4.0 ENVIRONMENTAL SETTING

This section describes the environmental setting for the Project in each of the jurisdictions – the island of Newfoundland, the Cabot Strait, and Nova Scotia.

4.1 ISLAND OF NEWFOUNDLAND

Project components on the island of Newfoundland include an estimated 293 km of transmission line along new and existing transmission corridors between Granite Canal and Cape Ray. Associated infrastructure includes one switchyard; one converter station; one transition compound; one anchor site; up to an estimated 28 km of grounding line; and approximately 2 km of underground cable (refer also to Figure 1.2.2 and Section 2).

4.1.1 ATMOSPHERIC ENVIRONMENT

This description of the atmospheric environment considers climate, ambient air quality, and ambient noise in the region of the Project components on the island of Newfoundland.

4.1.1.1 Climate

The Study Area on the island of Newfoundland is entirely within the Boreal Shield Ecozone. In general, climate is characterized by long winters and short warm summers, modified by maritime conditions along the coast, thereby resulting in higher mean annual precipitation (900-1600 mm) (Bell 2002a).

The Project components are located within four ecoregions: Maritime Barrens, Central Newfoundland, Long Range Barrens, and Western Newfoundland (Figure 4.1.1). Climate in the Maritime Barrens Ecoregion is highly influenced by the Atlantic Ocean, characterized by foggy, cool summers with an average temperature of 11.5 °C, and moderate winters with an average temperature of -1 °C. Mean annual precipitation ranges from 1200 to >1600 mm. The Western Newfoundland Ecoregion also has a marine-influenced climate, experiencing cool summers with mean annual temperature of 12 °C and short, cold winters with mean annual temperature of -3.5 °C. In the Long Range Barrens and Central Newfoundland Ecoregions, the climate is more continental and less influenced by the ocean. Summers are cool, with a mean temperature ranging from 11.5 to 12.5 °C, and winters are cold and snowy with mean temperatures of -3.5 to -4 °C. Mean annual precipitation ranges from 1000 to 1400 mm.

Climate normal data recorded from 1971-2000 for the Stephenville weather station, operated by EC, are provided in Table 4.1.1. Stephenville is located within the Western Newfoundland Ecoregion in which some of the Project components (including a portion of the transmission line, and converter station) are located. The data in Table 4.1.1 summarize climate in Stephenville from 1971 to 2000.

Table 4.1.1 Summary of Climate Normal Data for Stephenville – 1971 to 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Daily Mean (°C)	-6.2	-7.5	-3.6	2.3	7.4	12	16.1	16.2	12.2	6.9	2.3	-3
Daily Maximum (°C)	-2.5	-3.2	0.7	6	11.6	16.3	19.9	20.1	16.1	10.3	5.1	0.2
Daily Minimum (°C)	-9.9	-11.8	-7.9	-1.5	3	7.6	12.2	12.3	8.3	3.5	-0.6	-6.2
Extreme Maximum (°C)	12.4	12.7	19.7	23.8	27.2	30	30.6	29.9	29.1	22.2	20.6	16.1
Date of Occurrence (yyyy/dd)	1986/ 28	1996/ 17	1999/ 29	1986/ 26	1950/ 26	1954/ 27	1949/ 31	2001/ 01	1989/ 10	1946/ 01	1967/ 05	1966/ 01
Extreme Minimum (°C)	-26.1	-29.5	-29.2	-15.6	-7.1	-1.1	3.9	2.2	-0.7	-5.6	-14.9	-20.2
Date of Occurrence (yyyy/dd)	1957/ 29	1990/ 05	1990/ 08	1994/ 02	1993/ 11	1943/ 01	1974/ 07	1975/ 25	1986/ 21	1969/ 31	1992/ 24	1984/ 26
Precipitation												
Rainfall (mm)	34.8	28.8	37.5	55.4	93.7	102.3	117.4	122.8	127.9 .	126.6	90.3	47.4
Snowfall (cm)	114.6	82.2	60.5	20.9	4.2	0	0	0	0.1	3.7	31.7	89.1
Precipitation (mm)	134.5	102.1	93.7	75.6	98.1	102.3	117.4	122.8	128	130.2	120.7	126.7
Extreme Daily Precipitation (mm)	52.8	83.8	50.8	68.8	53.6	130.7	84.1	96	72.1	50.2	63	48.2
Date of Occurrence (yyyy/dd)	1979/ 08	1946/ 22	1968/ 20	1994/ 07	1993/ 14	1995/ 08	1979/ 17	1989/ 05	1943/ 25	2000/ 10	1951/ 08	1990/ 08
Days with:												
Maximum Temperature > 0 °C	9.5	7.9	17.5	27.9	30.9	30	31	31	30	31	26.9	15.9
Measureable Rainfall (≥ 0.2 mm)	5.5	4.5	6.9	9.7	13.9	14.2	15.3	14.9	16.1	18.4	13	7.4
Measureable Snowfall (≥ 0.2 (cm)	25	19.9	15	7.9	1.6	0	0	0	0.13	1.8	10.9	20.9
Measurable Precipitation (≥ 0.2 mm)	26.4	21.4	18.3	15.2	14.7	14.2	15.3	14.9	16.1	19	20.8	24.2
Wind												
Mean Wind Speed (km/h)	24.9	22	20.9	19.6	17.2	15.3	14.4	15.5	17.4	19	21.2	23.5
Most Frequent Wind Direction	W	W	NE	NE	NE	SW	SW	SW	SW	W	W	W
Extreme Wind Gust Speed (km/h)	141	137	140	111	111	93	80	102	113	137	116	137
Date of Occurrence (yyyy/dd)	1986/ 14	1967/ 23	1976/ 17	1980/ 05	1988/ 03	1981/ 26	1979/ 05	1990/ 02	1954/ 12	2000/ 29	1955/ 20	1972/ 02
Days with winds ≥ 52 km/h	6.2	2.9	3.3	1.8	0.7	0.1	0.1	0.5	0.5	1.4	2.4	5.7
Days with winds ≥ 63 km/h	2.3	1.3	1.4	0.5	0.2	0	0	0.1	0.1	0.5	0.7	2.2

Table 4.1.1 Summary of Climate Normal Data for Stephenville – 1971 to 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Visibility												
Less than 1 km (hours)	31.8	18	14.7	7.6	7.3	13.4	11.6	7.1	2.9	3	4.3	18.1
1 km to 9 km (hours)	225.6	166.4	113.9	68.9	63.7	77.6	95.4	73.3	51.7	47.2	81.4	176.5
Greater than 9 km (hours)	486.6	494	615.4	643.5	673	629	637	663.6	665.4	693.9	634.4	549.4

EC 2012a

4.1.1.2 Ambient Air Quality

Air quality in communities across the island of Newfoundland is generally considered to be good as ambient air quality standards are rarely exceeded for the pollutants being measured. According to the 2011 Ambient Air Monitoring Report produced by NLDEC (NLDEC 2012a) any exceedances tend to be at industrial property boundaries. The nearest National Air Pollution Surveillance (NAPS) Network site is located in Corner Brook and monitors the ambient levels of SO_2, NO_x, carbon monoxide (CO), ozone (O_3) and particulate matter ($PM_{2.5}$) on a continuous basis. None of the measured pollutants, with the exception of O_3, exceeded ambient air standards in 2011. The 8-hour O_3 standard was exceeded on 29 occasions in 2011 (NLDEC 2012a).

4.1.1.3 Ambient Sound

In rural areas such as those which constitute the majority of the Study Area, the acoustic environment is dominated by the sound of wind in the trees and vegetation, the sound of running water in the vicinity of streams and rivers, and wildlife sounds (*e.g.*, bird calls). Where the Study Area is closer to populated centres (*e.g.*, Port aux Basques), the ambient sound is influenced by traffic, sounds of construction, and other human activity. Sound levels in the overall Study Area are expected to be in the range of 45 to 50 decibels (dBA) during the day and 35 to 40 dBA at night.

Baseline ambient sound monitoring was conducted at three sites surrounding the Bottom Brook converter station in December 2011. Table 4.1.2 presents the calculated day-night average sound level (L_{dn}), for the three monitoring sites, during baseline conditions.

Table 4.1.2 Baseline Noise Monitoring Sites (day-night average) – Bottom Brook Converter Station

Noise Monitoring Site	UTM Coordinates		Distance to converter station	Residential Receptor (Yes/No)	L_{dn} (dBA)
	Easting (m)	Northing (m)			
1	407388	5375674	314 m	No	40.7
2	406278	5374535	1.6 km	No	51.0
3	405851	5374262	2.0 km	No	43.9

The baseline results are influenced by the existing substation at Bottom Brook but would be considered to be fairly representative of baseline noise levels in other parts of the Study Area, with similar surroundings.

Baseline noise measurements were also taken at the landfall site in August 2012. Table 4.1.3 presents the calculated L_{dn} values for three monitoring sites at Cape Ray, during baseline conditions.

Table 4.1.3 Baseline Noise Monitoring Sites - Landfall Site (Cape Ray)

Noise Monitoring Site		UTM Coordinates		Distance to Landfall Site (m)	Residential Receptor (Yes/No)	L_{dn} (dBA)
		Easting (m)	Northing (m)			
Cape Ray, NL	Site C	326895	5276812	390	No	52.8
	Site D	327403	5276793	500	Yes	51.7
	Site E	328343	5279402	3,100	No	48.6

4.1.2 GEOPHYSICAL ENVIRONMENT

The west coast of the island of Newfoundland borders on the Gulf of St. Lawrence and is separated from NS by the Cabot Strait. As noted above, the island lies within the Boreal Shield Ecozone. This Ecozone is characterized by broadly rolling uplands interspersed with lakes, ponds, and peatlands, caused resulting from glacier movement over the Precambrian granite bedrock of the Shield (Canadian Biodiversity Website n.d.). Soils are predominantly Brunisols in the north and Humo-Ferric Podzols in the south.

