Project Description Summary

Shelburne Basin Venture Exploration Drilling Project

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Date:
November 2013

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LIST OF ACRONYMS AND ABBREVIATIONS

ADW ..... Approval to Drill a Well
AZMP ..... Atlantic Zone Monitoring Program
BOP ..... blowout preventer
BP ..... British Petroleum Exploration Operating Company
BSF ..... below sea floor
CEA Agency ..... Canadian Environmental Assessment Agency
CEAA, 2012 ..... *Canadian Environmental Assessment Act, 2012*
CEPA, 1999 ..... *Canadian Environmental Protection Act, 1999*
CNSOPB ..... Canada-Nova Scotia Offshore Petroleum Board
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
DFO ..... Fisheries and Oceans Canada
DND ..... Department of National Defence
DP ..... dynamic positioning
DREA ..... Defence Research Establishment Atlantic
EA ..... environmental assessment
EBSA ..... ecologically and biologically significant area
EEZ ..... exclusive economic zone
EIS ..... Environmental Impact Statement
EL ..... Exploration Licence
ENGO ..... environmental non-governmental organization
FAC ..... Fisheries Advisory Committee
GPS ..... global positioning system
HSE ..... health, safety and environment
km ..... kilometres
KMKNO ..... Kwilmu'kw Maw-klusuaqn Negotiation Office
m ..... metres
MARPOL ..... International Convention for the Prevention of Pollution from Ships
MBBA ..... Maritimes Breeding Bird Atlas
MODU ..... mobile offshore drilling unit
MPA ..... marine protected area
Mt ..... metric tonne
NAFO ..... Northwest Atlantic Fisheries Organization
NCNS ..... Native Council of Nova Scotia

NEB ..... National Energy Board
OA ..... Operations Authorization
OWTG ..... Offshore Waste Treatment Guidelines
PD ..... Project Description
POB ..... persons on board
Project ..... Shelburne Basin Venture Exploration Drilling Project
RAPID ..... RAPID Climate Change Program
ROV ..... remotely operated underwater vehicle
SARA ..... *Species at Risk Act*
SBM ..... synthetic-based mud
SDL ..... significant discovery licence
SEA ..... strategic environmental assessment
TLP ..... tension leg platform
TVD ..... total vertical depth
VSP ..... vertical seismic profile
WAZ ..... wide azimuth
WBM ..... water-based mud

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1 INTRODUCTION

Shell Canada Limited (Shell) is proposing to conduct an exploratory drilling program within the area of its offshore Exploration Licences (EL) 2423, 2424, 2425, 2426, 2429 and 2430 (the Licences). The Shelburne Basin Venture Exploration Drilling Project (the Project) will consist of up to seven exploration wells drilled over a four-year period from 2015 through 2019 in accordance with the exploration period of the Licences. The Project will be phased and divided into two separate drilling campaigns, further outlined in Section 6. Each phase will be contingent upon results from Shell's 2013 Shelburne Basin 3D Seismic Survey and the previous phases of drilling conducted in association with the Project.

The exploration drilling Project Area is illustrated on Figure 1.1. Specific drilling locations will be determined using data gathered from the Shelburne Basin 3D Seismic Survey, as well as more detailed geotechnical and geohazard surveys to be conducted in 2014.

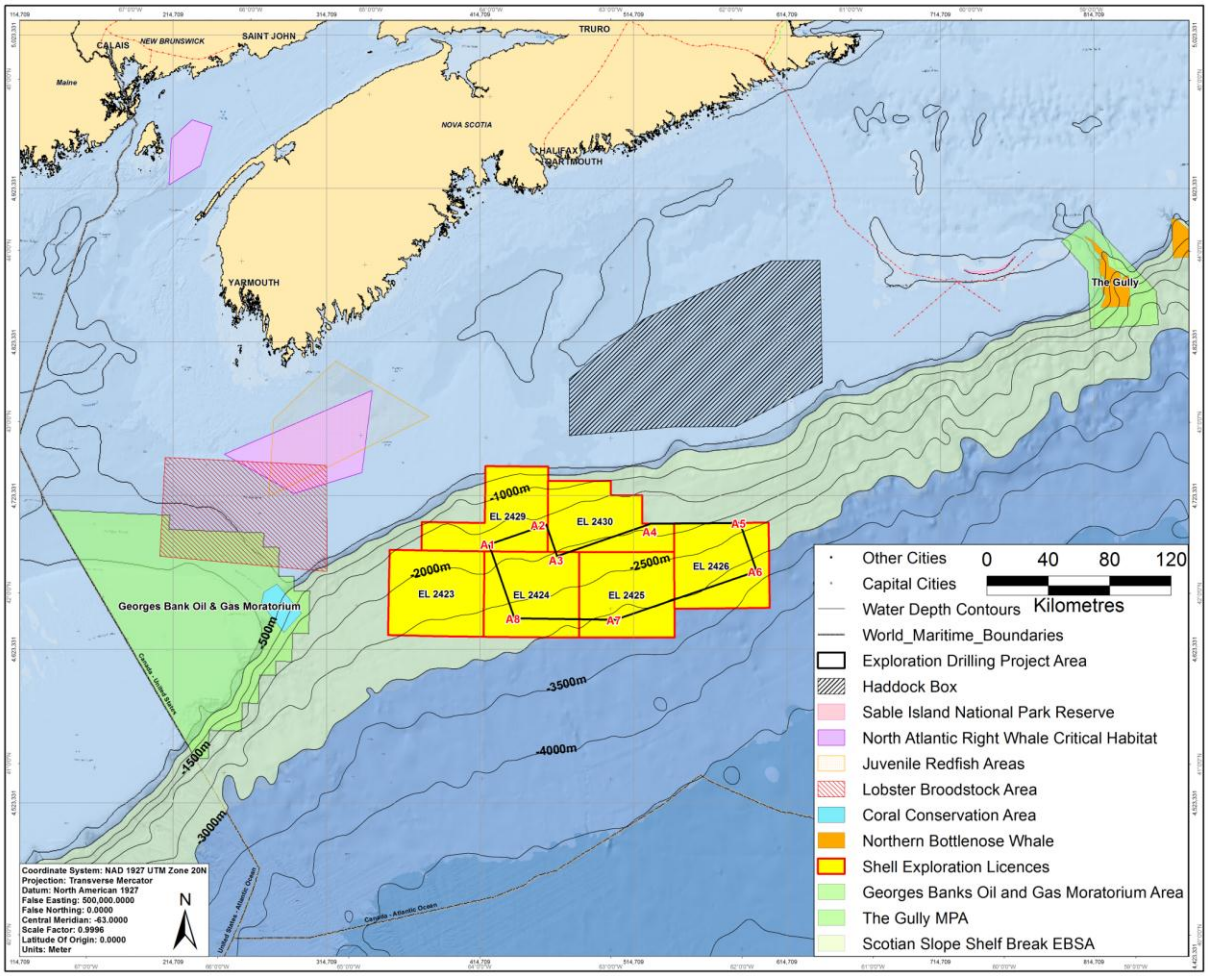

Figure 1.1 Proposed Exploration Drilling Project Area

An onshore supply base (supply base) and support vessels will be required to support the Project. The supply base will be owned and operated by a third party. The location of the supply base has not yet been determined, but existing industrial port locations along the coastline of Nova Scotia are currently being considered. Details regarding the anticipated requirements and activities associated with the supply base are further outlined in Section 4.3.3.

The Project is expected to require an environmental assessment (EA) under the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) since the drilling, testing and abandoning of offshore exploratory wells is listed under section 10 of the Schedule of Physical Activities, included in the *Regulations Designating Physical Activities* as amended on October 24, 2013.

Additionally, an EA will be required as part of the Operations Authorization (OA) being sought from the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) for the Project. The CNSOPB is responsible for regulating activities related to the exploration, development and transportation of oil and gas offshore of Nova Scotia through authorizations. It is expected an Environmental Impact Statement (EIS) completed to satisfy the CEAA, 2012 requirements will satisfy the CNSOPB EA requirements. The CNSOPB will also require the following to be submitted in satisfactory form prior to issuing an OA:

- a Canada – Nova Scotia Benefits Plan
- a Safety Plan
- an Environmental Protection Plan (including a waste management plan)
- a Spill Contingency Plan
- appropriate financial security
- appropriate certificates of fitness for the equipment proposed for use in the activities.

At present, a provincial level EA under the Nova Scotia *Environment Act* is not anticipated based on the current Project scope. Details of the expected EA triggers and how those related to the Project are provided in Section 12.

A Project Description (PD) was submitted to the Canadian Environmental Assessment Agency (CEA Agency) to initiate the EA process under CEAA, 2012 and with the CNSOPB. Under CEAA, 2012, the CEA Agency is required to consult the public on a summary of the PD that is posted on the Canadian Environmental Assessment Registry (CEAR) internet site. Accordingly, this PD Summary provides an overview of the information required under sections 1 to 19 of the *Prescribed Information for the Description of a Designated Project Regulations*.

2 PROPONENT CONTACT INFORMATION

A Halifax Regional Office has been opened in support of the Project and key technical staff will be located in Halifax for the duration of the Project. Additionally, support for the Project will also be provided by staff at the Calgary Head Office and will draw upon Shell's deep water expertise from Houston, New Orleans, and other global deep water operations. The associated addresses for these office locations are:

Calgary Head Office	Halifax Regional Office
400 4th Avenue SW	9th Floor Founders Square
Calgary, Alberta	1701 Hollis Street
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3 BACKGROUND INFORMATION

3.1 General Project Overview

The Project is being proposed to determine the hydrocarbon potential of Shell's currently held Licences within the Nova Scotia offshore area. The Project is anticipated to consist of up to seven exploration wells divided into two drilling campaigns conducted from 2015 to 2019 with the second drilling campaign dependent on the results of the first drilling campaign.

3.2 Project Purpose and Rationale

Shell was awarded eight ELs from March 2012 to January 2013, including ELs for six contiguous deep water offshore Nova Scotia parcels (ELs 2423, 2424, 2425, 2426, 2429, 2430). The purpose of the Project is to test potential drilling targets (as identified through analysis of seismic data) to determine the presence, nature, and quantities of the potential hydrocarbon resource. Wells developed as part of the Project are developed specifically for exploration and appraisal of the potential hydrocarbon resource, not for development or production of the resource. Any wells proposed to be developed for production would be considered under a different project scope requiring a separate EA and further licensing from the CNSOPB.

3.3 Spatial Boundaries

3.3.1 Exploration Drilling Project Area

Exploration drilling activities associated with this Project are expected to occur within the Exploration Drilling Project Area (Project Area) shown in Figure 1.1. The corner coordinates of the Project Area are provided in Table 1. The Project Area includes portions of EL 2424, 2425, 2426, 2429 and 2430 and encompasses almost 40% (7,870 km^2) of the total area of the ELs (19,845 km^2). It has been delineated based on preliminary results from Shell's Shelburne Basin 3D Seismic Survey conducted in 2013 and analysis of existing 2D seismic data collected over the area. Specific drill sites will be identified using data from the 2013 seismic survey and geotechnical surveys anticipated to be conducted in 2014.

Table 3.1 Project Area Corner Coordinates

Project Area "Corner"	NAD27	
	Latitude DMS	Longitude DMS
A1	42° 22' 25.752" N	63° 57' 51.480" W
A2	42° 18' 37.296" N	63° 25' 22.080" W
A3	42° 29' 58.668" N	62° 40' 56.640" W
A4	42° 29' 59.532" N	61° 58' 32.880" W
A5	42° 12' 58.788" N	61° 50' 58.560" W
A6	41° 56' 34.080" N	63° 45' 29.880" W
A7	42° 29' 35.232" N	63° 30' 44.640" W
A8	41° 56' 11.976" N	62° 57' 54.000" W

3.3.2 Study Area Spatial Boundaries

The study area spatial boundaries for the EIS will be determined as part of the EA process to adequately and appropriately consider any potential adverse environmental effects from the Project. Trajectory modeling will be conducted to consider malfunctions or accidental events (i.e., spills or releases) and the results of this modeling will further define the extent of the Project's study area spatial bounds.

