated seabed sampling in various areas. Environmental surveys, predictive habitat modelling and other analysis related to the presence and distribution of corals, sea pens and sponges have also been completed and are reported in the available literature (e.g., Edinger et al 2007a, 2007b; Wareham and Edinger 2007a, 2007b; WGEFAM 2008; Gilkinson and Edinger 2009; DFO 2010; Murillo et al 2011, 2012, 2016; NAFO 2011; Baker et al 2012; Beazley et al 2013; Knudby et al 2013).

In addition to areas within the 200 nautical mile limit, the continental slope beyond this area has also been surveyed in considerable detail to address the United Nations General Assembly (UNGA) 2004 Resolution 59/25 to protect marine vulnerable ecosystems and other such initiatives. Scientific groundfish bottom trawl surveys have, for example, been carried out by the Spanish Institute of Oceanography (Instituto Español de Oceanografía) and the European Union (EU) on board the Spanish RV “Vizconde de Eza” from 2006-2010. Multi-beam echo-sounder (MBES), subbottom profile (SBP) and rock dredge and scallop gear samples were acquired by the Spanish RV “Miguel Oliver,” operated by the Spanish General Secretariat of the Sea (Secretaría General del Mar) under the NEREIDA project. A number of refereed scientific papers have been published in various journals of which the recent publications appear to be based on the 2006-2010 data from this project. Barrio Froja’n et al (2012), for example, investigated benthic macrofaunal community structures, Beazley et al (2013) assess the influence of structure-forming deep-water sponge grounds on the composition, diversity, and abundance of the local epibenthic megafaunal community, and Altunai et al (2013) describe the distribution of deep water hydroids.

The 2009 and 2010 NEREIDA surveys cover the bank edge and continental slope beyond the 200 nautical mile limit offshore eastern Newfoundland. The NEREIDA 0609 survey (approximately 300-2,000 m water depth range) covered the area west and north of Flemish Cap, the Northeastern Newfoundland Shelf, Sackville Spur and the northern part of Flemish Pass (covering ELs 1123B, 1135, 1139, 1140, and 141). The NEREIDA 0709 survey (approximately 700-1,500 m water depth range) covered the Flemish Pass (EL1135). The RV Miguel Oliver NEREIDA 0609 and 0709 surveys acquired geophysical, seabed and water column data.

3.3.2 Marine Birds

A variety of bird species occur within the Project Area and in adjacent marine and coastal regions, including seabirds and other avifauna that inhabit the region at particular or extended periods for breeding, feeding, migration and other activities. A number of important habitats for birds have also been identified at locations along the coastline of eastern Newfoundland, well outside of the proposed Project Area.

Seabirds are relatively long-lived avifauna species with low fecundity, delayed recruitment and low rates of population growth. They are key indicators of ecosystem health, and are also important in terms of recreational (including hunting) and tourism pursuits. A variety of seabird species occur in the marine waters of the area, including cormorants, gannets, phalaropes, gulls, terns, alcids, jaegers and skuas, fulmars, petrels and shearwaters. Seabirds occur year-round in offshore waters, and are present at colonies on the eastern coast of Newfoundland throughout much of the year (Amec 2014). The nutrient-rich Grand Banks and Flemish Cap regions off eastern Newfoundland, for example, serve as a major feeding area for dozens of marine bird species throughout the year, particularly during the summer months. Many seabird groups such as cormorants and terns tend to have a more coastal distribution, and are therefore rarely observed this far offshore. Waterfowl occur in large numbers in marine habitats off eastern Newfoundland, especially during the winter months, but they prefer open water in coastal areas and are thus not likely to frequent the offshore environments that characterize the Project Area (Amec 2014).

The eastern coast of Newfoundland is also home to several major colonies supporting tens of millions of seabirds, which travel long distances offshore from their nest sites to forage for themselves and their chicks. The region also contains several designated Important Bird Areas (IBAs) which provide important habitat for nationally and/or globally significant numbers of birds and/or for avian species at risk, and there are various other sites of provincial and regional significance to birds. Although none of these areas or sites occurs within the Project Area itself, many bird species that make use of these designated habitats may spend some of their time in the Project Area.

A variety of existing information sources are available related to the characteristics, presence and distribution of marine / migratory birds within and around the proposed Project Area. The Eastern Newfoundland SEA (Amec 2014), for example, includes a detailed overview of the presence, life histories, and spatial and temporal distributions of marine avifauna within and around the region. Other existing and available sources such as the current Eastern Canadian Seabirds at Sea (ECSAS) dataset, other available literature and datasets, and marine birds sightings data collected by ExxonMobil and other operators working in the area provide additional information and insights on key species, times and locations for use in the EIS should one be required.

3.3.3 Marine Mammals and Sea Turtles

The waters off eastern Newfoundland support a diverse assemblage of marine fauna that includes more than 20 marine mammals and several sea turtle species, many of which are considered to be at risk or otherwise of special conservation concern (see Section 3.3.4). The Eastern Newfoundland SEA (Amec 2014) summarizes the distribution and abundance of marine mammals and sea turtles in the region, and describes these species' relevant life history characteristics. The existing and available information indicates that marine mammal (cetacean) species that are known or considered likely to occur within the area include a number of mysticetes (baleen whales), odontocetes (toothed whales and porpoises)

and pinnipeds (seals), and several sea turtle species have also been observed. These differ considerably in their likelihood of presence and in the particular locations and habitat types that they utilize and the times at which they occur in or pass through the region. Key feeding grounds such as the Grand Banks are of particular importance to marine mammals and turtles, and several Ecologically and Biologically Significant Areas (EBSAs) have been identified due in part to their known importance to a number of marine mammal species (Templeman 2007). Given that a number of these species have been designated as species at risk under Canadian legislation or are otherwise considered to be of conservation concern, they are typically a key consideration in the EA review process for projects and activities off eastern Newfoundland.

Again, there are a number of existing and available information sources that provide information on the characteristics, presence and spatial and temporal distribution of marine mammals and seabirds in and around the proposed Project Area. These are summarized in the Eastern Newfoundland SEA (Amec 2014), and include, for example, the current DFO marine mammals sightings database, other available literature (e.g., Templeman 2007) and marine mammals sightings data collected by ExxonMobil and other operators working in the area.

3.3.4 Species at Risk

The Canadian *Species at Risk Act* (SARA) provides for the protection of species at the national level to prevent extinction and extirpation, facilitate the recovery of endangered and threatened species, and to promote the management of other species to prevent them from becoming at risk in the future. Designations under the Act follow the recommendations and advice provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

There are currently a number of schedules associated with the SARA. Species that have formal protection are listed on Schedule 1, which includes the following potential designations:

- *Extirpated*: A species that no longer exists in the wild in Canada, but exists elsewhere;
- *Endangered*: A species that is facing imminent extirpation or extinction;
- *Threatened*: A species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; and
- *Special Concern*: A species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Schedule 1 of SARA is therefore the official federal list of species at risk in Canada. Once a species is listed, measures to protect and recover a listed species are established and implemented, including the development of a Recovery Strategy. Action Plans summarize the activities required to meet recovery strategy objectives and goals, and Management Plans set goals and objectives for maintaining sustainable population levels of one or more species that are particularly sensitive to environmental factors.

At the provincial level, the Newfoundland and Labrador *Endangered Species Act* (NL ESA) provides protection for indigenous species, sub-species and populations considered to be endangered,

threatened, or vulnerable within the province. These potential designations under the legislation are defined as follows:

- **Endangered:** A species that is facing imminent extirpation or extinction;
- **Threatened:** A species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; and
- **Vulnerable:** A species that has characteristics which make it particularly sensitive to human activities or natural events.

Designations are based on recommendations from COSEWIC and/or the provincial Species Status Advisory Committee (SSAC). Habitat that is important to the recovery and survival of endangered or threatened species can also be designated as critical habitat or recovery habitat, and protected under the *NL ESA*.

Table 3.1 provides a listing of identified species at risk and species of conservation concern that are known or considered likely to occur off eastern Newfoundland, indicating their current designations under applicable legislation and by COSEWIC. Comprehensive and up to date information on the protection and current designations of these species at risk and any associated Recovery Strategies, Action Plans and Management Plans (including any identified and designated critical habitat) is available from the relevant sources and will be used in any required EIS for this Project.

Table 3.1 Species at Risk or Otherwise of Special Conservation Concern (Current Designations)

Family	Species		Federal		Provincial
	Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Designation	NL ESA
MARINE FISH					
Anarhichadidae	Atlantic wolffish	<i>Anarhichas lupus</i>	Special Concern	Special Concern	
Anarhichadidae	Northern wolffish	<i>Anarhichas denticulatus</i>	Threatened	Threatened	
Anarhichadidae	Spotted wolffish	<i>Anarhichas minor</i>	Threatened	Threatened	
Anguillidae	American eel	<i>Anguilla rostrata</i>		Threatened	Vulnerable
Carcharhinidae	Blue shark	<i>Prionace glauca</i>		Special Concern	
Cetorhinidae	Basking shark	<i>Cetorhinus maximus</i>		Special Concern	
Gadidae	Atlantic cod	<i>Gadus morhua</i>		Endangered	
Gadidae	Cusk	<i>Brosme brosme</i>		Endangered	
Lamnidae	Porbeagle	<i>Lamna nasus</i>		Endangered	
Lamnidae	Shortfin mako	<i>Isurus oxyrinchus</i>		Threatened	
Lamnidae	White shark	<i>Carcharodon carcharias</i>	Endangered	Endangered	
Macrouridae	Roughhead grenadier	<i>Macrourus berglax</i>		Special Concern	
Macrouridae	Roundnose grenadier	<i>Coryphaenoides rupestris</i>		Endangered	
Phycidae	White hake	<i>Urophycis tenuis</i>		Threatened	

Family	Species		Federal		Provincial
	Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Designation	NL ESA
Pleuronectidae	American plaice	<i>Hippoglossoides platessoides</i>		Threatened	
Rajidae	Smooth skate	<i>Malacoraja senta</i>		Endangered	
Rajidae	Thorny skate	<i>Amblyraja radiata</i>		Special Concern	
Salmonidae	Atlantic salmon – Newfoundland population	<i>Salmo salar</i>		Threatened	
Scombridae	Atlantic bluefin tuna	<i>Thunnus thynnus</i>		Endangered	
Scorpaenidae	Acadian redfish	<i>Sebastes fasciatus</i>		Threatened	
Scorpaenidae	Deepwater redfish	<i>Sebastes mentella</i>		Threatened	
Squalidae	Spiny dogfish	<i>Squalus acanthias</i>		Special Concern	
MARINE BIRDS					
Laridae	Ivory Gull	<i>Pagophila eburnea</i>	Endangered	Endangered	Endangered
Scolopacidae	Red-necked Phalarope	<i>Phalaropus lobatus</i>		Special Concern	
MARINE MAMMALS AND SEA TURTLES					
Balaenopteridae	Blue Whale - Atlantic Population	<i>Balaenoptera musculus</i>	Endangered	Endangered	
Balaenopteridae	Fin Whale - Atlantic Population	<i>Balaenoptera physalus</i>	Special Concern	Special Concern	
Balaenidae	North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered	Endangered	
Ziphiidae	Northern Bottlenose Whale - Davis Strait, Baffin Bay, Labrador Sea population; Scotian Shelf population	<i>Hyperoodon ampullatus</i>	Endangered (Scotian Shelf population)	Special Concern (Davis Strait, Baffin Bay, Labrador Sea population); Endangered (Scotian Shelf population)	
Ziphiidae	Sowerby's Beaked Whale	<i>Mesoplodon bidens</i>	Special Concern	Special Concern	
Delphinidae	Killer Whale (Northwest Atlantic / Eastern Arctic population)	<i>Orcinus orca</i>		Special Concern	
Phocoenidae	Harbour Porpoise (Northwest Atlantic population)	<i>Phocoena phocoena</i>		Special Concern	