4.1.2.1 Topography and Drainage

The island of Newfoundland represents the eastern extremity of the Appalachian mountain system in North America. From west to east, the Study Area extends from Cape Ray through a valley that runs between the Anguille Mountains and the Long Range Mountains to Codroy Pond, across an undulating till plain to Bottom Brook, then through rugged undulating and semi-mountainous terrain at the foothills of the Indian Head Range to Stephenville. These areas correspond to the Codroy Lowlands, St. George's Bay Lowlands and Port au Port Peninsula, which form the Stephenville Lowlands physiographic region (AMEC 2008). Between Bottom Brook and Granite Lake, the Study Area is characterized by northeast trending harsh, uninhabited barren plateaus that are deeply incised by northwest trending streams and river valleys and northeast trending ponds. This area forms part of the Uplands of Newfoundland physiographic region (Stanford and Grant 1976).

Ground elevations within the Cape Ray to Stephenville portion of the Study Area generally range from sea level to 150 m above sea level (asl), with the exception of the portion of the Study Area that crosses the foothills of the Long Range Mountains, where elevations rise to a maximum elevation of approximately 250 m asl. Ground elevations within the rugged Bottom Brook to Granite Lake portion of the Study Area are variable and range from approximately 25 m asl at Bottom Brook to 400 m asl and 480 m asl within the Long Range Mountains and the Annieopsquotch Mountains, respectively.

The Study Area crosses various streams and rivers with the largest being the drainage systems of the Little Codroy River, Codroy River, Highlands River, Crabbs River, Barachois River, Fischells Brook, Flat Bay Brook, Little Barachois Brook, Southwest Brook, Harrys River and Exploits River. The upper reaches of these watercourses are located in the upland regions that are generally east of the Study Area between Cape Ray and Bottom Brook, north of the Study Area between Bottom Brook and Stephenville and east and west of the Study Area between Bottom Brook and Granite Canal. Numerous small ponds are also common in the area.

4.1.2.2 Surficial Geology

Within low lying valleys and plains between Cape Ray and Stephenville, surficial geology consists mainly of glacial till or glaciofluvial sand and gravel (Liverman and Taylor 1994a and Liverman and Taylor 1994b). Some local areas of exposed bedrock are present at the foothills of the Long Range Mountains and the Anguille Mountains in the vicinity of Cape Ray and Codroy Pond, and at the foothills of the Table Mountains near Stephenville. Local areas of bog are also present within the Study Area in near St. George’s Bay. Between Bottom Brook and Granite Lake, surficial geology consists mainly of a till veneer in low lying areas, with exposed bedrock concealed by patches of vegetation, till, sand and gravel or bog at higher elevations (Liverman and Taylor 1994b).

Glaciofluvial sand and gravel deposits are locally eroded and dissected, and marked by meltwater channel scars. Glacial till deposits generally border the glaciofluvial deposits at higher elevations along the valley flanks and occur as both thin discontinuous veneer (typically less than 2 m thick), and more extensive moraine deposits reaching a depth in local areas of up to 20 m. The composition of the veneer and moraine tills are variable and bedrock-controlled, but generally consist of a silty to sandy loam derived from sandstone, siltstone, conglomerate, and minor limestone, shale and metamorphic and igneous rocks. Bedrock outcrops may be weathered and covered by a thin layer of angular, frost-shattered and frost heaved rock fragments, as well as partially or fully concealed by forest vegetation. Exposed bedrock outcrops are commonly streamlined and display crag and tail structures that indicate northwest directed ice flow (Jacques Whitford 2008).

4.1.2.3 Bedrock Geology

On the island of Newfoundland, the Study Area crosses two tectonostratigraphic zones: the Humber Zone and the Dunnage Zone which range from late Precambrian to Carboniferous in age. The complex tectonic events associated with the geological development of these zones have resulted in a very complex depositional and structural environment in southwestern Newfoundland (NLDEC 1984). The boundary between the Humber and Dunnage Zones is defined by the northeast trending Cabot Fault shear zone that runs from the coast approximately 13 km north of Cape Ray to the southwestern tip of Grand Lake, approximately 14 km east of Bottom Brook. The Humber Zone is located north of the Cabot Fault and consists of a crystalline basement overlain by mainly sedimentary rocks. The Dunnage Zone is located south of the Cabot Fault and represents vestiges of an ocean domain. This zone is comprised of mafic volcanic rocks and associated marine sediments that locally overly an ophiolite suite of rock units (Williams 1979). The granitic, volcanic and various sedimentary rocks, as well as their metamorphic equivalents, that underlie the Study Area have undergone complex, multiphase deformation and are associated with regional folding and faulting.

4.1.2.4 Hydrogeology

Groundwater within the Study Area occurs within overburden materials and bedrock. Bedrock units generally have very low matrix (primary) porosity and permeability values. As a result, groundwater storage and flow within bedrock aquifers can be expected to mainly occur within secondary openings, such as fractures and joints, and varies depending on the frequency and interconnection of these structural features. For the purpose of characterizing the regional hydrogeology, geological units of considerable lateral extent that have similar lithological characteristics and hydraulic properties are grouped together to form hydrostratigraphic units. Surficial hydrostratigraphic units within the Study Area are divided into till deposits and sand and gravel deposits which are both reported to have moderate potential well yields (AMEC 2008). Bedrock hydrostratigraphic units within the study area include granitic and gneissic rocks (moderate yield), clastic sedimentary rocks (moderate yields), carbonate sedimentary rocks (moderate yield), carboniferous sedimentary rocks (moderate yield) and metavolcanic and metasedimentary rocks (low yield) (AMEC 2008, NLDEC 1984). A low yield well is classified as one that can produce between 5 and 25 L/min and a moderate yield well is classified as one that can produce between 25 and 125 L/min.

Available water quality data for overburden units indicates that groundwater quality is classified as good to excellent, except in the Flat Bay area where pH, arsenic, sodium and total dissolved solids (TDS) exceed Canadian Drinking Water Quality Guidelines (CDWQGs) (Health Canada 2011). Bedrock groundwater quality throughout the Study Area is classified as good to excellent, with CDWQG exceedances for turbidity, color, iron, manganese, pH and/or TDS in isolated areas, and elevated CDWQG exceedances for turbidity, arsenic, manganese, iron, TDS and sulphate in the Bay St. George area (AMEC 2008). Elevated concentrations of hydrogen sulfide in groundwater in some areas with carbonate sedimentary rocks may produce an offensive odour in some portions of the Study Area. Saltwater intrusion is considered possible in the portions of the Study Area that are located near the coast. Other common potential sources of groundwater contamination within the Study Area include road salts, sewage effluent, fuel spills and industrial effluents.

4.1.2.5 Domestic, Municipal and Industrial Water Wells

A number of municipal groundwater supplies are present within western Newfoundland. Protected municipal water supplies that fall within the Study Area include Wellfields 1 and 2 in Stephenville Crossing and the Dribble Brook protected surface water drainage area in St. George's. Unprotected municipal water supplies within the Study Area include wellfields in Benoit's Siding and Tompkins. Cabins and campgrounds located within the Study Area are expected to be serviced by on-site water wells and septic fields (refer to Section 6.3 for more information on water supply areas).

Industrial groundwater use in western Newfoundland is generally limited to areas where yield is high. Industrial groundwater users include fish processing plants, pulp and paper mills and mines as well as forestry and agriculture operations (AMEC 2008). These users are expected to rely on a combination of groundwater and surface water.