3.4 Project Access

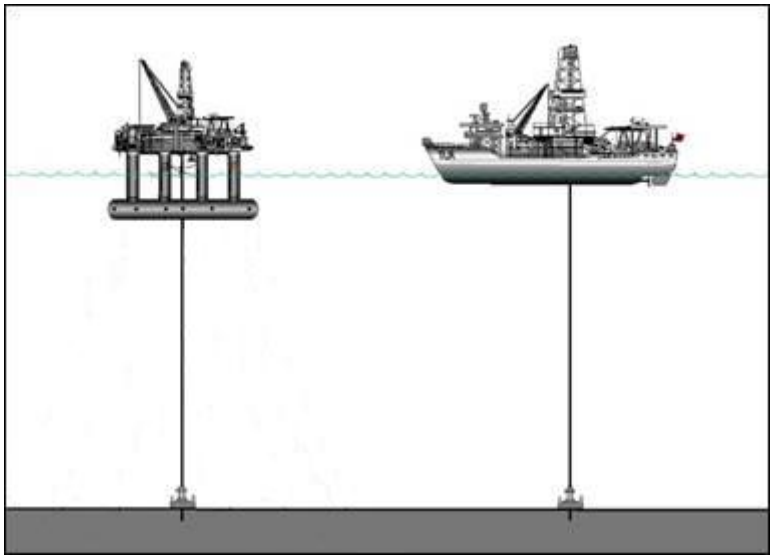
The Project Area is located approximately 250 km offshore from Halifax. During drilling activities, access to the Project Area will be necessary in association with re-supply of the mobile offshore drilling unit (MODU) and crew changes. Support vessels and helicopters will be used to facilitate these requirements. Transit to the Project Area by sea takes about 12 hours travelling at a vessel speed of 12 knots (22 km/h) from Halifax, or about 1.5 hours by helicopter. It is anticipated that an existing industrial port will be used as a supply base and as such access to the site by land and water will already be in place. No new construction will be required.

4 PROJECT COMPONENTS

The Project will consist of the following primary components: a MODU and offshore exploration wells. Logistical support for the Project will consist of marine support vessels, helicopter support, and onshore supply base support. The only Project component to be newly developed as part of the Project will be the offshore exploration wells. All other associated Project components and logistical support will utilize existing infrastructure and equipment.

4.1 Mobile Offshore Drilling Unit (MODU)

Either a drill ship or a semi-submersible will be used as the MODU for the Project. Both of these MODU options would use a dynamic positioning (DP) system to remain in place without subsea mooring. The specific MODU to be used for the Project has not yet been chosen and will be dependent on suitability and availability. However, it is anticipated that the selected MODU will be capable of drilling year-round and will be rated for deep water drilling in order to support the Project. Figure 4.1 is a schematic showing both MODU options.



Source: Adapted from MMS 2000

Figure 4.1 Schematic of Semi-submersible Rig (left) and Drill Ship (right)

4.2 Offshore Exploration Wells

Offshore Exploration Wells (up to seven) will be drilled over a four-year period from 2015 through 2019 in association with the exploration period of the ELs.

4.3 Logistical Support

4.3.1 Support Vessels

Support vessels will be used for re-supply and for on-site standby during drilling activities, and returning waste material for appropriate onshore disposal. It is anticipated that two to three support vessels will be required for Project. Each support vessel will make between two to three round trips per week from the supply base to the MODU during drilling activities. One support vessel will remain with the MODU at all times as required under the CNSOPB regulations.

4.3.2 Helicopter Support

Helicopter support will be required for crew transport, delivery of light supplies and equipment, or in the event that emergency medical evacuation from the MODU is necessary. During drilling activities, it is anticipated that an average of one trip per day from onshore Nova Scotia to the MODU will be required. The MODU will be equipped with a helicopter landing pad to support this service.

4.3.3 Supply Base

Shell will need to secure an onshore supply base to support the offshore drilling operations. The supply base will be used for temporary storage and laydown areas for the equipment and materials needed to support the exploratory drilling activities. The location of the supply base must be established in advance of drilling operations in order to house the associated equipment and materials in preparation for drilling, as well as to receive supplies throughout exploratory drilling for transport to the MODU.

The supply base will be owned and operated by a third party, which would be responsible for obtaining any new approvals necessary for its management and operation in association with the Project. Shell is currently seeking qualified companies interested in providing the supply base/dock facilities, with associated logistics and management services, in support of the Project. All of the onshore supply base locations under consideration are existing marine terminals operated by third parties in highly developed settings and utilized for routine industrial activities consistent with Project activities. Although none of the supply bases under consideration would require an expansion of existing site boundaries, some new infrastructure would be required at each of the sites. A discussion of the infrastructure requirements is provided below.

Shell is currently evaluating options for an onshore supply base through a tendering process and anticipates selecting a location by Q1 2014. The following four alternatives are currently being evaluated: Halterm Container Terminal (Piers B and C) in Halifax Harbour; Richmond Terminals (Pier 9) in Halifax Harbour; Woodside Atlantic Wharf (Woodside Terminal) (Dartmouth) in Halifax

Harbour; and Mulgrave Marine Terminal in the Strait of Canso (refer to Figure 4.3). The factors considered in the selection of the preferred location will include accessibility (rail and highway transportation options nearby), proximity to the offshore drilling location, existing on-site infrastructure, available space, and financial considerations.

The following list identifies the infrastructure that would be needed for the supply base but currently exists at each of the proposed locations:

- Dock/pier facility with sufficient water depth for safe berthing of two typical sized offshore support vessels
- Access roads
- Storage and laydown area(s) for the placement and temporary storage of drilling materials (cement) and equipment (casing and tubular materials)
- Permanent office space
- Warehousing
- Dock support equipment (heavy lift cranes, forklifts and additional handling equipment).

Depending on which candidate location is ultimately selected, some or all of the following additional equipment and/or infrastructure may be required to accommodate the supply base requirements for the Project:

- a mud batch plant with associated storage tanks for the storage of drilling mud and dry bulk products (e.g., cement, barite, bentonite)
- storage tanks/silos for the storage of additional dry bulk products (e.g., cement)
- fencing and/or gates within existing property boundaries
- pipe racks and warehouse racking in existing storage and laydown areas
- temporary/portable offices
- additional material handling and dock support equipment (e.g., cranes and forklifts)
- storage area(s) for the temporary storage of equipment and materials requiring transport to the MODU
- additional lighting which would be incremental to existing lighting at the site

On-site excavation and site preparation activities may be required in association with mud batch plant installation and prior to the placement of storage tanks and silos on site respectively (refer to Section 5.1). However, no site expansion, clearing, building construction, or in-water works will be required at any of the onshore supply base locations under consideration. Any addition(s) or modification(s) made to the selected onshore supply base location, including mud batch plant installation (if applicable), will be limited to the placement or assembly of equipment and infrastructure within the current spatial boundaries of the site, in onshore areas that are already disturbed (i.e., already paved, graveled, or otherwise developed).

Modifications at the supply base will not include the addition of fueling infrastructure. Fueling of Project-related vessels, vehicles, and equipment will take place only at existing facilities with all of the necessary permits and infrastructure already in place.

There are no wetlands on, adjacent to, or in close proximity to any of the supply base locations. Additionally, there are no First Nation reserve lands located adjacent to or in close proximity to any of the supply base locations. The closest First Nation reserve land is that of the Millbrook First Nation and is located approximately 5 km east of the Woodside Terminal supply base option (refer to Figure 10.1). Based on review of aerial photography, the distances to the nearest permanent, seasonal or temporary residences are approximately 825 m for Halterm, 290 m for Richmond Terminal, 396 m for Woodside Terminal, and 166 m for Mulgrave Terminal.

Figure 4.2 Supply Base Location Options

5 PROJECT ACTIVITIES

5.1 Mobilization

Pending regulatory approvals, mobilization will commence with the set-up of any new equipment or infrastructure not already exiting on- the supply base, including the mud batch plant facilities (if required) and storage tanks/silos in Q4 2014. Additionally arrival of equipment and materials will also occur at the supply base in advance of drilling activities. Arrival of solid storage materials could begin as early as Q1 of 2015.

Some excavation may be required in association with the physical installation of a secondary containment (liner and dyke) system and double-walled direct feedline in association with the mud batch plant if existing infrastructure is not already in place. Additionally, existing storage areas may require some preparation (grading, compaction, berming) prior to placement of storage silos and tanks on site. Standard industry practices (tarps, berms, silt fences) to control erosion, runoff, and sedimentation will be adhered to during these activities as appropriate.

After the MODU and support vessels undergo Shell's internal audit process and the CNSOPB Inspection process in Q4 2014/Q1 2015, offshore activities will commence with mobilization of the MODU at the pre-determined drill site. The MODU and support vessels will take approximately two to four days to travel to the drilling site. The MODU will then utilize its DP system to position above the drilling target so that pre-drill site surveys can be conducted. A remotely operated underwater vehicle (ROV) will be deployed to the seabed for video inspection to confirm that no surface hazards are present. No ground disturbance or seabed samples are planned as part of these predrill site surveys, which will take approximately one day to conduct.

5.2 Drilling

Once the MODU has mobilized and ROV inspection of the seabed has been completed, drilling activities will commence. The actual well design, including total vertical depth (TVD), drilling string depths, and casing size, is currently being developed, but a general overview of the associated steps for offshore drilling is provided below.

The drilling of each offshore well can be broken into two components starting with riserless drilling (i.e., an open system with no direct connection to the MODU other than the drill string itself) and continuing with riser drilling (i.e., closed loop system with direct connection to the MODU). Each well is anticipated to take approximately 130 days to drill to TVD. The following details are provided to give a general overview of the activities associated with deepwater drilling.

5.2.1 Riserless Drilling

During the drilling of the initial sections of the well, there is no closed loop fluid system (no riser system) in place to return drilling fluid back to the MODU (i.e., riserless drilling). As such the associated drilling fluids, excess cement and cuttings are directed to the seabed and released directly to the seafloor. During this phase, the drilling fluid consists of seawater or water-based drilling mud (WBM) to cool the drill bit as well as transport the cuttings to the seabed. Once approved by the CNSOPB, riserless drilling will be used for the initial drill sections (conductor and surface strings) of each well, prior to connection of a riser system for drilling the additional sections to target depth. The riserless drilling portion of each exploration well will involve: jetting the conductor to about 100 m below the seafloor (BSF); drilling, casing, and cementing of the surface hole drill section to approximately 1000 m BSF; and placing a blow-out preventer (BOP) stack at the end of the drilling riser pipe. The BOP runs down from surface to the well and is connected to the wellhead via the surface casing, creating a connection between vessel and well via the riser system.

5.2.2 Riser Drilling

Following the installation of the BOP stack to the well head, the riser system creates a conduit to capture the associated drilling fluids and cuttings and transport them back to the MODU for further processing. During this phase of drilling, the remaining well sections are drilled to TVD using either a water-based or synthetic- based mud (SBM). At varying intervals determined based on assessment of geological and pore pressure parameters, intermediate casing is set at established depths to reinforce the wellbore. At each intermediate section, the casing is cemented in place.

The associated exploration wells are anticipated to require up to six intermediate strings. The specific depths of each section and the size of associated casing will be determined as part of the final well design for the initial wells, which is anticipated to be finalized before the end of 2014. These technical details will require review and approval by the CNSOPB prior to drilling activities.

5.3 Vertical Seismic Profiling

Vertical Seismic Profiling (VSP) may be conducted in coordination with exploratory drilling activities. VSP employs similar technology to that used during a seismic survey (source and receiver) and can employ a number of different configurations that vary based on the positioning of the associated source and receivers. These methods include Zero-offset VSP, Offset VSP and Walkaway VSP. At present, the type of VSP to be conducted has not yet been determined, but all proposed methods will be assessed in the EIS.

5.4 Well Testing

Wells may be tested to gather further details regarding the potential reservoirs and to assess the associated commerciality of any potential discovery. The decision to test any of the associated exploration wells will be made following evaluation of the associated core samples and logs collected during drilling activities. As a result, there may be a delay between drilling activities and well testing.

Where well testing is determined to be necessary, the well is perforated (with well control tools placed across the subsea BOP) and reservoir fluids are allowed to flow up the well to a temporary flow testing facility on the deck of the MODU. Reservoir fluids may contain hydrocarbons (oil and gas) and/or formation water (produced water). The hydrocarbons are measured and separated from the produced water. Produced hydrocarbons and small amounts of produced water are flared using high-efficiency igniters for complete combustion and minimization of emissions. If produced water occurs, it will either be flared or treated in accordance with the latest version of the *Offshore Waste Treatment Guidelines* (OWTG) (National Energy Board [NEB] et al. 2010) prior to ocean discharge.

5.5 Abandonment

Wells drilled during the first campaign that are required for testing in the second campaign will be suspended for re-entry. Following testing, they will be abandoned in accordance with CNSOPB regulatory requirements. Abandonment will take place immediately following drilling and well testing (if required), and is anticipated to take approximately seven to ten days per well.

Abandonment activities will include isolation of the wellbore utilizing cement plugs. These plugs are placed at varying depths in the wellbore to separate and permanently isolate certain subsurface zones to prevent the escape of any subsurface fluids from the well. Approval may be sought to leave the wellhead in place. Where removal of the wellhead is required, the wellhead and associated equipment (casing) will be removed up to 1 m BSF through mechanical means (cutters).