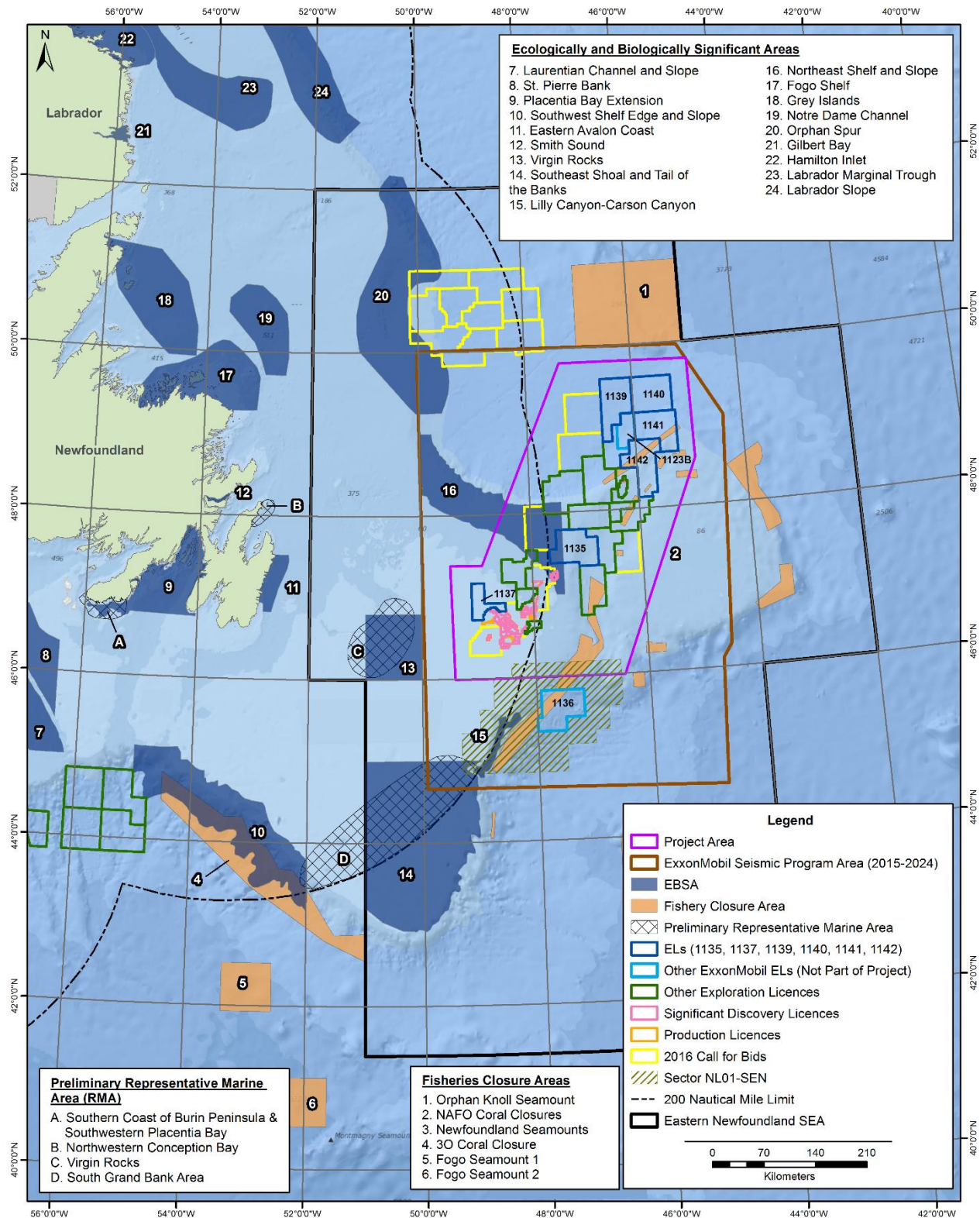
Family	Species		Federal		Provincial
	Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Designation	NL ESA
Dermochelyidae	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered	
Cheloniidae	Loggerhead Sea Turtle	<i>Caretta caretta</i>		Endangered	

3.3.5 Protected and Special Areas

A number of onland, marine and coastal areas within and off eastern Newfoundland have been designated as protected under provincial, federal and/or other legislation and processes, or have been formally identified through relevant forums and processes as being otherwise special or sensitive due to their ecological, historical and/or socio-cultural characteristics and importance.

The Project will occur in a marine area that is located several hundred kilometres from shore. The planned marine exploration activities that comprise this Project will therefore not occur within, or otherwise interact directly with, any of the existing provincial or federal Parks, Ecological Reserves, Wildlife Reserves, Marine Protected Areas, Migratory Birds Sanctuaries, IBAs or other locations that have been designated as protected on or around the Island of Newfoundland (Amec 2014). The Project Area does, however, overlap with a number of identified special or sensitive areas in the offshore environment (Fishery Closure Areas, EBSAs, see Figure 3.3), for which there are no associated prohibitions of marine activities such as that being proposed as part of this Project, and with the Project having little or no potential to result in adverse environmental effects upon these areas and their associated ecological features.

For those areas that are formally designated as protected or special under federal or provincial government legislation or other means, there is good information available (including mapping data) regarding their presence, location, size and important ecological and/or socioeconomic features and value, for use in the EIS should one be required.

Figure 3.3 Environmentally Special and Sensitive Areas off Eastern Newfoundland

3.4 Socioeconomic Environment

The following sections provide a brief overview of relevant aspects of the socioeconomic environment of the area, with a key focus on commercial fishing activity as well as other human uses of the marine environment.

3.4.1 Fisheries

Fisheries are an important component of the socioeconomic environment of Newfoundland and Labrador and other parts of Canada, including the various communities and regions that extend along the coastline of eastern Newfoundland. Commercial fisheries in this region are extensive and diverse, with the Project Area overlapping a number of NAFO Divisions and Unit Areas, and thus, fishing activities that involve a range of species, gear types and other characteristics at various times of the year.

Commercial fisheries data are provided by Fisheries and Oceans Canada (DFO) Statistical Services in Ottawa, ON, including landings (weight and value) statistics and geospatial information illustrating the overall location and timing of fishing activity. The mapping information is provided by DFO as an aggregated data set which gives a general indication of fishing areas (by species, gear types and other pre-determined categories and data classes) for individual grid “cells” that are approximately 6 x 4 nautical miles in size. The DFO datasets record and report domestic and foreign fish harvests that are landed in Canada. Figures 3.4 and 3.5 provide annual, locational summary information for commercial fishing activity in the Project Area and surrounding region for the previous five years (2010 to 2014) based on the above described DFO datasets, including the most current year for which such data are available from DFO. The Figures include relevant and representative maps showing overall fishing activity by year, as well as for the various categories of gear types (mobile and fixed gear). The data indicate that key species that are fished in the region include snow crab, yellowtail flounder, turbot / Greenland halibut, redfish, Northern shrimp, American plaice, halibut and others. Fishing activity occurs year-round, but is concentrated primarily in the April-August period.

There are also various regulatory jurisdictions that pertain to marine fish and fisheries within and around the Project Area. While the Government of Canada has jurisdiction over fish stocks and fishing activities within the 200 nautical mile limit (EEZ) and for benthic invertebrates (such as crab) across the entire continental shelf, NAFO manages groundfish activities and other resources beyond that 200 mile limit. The NAFO Regulatory Area (NRA) is some 2,707,895 km² in size (or 41 percent of the total NAFO Convention Area) and comprises that part of the Northwest Atlantic high seas located adjacent to Canada's 200 mile EEZ. Fishing activity in the NRA targets a range of species, including cod, redfish, Greenland halibut, shrimp, skates, and other finfish, and has an approximate landed value of \$200 million annually across all members (NAFO 2014). As a result of the 2007 United Nations General Assembly (UNGA Res. 61/105, paragraph 83) request that Regional Fisheries Management Organizations regulate bottom fisheries, NAFO undertook an exercise to identify bottom fishing areas in the NRA, and in doing so, to identify and map NAFO's bottom fishing footprint in the area. The NAFO fisheries footprint is 120,048 km² in size, and its location and relationship to the current Project Area is illustrated in Figure 3.6.

Information on fishing activity by the NAFO members that fish in the NAFO Divisions that overlap with the Project Area are available from various sources, including the STATLANT21A Databases (NAFO 2015).

Figure 3.4 Commercial Fisheries Locations, All Species (2010-2014)