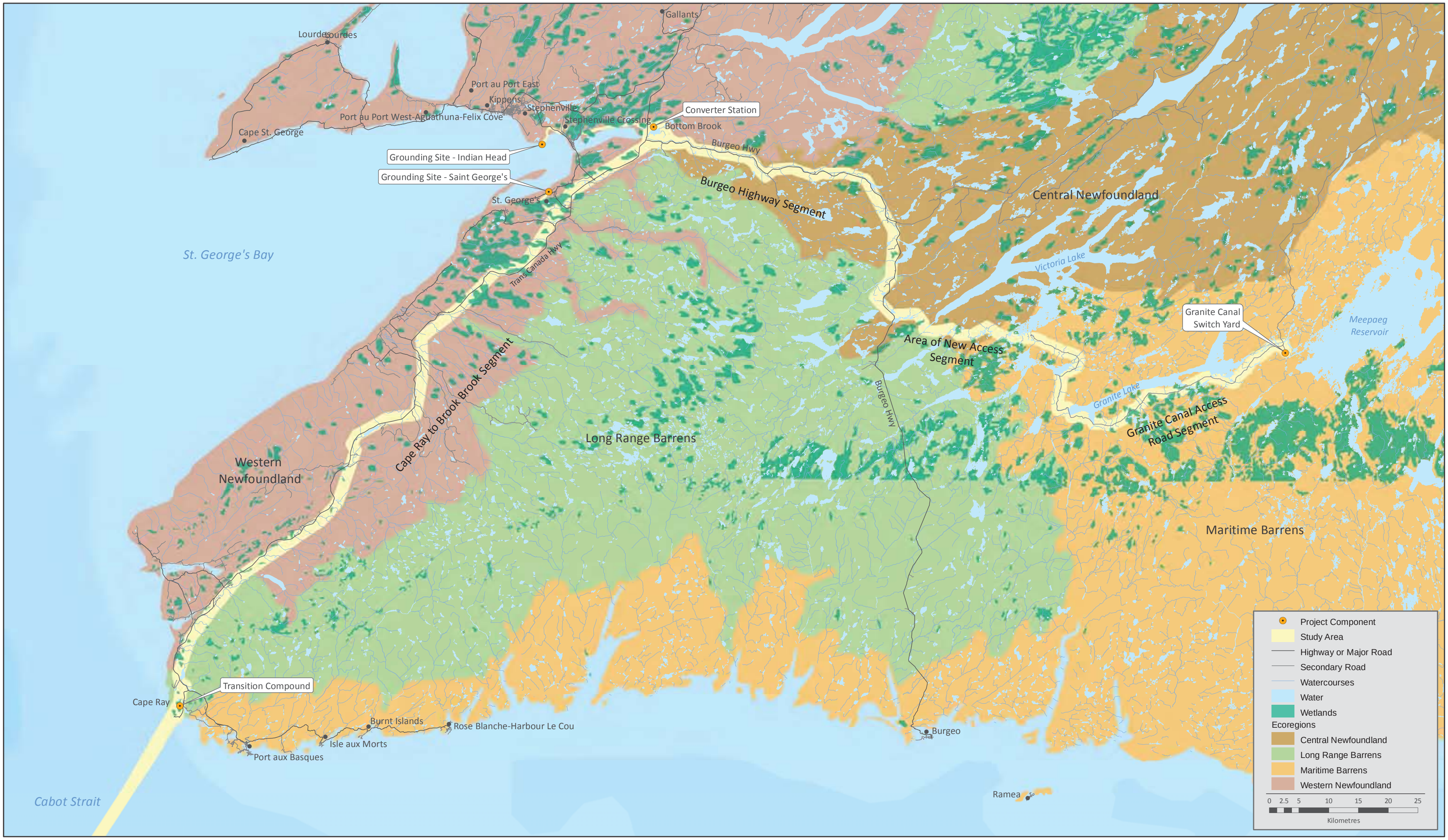
4.1.3 BIOLOGICAL ENVIRONMENT

4.1.3.1 Terrestrial Habitat

The Project crosses four ecoregions on the island of Newfoundland (Figure 4.1.1). Table 4.1.4 lists the ecoregions, and the areas of associated subregions which fall within the Study Area.

Table 4.1.4 Ecoregions Crossed by the Study Area (NL)

Ecoregion	Subregion	Area within the Study Area	
		km^2	% Total
Maritime Barrens	Central Barrens	1123	49.7
Long Range Barrens	Southern Long Range	458	20.3
Central Newfoundland	Red Indian Lake	175	7.7
	Portage Pond	228	10.1
Western Newfoundland	Corner Brook	133	5.9
	St. George's Bay	138	6.1
	Codroy	5	0.2



Emera
Newfoundland & Labrador

Coordinate System:
UTM NAD 83 Zone 21

Data Sources:
GeoBase
Geogratis

Scale: 1:600,000

Date: 28/11/2012

Environmental Overview
Island of Newfoundland

FIGURE 4.1.1

ENL133

The easternmost segment of the Project, the Granite Canal Access Road, falls within the Maritime Barrens Ecoregion; an ecoregion that extends across the southern half of the uplands to the Long Range Mountains (Figure 4.1.1). Elevations in this ecoregion range from sea level to 250 m asl, and frequent strong winds off the ocean cause foggy, cool summers and moderate winters with a mean annual precipitation range of 1200 to >1600 mm (Ecological Stratification Working Group, 1995, PAA 2008a). Balsam fir (*Abies balsamea*) is the dominant tree species, however, fires have greatly changed the forest over time leading to sparse stands of black spruce (*Picea mariana*), balsam fir, tamarack (*Larix laricina*) and mixed ericaceous shrubs with moss and lichens (Ecological Stratification Working Group, 1995). The Central Barrens subregion is similar to the rest of the ecoregion by the abundance of barrens interspersed with peatlands and pockets of forest (PAA 2008a). However, due to its inland location, the subregion is less foggy and windy and, as a result, is drier and has warmer summer temperatures (PAA 2008a).

The Study Area for this segment of the Project follows an existing access road along Granite Canal and is comprised largely of open barrens with sparse coniferous forest and extensive wetlands, including shrub wetlands, bogs, fens, and forested wetland, as well as smaller waterbodies, including ponds, lakes, and watercourses that largely drain into Granite Lake.

West of the Granite Canal Access Road, the Project transitions into the Central Newfoundland Ecoregion and the Long Range Barrens Ecoregion, passing through the southern extent of the Red Indian Lake and Portage Pond subregions, and the northern tip of the Southern Long Range subregion. The climate of the Central Newfoundland ecoregion is considered continental, with the highest summer and lowest winter temperatures on the island (PAA 2008b). Forests are typically boreal, consisting mostly of balsam fir and a dense ground cover of moss, with a mixed forest of black spruce and white birch (*Betula papyrifera*) colonizing areas after fire events (PAA 2008b). The Red Indian Lake subregion is characterized by dense forest, bogs, and rolling hills that increase in elevation in the transition to the Portage Pond subregion (PAA 2008b). The Portage Pond subregion is characterized by mountainous topography with closed, intermediate-to-low stands of balsam fir and black spruce dominating on steep, moist and upland slopes, and woodlands of black spruce, kalmia heath and lichens typical on drier sites (PAA 2008c). White birch, trembling aspen (*Populus tremuloides*) and black spruce are found on disturbed sites, and open stands of dwarf black spruce and tamarack are found on bogs (Ecological Stratification Working Group 1995). Bogs, in particular domed bogs, are common in both of these subregions and are distinguished by the absence of some common plants including dwarf (*Gaylussacia dumosa*) and black huckleberry (*Gaylussacia baccata)* (PAA 2008b and c). The climate of the Long Range Barrens Ecoregion is notable for having a short growing season and permanent snow cover throughout the winter (PAA 2008d). The ecoregion is covered by sparsely forested heath and moss barrens with dwarf patches of black spruce and balsam fir as well as dwarf kalmia and mosses, with mixed evergreen and deciduous shrubs on exposed sites (Bell 2002b, Ecological Stratification Working Group 1995). The Southern Long Range subregion is a windswept highland area with extensive barrens that, unlike the Maritime Barrens, have never been forested (PAA 2008d). String fens and slope bogs are common and cover large areas (PAA 2008d).

The Area of New Access incorporates the new transmission line route and encompasses parts of the Red Indian Lake and the Portage Pond subregions, as well as the Southern Long Range subregion. Habitat in the Study Area of this segment is characterized as a wet landscape with sparse coniferous forest, interspersed with numerous shrub wetlands, bogs, fens, smaller waterbodies, and large lakes. The lakes and major geological features are generally oriented in a southwest - northeast direction. Victoria Lake, the largest lake in the region with several arms that extend into the Area of New Access, forms the southeastern boundary of the Annieopsquotch Mountains, a mountain range that is craggy, and characterized primarily by of sparse coniferous forest and exposed rock.

The Burgeo Highway (Route 480) runs along the western margin of the Area of New Access, adjacent to the southwestern end of the Anniopsquotch Mountains. The Study Area for this segment follows the Burgeo Highway in a northwest direction, within the Portage Pond subregion, and is primarily composed of sparse coniferous forest and wetland habitat.

The western-most segment of the Project, the Bottom Brook to Cape Ray segment, falls within the Western Newfoundland Ecoregion, which is characterized by closed stands of balsam fir, with black spruce, tamarack and evergreen shrubs occurring in poorly drained areas (Bell 2002b,Ecological Stratification Working Group 1995). The Long Range Mountains, running from the Stephenville Crossing area to Cape Ray, provide protection from northeasterly winds which, along with high humidity, create some of the most favourable growing conditions on the island (Bell 2002b, PAA 2008d). The Study Area crosses three subregions within this ecoregion: Corner Brook, St. George’s Bay, and Codroy. The Corner Brook subregion is characterized by rolling forested hills consisting mostly of balsam fir, with a floor covering of wood ferns (*Dryopteris expansa*) (PAA 2008e). The St. George’s Bay subregion has flat-to-rolling terrain where the lower slopes of the Long Range Mountains extend towards the coast into extensive plateau bogs and balsam fir forests that remain fern dominated (PAA 2008f). The Codroy subregion is mountainous and rugged and heavily forested with the balsam fir and wood fern species, although yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), red maple (*Acer rubrum*) and trembling aspen are common (PAA 2008g).

This western-most segment of the Project, contains agricultural land, patches of tuckamore (stunted and windswept balsam fir and black spruce generally occurring on or near the coast, also known as krummholz), mixedwood forest including yellow birch in the Codroy Valley area, and coastal barrens. Medium-to-large river valleys, spreading from east to west, extend into the Study Area from the Long Range Mountains.

An ecological land classification (ELC) was undertaken in 2011 and 2012 to provide a landscape-level analysis of major vegetation communities and habitat within each segment of the Project. A summary by Project segment of each vegetation type, size, and relative occurrence is provided in Table 4.1.5.