6 PROJECT SCHEDULING

Project planning is currently underway. First Nation and stakeholder engagement as well as regulatory activities specific to the Project began in Q3 of 2013 and will continue throughout the life of the Project as required.

Supply base mobilization will commence with logistical preparations and physical installation of the mud batch plant (if required), currently anticipated to commence in Q4 2014, approximately six months in advance of the anticipated spud date of the first exploratory well to ensure all support logistics are in place to allow for drilling to commence following receipt of the necessary regulatory approvals required by Shell for drilling. Equipment and material storage will subsequently commence at the supply base location as early as Q1 2015.

Exploration drilling activities are anticipated to commence in 2015, with the potential to continue until 2019. Offshore drilling activities will be initiated with mobilization of the support vessels and the MODU in Q2 2015 (pending regulatory approval). Drilling activities will not be continuous and will instead be divided into two separate drilling campaigns with a number of sequential wells drilled in each campaign. In addition, the second campaign will be dependent on results of the first campaign. The initial drilling campaign is currently planned to commence in Q2 2015 and include up to three exploration wells with the third well drilled dependent on the results of the previous two wells. Each well will take approximately 130 days to drill to TVD.

Following the first drilling campaign, it is expected that 15 to 18 months will be required to assess the results of the exploration wells. Depending on the results, well testing on the existing exploration wells and a second drilling campaign may be conducted. If conducted, the second drilling campaign would commence in approximately 2017 and include up to four additional exploration wells.

Abandonment or suspension activities will be conducted either immediately following drilling and or well testing activities.

7 WASTE DISCHARGES AND EMISSIONS

A Project-specific waste management plan will be developed for the Project which will address collection, segregation, handling, storage, labeling and manifesting of all wastes generated during the Project. All waste discharges associated with the Project will be managed in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) of which Canada has incorporated provisions under various sections of the *Canada Shipping Act* and its regulations treated in accordance with the OWTG. Wastes destined for onshore treatment, recycling, and/or disposal will be managed in accordance with the Nova Scotia *Solid Waste-Resource Management Regulations* and comply with applicable federal and provincial requirements as well as municipal by-laws.

7.1 Drilling Waste

7.1.1 Drilling Mud and Cuttings

A combination of WBM and SBM will be used for drilling the well to TVD as detailed in Section 5. A WBM system would typically be composed of additives such as potassium chloride, barite (weighting component), a polymer fluid, an encapsulator, mud loss additives and glycol, suspended in seawater. The SBM system uses similar additives, but a synthetic base fluid is used in place of seawater.

During riserless drilling, cuttings are transported to the seabed and disposed in place. During riser drilling, cuttings are transported back to the MODU via the riser pipe. On the MODU, cuttings will be separated from the drilling fluid for separate management and disposal through the use of shale shakers, mud recovery units and centrifuges. The recovered drilling mud is reconditioned and reused.

Once treated, all cuttings will be discharged to the sea in accordance with the OWTG. Spent WBM will be discharged at sea, while spent SBM that cannot be reused will be transported to shore for onshore disposal.

7.1.2 Cement

Casing cement will be used to set the casing strings (conductor, surface and intermediate) in place. Any surplus cement used during riserless drilling will be disposed of on the seabed as is standard practice. Spent and surplus cement utilized during the riser drilling will be transported to shore for disposal in an approved facility.

7.2 Atmospheric Emissions

Anticipated atmospheric emissions for the Project will include exhaust emissions from the MODU and support vessels as well as onshore vehicles, plus potential flaring associated with produced gas encountered during well testing. These emissions will be inclusive of carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NO_x). The exhaust emissions from the Project are not expected to measurably affect local air quality or greenhouse gas emissions and will comply with the Air Quality Regulations under the Nova Scotia *Environment Act*, Ambient Air Quality Objectives under the *Canadian Environmental Protection Act* (CEPA) as well as Regulations under MARPOL. Potential flaring will occur in accordance with the CNSOPB Drilling and Production Guidelines.

7.3 Liquid Wastes

Liquid waste will be transported onshore via dedicated and appropriate containers/containment that comply with any applicable regulatory requirements. Liquid wastes are not expected to be stored at the supply base other than in course of transportation to an approved disposal facility.

If hydrocarbons are encountered during well testing activities, small amounts of produced water may be flared. Surplus produced water will be treated onboard the MODU in accordance with OWTG prior to ocean discharge. Oil that may be collected during testing will be stored onboard for onshore disposal. Produced sand is not expected during well testing but, if encountered, it will be stored onboard for onshore disposal.

The MODU includes living quarters and a galley, which will result in the production of grey and black water. Black water will be macerated to a maximum particle size and treated onboard. Following treatment it will be discharged to the ocean in accordance with the OTWG and MARPOL.

Ballast water will be used in both the MODU and support vessels for stability. Ballast water is stored in dedicated tanks; therefore, typically, it does not contain any oil or other contaminants and can be taken on and disposed of as needed for vessel operational safety. Prior to transiting into Canadian waters, the MODU will undergo normal ballast tank flushing procedures as required under Transport Canada's *Ballast Water Control and Management Regulations*.

Bilge water and water drained through machinery spaces will be treated onboard the drills ship and discharged in accordance with the OTWG (< 15 mg/L). Any ballast water suspected to be contaminated by oil will be similarly treated and discharged.

BOP fluids are typically fresh-water based, with additives such as biocide, glycol and a lubricant. The biocide or lubricant additive is typically 2% by volume. The fluid is treated similarly to WBM, in that once spent, it will be discharged to sea in accordance with the OWTG.

Sea water is used for cooling purposes aboard the MODU. Following use, the water is treated through an oil-water separator and disposed of at sea. No additives are used in the cooling system.

7.4 Hazardous Wastes and Waste Dangerous Goods

Hazardous wastes, including waste dangerous goods, generated during the Project will be stored in the appropriate containers/containment and in designated areas onboard the MODU for transportation to shore where it will be collected and disposed of by a third-party waste contractor at an approved facility and in compliance with the associated regulations and requirements.

The transportation and handling of any dangerous goods, waste dangerous goods or hazardous substances will occur in compliance with the *Transportation of Dangerous Goods Act* and its associated regulations. Such products are not expected to be stored at the supply base other than in the course of transportation to and from the supply vessels and the MODU. Any required approvals for the transportation, handling and any temporary storage of the dangerous goods, waste dangerous goods or hazardous substances will be acquired by the third party waste contractor and/or the supply base operator.

7.5 Non-Hazardous Wastes

Waste food will be macerated to maximum particle size and treated onboard. Following treatment it will be discharged to the ocean in accordance with the OTWG and MARPOL. Non-hazardous wastes generated during the Project will be stored in designated areas onboard the MODU for transportation to shore where it will be disposed of by a third party waste management contractor at an approved facility.

8 LAND AND OCEAN USE

8.1 Land Ownership and Tenure

The Project Area is located within the boundaries of Canada's Exclusive Economic Zone (200 nautical miles from Canadian coastline) and as such is considered to be located in federal waters. This area is managed jointly by the Government of Canada and the Government of Nova Scotia.

Offshore sub-surface rights are managed by the CNSOPB and are licensed for various industrial activities (exploration, development, production) for the purposes of developing offshore oil and gas resources. The proposed Project Area is inclusive of portions of EL 2424, 2425, 2426, 2429 and 2430 for which Shell currently owns 100% of the working interest and is the Operator.

The location of the onshore supply base has not yet been determined, but all options currently under consideration by Shell (see Section 4.3.3) are existing industrial sites owned/leased and operated by a third party. Depending which location is selected, the supply base may be situated on lands owned by the Halifax Port Authority (Richmond Terminals and Halterm Container Terminal), lands owned by the Nova Scotia Business Development Corporation and managed by the Nova Scotia Department of Transportation and Infrastructure Renewal (Woodside Terminal), or the Strait of Canso Superport Corporation (Mulgrave Terminal).

The supply base locations administered by the Halifax Port Authority are within areas zoned for marine industrial use (HRM 2006).

8.2 Federal Funding

No federal funding will be provided to the proponent from any federal authorities in association with the Project.

8.3 Existing Ocean Use and Infrastructure

8.3.1 Commercial and Aboriginal Fisheries

The Project Area is located within portions of the Northwest Atlantic Fisheries Organization (NAFO) Fishery Unit Areas 4Wm, 4Xl and 4Xn. Commercial fishing within the Scotian Slope region is mostly concentrated along the shelf break in waters between 200 and 1000 m depth. Commercial fisheries data from Fisheries and Oceans Canada (DFO) (DFO Commercial Fishery Landings Database, 2005 to 2010) indicate that commercial fishing activities for large pelagics, groundfish and shellfish fisheries occur within and adjacent to the Project Area. With respect to Aboriginal

fisheries, data provided by DFO indicates that 26 communal commercial licences are held for large pelagics and groundfish in and around the Exploration Drilling Project Area. In 2011, 15 of these licences reported landings. No communal commercial licences are held in the Project Area for shellfish fisheries.

8.3.2 Marine Shipping

Although there is no designated shipping corridor through the Project Area, a variety of ocean vessel traffic occurs in the vicinity of the Project Area due to trans-Atlantic commercial shipping to and from the eastern seaboard of the United States and the Great Lakes. Proximate main ports to the Project Area include Halifax and Port Hawkesbury, Nova Scotia, and Saint John, New Brunswick, as well as smaller ports along Nova Scotia's coastline (Sydney, Liverpool, Lunenburg, Shelburne and Sheet Harbour). Outside of the main shipping corridors it is left to the vessel captain's discretion to select a preferred routing (Hurley 2011).

8.3.3 Marine Research

At present, Shell is not aware of any research studies occurring or planned for within the Project Area. However, DFO conducts annual research studies within the Scotian Shelf and Slope area. These studies include a multi-species trawl survey, RAPID Climate Change Program study (RAPID) and the Atlantic Zone Monitoring Program (AZMP) study, but no RAPID or AZMP moorings are currently located within the Project Area. Final locations and scheduling for the surveys are determined on an annual basis. An Environment Canada weather buoy was identified within the EL boundaries and is located within the Project Area.

8.3.4 Other Oil and Gas Activity

In addition to the six Shell ELs illustrated on Figure 1.1, other CNSOPB Calls for Bids have been conducted and are planned for the Nova Scotia Offshore Area. In November 2012, it was announced that British Petroleum Exploration Operating Company Limited (BP) was the successful bidder on four offshore parcels (ELs 2431, 2432, 2433 and 2434) immediately adjacent to Shell's ELs. BP recently submitted a PD to the CNSOPB in association with a proposed 3D seismic program to be conducted in 2014. A recent Call for Bids (NS 13-1) consisting of six parcels on the central and eastern Scotian Shelf closed October 24, 2013;no bids were received.

The CNSOPB has outlined much of the remaining shelf and slope region of the Nova Scotia Offshore Area as Bid Forecast areas for the period 2014 to 2016. As such it is anticipated that exploration activities and tenures in proximity to the Project Area will increase.

8.3.5 Department of National Defence Operations

The Department of National Defence (DND) conducts training and other operations in designated 'Operations Areas' off the south coast of Nova Scotia. The Project Area overlaps with Operations Areas M1, M2, N1 and N2, but is outside of any associated Operations/Firing Exercise Areas.

8.3.6 Additional Ocean Infrastructure

There are several active and inactive cables that cross through the Project Area. The location of subsea cables are charted and as such will be avoided during the selection of drill sites. Geohazard surveys, to be conducted in 2014 prior to drilling, will provide information on any unknown cables or other debris relative to proposed drilling sites. Shell will consult with applicable cable owners prior to drilling to discuss proposed Project activities. Drilling activities will not interfere with active cable operation.

Geohazard surveys (e.g., side scan sonar, multi-beam sonar, sub-bottom profile, magnetometer, gravity and bathymetric surveys) and ROV video surveys are also conducted to provide information on any other seabed structures at potential drilling sites, including historical shipwrecks. Well sites will avoid known locations of shipwrecks or other debris.

9 THE MI'KMAQ OF NOVA SCOTIA

The First Nation People of Nova Scotia are the Mi'kmaq Nations comprised of thirteen bands based out of varying locations across the Province. The locations of Mi'kmaq Chiefs and Councils in Nova Scotia are listed in Table 9.1, although it is noted that First Nation lands may be located elsewhere throughout the province.