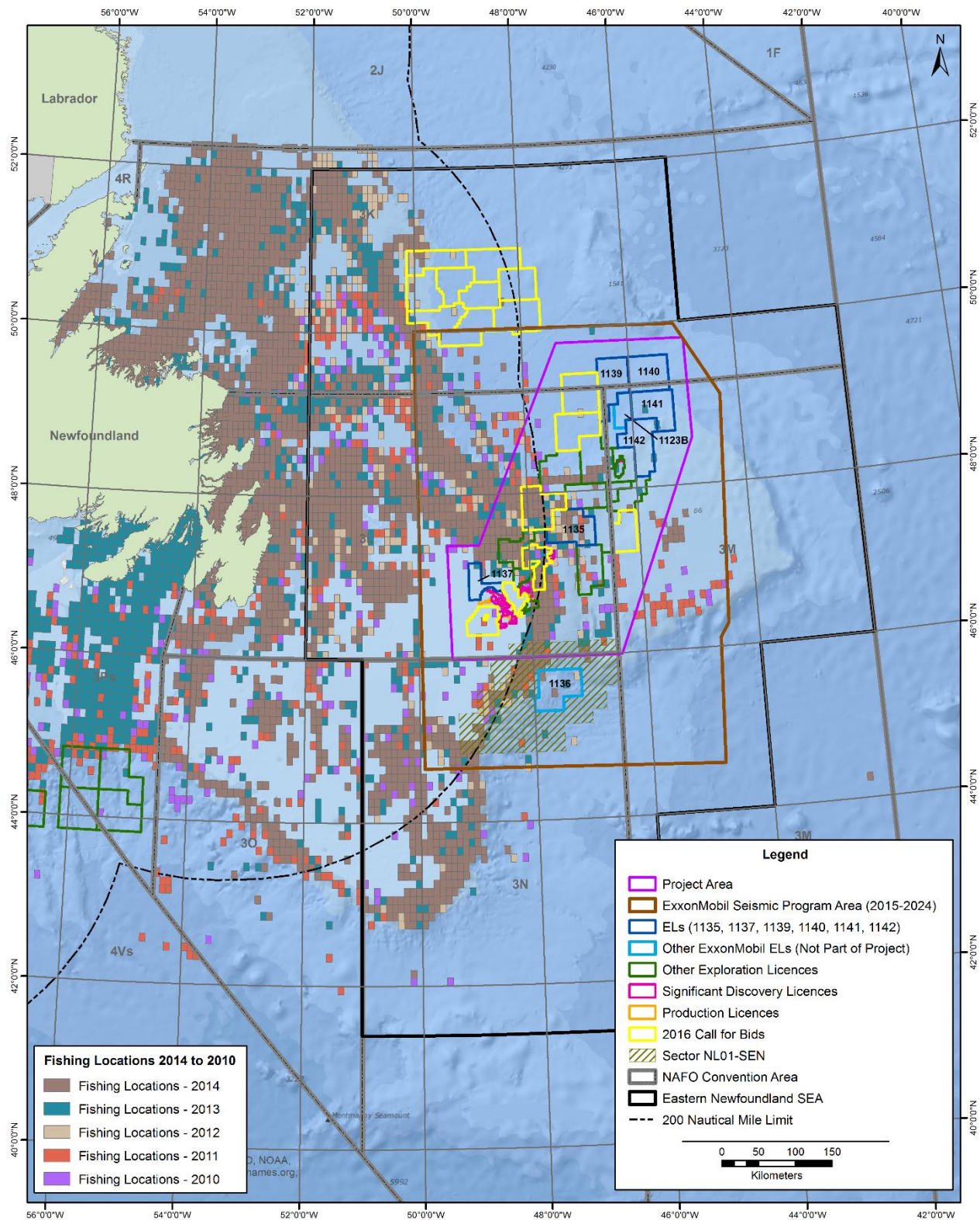


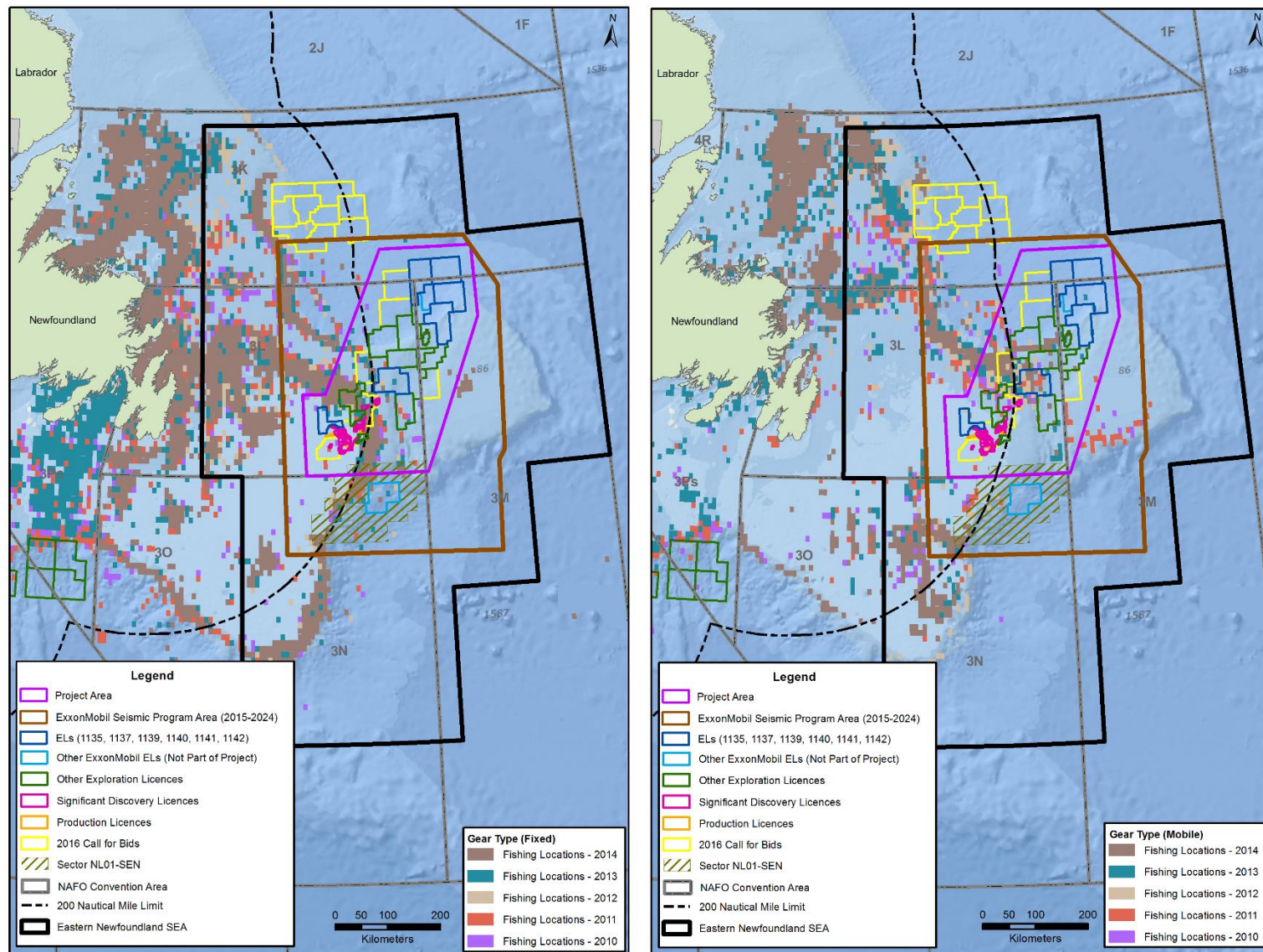
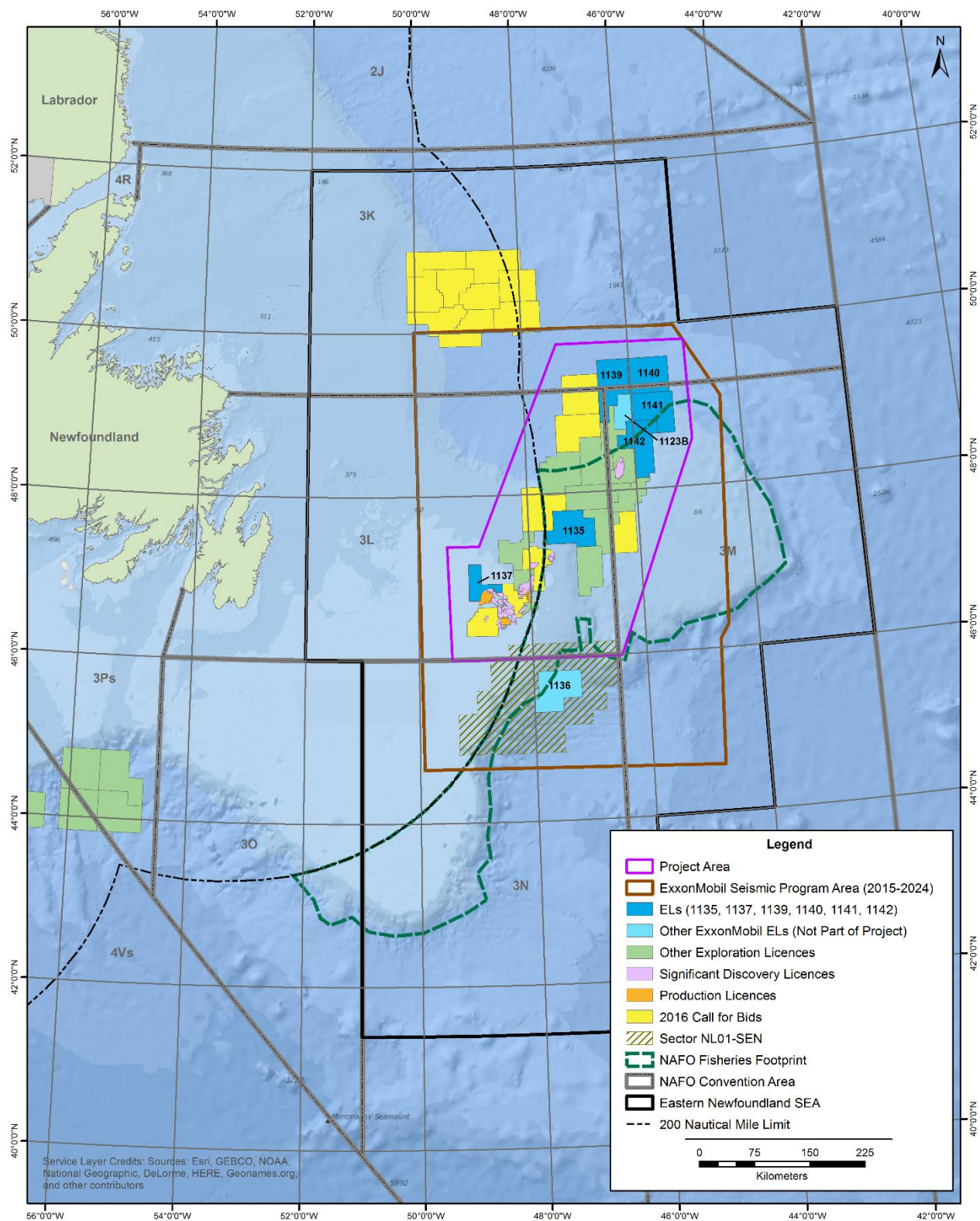
Figure 3.5 Commercial Fisheries Locations, Fixed and Mobile Gear (2010-2014)

Figure 3.6 NAFO Fishing Zones and Foreign Fleet Fisheries “Footprint”

As discussed further in Chapter 4, a number of Aboriginal groups hold commercial fishing licences for NAFO Divisions that overlap with the Project Area, including licences that permit access to a variety of species and locations within NAFO 3KLMN (see Figure 3.6). This includes the following:

- a) Labrador Inuit (Nunatsiavut Government): Several inshore groundfish enterprises that are licenced to operate in 3KL, and seal licences in Seal Fishing Areas 4-33 (Atlantic-wide).
- b) Labrador Innu (Innu Nation): Has a mid-shore enterprise (65 to 100 feet) with a groundfish licence permitting access to a variety of areas (Atlantic-wide) including 3KLMN, with an Area 6 (3K) shrimp licence also associated with this enterprise. Also hold an inshore enterprise with a mobile gear and fixed gear groundfish licence for 3KL.
- c) NunatuKavut Community Council: Multiple inshore enterprises with access to 3KL groundfish, several of which also have an associated Area 6 (3K) shrimp licence. Also hold several seal licences allowing access in Seal Fishing Areas 4-33 (Atlantic-wide).
- d) Conne River Mi'kmaw (Miawpukek First Nation): Multiple enterprises and licences that give access to 3KL, as well as several tuna licences in 3LN and a seal licence for Seal Fishing Areas 4-33.
- e) Qalipu Mi'kmaq First Nation Band: Has an inshore enterprise with groundfish licence giving access to 3K and a shrimp licence for Area 6 (3K), as well as pelagic fishery access (herring, mackerel, and capelin) which occurs close to shore in 3KL.
- f) Mi'kmaq Alsumk Mowimsikik Koqoey Association (formed by Miawpukek First Nation and Qalipu Mi'kmaq First Nation Band): Has an enterprise with a groundfish licence in 3KL.