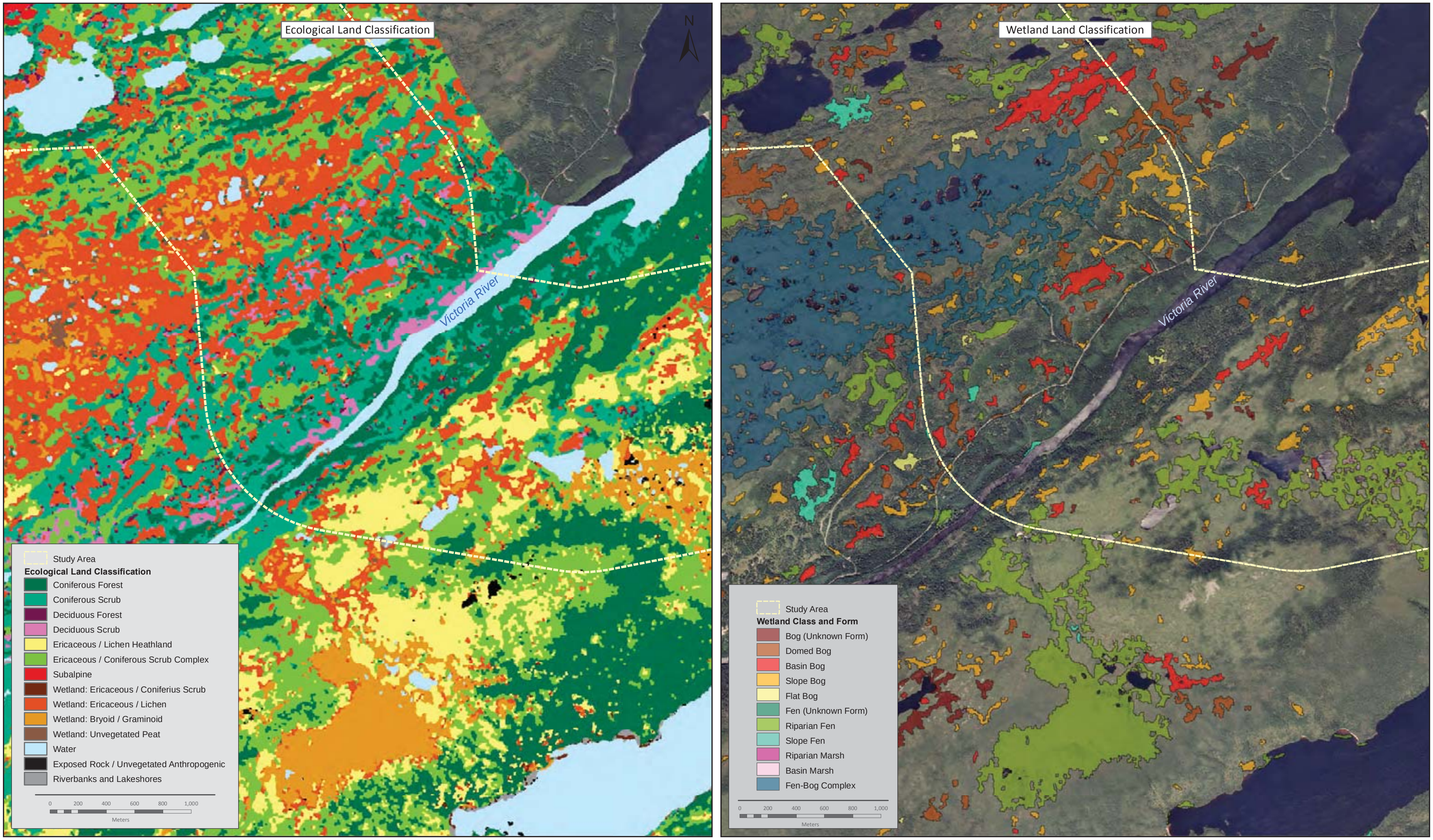
Table 4.1.5 Summary of ELC Habitat Types in the Study Area (NL)

Newfoundland ELC Habitat Type	Granite Canal Access Road		Area of New Access		Burgeo Highway		Bottom Brook to Cape Ray		All Segments	
	Area (ha)	% of Project for Segment	Area (ha)	% of Project for Segment	Area (ha)	% of Project for Segment	Area (ha)	% of Project for Segment	Area (ha)	% of Project
Coniferous Forest	50.7	13.1	32.8	20.0	179.7	45.5	220.8	25.9	484	27.0
Coniferous Scrub	57.1	14.8	20.3	12.4	3.4	0.9	64.8	7.6	145.6	8.1
Deciduous Forest	10.6	2.7	1.6	1.0	1.75	0.4	13.8	1.6	27.75	1.5
Deciduous Scrub	0.5	0.1	1.9	1.2	20.9	5.3	51.7	6.1	75	4.2
Dune System	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Ericaceous/ Coniferous Scrub Complex	94.9	24.6	34.7	21.2	6.9	1.7	56.9	6.7	193.4	10.8
Ericaceous/ Lichen Heathland	32.2	8.4	24.8	15.2	7.8	2.0	11.6	1.4	76.4	4.3
Exposed Rock/ Unvegetated Anthropogenic	6.3	1.6	1.1	0.7	1.9	0.5	13.3	1.6	22.6	1.3
Imagery Cloud and Shadow	0	0.0	2.2	1.3	0	0.0	0	0.0	2.2	0.1
Mixed Wood Forest	0	0.0	0	0.0	145.8	36.9	166.6	19.6	312.4	17.4
Riverbanks and Lakeshores	11.9	3.1	0.9	0.6	0.4	0.1	1.6	0.2	14.8	0.8
Subalpine	0	0.0	4.5	2.8	0	0.0	0	0.0	4.5	0.3
Vegetated Anthropogenic	0	0.0	0	0.0	0.1	0.0	19.1	2.2	19.2	1.1
Water	8	2.1	4.3	2.6	4.9	1.2	8.2	1.0	25.4	1.4
Wetland: Bryoid/ Graminoid	64.4	16.7	7	4.3	10.3	2.6	32.5	3.8	114.2	6.4
Wetland: Ericaceous/ Coniferous Scrub	4.1	1.1	1.3	0.8	1.7	0.4	155.9	18.3	163	9.1
Wetland: Ericaceous/Lichen	37.8	9.8	25.1	15.3	9.1	2.3	30.5	3.6	102.5	5.7
Wetland: Graminoid/ Herbaceous	0	0.0	0	0.0	0	0.0	2.9	0.3	2.9	0.2
Wetland: Unvegetated Peat	7.1	1.8	1.1	0.7	0.2	0.1	0.9	0.1	9.3	0.5
TOTALS	**385.6**	**100.0**	**163.6**	**100.0**	**394.85**	**100.0**	**851.1**	**100.0**	**1795.15**	**100.0**

In NL, the Final Report of the Canadian Wetlands Conservation Task Force (Cox 1993) calculated that 18% of the total land area for the province was made up of wetlands which equates to approximately 6 792 000 ha. To characterize wetlands in the Study Area, a wetland classification model was developed as part of the ELC model and delineated wetlands at a 1:25,000 scale. Wetland habitat was classified along the transmission corridor through a combination of modeling and field work. Figure 4.1.2 provides an example of both the ELC model and the wetland model.

The Study Area as a whole contains approximately 374 ha of wetland habitat, the majority of which is made up of riparian fens, bog-fen complexes, basin bogs, and domed bogs, with riparian fen being the most dominant wetland form along the transmission corridor. Table 4.1.6 summarizes the wetland forms present within the transmission corridor alone and provides relative coverage.

Recognizing the importance of wetlands as a landscape feature performing many biological, hydrological, social/cultural, and economic functions, Project design and planning has focused on avoiding wetlands to the extent feasible.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21
Scale: 1:25,000
Date: 22/11/2012

Data Sources:
Geobase - Road Network
Geogratis - National Atlas
ELC / Wetland Classification: CBCL

Example of Ecological Land Classification and Wetland Model
Victoria River, Island of Newfoundland

FIGURE 4.1.2

ENL0148

Table 4.1.6 Summary of Wetland Forms along Transmission Corridor (NL)

Wetland Form	Cape Ray to Bottom Brook		Burgeo Highway		Area of New Access		Granite Canal Access Road		All Segments	
	Area (ha)	% of Transmission Corridor for Segment	Area (ha)	% of Transmission Corridor for Segment	Area (ha)	% of Transmission Corridor for Segment	Area (ha)	% of Transmission Corridor for Segment	Area (ha)	% of Transmission Corridor
Fen-Bog Complex	0	0.0	0	0.0	3.5	2.1	10.2	2.6	13.7	3.7
Domed Bog	47.8	5.6	2.3	0.6	2.62	1.6	12.6	3.3	65.32	17.5
Basin Bog	54.2	6.4	5.5	1.4	2.2	1.3	14.2	3.7	76.1	20.3
Flat Bog	6.9	0.8	0.1	0.0	1.2	0.7	2.2	0.6	10.4	2.8
Slope Bog	10.9	1.3	2.2	0.6	2	1.2	0.5	0.1	15.6	4.2
Bog (Other Types)	1.1	0.1	1.1	0.3	0.2	0.1	0	0.0	2.4	0.6
Riparian Fen	90	10.6	7.8	2.0	18.8	11.5	68.1	17.7	184.7	49.4
Slope Fen	2.4	0.3	0.5	0.1	2	1.2		0.0	4.9	1.3
Fen (Other Types)	0.7	0.1	0.1	0.0	0	0.0	0.1	0.0	0.9	0.2
Riparian Marsh	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Basin Marsh	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL	**214**	**25.1**	**19.6**	**5.0**	**32.52**	**19.9**	**107.9**	**28.0**	**374.02**	**100**

Rare plant species modeling, which involved using ELC data and existing information on rare plant species (ranked as S1 and greater), identified three SOCI that could be encountered within the Study Area (Table 4.1.7).

Table 4.1.7 Plant Species of Conservation Interest that may Occur in the Study Area (NL)*

Common Name	Scientific Name	Status	
		SARA	NL *ESA*
Mountain Holly Fern	*Polystichum scopulinum*	Threatened	Threatened
Low Northern Rock Cress	*Braya humilis/ Neotorularia humilis*		Endangered
Boreal Felt Lichen	*Erioderma pedicellatum*	Special Concern	Vulnerable
*Based on rare species habitat modeling employing ELC data			

Rare flora surveys were conducted in 2012 along the proposed transmission corridor to determine presence/absence and abundance of rare plants and identify areas that might be particularly sensitive to disturbance. ELC data and rare flora potential modeling were used to focus field efforts. Species ranked S3 or greater were encountered at 56 of the 89 survey sites which were selected based on having moderately high to very high rare flora potential. The Bottom Brook area was identified as being particularly rich in rare species having four S1 species and seven S2 species. Other areas with concentrations of rare species are Codroy Pond and Southwest Brook. Table 4.1.8 provides a summary of rare flora encountered during the surveys. None of the SOCI listed in Table 4.1.7 were encountered during the surveys and none of the species observed during the surveys (Table 4.1.8) are listed by *SARA* or the NL *ESA* although two species (*Oclemena acuminate* and *Symphyotrichum tradescantii*) are assessed as threatened and recommended for listing under the NL *ESA* by the Species Status Advisory Committee in Newfoundland and Labrador.