Table 9.1 First Nations of Nova Scotia

Acadia RR#4, P.O. Box 5914-C, Yarmouth, NS, B5A 4A8 Tel: 902-742-0257	Membertou 111 Membertou St., Sydney, NS, B1S 2M9 Tel: 902-564-6466
Annapolis Valley P.O. Box 89, Cambridge Station, Kings County, NS, B0P 1G0 Tel: 902-538-7149	Millbrook P.O. Box 634, Truro, NS, B2N 5E5 Tel: 902-897-9199
Chapel Island P.O. Box 538, Chapel Island, NS, B0E 3B0 Tel: 902-535-3317	Pictou Landing RR#2, Site #6, Box 55, Trenton, NS, B0K 1X0 Tel: 902-752-4912
Eskasoni P.O. Box 7040, Eskasoni, NS, B1W 1A1 Tel: 902-379-2800	Paq'tnek (Afton) R.R. #1, Afton, Antigonish County, NS, B0H 1A0 Tel: 902-386-2781
Shubenacadie/Indian Brook Indian Brook Post Office, 522 Church St., Indian Brook, NS , B0N 1W0 Tel: 902-758-2049	We'koqma'q P.O. Box 149, Whycocomagh, NS, B0E 3M0 Tel: 902-756-2337
Glooscap P.O. Box 449, Hantsport, NS, B0P 1P0 Tel: 902-684-9788	Wagmatcook P.O. Box 30001, Wagmatcook, NS, B0E 1B0 Tel: 902-295-2598
Bear River P.O. Box 210, Bear River, NS, B0S 1B0 Tel: 467-3802	

The General Assembly of Nova Scotia Mi'kmaq Chiefs (General Assembly) currently comprises the Chiefs from 12 of the13 First Nations in Nova Scotia and represents the governance for the Mi'kmaq of Nova Scotia. The Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) supports and represents the Assembly with respect to consultation regarding how projects may impact

Mi'kmaq Aboriginal or treaty rights and directions regarding such matters are obtained through the KMKNO. The Shubenacadie/Indian Brook Mi'kmaq Nation has recently separated and will be conducting its administrative affairs outside of the KMKNO. The Aboriginal people residing off-reserve in Nova Scotia are represented by the Native Council of Nova Scotia (NCNS). The Native Council of Nova Scotia (NCNS) identifies itself as "the self-governing authority for the large community of Mi'kmaq/Aboriginal peoples residing off-reserve in Nova Scotia throughout traditional Mi'kmaq territory" (NCNS 2013).

At present, specific reserve lands or traditional lands used to exercise Aboriginal or Treaty rights have not been identified. However, Shell recognizes that Mi'kmaq communities may have an interest in the Project as a result of communal/commercial fishing rights they have in the offshore area. As such, Shell will be engaging directly with the designated representatives of the Mi'kmaq to provide Project details and gather associated input. Given the recent separation, Shell will engage the Shubenacadie/Indian Brook Mi'kmaq Nation separately from the other 12 Mi'kmaq First Nations. Further details regarding engagement with Mi'kmaq are provided in Section 11.

10 ENVIRONMENTAL SETTING

The Project Area is located approximately 250 km off the coast of Halifax in an area of the offshore known as the Southwestern Scotian Slope (see Figure 1.1). Water depths in the Project Area range from 1,500 to 3,000 m.

The location of the onshore supply base has not yet been determined, but, as noted previously, Shell will use an existing industrial port location to function as the supply base for the Project (Section 4.3.3). As a result of Shell's use of a pre-existing industrial port location, no changes to the environmental setting of the supply base location are anticipated as part of the Project. Section 10.1 presents an overview of the nearshore and coastal environment surrounding the four candidate supply base locations under consideration. The offshore environment is described in Section 10.2.

10.1 Nearshore and Coastal Environment

Halterm Container Terminal, Richmond Terminals, and Woodside Terminal are located in Halifax Harbour, whereas Mulgrave Marine Terminal is located in the Strait of Canso.

10.1.1 Halifax Harbour

Halifax Harbour is a major inlet of the North Atlantic Ocean surrounded by the Halifax Regional Municipality and bordered by the communities of Halifax, Bedford and Dartmouth. The Port of Halifax accommodates cargo vessels and cruise ships on a year-round basis.

The harbour extends inland for over 22 km to the northwest varying in width from approximately 385 m to approximately 4225 m and reaching depths of up to 70 m. The harbour is composed of outer and inner divisions with the inner harbour comprised of two projecting arms (the Northwest Arm and Eastern Passage), as well as a constricted passage (The Narrows) leading to a very deep and large bowl-shaped basin at its head (Bedford Basin). It has four islands from north to south: Georges, McNabs, Lawlor, and Devils and a major river (Sackville River) entering the north end of the harbour in the Bedford Basin.

The shore, intertidal zone and seabed of Halifax Harbour includes a wide variety of anthropogenic features based on the industrialization of the port. All locations are currently subject to high levels of marine-related industrial activity (e.g., ship loading and unloading, container handling, storage and laydown, rail and truck traffic, ship repair and rebuilding, servicing off-shore oil rigs, and/or vessel layup), including associated noise and other sensory disturbance. The three candidate supply base locations in Halifax Harbour have no natural intertidal zones, as the existing shorelines at each site were previously infilled to accommodate present operations. There are no wetlands, migratory bird

sanctuaries, National Wildlife Areas, or marine protected areas in the Harbour. However there are some coastal and onshore features in Halifax Harbour and surrounding area which are recognized nationally, provincially, and/or municipally for their cultural, recreational, and/or ecological value (refer to Figure 10.1).

10.1.1.1 Fish, Fish Habitat, and Aquatic Species

At least 69 species of fish have been recorded in the nearshore marine habitat of Nova Scotia within the 40 m depth of water (Hardy Associates Ltd. 1984). Marine fish of this coastal environment include the following five groups: demersal (or groundfish); pelagic; shellfish; small fishes of estuaries and tidal inlets; and exotic warm-water and eastern-arctic species.

Groundfish include cod, flatfishes, redfish, haddock, pollock, and hake. Typical pelagic species observed in the harbour include Atlantic herring and Atlantic mackerel. Anadromous fish using the Sackville River basin for spawning include Atlantic salmon and gaspereau. The American eel is the only catadromous species known to occur in the Halifax Harbour.

The distribution of most fish species varies seasonally in response to physical or chemical changes in the surrounding environment (e.g., depth, substrate, salinity, temperature) and as a result of seasonal habitat requirements (e.g., spawning, feeding). Long annual migrations are undertaken by most pelagic species.

Marine mammals inclusive of harbour seals (*Phoca vitulina*), grey seals (*Halichoerus grypus*), harbour porpoise (*Phocoena phocoena*) and Atlantic white-sided dolphins (*Lagenorhynchus acutus*) have been observed in Halifax Harbour. Harbour porpoise is listed as a species of Special Concern under Schedule 2 of the *Species at Risk Act* (SARA). Harbour seals are observed in large numbers particularly in the Bedford Basin, during winter. These numbers typically decline between May and July, when most of the animals move to breeding sites along the coast or possibly on Sable Island.

Larger whales have also been observed on occasion as well (Brodie 2000).

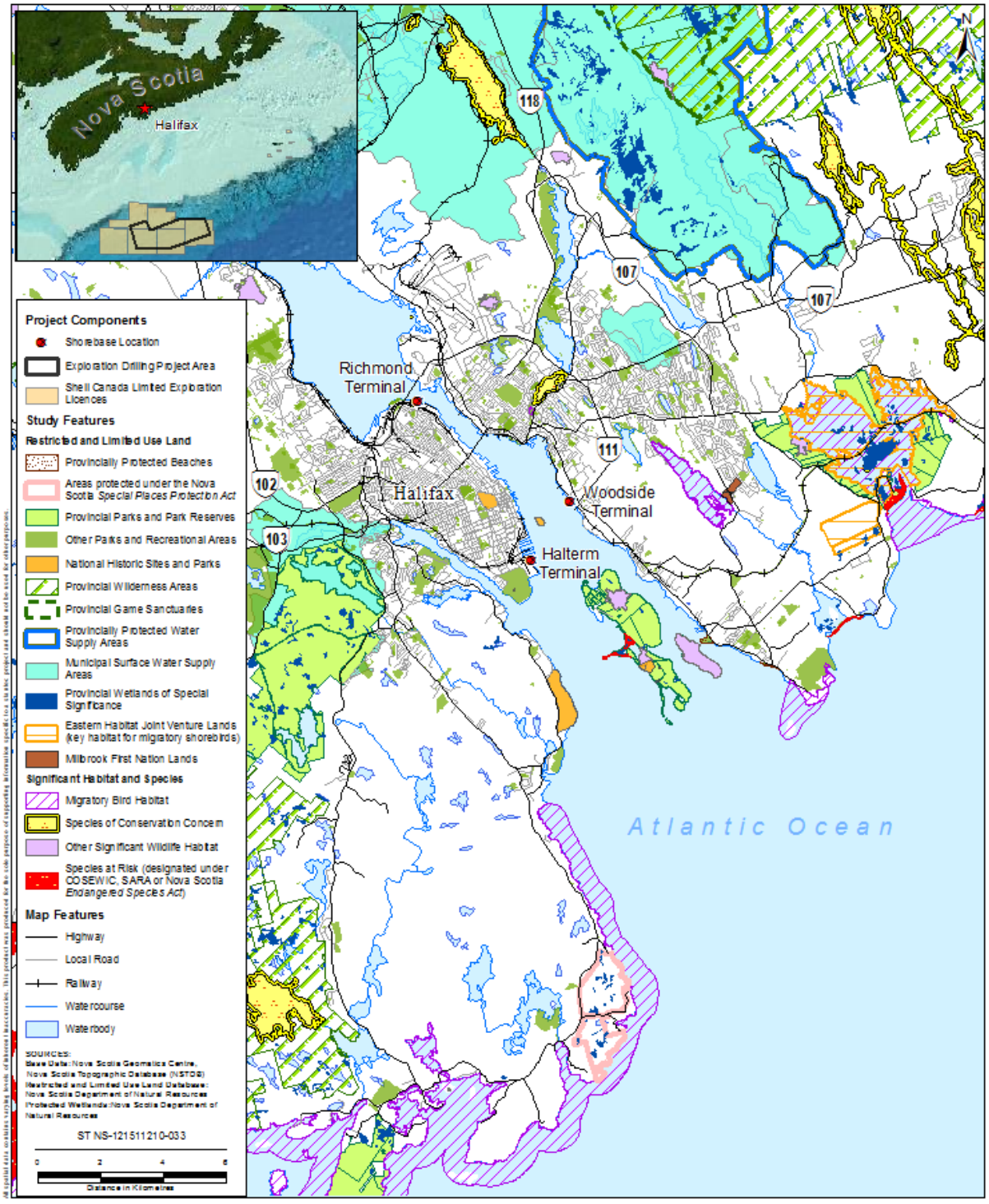


Figure 10.1 Environmentally Sensitive Areas in the Vicinity of Halifax Harbour

10.1.1.2 Migratory Birds

Based on review of the Maritimes Breeding Bird Atlas database (MBBA 2010), a total of 120 bird species have been recorded in the 10 km X 10 km census square in which Halterm Container Terminal, Richmond Terminals, and Woodside Terminal are located.

Forty-three migratory bird species were recorded in or on the edge of Point Pleasant Park (adjacent to the Halterm Container Terminal) during a breeding bird survey conducted in May 2010 (Stantec 2010) with the most commonly recorded species being Song Sparrow (*Melospiza melodia*), Dark-eyed Junco (*Junco hyemalis*), and Black-capped Chickadee (*Poecile atricapillus*). Rare or uncommon species included Blackpoll Warbler (*Dendroica striata*), Brown Thrasher (*Toxostoma rufum*), Canada Warbler (*Wilsonia canadensis*), Gray Catbird (*Dumetella carolinensis*), Northern Cardinal (*Cardinalis cardinalis*), Pine Warbler (*Dendroica pinus*), and Yellow-bellied Flycatcher (*Empidonax flaviventris*).

The migratory bird habitat illustrated on Figure 10.1 includes Great Blue Heron (*Ardea Herodias*) habitat at Morris Lake, approximately 3 km east of Woodside Terminal; Common Eider (*Somateria mollissima*) habitat in the vicinities of Chebucto Head, along the southwestern extent of the harbour shoreline, and Hartlen Point and Devils Island, at the southeastern extent of the harbour; and habitat for Canada Goose (*Branta canadensis*) and American Black Duck (*Anas rubripes*) on and around the Eastern Habitat Joint Venture Lands in the vicinity of Cole Harbour and Lawrencetown Lake. Maugher Beach, on the western shore of McNabs Island, provides unclassified Tern habitat as well as habitat for Piping Plover (*Charadrius melodus*), which is listed as Endangered under Schedule 1 of SARA. There is also Piping Plover habitat at Cow Bay Beach and Rainbow Haven Beach, which are located to the east of the approaches to Halifax Harbour.

There is reportedly a colony site for this species located in the vicinity of the Imperial Oil Dartmouth Refinery (near the Woodside Terminal) (pers. comm., Michael Crowell, senior terrestrial ecologist. Stantec, November 2013). However, the waters surrounding the candidate onshore supply base locations under consideration are not ideal foraging habitat for this species due to the level and frequency of disturbance.