There are no documented food, social, or ceremonial licences within the Project Area. The closest Aboriginal Reserve to the Project is Conne River, located on the south coast of Newfoundland several hundred kilometers west of the Project Area.

Various fisheries survey programs are also undertaken by government and/or industry, including DFO Multispecies RV Trawl Surveys, which comprise annual (spring and fall) standardized bottom-trawl surveys to collect information for managing and monitoring fish resources in the Newfoundland and Labrador Region. There is also an annual Industry - DFO Collaborative Post-season Trap Survey for snow crab in NAFO Divisions 2J3KLOPs4R, which is conducted using commercial and modified snow crab traps at established trap stations starting in late August or early September after the commercial snow crab season has ended.

3.4.2 Other Human Activities

A number of other human activities also take place in parts of the Project Area on either a year-round or seasonal basis. General shipping traffic within and through the region includes marine tanker traffic and supply vessels associated with the existing offshore oil development and activities, as well as cargo ships, fishing vessel transits, and other vessel traffic. Naval training exercises also occur in the general area, which involve both surface vessels and submarines. There are also known and potential unexploded ordnance (UXO) sites in the Atlantic Ocean, which include shipwrecks and submarines as

well as munitions dump sites, several of which occur within or near the Project Area (Amec 2014). A number of existing marine cable networks also cross through or near the Project Area.

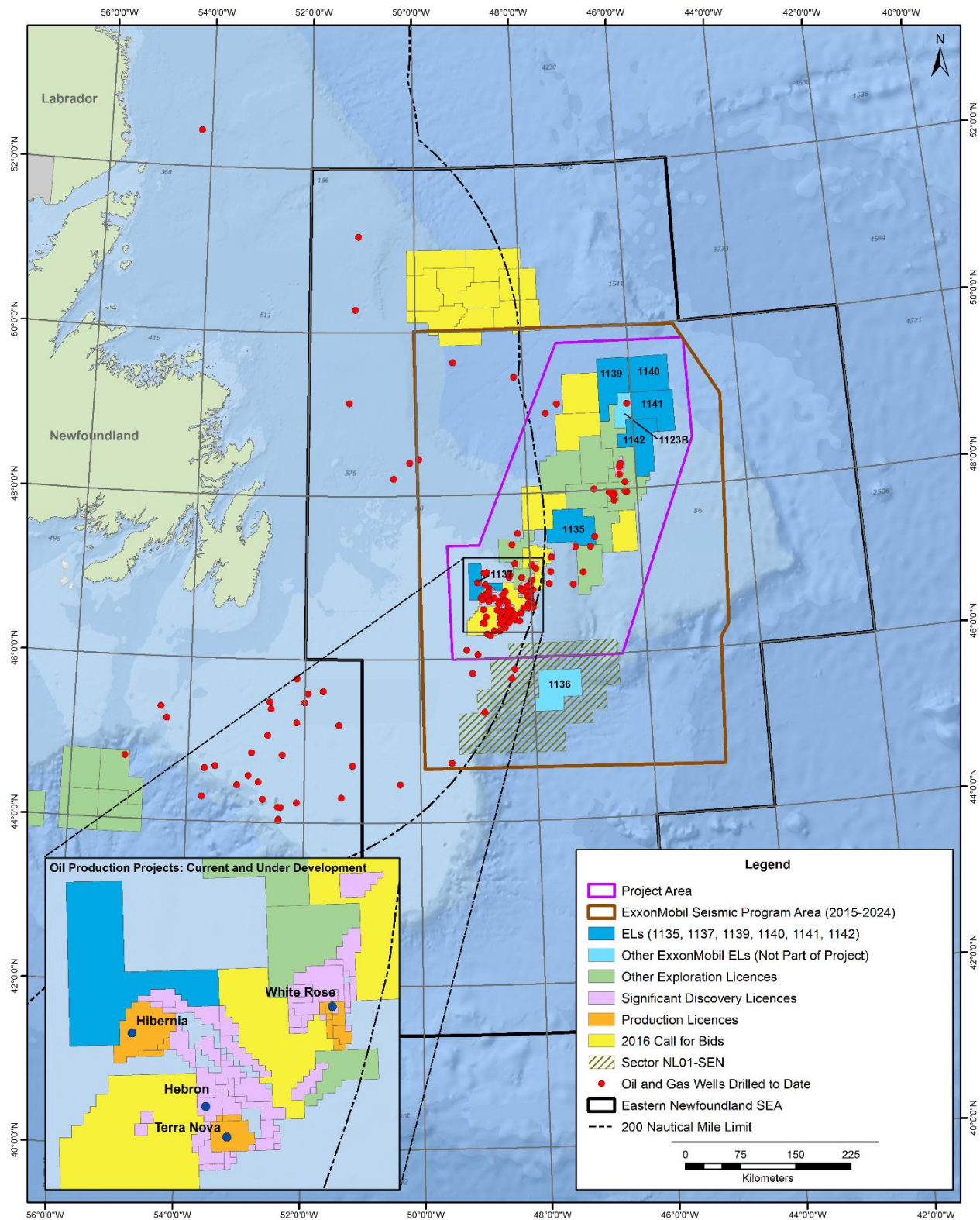
The area off eastern Newfoundland is subject to considerable oil and gas exploration activity, including geophysical surveys and drilling programs (Figure 3.7), with many thousands of kilometers of seismic survey data collected and several hundred wells having been drilled to date. Offshore oil production activities have also been occurring since the 1990s, including several producing oilfields and another that is currently under development (Amec 2014, Figure 3.7):

- 1) *Hibernia Oilfield*: Discovered in 1979, the Hibernia Oilfield is operated by the Hibernia Management and Development Company Ltd. The development phase of that project commenced in late 1990 and continued until the mating of the Gravity Based Structure (GBS) and its topsides at Bull Arm NL in 1997, after which the platform was towed to and installed at its site on the Grand Banks in June of that year. Commercial production from the Hibernia field commenced in November 1997 and is on-going. In recent years the project has been further expanded to include the Hibernia South Extension Unit, from which production commenced in 2011.
- 2) *Terra Nova Oilfield*: Discovered in 1984 and declared a significant discovery in 1985, the Terra Nova Project is currently in operation by Suncor Energy Inc. using a floating production, storage and offloading (FPSO) vessel. Dry-dock construction of the Terra Nova FPSO vessel began in early 1999, and it arrived at Bull Arm in May 2000 where outfitting, hook-up and commissioning of the vessel took place. The FPSO arrived at the oilfield in August 2001 and began producing oil in January 2002.
- 3) *White Rose Oilfield and Satellite Expansion*: Discovered in 1984, a significant discovery licence for the field was issued in January 2004. The White Rose oilfield and its satellite expansions are operated by Husky Energy Inc. utilizing a FPSO vessel, and first oil was produced in November 2005 followed by the North Amethyst expansion in May 2010.
- 4) *Hebron Oilfield*: First discovered in 1980, the Hebron Project is currently under development and will utilize a stand-alone concrete GBS being constructed at Bull Arm, which will be designed for an oil production rate of 150,000 barrels of oil per day. First oil from the Hebron Project is planned for 2017.

These offshore oil and gas exploration and development activities include a variety of ancillary and supporting activities as well.

Each of these development projects were subject to detailed and comprehensive EA reviews under the federal EA processes that were in place at the time they were proposed, and as described earlier many of the previous exploration (geophysical and drilling) programs have also been subject to EA review. As a result, there have been environmental studies (baseline and monitoring) and analysis and associated environmental emissions modelling (drill cuttings, oil spill fate and behaviour) exercises completed for numerous locations throughout the Project Area and surrounding regions off eastern Newfoundland.

Figure 3.7 Previous Wells Drilled off Eastern Newfoundland



4 CONSULTATION AND ENGAGEMENT

Consultation and engagement are often considered to be the cornerstone of the EA process, and are a key component of ExxonMobil's approach to the planning and implementation of its exploration programs and other business activities. A number of associated initiatives have been undertaken, are in progress, or are being planned in relation to the proposed Project, including discussions with relevant government departments and agencies, Aboriginal groups, stakeholder organizations and interested members of the public.

4.1 Regulatory Consultation

As noted in Chapter 1, a number of provincial and federal government departments and agencies may have regulatory responsibilities or other mandates and interests related to the Project and its potential environmental effects. As part of the planning and preparation of this Project Description, ExxonMobil has met with a number of regulatory organizations (Canadian Environmental Assessment Agency, C-NLOPB) and plans to meet with or otherwise provide Project information to various others, including the:

- Ecosystem Management Branch, Department of Fisheries and Oceans;
- Environmental Protection Operations Directorate - Environment Canada;
- Healthy Environments and Consumer Safety Branch - Health Canada;
- MARLANT Department of National Defence;
- Environmental Affairs and Aboriginal Consultation Unit - Transport Canada;
- Natural Resources Canada;
- Newfoundland and Labrador Department of Environment and Climate Change; and
- Newfoundland and Labrador Department of Natural Resources

The governmental review of this Project Description will help to identify any important environmental questions and issues related to the proposed Project, for consideration by the Canadian Environmental Assessment Agency in determining whether (and if so, what level of) EA is required and the scope and focus of that review. If further assessment is deemed necessary, relevant departments and agencies will also be involved in the development and finalization of EIS Guidelines, the eventual review of the Project's EIS, and at other stages of the review process.

ExxonMobil will also continue to consult directly with relevant government departments and agencies as part of the planning and completion of any required EIS for the Project, as well as in any post-EA environmental permitting and overall environmental management initiatives during its eventual implementation.

4.2 Aboriginal Engagement

ExxonMobil is committed to ensuring that relevant Aboriginal groups are appropriately informed and engaged regarding the company's on-going and planned activities, particularly where these groups are known to reside and/or undertake activities in areas where the company is planning to carry out its operations.

A number of Aboriginal groups reside in Newfoundland and Labrador, and ExxonMobil is aware that fishing enterprises associated with several of these organizations undertake commercial fishing activity within NAFO Divisions that overlap parts of the proposed Project Area. This includes fishing activity by the: 1) Labrador Inuit (Nunatsiavut Government) 2) Labrador Innu (Innu Nation), 3) NunatuKavut Community Council, 4) Conne River Mi'kmaw (Miawpukek First Nation), and 5) the Qalipu Mi'kmaq First Nation Band (see Section 3.4.1). ExxonMobil is not aware, however, that these (or any other) Aboriginal groups hold, claim or otherwise assert Aboriginal or Treaty rights within or near the proposed Project Area, pursuant to Section 35 of the *Canadian Constitution Act*, 1982. Rather, it is ExxonMobil's understanding that these organizations undertake fishing activity off eastern Newfoundland through commercial licences issued by the federal government under the *Fisheries Act* and its associated *Aboriginal Communal Fisheries Licensing Regulation*, as well as other government policies and strategies that are designed to involve Aboriginal people and communities in commercial fisheries in Canada.