Table 4.1.8 List of S1, S2 and Selected S3 Species Encountered in Survey Area (NL)

S-Rank	Scientific Name	Common Name
S1	*Dennstaedtia punctiloba*	Hay-scented fern
	Equisetum hyemale	Scouring rush
	Oclemena acuminate	Whorled wood aster
	Prosperpinaca pectinata	Mermaid weed
	Scirpus pedicellatus	Stalked bulrush
	Symphotrichum tradescanti	Shore aster
S1S2	*Eriophorum gracile*	Slender cottongrass
	Hordeum jubatum subsp *jubatum*	Foxtail barley
S2	*Carex Hostian*	Tawny Sedge
	Carex novae angliae	New England sedge
	Carex pseudocyperus	Cyperus sedge
	Crateagus chrysocarpus	Fireberry hawthorn

Table 4.1.8 List of S1, S2 and Selected S3 Species Encountered in Survey Area (NL)

S-Rank	Scientific Name	Common Name
	Hypericum ellipticum	Pale St Johns wort
	Limonium carolinianum	Sea lavender
	Listera auriculata	Auricled twayblade
	Lycopodiella appressa	Southern bog clubmoss
	Mitchella repens	Partridgeberry, two-eyed berry
	Oxyria digyna	Mountain sorrel
	Platanthera grandiflora	Large purple fringed orchid
	Schoenoplectus pungens	Canemakers rush
	Schoenoplectuc tabernaemontani	Great bulrush
	Solidago sempervirens var. *sempervirens*	Seaside goldenrod
	Sparganium fluctuans	Floating bur-reed
	Spartina alterniflora	Saltwater cordgrass
	Xyris Montana	Yellow eyed grass
S2S3	*Agramonia striata*	Woodland agrimony
	Apocynum androsaemifolium	Spreading dogbane
	Apocynum cannabinum	Clasping leaf dogbane
	Scirpus cyperinus	Woolgrass
	Scutellaria lateriflora	Blue skullcap
	Sparganium americanum	American bur-reed
S3	*Ammophila breviligulata*	Beachgrass
	Brachyeletrum septentrionale	Northern shorthusk
	Carex aurea	Goldenfruit sedge
	Carex gracilima Schwein.	Graceful sedge
	Carex hormathodes	Marsh straw sedge
	Carex projecta	Necklace sedge
	Cornus alternifolia	Alternate leaved dogwood
	Epilobium lactiflorum	Milky willow herb
	Epilobium leptophyllum	Bog willow herb
	Equisetum palustre	Marsh horsetail
	Equisetum pretense	Meadow horsetale
	Equisetum variegatum	Variegated scouring rush
	Juncus militaris	Jointed bog rush
	Malaxis unifolia	Green adder's mouth
	Scheuzeria palustris L.	Podgrass
	Schizea pusilla	Curly grass fern
	Schoenoplectus acutus var. *acutus*	Hardstem bulrush
	Scirpus hattorianus	Mosquito bulrush
	Spartina pectinata	Freshwater cord grass
	Veronica scutellata	Marsh speedwell

Protected Areas

There are several provincial parks within, and in proximity, to the Study Area that also provide recreational opportunities, including J. T. Cheeseman Provincial Park, Codroy Valley Provincial Park, T'Railway Provincial Park, and Barachois Pond Provincial Park (refer to Section 6.3 for more information on recreational land use and protected areas).

4.1.3.2 Wildlife

Aerial wildlife reconnaissance surveys conducted in November 2011 and January 2012 revealed evidence (sightings and/or tracks) of typical mammalian species, including moose (*Alces alces*), beaver (*Castor canadensis)*, coyote (*Canis latrans)*, otter (*Lutra canadensis*), and caribou (*Rangifer tarandus*). The Study Area is known habitat for three caribou populations that are part of a larger boreal woodland caribou population occurring in other parts of Canada. The La Poile, Buchans and Grey River populations have all undergone substantial fluctuations since the 1960s, drawing attention to the sustainability of the populations in NL (Section 6.1 provides additional information on caribou). Black bear (*Ursus americanus)* was not observed during these surveys, as this species would have been hibernating, but black bear is known to inhabit the Study Area. Aerial surveys over the Bottom Brook to Cape Ray segment had the most abundance and diversity of wildlife.

Various avifauna surveys were conducted during 2011 and 2012 as summarized in Table 4.1.9. In addition, ACCDC data, North American Breeding Bird Survey data, and habitat mapping was used to model potential presence of Species of Conservation Interest in the Study Area. Raptor species not ranked as Species of Conservation Interest based on federal or provincial criteria, but identified as species of interest by NLDEC, were also considered in the rare species modeling.

Table 4.1.9 Summary of Newfoundland Avifauna Field Program (2011-2012)

Dates	Survey Type	Protocol/Method
Late June, early July 2011	Breeding Bird Survey	Point counts; paired point plot surveys
June 2011	Shoreline Survey	Point counts and incidental observations during travel between point count locations
July, August, September 2012	Shorebird Survey	Atlantic Canada Shorebirds Survey Protocol
June 2012	Breeding Bird Survey	Dawn point count survey – distance sampling; call playback; area searches
June 2012	Directed Species Surveys for Bank Swallow, Rusty Blackbird, Red Crossbill and Short-eared Owl	Ontario Bank Swallow Project Protocol; call playback; Atlas style searches
June 2012	Habitat of Interest Survey (yellow birch and riparian)	Atlas-style search

Breeding bird surveys were conducted in June and July 2011 as well as in June 2012. During the 2011 surveys, a total of 1,036 birds were recorded along the study corridor, representing 79 species. A total of 1,508 birds representing 79 species were recorded during the 2012 breeding bird surveys. Shoreline surveys in June 2011 identified a total of 1,462 birds of 30 species from the three shoreline survey locations. The most abundant species observed during the 2011 and 2012 avifauna surveys are listed below (in alphabetical order):

- American Robin (*Turdus migratorius)*
- Common Yellowthroat (*Geothlypis trichas)*
- Double-crested Cormorant (*Larus argentatus)*
- Fox Sparrow (*Passerella iliaca)*
- Herring Gull (*Phalacrocorax auritus)*
- Magnolia Warbler (*Dendroica magnolia)*
- Ruby-crowned Kinglet (*Regulus calendula)*
- Swainson’s Thrush (*Catharus ustulatus)*
- White-throated Sparrow (*Zonotrichia albicollis)*
- Yellow-bellied Flycatcher (*Empidonax flaviventris)*

General shorebird surveys conducted in 2012 recorded 446 shorebirds representing 10 confirmed species and a possible 11th species (Short-billed Dowitcher (*Limnodromus griseus*)). The three most abundant species, Semipalmated Plover (*Charadrius semipalmatus*), Semipalmated Sandpiper (*Calidris pusilla*) and Least Sandpiper (*Calidris minutilla*) accounted for 53% of the 446 shorebirds recorded during the surveys. J. T. Cheeseman Provincial Park had the greatest shorebird abundance and species richness, attracting 70% of the total number of shorebirds recorded including the endangered Piping Plover (seven sightings over two survey dates).

The NL spring avifauna survey 2012 program also included Atlas-style surveys in appropriate habitat for Bank Swallow (*Riparia riparia*), Olive-sided Flycatcher (*Contopus cooperi*), Rusty Blackbird (*Euphagus carolinus*), Red Crossbill (*Loxia curvirostra*) and Short-eared Owl (*Asio flammeus*). In addition, Atlas-style surveys were conducted in habitats of interest (*i.e*., yellow birch and riparian). An overview of Atlas-style survey results is presented below.

- One area of potential Bank Swallow habitat was investigated. Although this area falls outside of the proposed transmission line corridor, it is adjacent to the corridor and adjacent potential grounding site location. Six Bank Swallows were observed on the beach at Stephenville Crossing. Burrows were found in near vertical sandbanks proximate to the ocean in two locations that were approximately 100 m apart. Bank Swallows were observed entering and exiting burrows at one location.

- In addition to call playback following point counts in potential Olive-sided Flycatcher habitat, eleven areas of potential habitat as identified by the field team during travel in the study corridor were assessed for this species through the use of call playback. Olive-sided Flycatchers responded to call playback three times (27% success). Olive-sided Flycatchers were also identified during point count surveys.
- Similarly, 10 areas of potential Rusty Blackbird habitat were identified and call playback was initiated. Rusty Blackbird responded on one occasion (10% success).
- Only one area of potential Red Crossbill habitat was identified during these field surveys. Red Crossbill call playback was initiated. There was no response by this species.
- Two areas of potential habitat for Short-eared Owl were identified in the proposed transmission line corridor. These areas were surveyed near dusk in ideal weather conditions on June 19, 2012. No Short-eared Owls were detected. The presence of a pair of Northern Harriers (*Circus cyaneus*) at the Wreckhouse may preclude Short-eared Owls also inhabiting this particular area.
- Riparian habitat was surveyed with a general Atlas-style survey in four locations. A total of 31 birds were recorded, representing 21 species.
- Yellow birch stands occur along the western slopes of the Long Range Mountains in the Western region of the proposed transmission line corridor. One accessible stand was surveyed. Of note were the Veery (*Catharus fuscescens*) and Least Flycatcher (*Empidonax minimus*), both of which have a restricted range in Newfoundland, and nesting Northern Goshawk (*Accipiter gentilis*). The male Northern Goshawk was observed and heard near a nest.

The avifauna surveys also identified SOCI (Table 4.1.10). Exposed land (*e.g.*, shorelines, disturbed areas), grassland, and wetland treed habitats were the most prevalent habitats for avian SOCI in the Study Area (refer to Section 6.2 for more information on bird SOCI including additional species that could potentially interact with the Project). No shoreline SOCI were observed during the avifauna surveys.