10.1.1.3 Commercial and Aboriginal Fisheries

Halifax Harbour is located within NAFO Fishery Unit Area 4Wk. Commercial fisheries in the harbour include a small commercial finfish fishery, a bait fishery as well as salmon and mackerel fishing during seasonal migrations along the edges of the Narrows during passage to and from Sackville River (Stantec 2012).

The harbour is included within the boundaries of Lobster Fishing Area (LFA) 33, which extends from Cole Harbour to Yarmouth. Lobster is the primary commercial species harvested within Halifax

Harbour with the majority of the lobster fishing activity being conducted around McNabs Island as well as some lighter activity around Georges Island and the Bedford Basin.

In 2011, four Aboriginal communal food, social and ceremonial licences were known to have been issued for LFA 33. DFO's Aboriginal Fisheries Branch (Maritimes Region) was not aware of any fishing activity in Halifax Harbour related to those licences; however, the licencees are nonetheless entitled to make use of their access if they so choose (Stantec 2012). The Confederacy of Mainland Mi'kmaq (2013) identified the LFA 33 lobster fishery as an active communal commercial fishery for 2013.

10.1.1.4 Heritage, Historic, and Archaeological Resources

The potential for previously undisturbed heritage, historic, or archaeological resources to be present on-site is assumed to be low as the candidate supply base locations in Halifax Harbour are existing port facilities with existing shorelines at each site being previously infilled to accommodate present operations (i.e., no intertidal zone).

10.1.2 Strait of Canso

The Strait of Canso is a long, narrow channel in North Atlantic Ocean that separates mainland Nova Scotia from the island of Cape Breton. The strait is approximately 27 km long and averages 3 km in width and 60 m in depth. It connects Chedabucto Bay on the Atlantic Ocean to St. George's Bay on the Northumberland Strait. Since the construction of the Canso Causeway in 1955, the Strait of Canso has become a tidal inlet.

Located approximately midway along the Strait of Canso are The Town of Mulgrave and the Town of Port Hawkesbury. Both of these communities contain active marine facilities that comprise the Strait of Canso Port (i.e., the Mulgrave Marine Terminal and the Port Hawkesbury Pier, respectively). The Mulgrave Marine Terminal accommodates cargo vessels and industrial operations on a year-round basis.

The shore, intertidal zone, and seabed of the Strait of Canso at Mulgrave Marine Terminal is currently subject to high levels of marine-related industrial activity (e.g., ship loading and unloading, container handling, storage and laydown, and truck traffic), including associated noise and other sensory disturbance. The candidate supply base location has no natural intertidal zone, as the existing shoreline was previously infilled to accommodate present operations. There are no wetlands, migratory bird sanctuaries, National Wildlife Areas, or marine protected areas in the Harbour. However there are some coastal and onshore features in the Strait of Canso and surrounding area which are recognized nationally, provincially, and/or municipally for their cultural, recreational, and/or ecological value (refer to Figure 10.2).

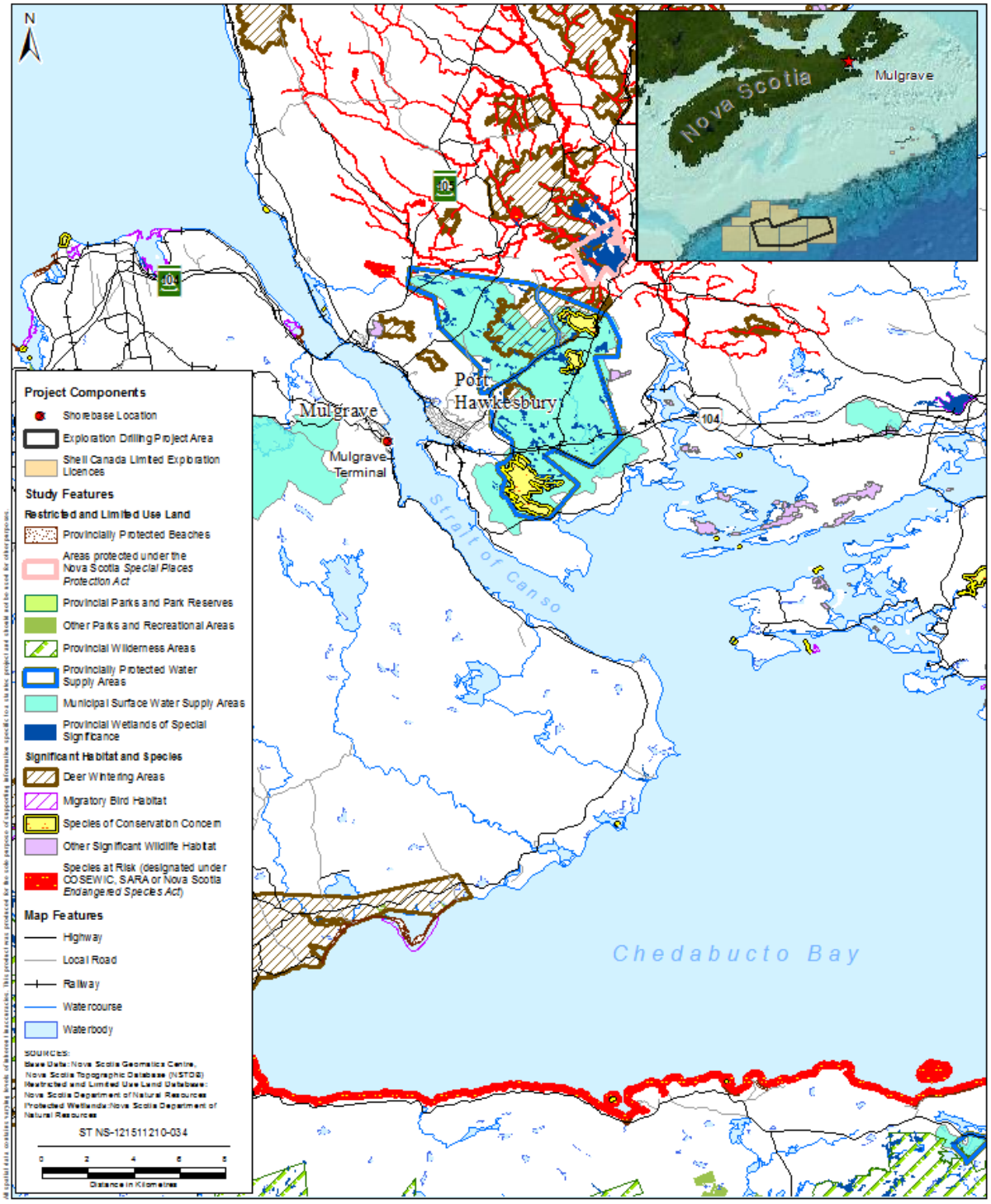


Figure 10.2 Environmentally Sensitive Areas in the Vicinity of the Strait of Canso

10.1.2.1 Fish, Fish Habitat, and Aquatic Species

As noted in Section 10.1.1.1, at least 69 species of fish have been recorded in the nearshore marine habitat of Nova Scotia within the 40 m depth of water (Hardy Associates Ltd. 1984). Groundfish known to occur in the Strait of Canso and its approaches include flounders, codfishes, skates, sand lances and redfishes. Typical pelagic species observed in the Strait of Canso include Atlantic herring and Atlantic mackerel. Anadromous fish species known to occur in the Strait of Canso include salmon, trout, gaspereau, and smelt. The catadromous American eel also has potential to be present in the Strait of Canso (CNSSCEC 1975).

Grey seals and harbour seals occur are fairly common in the Strait of Canso. Hooded seals (*Cystophora cristata*) and harp seals (*Phoca groenlandica*) also have potential to be found in the Strait of Canso.

Harbour porpoises are likely the most common cetacean in the Strait of Canso. Pilot whales (*Globicephala spp.*), minke whales (*Balaenoptera acutorostrata*), Atlantic white-sided dolphin, white-beaked dolphin (*Lagenorhynchus albirostris*), fin whale (*Balaenoptera physalus*), and a beached blue whale (*Balaenoptera musculus*) have been seen in the Strait of Canso or its approaches (Jacques Whitford 2004). Two of these species are listed under Schedule 1 of SARA: the Atlantic population of fin whale is listed as Special Concern, and the Atlantic population of blue whale is listed as Endangered.

10.1.2.2 Migratory Birds

Based on review of the Migratory Breeding Birds Atlas database (MBBA 2010), a total of 42 bird species have been recorded in the 10 km X 10 km census square in which the Mulgrave Container Terminal is located.

The Common Tern, Double-crested Cormorant (*Phalacrocorax auritus*) and Great Cormorant (*Phalacrocorax carbo*), have been recorded as nesting in Chedabucto Bay and Strait of Canso. Unclassified Terns have also been recorded inhabiting islands in Chedabucto Bay. Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (*Larus marinus*) nest at variety of locations in the vicinity of the Strait of Canso, particularly along the south shore of Chedabucto Bay. The Leach's Storm-petrel (*Oceanodroma leucorhoa*), is known to breed in proximity to the Strait of Canso. A Leach's Storm-petrel colony is located in the vicinity of Canso.

As depicted on Figure 10.2, there is known habitat for Harlequin Duck (*Histroronicus historonicus*) along the southern shoreline of Chedabucto Bay. Harlequin duck is listed as a species of Special Concern under Schedule 1 of SARA and is designated as Endangered under the Nova Scotia *Endangered Species Act*. Figure 10.2 also indicates unspecified migratory bird habitat on the northern shoreline of Chedabucto Bay.

10.1.2.3 Commercial and Aboriginal Fisheries

The Strait of Canso is located in NAFO Fishery Unit Area 4Wd. Invertebrate fisheries, include shrimp, snow crab fisheries and lobster making up the most productive and commercially important fisheries in this area. An exploratory rock crab season also occurs in Area 4Wd. Other commercial invertebrate landings in Area 4Wd include spider/toad crab, Jonah crab, oyster, scallop, sea urchin, soft shell crab, soft shell clam, squid, stone crab, and whelk.

A large proportion of the groundfish catch consists of cod, Atlantic halibut, and Pollock. Other groundfish species commercially fished in Area 4Wd include catfish, cusk, dogfish, haddock, monkfish, plaice, redfish, turbot, flounder, and hake.

The main pelagic fisheries include herring and mackerel. Other commercial pelagic species in Area 4Wd include alewife, bluefin tuna, eel, blue shark, mackerel shark, and smelt,

The Mulgrave Marine Terminal is located within DFO Statistical District 14, which encompasses the area from Mulgrave to Guysborough. A limited Aboriginal fishery operates out of the St. Peters area in District 9. These fishers have rights to access the water of District 14 as well (AMEC 2008) and therefore have potential to do so in the vicinity of the Mulgrave Marine Terminal.

10.1.2.4 Heritage, Historic, and Archaeological Resources

The potential for previously undisturbed heritage, historic, or archaeological resources to be present on-site is low as the Mulgrave Marine Terminal has no intertidal zone as the existing shoreline was previously infilled to accommodate present operations.

10.2 Offshore Environment

The description of the offshore environmental setting draws primarily on information reported in the EA of Shell Canada Ltd.'s Shelburne Basin 3-D Seismic Survey (LGL 2013). This information will be updated as applicable during the preparation of the EIS.

10.2.1 Offshore Physical Environment

The Scotian Slope is defined as the point at which the Scotian Shelf begins to sharply descend from the 200 m isobath indicator to about 2000 m (Breeze et al. 2002; DFO 2010a). Following this extreme descent, the Slope increases in water depth gradually from 2000 m to around 5000 m below the ocean surface reaching out to the commencement of the abyssal plain (Breeze et al. 2002). The Project Area is located wholly within the Scotian Slope region with the northern edge located south of the 1500m isobath contour.

10.2.1.1 Geology and Topography

The Scotian Slope is characterized by a steep to moderately steep topography with a complex and irregular seafloor including geological features such as iceberg furroughs and pits (Breeze et al. 2002; Hurley 2011).

The Project Area is located in a geological region known as the Shelburne Basin. Surficial sediment within the Project Area consists primarily of silt, clay and sand, with rare isolated patches of gravel (Hurley 2011). The Project area is also characterized by a geology underlain by thick rift sediments and characterized by extensive salt deposits (Nova Scotia Museum of Natural History n.d., Internet site).

10.2.1.2 Climate

The climate of the Project Area is affected by the varying airstreams that converge in the region. Fog is relatively common in spring and summer months and tropical storms frequent the area in the late summer to early winter. Meteorological and climate data for the Project area is collected from a weather station located on Sable Island.