As part of its planned engagement with relevant commercial fishing interests in and near the proposed Project Area during the EA process, ExxonMobil will engage with each of the Aboriginal organizations that are known to be involved in the commercial fishery in the area. As part of the planning and preparation of this Project Description, the Company has contacted the following groups to provide information on the Project and to seek any initial input:

- Nunatsiavut Government;
- Innu Nation;
- NunatuKavut Community Council;
- Miawpukek First Nation;
- Qalipu Mi'kmaq First Nation Band; and the
- Mi'kmaq Alsumk Mowimsikik Koquey Association

This included writing to each Aboriginal group on June 15, 2016 to provide an initial notification of the proposed Project, and an opportunity for them to identify any questions or comments regarding the Project and its potential environmental effects for consideration in the EA, as well as inviting further information sharing and engagement as the EA review progresses. As of the time of finalization and submission of this Project Description, two of these groups had responded to ExxonMobil acknowledging receipt of this correspondence, confirming their respective fishing licences off Eastern Newfoundland, and identifying a specific contact for future engagement. No additional or specific environmental issues or concerns were raised by any group contacted to date

4.3 Stakeholder and Community Engagement

As part of its on-going exploration and development activities off Newfoundland and Labrador, ExxonMobil regularly consults with applicable stakeholders through existing forums (such as the One Ocean initiative), and conducts additional and specific engagements with interested persons and groups if and as new activities, issues and requirements arise.

During the preparation of this Project Description, ExxonMobil has met with and/or otherwise contacted the following stakeholder groups:

- Canadian Association of Petroleum Producers (CAPP);

- Newfoundland and Labrador Oil and Gas Industry Association (NOIA);
- Fish, Food and Allied Workers Union (FFAW-Unifor);
- One Ocean; and
- Ocean Choice International.

This included meetings with each of the three fisheries-related organizations referenced above, which involved providing a brief overview of the Project and subsequent discussion. Each organization indicated its overall familiarity with offshore oil and gas exploration programs such as those being proposed and with the relevant EA processes, as well as their intention to participate in and respond through the EA review for the Project. No additional or specific environmental issues or concerns were raised by any of the stakeholder groups contacted to date.

As part of its on-going and future Project planning, ExxonMobil will continue to meet or otherwise communicate with these and other key stakeholders, including other fishing industry representatives (e.g., NAFO, Association of Seafood Processors, Torngat Fish Producers Co-operative Society Limited), communities, environmental organizations (e.g., Canadian Parks and Wilderness Society (CPAWS), Nature Newfoundland and Labrador, Atlantic Canada Chapter – Sierra Club Foundation) and others to provide Project details and to identify and discuss any information, questions or concerns that these stakeholders may have.

Should an EIS be required for the Project under *CEAA* 2012, ExxonMobil will design and implement a public and stakeholder consultation program that will provide various mechanisms and opportunities for persons and groups to receive and review information, as well as to provide information and perspectives related to the Project and its potential effects. This will include opportunities to identify questions, concerns and issues which require consideration in the EIS, as well as in eventual Project planning and implementation. A key focus of these consultation activities will therefore be around obtaining and recording information and input related to:

- 1) Questions, issues or comments regarding the Project and its potential environmental and socioeconomic effects (including benefits);
- 2) Suggestions for any means through which these issues could be addressed in future Project planning and decisions / actions; and
- 3) Local knowledge regarding the existing biophysical and socioeconomic environments in and around the Project Area..

The results of this consultation will therefore be used to identify key issues and questions to be considered and addressed in the EIS, and thus, to appropriately focus the analysis. Identified questions and issues will be recorded at each interface, for consideration in Project planning and assessment, and for follow-up as appropriate.

5 POTENTIAL PROJECT-RELATED ENVIRONMENTAL INTERACTIONS

The following sections provide an overview of some of the potential environmental issues and interactions that may result from the proposed Project, and which would therefore form a key area of focus for any EIS that may eventually be required for it.

5.1 Possible Project-Related Changes to the Environment

The implementation and conduct of the proposed offshore oil and gas exploration activities that comprise this Project have the potential to interact with, and result in associated changes to, a number of environmental components. CEAA 2012 includes the following definitions and specifications related to assessing the environmental effects of a designated project:

[E]nvironment means the components of the Earth, and includes

- (a) land, water and air, including all layers of the atmosphere;*
- (b) all organic and inorganic matter and living organisms; and*
- (c) the interacting natural systems that include components referred to in paragraphs (a) and (b)*

5 (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

- (i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,*
- (ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,*
- (iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and*
- (iv) any other component of the environment that is set out in Schedule 2;*

(b) a change that may be caused to the environment that would occur

- (i) on federal lands,*
- (ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or*
- (iii) outside Canada; and*

(c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on

- (i) health and socio-economic conditions,*
- (ii) physical and cultural heritage,*
- (iii) the current use of lands and resources for traditional purposes, or*
- (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.*

(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account:

(a) a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project; and

(b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage, or

(iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

In the case of this proposed Project, potential environmental effects may occur as a result of its planned components and activities, as well as any unplanned events such as an accident or malfunction.

5.1.1 Planned Project Components and Activities

As described in Chapter 2, the Project includes a number of planned offshore petroleum exploration activities in an area off eastern Newfoundland that encompasses a number of existing ELs within this region and others that may be awarded to ExxonMobil through the C-NLOPB's 2016 Calls for Bids. The purpose of this exploration program is to help determine the potential presence of hydrocarbons in these areas, and it could involve drilling from one and potentially up to five wells (exploration or delineation) on some ELs, with specific well types and locations being selected as Project planning and design activities continue. The Project could also include wellsite seabed surveys, VSP surveys, well testing and eventual abandonment, and associated supply and service activities.

Some of the key components and activities, and potential environmental disturbances or interactions, that may be associated with the proposed Project and which would be particularly relevant to any environmental effects analysis therefore include those listed below:

- a) The presence and movement of the drilling unit(s) and supporting vessels / aircraft and equipment;
- b) Drilling activities and the associated discharge and deposition of drill cuttings / fluids;
- c) Project-related noise into the atmospheric and marine environment (e.g., operation and movement of rigs / vessels, DP systems, other equipment, VSP surveys, eventual wellhead removal);
- d) Air emissions (exhausts, well testing / flaring) and lighting on Project vessels and equipment;
- e) The generation of solid and liquid waste materials and their management; and
- f) Eventual well abandonment and rehabilitation activities.

Based on these elements, some potential environmental issues and interactions that may be associated with the proposed Project are identified below in Table 5.1.

Any potential environmental issues and interactions that may be associated with the proposed Project can be avoided or reduced through the use of good planning and sound operational practices and procedures, supported by standard mitigations that are well established and outlined in relevant regulatory procedures and guidelines.

A summary of some of the standard mitigation measures that are often implemented in relation to offshore exploration drilling program off Newfoundland and Labrador is also provided in the Table below, for initial review and illustrative purposes. These measures have been routinely and successfully applied to similar oil and gas exploration programs off Newfoundland and Labrador and elsewhere in previous years. These and/or other planning and management measures, in combination with ExxonMobil's own policies, principles and environmental management plans and procedures, will help to ensure that the Project is planned and completed in a manner that avoids or reduces potential environmental effects. In planning and implementing the proposed Project, ExxonMobil will continue to be guided and informed by these and other such requirements and approaches, as well as the various applicable mitigation measures that were identified and described through the C-NLOPB's Eastern Newfoundland SEA (Amec 2014).

Table 5.1 Potential Environmental Interactions and Associated Mitigation

Potential Environmental Changes	Potential Mitigation Measures (For Illustration)
<ul style="list-style-type: none"> Possible effects on water quality and the contamination, smothering or other alteration of marine habitats and benthic organisms due to physical disturbance of the substrate (and associated sedimentation), the discharge and deposition of drill cuttings and/or fluids, and other potential environmental emissions during planned activities. Possible temporary avoidance of areas by marine fish, birds, mammals and sea turtles due to underwater noise or other disturbances, which may alter their presence and abundance as well as disturbing movements / migration, feeding or other activities. Possible attraction of marine fish, birds, mammals and sea turtles to drill rigs and vessels, with increased potential for injury, mortality, contamination or other interactions (e.g., collisions). Potential effects on fisheries (landings and values) and other 	<ul style="list-style-type: none"> Avoidance of known important and sensitive species and areas / times where possible in the planning and conduct of oil and gas activities. Minimizing the amount of associated vessel and aircraft traffic, the use of existing and common travel routes where possible and the avoidance of low-level aircraft operations wherever possible. Minimizing environmental discharges and emissions from planned operations and activities, including compliance with relevant regulations and standards. Pre-drilling surveys of the sea bed to assess the potential presence of sensitive benthic micro-habitats (such as corals). Selection of non-toxic drilling fluids, including the use of WBMs wherever possible and technically feasible. Treatment of operational discharges (such as sewage, deck drainage) prior to release in compliance with the Offshore Waste Treatment Guidelines and other applicable regulations and standards. Installation and use of oil water separators to treat contained deck drainage, with collected oil stored and disposed of properly. Minimizing the use of artificial lighting, where possible with due regard to safety and associated operational requirements. Programs and protocols for the collection and release of marine birds that become stranded on offshore installations, including associated regulatory guidance and permit requirements. Inspections of ship hulls, drilling units and equipment for alien invasive species and associated follow-up maintenance. Maximizing use of local vessels, drilling unit and equipment where possible. Avoiding or minimizing flaring, and the use of high efficiency burners where flaring is required.

Potential Environmental Changes	Potential Mitigation Measures (For Illustration)
<p>marine activities due to possible biophysical effects (including resource abundance, distribution or quality).</p> <ul style="list-style-type: none"> Interference with and possible reduced access to (safety zones) preferred fishing or other marine areas during Project activities in certain locations, with possible decreases in activity success, efficiency, value or enjoyment. Potential damage to fishing gear, vessels of other equipment and infrastructure as a result of direct interactions with Project equipment, activities or environmental discharges. Potential direct or indirect interactions with protected and sensitive areas in the marine environment, and associated impacts on their ecological integrity (ecological, aesthetic) and/or human use and value. The creation of employment and business opportunities and associated economic benefits (direct, indirect and induced). 	<ul style="list-style-type: none"> Appropriate handling, storage, transportation and on-shore disposal of solid and hazardous wastes. Water contaminated with hydrocarbons generated during flow testing (within certain tolerances), can be atomized in the flare (using high efficiency burners) or shipped on-shore for disposal Selection and screening of chemicals under the Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands. The use of mechanical procedures during well completion and abandonment activities where possible, including the proactive design of well structures to facilitate this. Spill prevention plans and procedures, with associated and effective spill preparedness and response plans in place. On-going information gathering and analysis regarding fishing areas and times and continued monitoring of fishing activity. Establishment and communication of safety / no-fishing zones. Active and continuous communications and coordination procedures. Issuance of Notices to Mariners and other notifications / direct industry communications. Educational and training initiatives for Project personnel. Establishment, communication and implementation of a Fishing Gear Damage or Loss Compensation Program (as per the associated Guidelines).

Table 5.2 links each of the potential environmental interactions that may be associated with planned Project components and activities to the various environmental components and issues that are specified under CEAA (2012).