Table 4.1.10 Bird Species of Conservation Interest Identified during 2011/2012 Avifauna Surveys (island of Newfoundland)

Common Name	Scientific Name	Status	
		SARA	**NL *ESA***
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened
Red Crossbill	*Loxia curvirostra percna*	Endangered	Endangered
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Vulnerable
Piping Plover	*Charadius melodus*	Endangered	Endangered

Raptor species of interest observed during the 2011 and/or 2012 surveys, in the Study Area, included Osprey (*Pandion haliaetus)*, Merlin (*Falco columbarius*) and Northern Goshawk.

The Project will cross, or be located adjacent to, a number of rivers and lakes, including scheduled salmon rivers (DFO 2011). A freshwater fish and fish habitat survey identified approximately 241 stream crossings associated with the transmission corridor.

A total of 82 crossings were surveyed, with 30 sampled for water chemistry analysis. Dominant habitat types included riffle (48%) and run (21%), with boulder substrate dominant in all transmission corridor segments and fines most important in streams associated with the grounding lines. There were no limiting or critical habitats identified at proposed stream crossings; several were noted as high quality rearing habitats, however, these features were not unique in the region. Water chemistry data indicated streams are representative of natural, relatively pristine waters with limited anthropogenic influence. Nutrients were low to absent, reflecting the largely oligotrophic nature and limited productivity of many surface waters. Exceedances of aluminum, cadmium, chromium and iron were considered the result of natural weathering and leaching processes.

A literature review identified various fish species that would be expected to be present in the watersheds in the Study Area (Table 4.1.11). In addition, there is potential for two fish SOCI to occur in the Study Area (Table 4.1.12).

Table 4.1.11 Fish Species Likely to be Present in Watersheds in the Study Area (NL)

Common Name	Scientifc Name
Alewife	*Alosa pseudoharengus*
Arctic char	*Salvenlinus alpinus*
Atlantic salmon	*Salmo salar* (anadramous and landlocked)
Atlantic tomcod	*Microgadus tomcod*
Brook trout	*Salvelinus fontinalis* (anadramous and landlocked)
Mummichog	*Fundulus heteroclitus*
Ninespine stickleback	*Pungitius pungitius*
Rainbow smelt	*Osmerus mordax*
Rainbow trout	*Oncorhynchus mykiss*
Threespine stickleback	*Gasterosteus aculeatus*

Table 4.1.12 Fish Species of Conservation Interest that may occur in the Study Area (NL)

Common Name	Scientific Name	Status	
		SARA	NL *ESA*
American eel	*Angulilla rostrata*	No Status	Vulnerable
Banded killifish* (Newfoundland population)	*Fundulus diaphanous*	Special Concern	Vulnerable
* Seal Cove Brook and Highlands River (Loch Leven) are located within the Study Area and have reported populations of banded killifish downstream from the proposed crossing locations. Populations have also been reported in adjacent areas			

4.2 CABOT STRAIT

Project components in the Cabot Strait include two subsea cables that will span approximately 180 km from Cape Ray, NL, to the Point Aconi Generating Station, NS. This segment of the Project also includes two grounding sites and two landfall sites, where the cables come ashore in each province (refer to Figure 4.2.1). As noted in Section 2, two options for grounding sites have been selected in northeast Cape Breton County near Big Lorraine and Little Lorraine, NS and near Indian Head and St. George's, NL (Figures 1.2.2 and 1.2.4).

The baseline conditions described below are drawn from the results of technical research and studies carried out in support of the Project. Known attributes of the Cabot Strait marine environment were referenced when Project-specific information was not available. The following surveys and studies were undertaken in the Cabot Strait:

- marine geophysical surveys;
- metocean study;
- icebergs and pack ice study;
- ambient underwater sound surveys;
- benthic surveys (within the Cabot Strait and at the grounding site locations); and
- sediment transport and dispersion surveys.

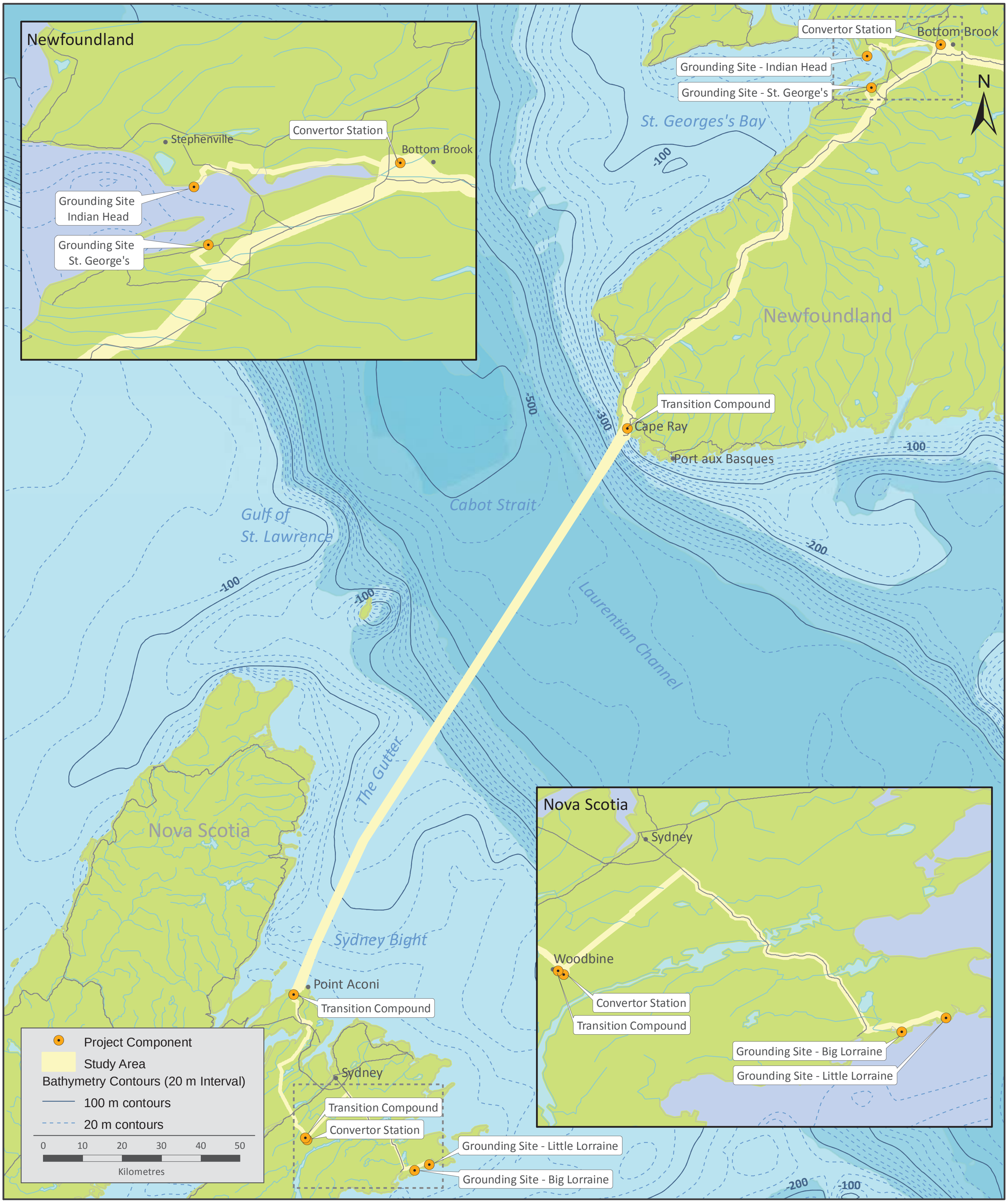
4.2.1 PHYSICAL ENVIRONMENT

The Cabot Strait is the largest of three outlets of the Gulf of St. Lawrence into the Atlantic Ocean, and is a strategically important waterway and international shipping route to inland ports on the Great Lakes and the St. Lawrence Seaway (DFO 2005c).

The following description of the physical environment of the Cabot Strait Study Area is based on a summary of findings from the various baseline studies undertaken for the EA.

4.2.1.1 Bathymetry

The bathymetry of the Cabot Strait is highly variable. Comparatively shallow waters occur in the coastal bays and estuaries while the Laurentian Channel creates a deep trench through the center. The bathymetry is different on either side of the Strait, with water depth nearshore Newfoundland increasing rapidly compared to a more gradual change on the Nova Scotia side. The gradual slope from the Nova Scotia shore ends at the western edge of the Laurentian Channel at a depth of approximately 160 m. From there the Channel drops off quickly to 400 m and then more gradually to 460 m. Off the island of Newfoundland, the steep slopes of the Laurentian Channel are encountered approximately 20 km from shore, and water depth quickly drops to 400 m (Figure 4.2.1).



Coordinate System:
UTM NAD 83 Zone 21

Scale: 1:1,300,000

Data Sources:
Geogratis- National Atlas
Seafloor Features: CBCL

Date: 18/12/2012

FIGURE 4.2.1

Bathymetry
Cabot Strait

ENL118

4.2.1.2 Tides and Ocean Currents

Tides in the Cabot Strait are semi-diurnal, mixed tides with two complete tidal oscillations each day (*i.e.*, two low and two high tides in one day with oscillations of unequal amplitude). Tidal data for the Cabot Strait are available from coastal tide gauges at Port aux Basques, NL and from North Sydney, NS, where the tidal ranges are 2.9 m, and 2.8 m, respectively.

Currents in the Cabot Strait have been examined by geostrophic calculations based on the density structure across the Strait, 3D modelling, and measurements from moored instruments. In general there is an inward surface flow into the Gulf of St. Lawrence on the Newfoundland side and an outward surface flow from the Gulf on the Cape Breton side of the Strait. The currents in the Cabot Strait are seasonally variable due to a variety of factors in the Gulf of St. Lawrence. These factors include: the outflow of relatively fresh surface water from the Gulf of St. Lawrence, the inflow of slope water at deeper water depths from the shelf and into the Gulf through the Laurentian Channel, and the seasonal inflow through the Strait of Belle Isle. All of these factors add to the complexity of currents in the area.