10.2.1.3 Ocean Currents and Tides

The Project Area is located within an open ocean environment with surface water influenced primarily by the Gulf Stream which flows northeast along the Scotian Shelf and mixes with the cooler waters of the Labrador Current to form the slope waters (DFO 2011a). Typical current speeds in the Project area are between 5 to 15 cm/s with a peak current of between 50 to 60 cm/s in the winter months (Hurley 2011).

Based on historical data, wind direction is most frequently southwest from May to September, shifting to northwest in October to April. Average wind speed ranges from 4.8 m/s in July and 9.8 m/s in January. Wave conditions are characterized by an average wave height in the summer of less than 2 m and around 3 m in the winter months. Extreme maximum significant wave heights have been recorded in the winter months with the monthly maximum for January being over 14 m (Hurley 2011). The EIS will draw on updated data sources for the description of oceanographic conditions, including, but not limited to, the MSC50 Wind and Wave Hindcast Data for the North Atlantic Basin.

10.2.1.4 Air and Water Quality

The air quality and water quality of the Project Area is not currently monitored or tested on a continuous basis. Influences on air and water quality in Project Area, at present, would include natural changes in conditions and marine processes such as the Gulf of St. Lawrence outflow, natural hydrocarbon seeps as well as limited effects from human use (e.g., marine shipping) previously discussed above (DFO 2012).

Based on the limited use of the offshore Project area, the water and air quality in the offshore Project area is anticipated to be good with minimal to no contaminants present. It has been noted that contaminant and sediment levels in the offshore waters very rarely exceed Canadian guidelines for water quality (DFO 2012).

10.2.2 Offshore Biological Environment

The Southwest Scotian Shelf and Slope support a wide variety of marine species and biological diversity inclusive of: marine benthos; fish and fish habitat; marine mammals and sea turtles; and migratory birds. In general, there has been little survey work conducted on the Scotian Slope to identify species inhabiting the deep waters there; most available knowledge comes from surveys conducted on the Scotian Shelf.

10.2.2.1 Fish, Fish Habitat and Aquatic Species

Marine benthos includes all flora (plants) and fauna (animals) found within the benthic (seafloor) environment. Benthic diversity and abundance in the Project Area is estimated to be low in consideration of surveys run in nearby ELs. Although black corals and sea pens have been noted at depths up to 3000 m in other regions the absence of hard substrates and low current in the Project Area likely limits coral development. Although seabed surveys at water depths beyond 500 m in the Scotian Slope area are limited, based on existing data in areas of similar depth and characteristics, the Project Area is likely characterized by a benthic community consisting mainly of invertebrate groups such as anemones, ophiuroids, polychaetesm, sponges, bivalves, gastropods and sea urchins (Hurley 2011).

Although an invertebrate fishery is not prevalent within the Project Area, commercial benthic invertebrate species found in the Southwestern slope and shelf region include lobster, snow crab, Jonah crab, rock crab, sea scallops, squid, and sea urchins.

No marine benthos species with a distribution in the Project Area are currently listed under SARA or designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

A number of commercial demersal fish species including cod, redfish, silver hake and American plaice, are found in the Southwestern slope and shelf region shifting from the upper banks in the summer to the lower banks in the winter; however, most resident deep water species (>900 m) found in the Project Area are identified as non-commercial. The Scotian Slope is considered to be a primary north-south migratory route for a number of pelagic fish, which results in the seasonal presence of large pelagic fish species including sharks, swordfish and tuna. Spawning activities are mostly concentrated over the Scotian Shelf as opposed to the deeper Scotian Slope area. Thus spawning activity is unlikely within the Project Area.

The following fish species listed under Schedule 1 of SARA have the potential to occur within the Project Area: white shark (*Carcharodon carcharias*), Northern wolffish (*Anarhichas denticulatus*), spotted wolffish (*Anarhichas minor*), and Atlantic wolffish (*Anarhichas lupus*). The following species considered to be at risk by COSEWIC may also occur within the Project Area: Atlantic bluefin tuna (*Thunnus thynnus*), Atlantic cod (*Gadus morhua*) (Southern population), Roundnose grenadier (*Coryphaenoides rupestris*), porbeagle shark (*Lamna nasus*), Atlantic salmon (*Salmo salar*) (Nova Scotia Southern Upland population), cusk (*Brosme brosme*), shortfin mako shark (*Isurus oxyrinchus*) (Atlantic population), Acadian redfish (*Sebastes fasciatus*), winter skate (*Leucoraja ocellata*) (Eastern Scotian shelf and Georges Bank–Western Scotian Shelf-Bay of Fundy populations), smooth skate (*Malacoraja senta*) (Laurentian Scotian population), thorny skate (*Amblyraja radiate*), spiny dogfish (*Squalus acanthias*), roughhead grenadier (*Macrourus berglax*), basking shark (*Cetorhinus maximus*), and blue shark (*Prionace glauca*).

Concentrations of marine mammal species are present in the Scotian Shelf and Slope area, particularly in the vicinity of the Sable Island National Park Reserve and the Gully Marine Protected Area (MPA) (Hurley 2011). Baleen whale species, including humpback (*Megaptera novaeangliae*), blue (*Balaenoptera musculus*), fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), North Atlantic right (*Eubalaena glacialis*) and minke (*Balaenoptera acutorostrata*) whales, are at their highest numbers in the Project Area from July to November, but are present along the Scotian Shelf edge as early as March. Toothed whale species, including sperm (*Physeter macrocephalus*), Sowerby's beaked whales (*Mesoplodon bidens*) and northern bottlenose whales (*Hyperoodon ampullatus*), are present year-round in the Scotian Shelf and Slope with peak numbers observed in summer and early fall each year. Pinniped species, including grey (*Halichoerus grypus*), harbor (*Phoca vitulina*), harp (*Pagophilus groendlandicus*), ringed (*Phoca hipsida*) and hooded (*Cystophora cristata*) seals, are present in the offshore area, but are mostly concentrated along the Scotian Shelf area and nearshore waters with a low likelihood of being found in the Project Area (Hurley 2011, DFO 2011a).

Two species of sea turtle, leatherback (*Dermochelys coriacea*) and the loggerhead (Caretta caretta) are likely to be present in the Project Area, particularly during the summer and fall months (June to October). Kemp's Ridley (*Lepidochelys kempii*) has been observed occasionally, but the Project Area is not identified as within its normal foraging range (Hurley 2011; DFO 2011a) and so it is estimated to have a low likelihood of being present. Green turtle (*Chelonia mydas*) also has potential occur in the Project Area during the summer as a result of its wide range (Hurley 2011).

The following marine mammal and sea turtle species with potential to occur within the Project Area have been listed under Schedule 1 of SARA and/or are considered at risk by COSEWIC: blue whale (Atlantic population), North Atlantic right whale, Northern bottlenose whale (Scotian Shelf population), leatherback sea turtle, fin whale (Atlantic population), Sowerby's beaked whale

(*Mesoplodon bidens*), loggerhead sea turtle, and killer whale (*Orcinus orca*) (Northwest Atlantic-Eastern Arctic population).

10.2.2.2 Migratory Birds

Bird species are present year-round in the Project Area with over 25 species having been observed in the Scotian Shelf and Scotian Slope areas. During the summer months, offshore bird populations consist primarily of shearwaters and storm petrels with kittiwakes, fulmars and alcids prevalent in the winter months. Migratory birds inclusive of Roseate Tern (*Sterna dougallii*) and Red Knot (*Calidris canutus*), federally listed endangered species under Schedule 1 of SARA, may be present in the Project Area during their seasonal migrations to and from Sable Island National Park Reserve and their southerly overwintering habitat (Hurley 2011).

10.2.2.3 Special Areas

A number of offshore special areas have been identified for the Scotian Shelf and Scotian Slope regions. The special areas located in proximity to the Project Area are:

- Georges Bank Moratorium Area (122 km west of the Project Area)
- Haddock Nursery Closure Area (60 km north of the Project Area)
- Lobster Closure Area (LFA 40) (105 km west of the Project Area)
- Redfish Nursery Closure Area (92 km northwest of the Project Area)
- Roseway Basin Right Whale Critical Habitat Area (95 km northwest of the Project Area).

The locations of these areas are indicated on Figure 1.1. The Sable Island National Park Reserve as well as The Gully MPA and adjacent Haldimand and Shortland Canyons, all identified northern bottlenose whale critical habitat under SARA, are over 200 km from the proposed Project Area.

The Project Area lies within a portion of the Scotian Slope/Shelf Break Ecologically and Biologically Significant Area (EBSA). EBSAs are areas that, based on scientific expert opinion, demonstrate uniqueness; diversity; importance for threatened, endangered or declining species and/or habitats; sensitive habitat and/or abundance of key species (Doherty and Horsman 2007). While EBSAs have no formal designation or environmental protection, they are considered to play a key role in marine protected areas planning. Attributes of the area that justified its selection as an EBSA include its unique geology; its high biological diversity, including the presence of nationally listed species; its importance as a migratory route for whales and endangered leatherback turtles; and its use as an overwintering area for fish and seabird species (Doherty and Horsman 2007).

10.3 Existing Environmental Studies

A number of EAs, environmental studies (inclusive of technical reports) and ecological studies have been conducted in association with this marine region (i.e., Scotian Slope and Shelf). The EIS report will also draw on strategic environmental assessments (SEAs) that have been completed by

the CNSOPB for petroleum exploration activities on the Scotian Shelf and Slope. In particular, the EIS will draw on the SEA of Petroleum Exploration Activities on the Southwestern Scotian Slope (Hurley 2011) and SEA for the Western Scotian Slope, which is expected to be released as a draft document for public comment in December 2013.

Although no environmental field surveys are currently planned in association with compilation of the EIS, desktop studies will be conducted to gather recent and relevant publicly available information from existing environmental studies, projects and reports for use as applicable in the EIS.

11 POTENTIAL PROJECT RELATED ENVIRONMENTAL EFFECTS

Under CEAA, 2012, the Project Description must describe any potential changes to fish and fish habitat, aquatic species, and migratory birds, as well as the potential for environmental changes to affect federal or transboundary lands and Aboriginal peoples.

Table 11.1 provides an overview of the potential environmental interactions with routine Project activities (i.e., operation of the MODU and exploratory drilling) that have the potential to result in changes to the environmental components identified in CEAA, 2012.

Table 11.1 Potential Environmental Interactions with Routine Project Activities

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	Routine Project activities have the potential to result in changes affecting fish, fish habitat, aquatic species as defined under SARA, marine mammals, and other aquatic species due to the following interactions with the environment: ▪ localized sensory disturbance to aquatic species from underwater noise emissions associated with drilling and VSP activities ▪ localized degradation and disturbance to the benthic environment (including benthic species) due to seabed disposal at drill site(s) (i.e., drill mud/cuttings, cement) ▪ localized effects on marine water quality due to routine ocean discharges (e.g., waste water) ▪ potential injury or mortality to marine mammal(s) from vessel collisions
Migratory Birds	5(1)(a)(iii)	Routine Project activities have the potential to result in changes affecting migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, due to the following interactions with the environment: ▪ attraction of migratory birds to MODU lighting (including flares) and discharges (e.g., food wastes) ▪ mortality or stranding of migratory birds (particularly storm petrels) on MODU
Project Activities Occurring on Federal Lands	5(1)(b)(i)	Routine Project activities have the potential to result in changes to the environment that would occur in federal waters as a result of the Project Area being located within Canada's EEZ and thus entirely within federal waters under the jurisdiction of the Government of Canada.
Transboundary Issues	5(1)(b)(ii)	Environmental interactions from routine Project activities are not anticipated to result in changes to the environment that would occur outside of the Nova Scotian or Canadian offshore area.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	Routine Project activities have the potential to result in the following changes to the environment that may have an effect on Mi'kmaq commercial fishing activities, including those carried out under communal commercial licences in and around the Project Area: ▪ establishment of a safety zone (fisheries exclusion zone) around the MODU during drilling activities, as required by the CNSOPB, and associated spatial and temporal restrictions on commercial fish

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions
		harvesting activity ▪ localized sensory disturbance from underwater noise emissions, and associated changes in behavior and distribution of commercial fish species The Project is also expected to have economic benefits, including economic and contracting opportunities. Routine Project activities are not expected to result in any changes to the environment that would have an effect on the health conditions of Mi'kmaq or non-Aboriginal peoples.
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)	Routine Project activities are not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage areas or resources. However, information gathered during 3D seismic surveys, geotechnical and geohazard surveys, and pre-drill ROV site surveys in the Project Area will confirm the absence of marine heritage resources on the seabed before any seabed disturbance takes place. If any concerns related to this matter are identified during engagement with the Mi'kmaq of Nova Scotia, they will be considered in the EIS.
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	5(1)(c)(iii)	Routine Project activities are not anticipated to result in any changes to the environment that would have an effect on the current use of land and resources for traditional purposes by the Mi'kmaq of Nova Scotia, other than those Mi'kmaq commercial fisheries (including communal commercial fisheries) noted above, given the Project Area's water depth and distance from shore. Additional information regarding traditional Mi'kmaq fisheries and land and resource use will be gathered through engagement with the Mi'kmaq of Nova Scotia. If any concerns related to this matter are identified during engagement with the Mi'kmaq, they will be considered in the EIS.