Table 5.2 Environmental Components / Issues and Potential Environmental Interactions Relevant to CEAA (2012) – Planned Project Components and Activities

Environmental Component / Issue	Relevant Section(s) of CEAA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	<ul style="list-style-type: none"> Disturbances (noise, lights, others) associated with the drill rig and vessel movements, resulting in possible avoidance or attraction by marine biota (fish, mammals, turtles). Associated direct (injury or mortality) or indirect (alterations of key life history activities and

Environmental Component / Issue	Relevant Section(s) of CEAA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
		<p>requirements, such as migration, reproduction, communication, availability and quality of food sources) effects on marine biota</p> <ul style="list-style-type: none"> Possible effects on water quality and the contamination, smothering or other alteration of marine habitats and benthic organisms due to physical disturbance of the substrate, the discharge and deposition of drill cuttings and/or fluids, or other solid and liquid wastes.
Migratory Birds	5(1)(a)(iii)	<ul style="list-style-type: none"> Attraction and disturbance / disorientation, potential injury or mortality Possible health effects due to contamination of individuals and/or their habitats Potential effects on prey species / food sources
Project Activities Occurring on Federal Lands	5(1)(b)(i)	<ul style="list-style-type: none"> The proposed Project Area includes marine areas (federal lands) that are located within Canada's 200 nautical mile EEZ on the outer continental shelf. Where planned Project components and activities occur on or near such federal lands, any resulting environmental effect described in this Project Description may affect existing environmental conditions on these lands.
Transboundary Issues	5(1)(b)(ii)	<ul style="list-style-type: none"> Planned and routine Project activities that take place within the area of Canada's jurisdiction are not anticipated to result in environmental emissions or other interactions that will extend to the environment outside Newfoundland and Labrador or outside the marine waters under the jurisdiction of Canada. Project components and activities that occur within the area of Canada's jurisdiction may, however, affect environmental components (such as migratory fish, aquatic species, or birds and air and water quality) that extend and/or move both within and outside the areas under the jurisdiction of Canada.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	<ul style="list-style-type: none"> Potential effects on fisheries (landings and values) and other marine activities due to biophysical changes (resource availability, distributions, quality), access / interference, damage to equipment or other direct or indirect interactions. Potential interactions with protected or special marine areas and possible associated effects on their human use and value.
Physical and Cultural Heritage, or Resources of Historical, Archaeological,	5(1)(c)(ii) 5(1)(c)(iv)	<ul style="list-style-type: none"> No interactions or adverse effects are anticipated as a result of planned Project activities in this marine environment, which is located far offshore. (To be

Environmental Component / Issue	Relevant Section(s) of CEAA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
Paleontological, or Architectural Significance	5(2)(b)(ii) 5(2)(b)(iii)	confirmed through pre-drilling well site surveys and associated mitigations).
Current Use of Lands and Resources for Traditional Purposes by Aboriginal Groups	5(1)(c)(iii)	<ul style="list-style-type: none"> No interactions or adverse effects are anticipated as a result of planned Project activities in this marine environment, which is located far offshore. Although a number of Aboriginal groups are known to undertake commercial fishing activity off eastern Newfoundland, ExxonMobil is not aware that these (or any other) Aboriginal groups hold, claim or otherwise assert Aboriginal or Treaty rights within or near the proposed Project Area. There are no documented food, social, or ceremonial licences within the Project Area.
Other Changes to the Environment Directly Related or Necessarily Incidental to a Federal Authority's Exercise of a Power or Performance of a Duty or Function in Support of the Project	5(2)(a)	<ul style="list-style-type: none"> None identified in addition to the potential environmental effects described above .

Relevant environmental planning, management and mitigation measures will be considered integrally in the environmental effects analyses provided as part of any future EIS for the Project. This will include those that have been “built-in” to the Project through its on-going planning and design in order to proactively avoid or reduce potential environmental issues, as well as the other general and component-specific environmental protection measures which will be further identified and proposed as the EA review progresses.

5.1.2 Unplanned Events

Environmental incidents that may be associated with offshore drilling programs include potential blowouts (subsea and surface), as well as other possible spills of hydrocarbons or other substances from the drilling unit and/or associated vessel activities, which may vary considerably in terms of their nature, scale, duration and potential environmental consequences.

An overview of ExxonMobil's policies, plans and systems related to oil spill prevention and response were provided earlier in Section 2.5. As indicated, oil spill prevention is a key focus of ExxonMobil's plans and activities and an integral component of all aspects of the planning and implementation of its offshore petroleum exploration and development activities. This includes the incorporation of multiple preventative barriers in Project design and execution, such as in well and casing design, BOP design and associated activation and control procedures, well control and detection processes, the definition of severe environmental operating conditions and associated contingency (including disconnect) procedures, and other relevant measures. In the very unlikely event of a spill, ExxonMobil's project and site-specific OSRP will detail the equipment and procedures that will be implemented to effectively respond to such an incident.

As part of its regulatory review processes (see Section 1.3), the C-NLOPB receives and considers information from operators that detail the proposed drilling location and activities, the equipment and procedures involved, and the qualifications and training of personnel, through multi-tiered approval and authorization processes. Operators are also required to develop and implement systematic and comprehensive oil spill prevention and response plans and procedures. In the event of a large oil spill, a number of processes and measures also exist to compensate any affected parties for any associated losses or damages. These are described in the associated *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* and other documentation. Oil spill prevention, response and overall preparedness approaches for the Project will be further developed and defined as the various regulatory review and approval processes move forward.

As the fate and behaviour of accidental spills are dependent upon Project and site-specific characteristics, such as hydrocarbon volumes, types and properties, oceanographic conditions, as well as the size, location and timing of the spill, the EA reviews for individual proposed drilling programs may include a project-specific analysis of oil spill probabilities, as well as modelling studies of the likely fate and behaviour of possible oil spills. Any eventual EIS for this Project will describe and assess any such accidental events and malfunctions that could potentially occur, including the results of any associated spill modelling conducted for the Project (if and as required) which will form an integrated part of the associated environmental effects analysis and the identification of appropriate mitigation. The EIS will also describe relevant accident prevention and emergency response plans and procedures.

Table 5.3 links the various potential environmental interactions that may be associated with unplanned Project components and activities to the environmental components and issues that are specified under CEAA (2012).

Table 5.3 Environmental Components / Issues and Potential Environmental Interactions Relevant to CEAA (2012) – Unplanned Project Components and Activities

Environmental Component / Issue	Relevant Section(s) of CEAA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	<ul style="list-style-type: none"> Changes in the presence, abundance, distribution and/or health of marine fish / other aquatic species as a result of exposure to accidental spills (including injury or mortality through physical exposure, ingestion, or effects on prey and habitats / water quality).
Migratory Birds	5(1)(a)(iii)	<ul style="list-style-type: none"> Changes in the presence, abundance, distribution and/or health of marine birds as a result of exposure to accidental spills (including injury or mortality through physical exposure, ingestion, or effects on prey and important habitats).
Project Activities Occurring on Federal Lands	5(1)(b)(i)	<ul style="list-style-type: none"> The proposed Project Area includes marine areas (federal lands) that are located within Canada's 200 nautical mile EEZ on the outer continental shelf. Where Project components and activities and any associated unplanned events (such as an oil spill) occur on or near such federal lands, any associated environmental effects as described in this Project Description may affect existing environmental conditions on these lands.

Environmental Component / Issue	Relevant Section(s) of CEEA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
Transboundary Issues	5(1)(b)(ii)	<ul style="list-style-type: none"> • An accidental event could result in transboundary effects by extending outside an area of Canada's jurisdiction, as well as by affecting environmental components (such as migratory fish, aquatic species, or birds and air and water quality) that extend and/or move both within and outside the areas under the jurisdiction of Canada. No land masses are anticipated to be affected. • Oil spill modelling (previous studies and possible additional analyses) assesses the nature and geographic extent of any such accidental event and its potential effects.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	<ul style="list-style-type: none"> • Potential effects of offshore oil spills on other marine activities (including fishing) equipment and resources and the resulting implications for users and their livelihoods and communities (resulting from loss of resources, taint / quality, loss of markets, gear damage). • Potential interactions with protected or special marine areas and associated effects on their human use and value.
Physical and Cultural Heritage, or Resources of Historical, Archaeological, Paleontological, or Architectural Significance	5(1)(c)(ii) 5(1)(c)(iv) 5(2)(b)(ii) 5(2)(b)(iii)	<ul style="list-style-type: none"> • No interactions or adverse effects are anticipated as a result of unplanned Project activities in this marine environment, which is located far offshore. • Oil spill modelling (previous studies and possible additional analyses) assesses the nature and geographic extent of any such accidental event and its potential effects.
Current Use of Lands and Resources for Traditional Purposes by Aboriginal Groups	5(1)(c)(iii)	<ul style="list-style-type: none"> • No interactions or adverse effects are anticipated as a result of unplanned Project activities in this marine environment, which is located far offshore. • Although a number of Aboriginal groups are known to undertake commercial fishing activity off eastern Newfoundland, ExxonMobil is not aware that these (or any other) Aboriginal groups hold, claim or otherwise assert Aboriginal or Treaty rights within or near the proposed Project Area. There are no documented food, social, or ceremonial licences within the Project Area. • Oil spill modelling (previous studies and possible additional analyses) assesses the nature and geographic extent of any such accidental event and its potential effects.
Other Changes to the Environment Directly Related or Necessarily Incidental to a Federal	5(2)(a)	<ul style="list-style-type: none"> • None identified in addition to the potential environmental effects described above.

Environmental Component / Issue	Relevant Section(s) of CEAA (2012)	Potential Environmental Interactions / Changes (See Also Associated Mitigations Described Earlier)
Authority's Exercise of a Power or Performance of a Duty or Function in Support of the Project		

5.2 Environmental Assessment Scoping Considerations

Any required EIS for this Project will be planned and prepared in accordance with the requirements of CEAA (2012) and its associated *Regulations*, and in full compliance with the EIS Guidelines that will be issued by the Agency following governmental and public review and input. The EIS will provide the required information about the Project, its existing environmental setting, potential environmental effects, proposed mitigations and any associated residual environmental effects and proposed follow-up initiatives.

The Project will involve each of the components and activities described previously in Chapter 2, including those associated with the drilling of exploration and possibly delineation wells, wellsite seabed surveys, VSP surveys, well testing and eventual abandonment, and relevant supply and service activities. Any Project-related onshore support activities will again take place at an existing, established onshore supply facility that is operated by a third-party contractor, has been previously approved under applicable regulatory processes, and provides services to multiple offshore operators. It is therefore not proposed that these onshore components and activities will be included as part of the scope of the Project for EA purposes. Similarly, any support vessel and aircraft transit to and from the Project Area from these supply bases are not proposed to be included within the scope of the Project. ExxonMobil again recognizes that should an EA be required under CEAA (2012), the scope of the Project and its EA will be set by the Canadian Environmental Assessment Agency.

Based on the initial information and analysis provided above, and in keeping with most recent EAs for similar exploration projects of Newfoundland and Labrador and elsewhere, a preliminary list of potential Valued Components (VCs) upon which any eventual EIS will be focused is provided below:

- a) Fish and Fish Habitat (including Species at Risk);
- b) Marine / Migratory Birds (including Species at Risk);
- c) Marine Mammals and Sea Turtles (including Species at Risk);
- d) Commercial Fisheries and Other Ocean Users; and
- e) Protected and Special Areas.