Normal ocean currents categorized by depth, distance from shore, and season for Cabot Strait are illustrated in Figure 4.2.3 and which are based on the modelling results by Han *et al.* (1999). Positive current values in Figure 4.2.3 indicate southward outflow currents from the Gulf of St. Lawrence and northward inflow currents into the Gulf of St. Lawrence are shown as negative current values. The three-dimenstional modelling conducted by Han *et al.* (1999) indicated that the near-surface flow on the Cape Breton side has a speed of 20 cm/s and 15 cm/s on the Newfoundland side. During the fall on the Cape Breton side, the surface outflow current extends over two-thirds of the Strait with speeds of 45 cm /s. In the winter months the main outflow from the Gulf is centred over the 400 m isobath with a speed of 30 cm/s. The spring brings about slower current speeds in the range of 15 cm/s on the Cape Breton side (Oceans Ltd. 2012). This information, however, is based on circulation model output and is subject to uncertainty but which is in agreement for some areas with seasonal mean currents from moored measurements (Han *et al.* 1999).

Physcal current speed measurements for the Cabot Strait are based on 20 moorings from 1966-1979 (Oceans Ltd. 2012). These moorings can be divided into the Newfoundland and Cape Breton sides of the Cabot Strait, as well as mid-channel. The maximum current speed recorded for the Newfoundland side was 132 cm/s at a depth of 50 m in September. Speeds of 98 cm/s at 90 m and 55 cm/s at 225 m in January have also been recorded on the Newfoundland side. Mean current speeds, however, are lower and for the upper 50 m of the Newfoundland side range from 20 cm/s to 49 cm/s, at 100 m the mean water speed ranges from 17 cm/s to 20 cm/s, and at 350 m the current speeds measure about 13 cm/s.

Mid-channel maximum speeds have been recorded at 84 cm/s at 13 m during September. Mean speeds have been recorded at 43 cm/s at 13 m and 8 cm/s at 325 m. On the Cape Breton side maximum speeds of 212 cm/s at 25 m, 157 cm/s at 75 m, 118 cm/s at 140 m, and 110 cm/s at 289 m have been recorded in January. Mean current speeds on the Cape Breton side range from 55 cm/s at 15 m to 13 cm/s at 300 m.

In general, there is a trend in decreasing current speeds with depth across the Strait. Currents are strongest on the Cape Breton Side, followed by the Newfoundland Side and mid-channel respectively. The extreme current speeds on the Newfoundland side, mid-channel, and on the Cape Breton side of the Cabot Strait are provided in Tables 4.2.1, 4.2.2 and 4.2.3, respectively, and after Oceans Ltd. (2012).

Table 4.2.1 Extreme Analysis Results for the Currents on the Newfoundland Side of the Cabot Strait

Near-Surface (0 to 60 m)		
Return Periods (Years)	**Current Speeds (cm/s)**	**Upper 95% Confidence Limits (cm/s)**
1	126	151
5	153	194
10	165	213
50	192	256
100	203	274
Mid-depth (60 to 200 m)		
1	98	116
5	117	146
10	126	159
50	144	189
100	152	201
Deep Waters (200 to 470 m)		
1	56	62
5	59	66
10	65	75
50	71	85
100	73	89

Table 4.2.2 Extreme Analysis Results for the Currents in the Mid-section of the Cabot Strait

Near-Surface (0 to 60 m)		
Return Periods (Years)	**Current Speeds (cm/s)**	**Upper 95% Confidence Limits (cm/s)**
1	86	111
5	113	154
10	125	173
50	152	215
100	163	134
Mid-depth (60 to 200 m)		
1	56	70
5	71	94
10	78	104
50	93	128
100	99	139
Deep Waters (200 to 470 m)		
1	39	47
5	48	62
10	52	68
50	61	82
100	65	88

Table 4.2.3 Extreme Analysis Results for the Currents on the Cape Breton Side of the Cabot Strait

Near-Surface (0 to 60 m)		
Return Periods (Years)	**Current Speeds (cm/s)**	**Upper 95% Confidence Limits (cm/s)**
1	238	302
5	307	412
10	337	459
50	405	567
100	434	614
Mid-depth (60 to 200 m)		
1	163	216
5	220	306
10	244	345
50	301	343
100	325	473
Deep Waters (200 to 470 m)		
1	91	124
5	126	179
10	141	203
50	176	258
100	191	282

4.2.1.3 Wind and Waves

Wind data have been collected from the MSC50 Data set from 1954-2007 in the Cabot Strait (at Node 12507 at 47.5° N and 59.9° W) (AMEC 2007). A wind rose has been created using the compiled data and is reproduced in Figure 4.2.2. Maximum wind speeds of 72 km/h have been recorded in the area and are typically strongest during the months of November to February. Westerly winds predominate, with the highest velocities from the northwest and west during the winter months (Figure 4.2.2).

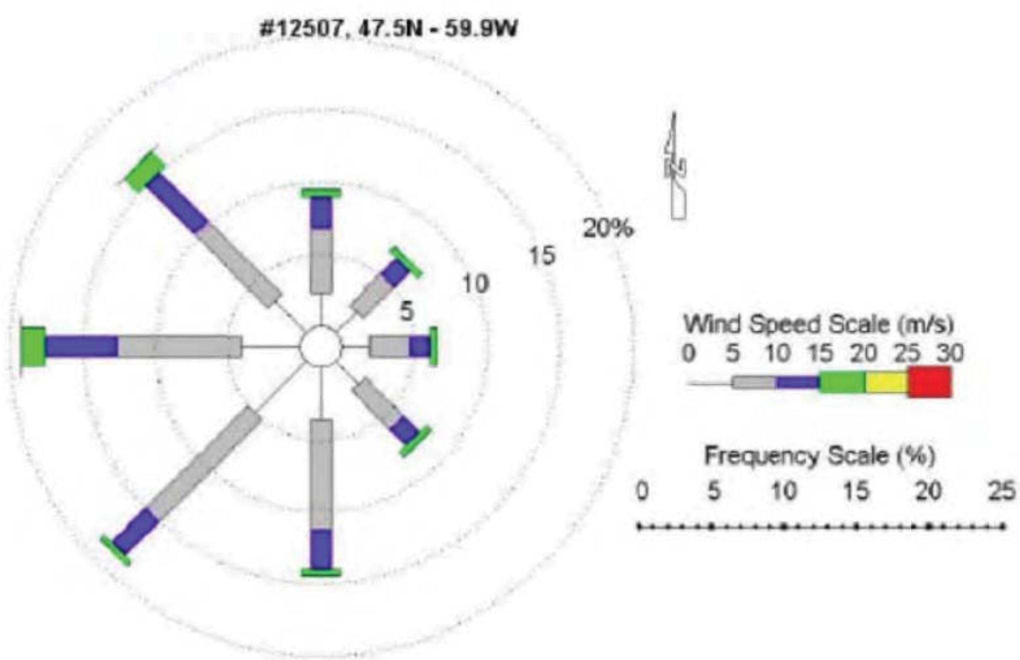
Wave data have also been collected from the MSC50 Node 12507 in the Cabot Strait. Waves are probable from all directions (AMEC 2007) but are often aligned in a northwest to southeast direction with the flow of current in the Strait. During the winter waves predominantly travel from the west to northwest; during the summer months the predominant wave direction is from the southwest and south. The majority of waves at Node 12507 are between 1 and 1.5 m (21%), with probability of larger waves decreasing with wave size (waves in the range of 3.5 m to 4 m are observed 2 to 3% of the time. Waves up to 10 m in height are possible, but occur very infrequently. Waves in the winter months (October to January) are usually twice as high compared to the summer months.

4.2.1.4 Water Temperature and Salinity

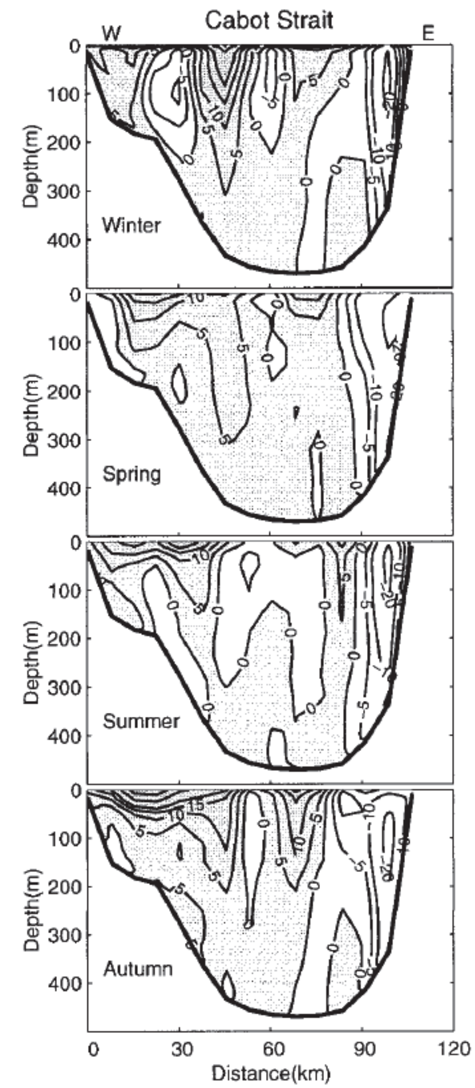
The general water temperature in the Cabot Strait by depth and time of year can be seen in Figure 4.2.3 (at the MSC50 node 12507). There is a steady year-round thermocline at the 175 m to 200 m depth. Water temperature above this thermocline remains constant between 0°C and 2°C up to approximately 50 m below the surface. Water temperature below the thermocline is constant at 4°C to 6°C. The coldest sea surface temperatures occur during the months of February and March with temperatures around 0°C. From May to September a surface thermocline forms creating a warm surface layer to a depth of approximately 50 m. Surface temperatures can reach as high as 15°C during August and September.