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions
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)	Routine Project activities authorized by the CNSOPB have the potential to result in directly related or necessarily incidental changes to the atmospheric environment due to the following interactions with the environment: ▪ release of air emissions associated with operation of the MODU ▪ generation of noise associated with operation of the MODU

Routine logistical activities conducted in support of the Project include activities associated with the onshore supply base and the support vessels. Routine logistical activities at the onshore supply base are either not anticipated to result in any adverse environmental effects, or have the potential to cause only minor environmental effects that can be adequately managed through other existing legislative or regulatory processes. Potential environmental interactions with routine logistical activities in support of the Project are summarized in Table 11.2.

Table 11.2 Potential Environmental Interactions with Routine Logistical Activities in Support of the Project

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	Routine activities at the onshore supply base are not anticipated to interact with the environment in such a way that results in changes affecting fish, fish habitat, aquatic species as defined under SARA, marine mammals, or other aquatic species for the following reasons: ▪ all supply base activities will be carried out entirely onshore ▪ no in-water works will be required to prepare the selected supply base location for Project activities ▪ if excavation is required for mud batch installation, standard industry practices for erosion, runoff and sediment control will be adhered to, including the use of tarping, berming, silt fencing and other methods as appropriate to prevent discharges to the marine environment	Routine support vessel activities have the potential to result in changes affecting fish, fish habitat, aquatic species as defined under SARA, marine mammals, and other aquatic species due to the following interactions with the environment: ▪ localized sensory disturbance to aquatic species from underwater noise emissions associated with vessel transiting ▪ localized effects on marine water quality due to routine ocean discharges (e.g., waste water) ▪ potential injury or mortality to marine mammal(s) from vessel collisions
Migratory Birds	5(1)(a)(iii)	Routine activities at the onshore supply base are not anticipated to interact with the environment in such a way that results in changes affecting migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, for the following reasons: ▪ mitigation will be in place to prevent any discharges to the marine environment ▪ all of the candidate supply base locations under consideration are active marine terminal facilities that currently use artificial lighting ▪ the installation of additional lighting (if required)	Routine support vessel activities have the potential to result in changes affecting migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, due to the following interactions with the environment: ▪ attraction of migratory birds to support vessel lighting and discharges (e.g. food wastes) ▪ mortality or stranding of migratory birds (particularly storm petrels) on support vessels

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
		would result in only an incremental increase in light emissions beyond those already associated with the supply base and/or surrounding industrial area and the use of directional lighting will be considered	
Project Activities Occurring on Federal Lands	5(1)(b)(i)	Routine Project activities at the onshore supply base have the potential to result in changes to the environment that would occur on lands owned by the Halifax Port Authority for the Halterm Container Terminal and Richmond Terminals locations. However, these changes would be temporary and would not result in transboundary effects, or environmental effects on aquatic species, migratory birds or Aboriginal people as demonstrated within this Table.	Routine support vessel activities have the potential to result in changes to the environment that would occur in federal waters as a result of the Project Area being located within Canada's EEZ and thus entirely within federal waters under the jurisdiction of the Government of Canada.
Transboundary Issues	5(1)(b)(ii)	Routine Project activities at the onshore supply base are not anticipated to result in any change to the environment that would occur outside of the existing spatial boundaries of the selected supply base location.	Environmental interactions from routine support vessel activities are not anticipated to result in changes to the environment that would occur outside of Nova Scotian or Canadian waters.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	Routine Project activities at the onshore supply base are not anticipated to result in any change to the environment that may have an effect on heath and socio-economic conditions for Aboriginal people for the following reasons: ▪ there will be no interaction with Mi'kmaq nearshore commercial fishing or other traditional nearshore activities because there will be no discharges to the marine environment and all supply base activities will be carried out entirely	Routine support vessel activities outside of the MODU safety zone will be consistent with existing offshore and nearshore shipping traffic in the region and are therefore not anticipated to result in any changes to the environment that would have an effect on Mi'kmaq fishing activities. (Potential environmental interactions associated with the MODU safety zone are addressed in Table 11.1.) Routine support vessel activities are not expected to result in any changes to the environment that would have an effect on the health conditions of Mi'kmaq

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
		onshore ▪ there will be no interaction with Mi'kmaq harvesting of terrestrial resources because all supply base activities will be carried out entirely within existing site boundaries (i.e., within a previously disturbed/developed area in an industrial setting that excludes access for traditional use and that precludes the presence or availability of terrestrial resources used for commercial purposes) Routine Project activities at the supply base are not expected to result in any changes to the environment that would have an effect on the health conditions of Mi'kmaq or non-Aboriginal peoples.	or non-Aboriginal peoples.
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)	Routine Project activities at the onshore supply base are not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage areas or resources due to the industrial, previously disturbed/developed nature of all of the candidate supply base locations under consideration. Archaeological potential would be considered low for all supply base site options. However, if any potential heritage resources are identified during work onsite, appropriate mitigation will be implemented by a qualified archaeologist in consultation with the Nova Scotia Museum. KMKNO's archaeologist will also be consulted in the event of a suspected Mi'kmaq resource.	Routine support vessel activities will not result in any ground/seabed disturbance or impact availability or access to traditional resources and are therefore not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage areas or resources.

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	5(1)(c)(iii)	Routine Project activities at the onshore supply base are not anticipated to result in any changes to the environment that would have an effect on the current use of land and resources for traditional purposes by the Mi'kmaq of Nova Scotia for the following reasons: ▪ there will be no interaction with Mi'kmaq nearshore commercial fishing or other traditional nearshore activities because there will be no discharges to the marine environment and all supply base activities will be carried out entirely onshore ▪ there will be no interaction with Mi'kmaq traditional harvesting of terrestrial resources because all supply base activities will be carried out entirely within the existing site boundaries of a previously disturbed/developed area in an industrial setting that excludes access for traditional use and that precludes the presence or availability of terrestrial resources used for commercial purposes.	Routine support vessel activities will be consistent with existing shipping traffic in the region and are therefore not anticipated to result in any changes to the environment that would have an effect on traditional nearshore fishing activities. The support vessels will operate entirely in the marine environment and will therefore have no interaction with the current use of terrestrial lands and resources for traditional purposes by the Mi'kmaq of Nova Scotia. Additional information regarding traditional Mi'kmaq fisheries and other traditional resource use will be gathered through engagement with the Mi'kmaq of Nova Scotia. If any concerns related to this matter are identified during engagement with the Mi'kmaq, they will be considered in the EIS.
Other Changes to the Environment Directly Related or Necessarily Incidental to a Federal Authority's Exercise of a Power or	5(2)(a)	If the Halterm Container Terminal or Richmond Terminals is ultimately selected as the preferred supply base location, routine activities authorized by the Halifax Port Authority at the onshore supply base have the potential to result in only minor directly related or necessarily incidental changes to the atmospheric and acoustic environment due to the following interactions with the environment: ▪ low-level and intermittent release of air emissions (e.g., exhaust) associated with operation of	Routine support vessel activities authorized by the CNSOPB have the potential to result in directly related or necessarily incidental minor changes to the atmospheric environment due to the following interactions with the environment: ▪ release of air emissions associated with operation of support vessels ▪ generation of noise associated with operation of support vessels

Environmental Component of Concern	Relevant Section of CEAA, 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
Performance of a Duty or Function in Support of the Project		vehicles and equipment ▪ low-level and intermittent generation of noise associated with operation of vehicles and equipment However, the onshore supply base will be located at an existing industrial site in a developed area that is routinely subject to air and noise emissions. Project activities will be conducted in accordance with relevant federal and provincial standards for air emissions and municipal noise by-laws (where applicable).	

In addition to assessment of environmental effects from routine Project activities, environmental effects from non-routine Project activities such as accidents and malfunctions have also been considered. Potential accidental events that can occur during exploration drilling include blowouts (uncontrolled release of hydrocarbons during drilling), platform and vessel leaks, as well as spills and releases (e.g., hydraulic fluid, drilling mud, diesel). Collectively, these accidental releases are referred to as "spills".

Preventative measures including appropriate management systems and equipment (e.g., well casing, blow out preventer) will be in place throughout the Project to prevent incidents from occurring and to maintain control and safety throughout the Project. In addition to the preventative measures, response plans will be in place to implement effective response in the unlikely event that an incident should occur. The EIS will provide additional details regarding these preventative, contingency, and emergency response measures that are designed to prevent accidents and malfunctions, and to minimize impacts to human health and the environment should it occur.

Table 11.3 Potential Environmental Interactions with Accidents and Malfunctions during Project Activities

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	An accidental spill or release during Project activities could potentially result in changes to fish, fish habitat, aquatic species as defined in SARA, marine mammals, and other aquatic species, including: ▪ reduced availability and quality of habitat ▪ degradation and reduction in marine water quality ▪ injury, mortality and/or reduced health for fish and other aquatic species
Migratory Birds	5(1)(a)(iii)	An accidental spill or release during Project activities could potentially result in changes to migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, including injury, mortality and/or reduced health for migratory bird species.
Project Activities Occurring on Federal Lands	5(1)(b)(i)	An accidental spill or release during Project activities could potentially result in changes to the environment that would occur in federal waters as a result of the Project Area being located within Canada's EEZ and thus entirely within federal waters under the jurisdiction of the Government of Canada.
Transboundary Issues	5(1)(b)(ii)	An accidental spill may result in transboundary effects outside of Nova Scotian or Canadian offshore areas. Spill probability analysis and trajectory modeling will be conducted to determine the potential for and scope of any transboundary environmental effects. According to the CANUSLANT Joint Marine Pollution Contingency Plan, the Canadian Coast Guard Maritimes Region is the agency responsible for assisting with transboundary spills and the associated response.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	An accidental spill or release during Project activities could potentially result in the following changes to the environment that may have an effect on commercial fisheries, including Mi'kmaq commercial fisheries: ▪ contamination-related closure of commercial fishing areas, and associated restrictions on commercial fish harvesting activity ▪ reduced catchability associated with damage to fishing gear (e.g., fouling) and changes in population health, behavior, and distribution of commercial fish

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions
		species as a result of marine pollution ▪ changes in population size and health of individuals among commercial fish species, and associated loss of income through reduced catch value A vessel collision with fishing gear could also potentially result in changes to the environment that would have an effect on human health and safety for Mi'kmaq or non-Aboriginal peoples.
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)	An accidental spill or release during Project activities could potentially cause a change to the environment that may result in effects to a physical and cultural heritage area or resource due to potential impacts on fisheries and species that may be used for traditional purposes. Given the location of the Project offshore, non-routine Project activities are not expected to result in changes to resources of Historical, Archeological, Paleontological, or Architectural significance.
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	5(1)(c)(iii)	An accidental spill or release during Project activities could potentially result in the following changes to the environment that would have an effect on any traditional Mi'kmaq fisheries within the spill trajectory: ▪ contamination-related closure of traditional fishing areas, and associated restrictions on traditional fish harvesting activity ▪ reduced catchability associated with damage to fishing gear (e.g., fouling) and changes in population size, behavior, and distribution of commercial fish species as a result of marine pollution ▪ changes in population size and health of individuals among commercial fish species, and associated reduction in value of fishery resource for traditional use
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)	An accidental fire occurring as a result of Project activities authorized by the CNSOPB could potentially result in temporary and localized changes to air quality.

Table 11.4 considers potential environmental interactions that may result from accidents and malfunctions during logistical activities in support of the Project. As indicated in Table 11.4, potential accidents and malfunction at the onshore supply base relate primarily to accidental spills or releases. Accidents and malfunctions are not expected to result in adverse environmental effects.