ExxonMobil recognizes that the scope and focus of any EIS that may be required under CEAA 2012, including the final selection of VCs upon which it will focus, will be informed by and based upon the results of the review processes described previously, including associated input from participating governmental, aboriginal, stakeholder and public interests, and again will be set by the Canadian Environmental Assessment Agency.

6 REFERENCES

Altunai A. Murillo F.J., and Calder D.R. (2013). Aglaopheniid hydroids (Cnidaria: Hydrozoa: Aglaopheniidae) from bathyal waters of the Flemish Cap, Flemish Pass, and Grand Banks of Newfoundland (NW Atlantic). *Zootaxa* 3737 (5): 501–537.

Amec Environment and Infrastructure. (2014). Eastern Newfoundland Strategic Environmental Assessment (SEA). Prepared for the Canada-Newfoundland and Labrador Offshore Petroleum Board (August 2014).

Amec Foster Wheeler Environment and Infrastructure (2015). Eastern Newfoundland Offshore Geophysical, Geochemical, Environmental and Geotechnical Programs 2015-2024 – Environmental Assessment. Prepared for ExxonMobil Canada Ltd.

Baker, K.D., Haedrich, R.L., Snelgrove, P.V.R., Wareham, V.E., Edinger, E.N. and Gilkinson K.D. (2012). Small-scale patterns of deep-sea fish distributions and assemblages of the Grand Banks, Newfoundland continental slope 65: 171-188.

Barrio Froja'n, C. R. S., MacIsaac, K. G., McMillan, A. K., del Mar Sacau Cuadrado, M., Large, P. A., Kenny, A. J., Kenchington, E., and de Ca'rdenas Gonza'lez, E. (2012). An evaluation of benthic community structure in and around the Sackville Spur closed area (Northwest Atlantic) in relation to the protection of vulnerable marine ecosystems. – *ICES Journal of Marine Science*, 69: 213–222.

Beazley, L.I. and Kenchington, E.L. (2015). Epibenthic Megafauna of the Flemish Pass and Sackville Spur (Northwest Atlantic) Identified from In Situ Benthic Image Transects. *Can. Tech. Rep. Fish. Aquat. Sci.* 3127: v + 496 p.

Beazley, L.L., Kenchington, E.L., Murillo, F.J. and del Mar Sacau, M. (2013). Deep-sea sponge grounds enhance diversity and abundance of epibenthic megafauna in the northwest Atlantic. *ICES Journal of Marine Sciences*, doi:10.1093/icesjms/fst124.

Bell, J.S., and G.R. Campbell. (1990). Petroleum resources in, Keen, M.J., and Williams, G.L., eds., *Geology of the continental margin of eastern Canada: Geological Survey of Canada, Geology of Canada*, 2: 677-720.

Bradbury, I.R., Laurel, B.J., Robichaud, D.R., Rose, G.A., Snelgrove, P.V.R., Gregory, R.S., Cote, D., Windle, D.J.S. (2008). Discrete spatial dynamics in a marine broadcast spawner: reevaluating scales of connectivity and habitat associations in Atlantic cod (*Gadus morhua* L.) in coastal Newfoundland. *Fisheries Research* 91: 299-309.

Cameron, G.D.M. and M.A. Best. (1985). Surface Features of the Continental Margin of Eastern Canada. Map compilation for the Atlantic Geoscience Centre, Bedford Institute of Oceanography.

Casas, J.M. and Gonzalez-Troncoso, D. (2013). Results from Bottom Trawl Survey on Flemish Cap of June –July 2012. NAFO SCR Doc: 13/013.

CIS (Canadian Ice Service) (2011). Sea Ice Climatic Atlas, East Coast, 1981-2010. Available at: <http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=8DFED3F9-4BD6-49F3-9ACA-F9AA9F52A96D>

Dalley, E.L. and Anderson, J.T. (1998). Plankton and Nekton of the Northeast Newfoundland Shelf And Grand Banks in 1997. Canadian Stock Assessment Secretariat Research Document 98/121.

Dawe, E.G., Koen-Alonso, M., Chabot, D., Stansbury, D., and Mullowney, D. (2012). Trophic interactions between key predatory fishes and crustaceans: Comparison of two Northwest Atlantic systems during a period of ecosystem change. *Marine Ecology Progress Series*. 469:233-248.

Desrosiers, G., Savenkoff, C., Olivier, M., Stora, G., Juniper, K., Caron, A., Gagne, J.P., Legendre, L., Mulsow, S., Grant, J., Roy, S., Grehm, A., Scaps, P., Silverberg, N., Klein, B., Tremblay, J.E., and Therriault, J.C. (2000). Trophic structure of macrobenthos in the Gulf of St. Lawrence and on the Scotian Shelf. *Deep-Sea Research II*. 47(2000):663-697.

DFO (Department of Fisheries and Oceans Canada) (2006). Risks Associated with Drilling Fluids at Petroleum Development Sites in the Offshore: Evaluation of the Potential for a Lipidic Hydrocarbon Based Drilling Fluid to Produce Sedimentary Toxicity and for Barite to be Acutely Toxic to Plankton. DFO Canadian Technical Report of Fisheries and Aquatic Sciences No. 2679 28p.

DFO (Department of Fisheries and Oceans Canada). (2007). Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment Available at: <http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/information-eng.asp>

DFO (Department of Fisheries and Oceans Canada). (2010). Occurrence, Susceptibility to Fishing, and Ecological Function of Corals, Sponges, and Hydrothermal Vents in Canadian Waters. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/041.

Edinger, E., Baker, K., Devillers, R., Wareham, V., (2007a). Coldwater corals in Newfoundland and Labrador waters: Distribution and fisheries impacts. WWF-Canada, 41 p. plus enclosed map CD.

Edinger, E.N., Wareham, V.E., Haedrich, R.L., (2007b). Patterns of groundfish diversity and abundance in relation to deep-sea coral distributions in Newfoundland and Labrador waters. *Bulletin of Marine Science*. 81:289-313.

ExxonMobil and Stantec (2011). Hebron Project Comprehensive Study Report. Additional Report - Offshore Oil Spill Modeling Report Results from Simulations of Oil Spills at the Hebron Well Site

Fader, G.B., G.D.M. Cameron and M.A. Best. (1989). Geology of the Continental Margin of Eastern Canada, Geological Survey of Canada, Map 1705A.

Froján, C. R. B., MacIsaac, K. G., McMillan, A. K., Cuadrado, M. D. M. S., Large, P. A., Kenny, A. J., ... & de Cárdenas González, E. (2012). An evaluation of benthic community structure in and around the Sackville Spur closed area (Northwest Atlantic) in relation to the protection of vulnerable marine ecosystems. *ICES Journal of Marine Science: Journal du Conseil*. 69(2): 213-222.

G and G Exploration Consulting Ltd. (2003). Hydrocarbon Potential of Parcels 1-12, C-NOPB Call for Bids NF 03-1. Orphan Basin Offshore Newfoundland. Canadian Journal of Earth Sciences. 22:504-526.

Gilkinson, K. (2013). Recent DFO (Newfoundland & Labrador Region) studies of the Grand Banks benthos at small and large spatial scales. DFO Canadian Scientific Science Advisory Secretariat Research Document. 2012/114. v + 30 p.

Gilkinson, K. and Edinger, E. (2009). The Ecology of Deep-Sea Corals of Newfoundland and Labrador Waters: Biogeography, Life History, Biogeochemistry, and Relation to Fishes. Canadian Technical Report of Fisheries and Aquatic Sciences 2830.

Head, E.J.H. and Sameoto, D.D. (2007). Inter-decadal variability in zooplankton and phytoplankton abundance on the Newfoundland and Scotian shelves. Deep Study Research Part II: Topical Studies in Oceanography 54: 2686-2701.

Houston, K.A. and Haedrich, R.L. (1984). Abundance and biomass of macrobenthos in the vicinity of Carson Submarine Canyon, northwest Atlantic Ocean. Marine Biology 82: 301-305.

IOGP (International Association of Oil and Gas Producers). (2016). Environmental Fates and Effects of Ocean Discharge of Drill Cuttings and Associated Drill Fluids From Offshore Oil and Gas Operations. IOGP Report 543, March 2016.

Kenchington, E.L.R., Prena, J., Wilkinson, K.D., Gordon Jr., D.C., MacIsaac, K., Bourbonnais, C., Schwinghamer, P.J., Rowell, T.W., McKeown, D.L., and Vass, W.P. (2001). Effects of experimental otter trawling on the macrofauna of a sandy bottom ecosystem on the Grand Banks of Newfoundland. Canadian Journal of Fisheries and Aquatic Sciences. 58: 1043-1057.

Knudby, A., Lirette, C., Kenchington, E., and Murillo, F.J. (2013). Species Distribution Models of Black Corals, Large Gorgonian Corals and Sea Pens in the NAFO Regulatory Area. NAFO Scientific Council Research Document 13/078. 1-17.

Maillet, G.L., Pepin, P., and Craig, J.D.C. (2004). Assessing Phytoplankton and Zooplankton Taxa from the CPR Survey in NAFO Subareas 2 and 3 in the Northwest Atlantic. Northwest Atlantic Fisheries Organization, NAFO SCR Doc. 04/30.

Murillo, F. J., Muñoz, P. D., Altuna, A., & Serrano, A. (2011). Distribution of deep-water corals of the Flemish Cap, Flemish Pass, and the Grand Banks of Newfoundland (Northwest Atlantic Ocean): interaction with fishing activities. ICES Journal of Marine Science: Journal du Conseil, 68(2), 319-332.

Murillo, F.J., Kenchington, E., Lawson, J.M., Li, G., Piper, D.J.W. (2016). Ancient deep-sea sponge grounds on the Flemish Cap and Grand Bank, northwest Atlantic. Mar. Bio.. 163:63. Doi: 10.1007/s00227-016-2839-5

Murillo, F.J., Muñoz, P.D., Cristobo, J., Rios, P., Gonzalez, C., Kenchington, E., and Serrano, A. (2012). Deep-sea sponge grounds of the Flemish Cap, Flemish Pass and the Grand Banks of Newfoundland (Northwest Atlantic Ocean): Distribution and species composition. Marine Biology Research, 8:842-854.

NAFO (Northwest Atlantic Fisheries Organization). (2011). New VME Indicator Species (Excluding Corals and Sponges) and Some Potential VME Elements of the NAFO Regulatory Area. NAFO SCR Doc. 11/73.

NAFO (Northwest Atlantic Fisheries Organization). (2014). The NAFO Convention Area. www.nafo.int.

NAFO (Northwest Atlantic Fisheries Organization). (2015). STATLANT21A and STATLANT21B Datasets for 2010-2013. Available at: <http://www.nafo.int/data/frames/data.html>

NRCan (Natural Resources Canada). (2016a). Earthquake Zones in Eastern Canada. Available at: <http://earthquakescanada.nrcan.gc.ca/zones/eastcan-en.php>.

NRCan (Natural Resources Canada). (2016b). Simplified Seismic Hazard Map for Canada. Available at: <http://earthquakescanada.nrcan.gc.ca/hazard-alea/simp haz-en.php>.