Table 11.4 Potential Environmental Interactions with Accidents and Malfunctions during Logistical Activities in Support of the Project

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	An accidental spill or release at the onshore supply base is not expected to result in changes to fish, fish habitat, aquatic species as defined in SARA, marine mammals, and other aquatic species for the following reasons: ▪ a secondary containment system will be in place for the mud batch plant ▪ all potentially hazardous materials will be stored and handled only in designated areas by trained personnel ▪ spill containment/clean-up equipment will be kept on-site for use by trained personnel in accordance with Project-specific emergency response plans	An accidental spill or release from a support vessel could potentially result in changes to fish, fish habitat, aquatic species as defined in SARA, marine mammals, and other aquatic species, including: ▪ localized reduction in availability and quality of habitat ▪ localized degradation and reduction in marine water quality ▪ localized injury, mortality and/or reduced health for fish and other aquatic species
Migratory Birds	5(1)(a)(iii)	An accidental spill, release or other malfunction at the onshore supply base is not expected to result in changes affecting migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, including injury, mortality and/or reduced health for migratory bird species because these are existing industrial areas, and an accidental spill or release is expected to be contained to the site and not affect the marine environment.	An accidental spill or release from a support vessel could potentially result in changes affecting migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, including injury, mortality and/or reduced health for migratory bird species as a result of the spill/release entering the marine environment.
Project Activities Occurring on Federal Lands	5(1)(b)(i)	An accidental spill or release at the onshore supply base could potentially result in changes to the environment that would occur on lands owned by the Halifax Port Authority for the Halterm Container Terminal and Richmond Terminals locations. Given the existing industrial operations at these locations, any potential	An accidental spill or release from a support vessel could potentially result in changes to the environment that would occur in federal waters as a result of the Project Area being located within Canada's EEZ.

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
		environmental effects are expected to be minor and adequately managed through other existing legislative or regulatory processes or requirements applicable to these sites.	
Transboundary Issues	5(1)(b)(ii)	An accidental spill or release at the onshore supply base would not result in any change to the environment that would occur in another province or outside of Canada.	An accidental spill or release from a support vessel would not result in any change to the environment that would occur in another province or outside of Canada.
Health and Socio-Economic Conditions for Aboriginal and Non-Aboriginal People	5(1)(c)(i) 5(2)(b)(i)	An accidental spill or release at the onshore supply base is not expected to result in a change to the environment that would have an effect on commercial fisheries as any spill/release is expected to be contained onsite and given the existing industrial operation of the site and the nearshore area.	An accidental spill or release from a support vessel could potentially result in the following changes to the environment that would have an effect on commercial fisheries, including Mi'kmaq fisheries: ▪ temporary and localized restrictions on commercial fish harvesting activity ▪ localized reduced catchability associated with damage to fishing gear (e.g., fouling) and changes in population health, behavior, and distribution of commercial fish species as a result of marine pollution ▪ localized changes in population size and health of individuals among commercial fish species, and associated loss of income through reduced catch value An accidental event or malfunction resulting in vessel collision could also potentially result in changes to the environment that would have an effect on human health and safety for Mi'kmaq or non-Aboriginal peoples.

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
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)	Accidents and malfunctions at the onshore supply base are not expected to cause a change to the environment that would result in the disturbance and/or destruction of a physical and cultural heritage area or resource given the industrial nature of the sites and their current levels of disturbance/development.	Accidents and malfunctions from support vessel activities are not expected to result in changes to physical and cultural heritage and resources of historical, archeological, paleontological or architectural significance given that supply based operations are marine based and not land-based. Potential effects from accidents and malfunctions are therefore expected to be limited to the marine environment or foreshore areas.
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	5(1)(c)(iii)	An accidental spill or release at the onshore supply base is not expected to result in a change to the environment that would have an effect current use of lands or resources for traditional purposes, including traditional Mi'kmaq fisheries given that: • the supply bases are located on existing industrial lands used as active port facilities and not for traditional purposes • any spills/releases are expected to be contained onsite	An accidental spill or release from a support vessel activities could potentially result in the following changes to the environment that would have an effect on any traditional Mi'kmaq fisheries within the spill trajectory: ▪ temporary and localized restrictions on traditional fish harvesting activity ▪ temporary and localized reduced catchability associated with damage to fishing gear (e.g., fouling) and changes in population size, behavior, and distribution of commercial fish species as a result of marine pollution ▪ temporary and localized changes in population size and health of individuals among commercial fish species
Other Changes to the Environment Directly Related or Necessarily Incidental to a Federal	5(2)(a)	If the Halterm Container Terminal or Richmond Terminals is ultimately selected as the preferred supply base location, an accidental fire occurring a result of Project activities authorized by the Halifax Port Authority at the onshore supply base has the potential to result in directly related or necessarily incidental changes to the	An accidental fire occurring as a result of support vessel activities authorized by the CNSOPB could potentially result in directly related or necessarily incidental changes to the atmospheric environment, including air emissions, and/or result in localized changes to the marine

Environmental Component of Concern	Relevant Section of CEAA. 2012	Potential Environmental Interactions	
		Onshore Supply Base	Support Vessels
Authority's Exercise of a Power or Performance of a Duty or Function in Support of the Project		atmospheric environment, including air emissions. However, these changes are not likely to results in effects on migratory birds, aquatic species or Aboriginal peoples.	environment affecting other offshore users.

12 CONSULTATION AND ENGAGEMENT

Shell began consultation with local stakeholders regarding the Project in August 2013. Through this dialogue, which is anticipated to be ongoing throughout the Project life, Shell hopes to gain an understanding of the issues and any concerns in order to identify ways in which any potential negative effects of the Project can be reduced and benefits enhanced. Key concerns and comments raised to date by engaged stakeholders have been general in nature and have been in regards to the following:

- local economic benefit from Project activities
- accidental event prevention (process safety) and response
- potential effects to marine life from offshore drilling

The following stakeholders and interest groups are identified as potentially having an interest in the Project:

- CNSOPB
- DFO
- CEA Agency
- Environment Canada
- DND
- Nova Scotia Environment
- Fisheries Advisory Committee (FAC)
- Nova Scotia Assembly of Mi'kmaq Chiefs and its administrative arm the KMKNO
- Shubenacadie/Indian Brook Mi'kmaq Nation
- Native Council of Nova Scotia
- Nova Scotia Office of Aboriginal Affairs
- Nova Scotia Department of Energy
- Commercial Fisheries Industries Representatives (non FAC)
- Environmental Non-governmental Organization (ENGOs)

Comprehensive consultation and engagement specific to this Project is currently being implemented. This includes engagement with Aboriginal peoples, fisheries representatives, government agencies with regulatory or permitting responsibilities related to the Project, and other interested parties. In September 2013, Shell emailed Project information packages to stakeholders and followed up by phone and email to gather feedback and concerns. Face to face meetings were held with interested stakeholders in September and October to introduce the Project.

Concerns and questions raised to date by engaged stakeholders relate to safety and environmental considerations of offshore drilling activities.

12.1.1 Engagement with the Mi'kmaq of Nova Scotia

Shell has commenced its engagement with the Mi'kmaq regarding the Project. In addition, as a precursor to this Project and in association with Shelburne Basin 3D Seismic Survey conducted in summer 2013, Shell was invited to participate in engagement opportunities (information sharing and relationship building) with the Mi'kmaq of Nova Scotia. As such, the objectives of engagement with the Mi'kmaq of Nova Scotia have been, and will continue to be:

- to provide Project information in a timely manner and at regular intervals to create an opportunity for feedback and open dialogue
- to understand community interests and work to develop a positive long-term relationship
- to create a context of open dialogue to discuss Project questions and potential concerns related to environmental, cultural, and traditional land and resource use issues
- to identify appropriate ways to provide benefits from the Project.

Engagement with the Mi'kmaq of Nova Scotia in relation to the Project began in August 2013 with the anticipation that opportunities for further engagement will be sought and continued throughout the Project. The following activities are proposed in association with the Project:

- provision of Project information materials inclusive of Project scope, timing and additional relevant details with the opportunity for the Mi'kmaq of Nova Scotia to provide feedback, pose questions and identify any further information requirements
- provision of regular Project updates (i.e., direct meetings, written materials and/or other communication mechanisms)
- Monthly calls/meetings to touch base for the life of the Project or as appropriate
- response to information requests and queries in a timely fashion
- participation in synergy groups and committees as appropriate to achieve the mutual aims noted above (e.g., Mi'kmaq Benefits Committee, Energy Committee, and Fisheries Advisory Committee)
- participation in other initiatives and forums as requested and as appropriate.

These proposed engagement activities will build upon the existing relationship between Shell and the Mi'kmaq of Nova Scotia, which began in August 2012 in association with the planning and development of the Shelburne Basin 3D Seismic Survey. Similar activities detailed above have been conducted throughout the time period of August 2012 to October 2013. In addition to these activities, Shell and the Mi'kmaq of Nova Scotia co-organized a *Mi'kmaq Supplier's*

Information Session and Introduction to the Offshore Drilling Program session that took place in Millbrook on August 21, 2013. Invitation was also extended to the various Mi'kmaq communities to other public sessions on the same topic held at various locations across the province that same week.

In association with the Project, Shell will also make similar efforts to engage the Shubenacadie Band as an individual First/Indian Brook Mi'kmaq Nation, as a result of the recent separation from the KMKNO and its administrative function. Shell will also seek advisement from the KMKNO on this matter. Shell has provided the Shubenacadie/Indian Brook Mi'kmaq Nation with a Project Information Package (September 2013) and currently tentatively scheduled to meet with their leadership in early December 2013. Additionally, Shell will also engage the Native Council of Nova Scotia to receive its input in early December 2013.

12.1.2 Stakeholder and Community Engagement

Engagement with regulatory agencies and government in association with the Project began in January of 2013 with ongoing engagement throughout 2013. Additional meetings are anticipated to occur between Shell and regulatory agencies throughout the regulatory process to achieve compliance with all regulatory requirements, to gather departmental knowledge and feedback and assure that expectations and requirements are understood.

In addition to engagement with regulatory agencies, engagement and consultation with additional stakeholders will be conducted.

13 REQUIRED PERMITS AND APPROVALS

13.1 Environmental Assessment Requirements

13.1.1 CEAA, 2012

The *Regulations Designating Physical Activities* under CEAA, 2012 as amended on October 24, 2013 are in force. Based on the nature as well as location of the Project, it is a "designated project" under section 10 of the amended Regulations. The Project consists of the drilling, testing and abandonment of offshore exploratory wells within the Licences issued to Shell by the CNSOPB, and these proposed wells constitute the first drilling program in the licensed areas.

Additionally an EA is required in support of an OA being sought from the CNSOPB for the Program. It is expected that the EIS completed to satisfy the CEAA, 2012 requirements will also satisfy the CNSOPB EA authorization requirements.

The onshore supply base does not trigger an EA under CEAA, 2012 in and of itself because it is not listed in the *Regulations Designating Physical Activities*.

13.1.2 Nova Scotia Environment Act

The Nova Scotia *Environment Act* establishes the provincial EA process for the Province. Under the *Act* and associated *Environmental Assessment Regulations* (EA Regulations), designated Class I and Class II undertakings require a provincial level EA to be completed.

The Project will not trigger an EA under the Nova Scotia *Environment Act* as offshore projects are not designated under the *Environmental Assessment Regulations*. The supply base will be owned and operated by a third party, which will be responsible for obtaining any approvals necessary to manage and operate that facility, including fulfilling any environmental requirements. At present, it is not anticipated that the supply base will trigger the requirement for a provincial level EA under the Nova Scotia *Environment Act* due to the anticipated use of existing industrial facilities. In the event that the operator of the supply base determines that an EA is required under the Nova Scotia *Environment Act*, this is more appropriately conducted through a regulatory process separate from the CEAA, 2012 EA process.

13.1.3 Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act

Under paragraph 142(1)b of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act,* the CNSOPB has the power to authorize offshore activity following application by an Operator and provided they meet the prescribed application requirements.

Pursuant to s. 142(1), the CNSOPB is able to prescribe the application requirements associated with authorizing offshore activity. The CNSOPB has confirmed that under this provision, an EA will form one of the requirements of an application for an OA that is required prior to the commencement of the proposed Program.

13.2 Additional Authorizations

In addition to the EIS, the permits, approvals and authorizations anticipated to be required for construction and operation of the Project, in addition to a federal EA decision, are summarized in Table 13.1. At present, no provincial permits are currently anticipated to be required for the Project.

Table 13.1 Additional Permitting Requirements

Permit Required	Governing Agency	Project Component
Operations Authorization	CNSOPB	Authorization to conduct exploration drilling program in association with an EL.
Approval to Drill A Well	CNSOPB	Licence to drill a well in association with an Operations Authorization.
Migratory Bird Handling Permit	Environment Canada	Salvage of stranded birds during operation of the DP MODU, VSP vessel and support vessels

Federal legislation that is relevant to the environmental aspects of this Project include:

- *Canadian Environmental Assessment Act, 2012*
- *Canada-Nova Scotia Accord Implementation Acts*
- *Oceans Act*
- *Fisheries Act*
- *Navigable Waters Protection Act*
- *Species at Risk Act*

- *Migratory Birds Convention Act*
- *Canada Shipping Act*
- *Canadian Environmental Protection Act*

Regulatory approvals will already be in place to support existing operations at the supply base. Any additional authorizations required to support the Project will be the responsibility of the third party operator.

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