NRCan (Natural Resources Canada). (2016c). National Earthquake Database. Available at: <http://earthquakescanada.nrcan.gc.ca/stndon/NEDB-BNDS/bull-en.php>

Piper, D.J.W. (1991). Seabed Geology of the Canadian Eastern Continental Shelf. *Can. Shelf Res.*, 11(8-10):1013-1035.

Piper, D.J.W., G.D.M. Cameron and M.A.Best. (1988). Quaternary Geology of the Continental Margin of Eastern Canada, Geological Survey of Canada, Map 1711A.

Schneider, D.C., Gagnon, J.-M., and Gilkinson, K.M. (1987). Patchiness of epibenthic megafauna on the outer Grand Banks of Newfoundland. *Marine Ecology Progress Series* 39: 1-13.

SL Ross Environmental Research Ltd (2002). The Fate and Behaviour of Hypothetical Oil Spills from the Petro-Canada Flemish Pass Exploration Project. Prepared for Petro-Canada.

SL Ross Environmental Research Ltd (2007). Oil Spill Fate and Behaviour Modeling in Support of Husky's 2007 Drilling EA. Prepared for Husky Oil Operations Limited.

SL Ross Environmental Research Ltd (2008). Hypothetical Spill Trajectory Probabilities from the StatoilHydro 2008 Mizzen Drilling Program. Prepared for StatoilHydro Canada E&P.

SPE (Society of Petroleum Engineers) (2006). Fate of Nonaqueous Drilling Fluid Cuttings Discharged from a Deep Water Exploration Well. SPE 98612.

Templeman, N.D. (2007). Placentia Bay-Grand Banks Large Ocean Management Area Ecologically and Biologically Significant Areas. DFO Canadian Science Advisory Secretariat Research Document 2007/052.

Wareham, V.E. and Edinger, E.N. (2007a). Distribution of deep-sea corals in the Newfoundland and Labrador region, Northwest Atlantic Ocean, *Bulletin of Marine Science* 81: 289–313.

Wareham, V.E., and Edinger, E.N., (2007b). Distribution of deep-sea corals in the Newfoundland and Labrador region, Northwest Atlantic Ocean. In: George, R.Y., Cairns, S.D. (Eds), *Conservation and*

Adaptive Management of Seamount and Deep-sea Coral Ecosystems. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, pp. 289–313

WGEAFM (Working Group on Ecosystem Approaches to Fisheries Management). (2008). Scientific council meeting – June 2008. NAFO SCS Doc. 08/10.

Appendix A

Table of Concordance with the Prescribed Information for the Description of a Designated Project Regulations under CEAA (2012)

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
General Information / General Information and Contacts				
1	The project's name, nature and proposed location.	1.1	Describe the nature of the designated project, and proposed location	Section 1.1, 2.1
2	The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project.	1.2	Proponent information 1.Name of the designated project. 2.Name of the proponent. 3. Address of the proponent. 4.Chief Executive Officer or equivalent (include name, official title, email address and telephone number). 5.Principal contact person for purposes of the project description (include name, official title, email address and telephone number).	Section 1.2
3	A description of and the results of any consultations undertaken with any jurisdictions and other parties including Aboriginal peoples and the public.	1.3	Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the project description. (A description of the result of any consultations undertaken is to be provided in sections 6 and 7).	Section 4.0
4	The environmental assessment and regulatory requirements of other jurisdictions	1.4	Provide information on whether the designated project is subject to the environmental assessment and/or regulatory requirements of another jurisdiction(s).	Section 1.3
4.1	A description of any environmental study that is being or has been conducted of the region where the project is to be carried out	1.5	Provide information on whether the designated project will be taking place in a region that has been the subject of an environmental study.	Section 3.1
Project Information				
5	A description of the project's context and objectives	2.1	Provide a general description of the project, including the context and objectives of the project. Indicate whether the designated project is a component of a larger project that is not listed in the Regulations Designating Physical Activities	Section 1.1, 2.0
6	The provisions in the schedule to the <i>Regulations Designating Physical Activities</i> describing the project in whole or in part.	2.2	Indicate the provisions in the schedule to the <i>Regulations Designating Physical Activities</i> that describe the designated physical activities that are proposed to be carried out as part of the designated project	Section 1.3.1
7	A description of the physical works that are related to the project including their purpose, size and capacity	2.3	Provide a description of the components associated with the designated project, including: 1.The physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine	Section 2.3

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
			transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	
8	The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures	2.3	<p>2. Anticipated size or production capacity of the designated project, with reference to thresholds set out in the Regulations Designating Physical Activities, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures. The production capacity does not refer to the planned production capacity of a project but the maximum production capacity based on the project's design and operating conditions.</p> <p>3. If the designated project or one component of the designated project is an expansion, describe the size and nature of the expansion with reference to the thresholds set out in the Regulations Designating Physical Activities</p>	Section 2.3
9	A description of all activities to be performed in relation to the project	2.3	<p>4. A description of the physical activities that are incidental to the designated project. In determining such activities, the following criteria shall be taken into account:</p> <ul style="list-style-type: none"> • nature of the proposed activities and whether they are subordinate or complementary to the designated project; • whether the activity is within the care and control of the proponent; • if the activity is to be undertaken by a third party, the nature of the relationship between the proponent and the third party and whether the proponent has the ability to "direct or influence" the carrying out of the activity; • whether the activity is solely for the benefit of the proponent or is available for other proponents as well; and, • the federal and/or provincial regulatory requirements for the 	Section 2.0

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
			activity.	
10	A description of any waste that is likely to be generated during any phase of the project and of a plan to manage that waste	2.4	Emissions, discharges and waste Provide a description of any waste that is likely to be generated during any phase of the designated project and plans to manage that waste, including the following: 1.Sources of atmospheric contaminant emissions during the designated project phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions. 2.Sources and location of liquid discharges. 3.Types of wastes and plans for their disposal (e.g., landfill, licenced waste management facility, marine waters, or tailings containment facility).	Section 2.4
11	A description of the anticipated phases of and the schedule for the project's construction, operation, decommissioning and abandonment	2.5	5.Construction, operation, decommissioning and abandonment phases and scheduling. Provide a description of the timeframe in which the development is to occur and the key project phases, including the following: 1.Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, decommissioning and abandonment. 2.Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).	Section 2.2
Project Location Information				
12	A description of the Project's location, including	3.0	Provide a description of the designated project's location, including:	Section 2.1
(a)	Its geographic coordinates	3.1	1.Coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points.	Section 2.1

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
(b)	Site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of project components	3.1	<p>2. Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.</p> <p>3. Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to:</p> <ul style="list-style-type: none"> • watercourses and waterbodies with names where they are known; • linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines); • other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures); • location of Aboriginal groups, settlement land (under a land claim agreement) and, if available, traditional territory; • federal lands[3] including, but not limited to National parks, National historic sites, and reserve lands; • nearby communities; • permanent, seasonal or temporary residences; • fisheries and fishing areas (i.e., Aboriginal, commercial and recreational); • environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, National Wildlife areas, and priority ecosystems as defined by Environment Canada); and, • provincial and international boundaries. 	Section 1.1, 2.1, 3.3, 3.4
(c)	The legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot			Section 1.3, 2.1
		3.1	4. Photographs of work locations to the extent possible	n/a
(d)	The project's proximity to any permanent, seasonal or	3.1	5. Proximity of the designated project to:	Section 2.1, 3.4

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
	temporary residences		• any permanent, seasonal or temporary residences;	
(e)	The project's proximity to reserves, traditional territories as well as lands and resources currently used for traditional purposes by Aboriginal peoples		• traditional territories, settlement land (under a land claim agreement) as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and,	Section 3.4, 4.2
(f)	The project's proximity to any federal lands		• any federal lands.	Section 1.3, 2.1
		3.2	<p>Land and Water Use</p> <p>To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following.</p> <p>1. Zoning designations.</p> <p>2. Legal description of land to be used (including information on sub-surface rights) for the designated project, including the title, deed or document and any authorization relating to a water lot.</p> <p>3. Any applicable land use, water use (including ground water), resource management or conservation plans applicable to or near the project site. Include information on whether such plans were subject to public consultation.</p> <p>4. Describe whether the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples.</p>	Section 1.3, 2.1, 3.4, 4.2
Federal Involvement				
13	A description of any financial support that federal authorities are, or may be, providing to the project	4.1	Describe if there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to support the carrying out of the designated project.	Section 1.3
14	A description of any federal land that may be used for the purpose of carrying out the project	4.2	Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership).	Section 1.3
15	A list of permits, licences or other authorizations that may be required under any Act of Parliament to carry out the project	4.3	Provide a list of any federal permits, licences or other authorizations that may be required to carry out of the project.	Section 1.3
Environmental Effects				
16	A description of the physical and biological setting	5.1	Using existing knowledge and available information provide an	Section 3.0

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
			overview of the following: 1.A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	
17	A description of any changes that may be caused, as a result of carrying out the project, to	5.2	A description of any changes that may be caused as a result of carrying out the designated project to:	Section 5.0
(a)	fish and fish habitat as defined in subsection 2(1) of the <i>Fisheries Act</i> ;	(a)	Fish and fish habitat, as defined in the <i>Fisheries Act</i>	Section 5.1, 5.2
(b)	aquatic species, as defined in subsection 2(1) of the <i>Species at Risk Act</i> ; and			Section 5.1, 5.2
		(b)	b.marine plants, as defined in the <i>Fisheries Act</i> ; and	Section 5.1, 5.2
(c)	migratory birds, as defined in subsection 2(1) of the <i>Migratory Birds Convention Act, 1994</i>	(c)	migratory birds, as defined in the <i>Migratory Birds Convention Act, 1994</i>	Section 5.1, 5.2
18	A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada.	5.3	A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada	Section 5.1, 5.2
19	Information on the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	5.4	A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	Section 3.4, 4.2, 5.1, 5.2
Proponent Engagement and Consultation with Aboriginal Groups				
		6.0	Provide the following information to the extent that it is available or applicable:	Section 4.2
		6.1	A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project.	Section 4.2
		6.2	2.A description of the engagement or consultation activities carried out to date with Aboriginal groups, including:	Section 4.2

Prescribed Information for the Description of a Designated Project Regulations		Guide to Preparing a Description of a Designated Project under CEAA 2012		Where Addressed in the Project Description
			<ul style="list-style-type: none"> • names of Aboriginal groups engaged or consulted to date with regard to the designated project; • date(s) each Aboriginal group was engaged or consulted; and, • means of engagement or consultation (e.g., community meetings, mail or telephone). 	
		6.3	An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these groups.	n/a
		6.4	A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be exchanged and collected (or, alternatively, an indication of why such engagement or consultation is not required).	Section 4.2
Consultation with the Public and Other Parties (other than Aboriginal consultation included above)				
		7.0	Provide the following information to the extent that it is available or applicable	Section 4.0
		7.1	An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	Section 4.3
		7.2	An overview of any ongoing or proposed stakeholder consultation activities	Section 4.3
		7.3	A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	Section 4.1
Summary				
20	A summary of the information required under sections 1 to 19	8.0	Proponents are to include as part of the project description a standalone section that summarizes the information identified in Sections 1 to 7 of this Guide	Provided separately, as requested