The general salinity profile for the Cabot Strait is also provided in Figure 4.2.3. From January to March the surface salinities are relatively higher due to vertical mixing caused by winter storms. During April and May a thermocline begins to form preventing surface waters from mixing with deeper water. As a result, from April to December the upper 50 m of the water column has a salinity of approximately 30 practical salinity units (psu). This halocline breaks up in January with the onset of storms and vertical mixing. During August to October isohalines at greater depths shift downwards 75 m to 100 m.

Annual Wind Rose for MSC50 Node 12507



Normal Ocean Current Velocity



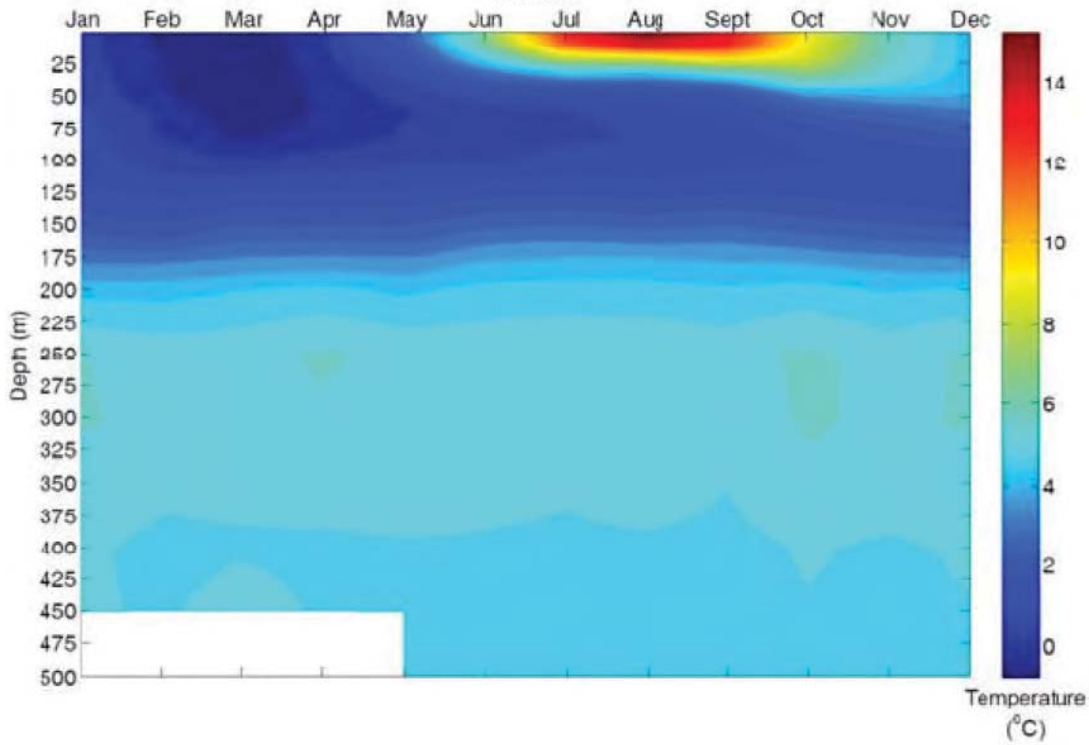
Data Sources:
Wind Rose - AMEC (2007)
Ocean currents Volocity - Han et al. (1999)
Date: 22/11/2012

FIGURE 4.2.2

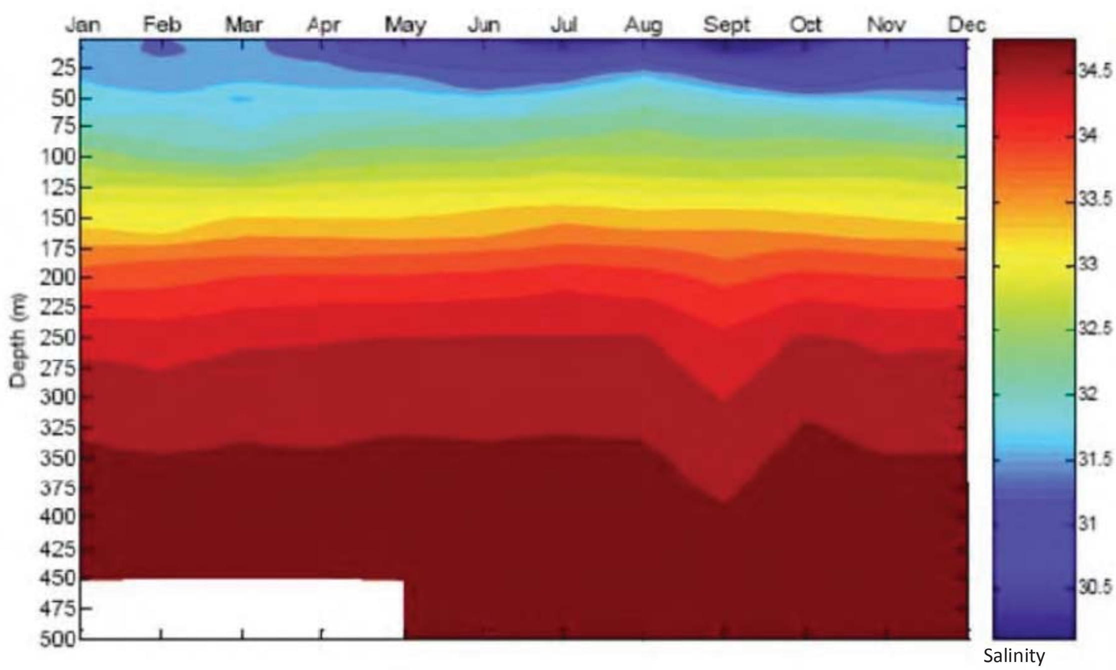
Annual Wind Rose for MSC50 Node 12507 & Normal Ocean Current Velocity
Cabot Strait

ENL120

Monthly Water Temperature



Monthly Salinity



Data Sources: AMEC (2007)

Date: 21/11/2012

FIGURE 4.2.3

Monthly Water Temperature & Salinity Profile
Cabot Strait

ENL121

4.2.1.5 Ice

Ice scour risk has been considered for the nearshore areas of NL and NS and all portions of the Study Area less than 200 m deep. Sea ice typically forms in the western and northern coastal zones of the Gulf of St. Lawrence during December and by the end of January the sea ice starts to flow through the Cabot Strait under the influence of surface currents and wind. Some years a mixture of drift ice and locally formed ice may extend as far as Halifax and to the southwest towards Sable Island. The spring breakup normally commences in March and recedes to isolated patches of ice within the Gulf of St. Lawrence by mid-April. In severe years ice may stay on the Scotian Shelf until May or June.

4.2.1.6 Ambient Noise for the Study Area (Cabot Strait)

The Cabot Strait is characterized by frequent sounds from marine mammal and anthropogenic sources. Sound pressure levels (SPLs) measured at four stations spread across the Study Area showed that anthropogenic sources are a major contributor to ambient noise, including distant shipping noise which was present at all times.

Localized vessel detections occurred most frequently above the slope on the Nova Scotia side of the Laurentian Channel, increasing noise levels by 15 to 20 dB when vessels were present. Shipping detections in the Laurentian Channel had a mean Sound Pressure Level (SPL) of 129 dB_{rms} at the depth of the recorder (350 m). This equates to a minimum source level of approximately 180 dB_{rms} re 1 μPa near the surface from vessels using the Cabot Strait on a regular basis.

4.2.1.7 Sediment Quality

Sediment quality was determined from grab samples taken at 19 locations spread across the Study Area. Very low levels (33 to 57 mg. kg^{-1}) of C21-C32 fraction of hydrocarbons were detected in 8 samples, mostly located on the NS shelf, suggesting possible lube oil contamination. There were no hydrocarbons detected in the other sediment samples. Trace metal results for all grab locations were below the Canadian Council of Ministers for the Environment (CCME) sediment quality guidelines for adverse biological effects.

4.2.2 GEOPHYSICAL ENVIRONMENT

The Cabot Strait between Cape Ray, NL, and Cape North, NS, is approximately 105 km wide. The Maritime Link cable route runs from Cape Ray to the Point Aconi region of NS, thus crossing a portion of the Cape Breton Shelf known as the Sydney Bight, for a total distance of 180 km. Water depths across the Cabot Strait, increase rapidly from the Cape Ray region to 470 m in the Laurentian Channel where the seabed is regionally flat. On the Nova Scotia side of the Channel the cable route crosses the Sydney Bight, a relatively shallow shelf with depths under 200 m, gradually sloping to the Point Aconi region over a distance of 65 km.

The Laurentian Channel, or Trough, is a long, linear feature that is interpreted to have resulted from very old river systems that were severely eroded by subsequent glacial ice streams during the Pleistocene. The Channel runs from the estuary of the St. Lawrence River, across the Gulf of St Lawrence, and through the Cabot Strait to, terminate in 500 – 600 m water depth at the edge of the continental shelf south of Newfoundland. It is a relatively steep-sided channel with numerous elongated depressions on the floor that range up to 100 m deeper than the surrounding seabed.

The following description of the geophysical environment of the Cabot Strait Study Area is based on a summary of findings from the various baseline studies undertaken for the EA pertaining to the following features:

- surficial sediments;
- gas-vent pockmarks;
- sedimentary furrows and preglacial iceberg scour; and
- sand waves and megaripples.

4.2.2.1 Bedrock Geology

The Cabot Strait occurs within the Maritimes Basin physiographic province which contains thick sedimentary bedrock of Mississippian to Permian age. The cable route lies within the region known as the Sydney Basin. The sedimentary bedrock underlies the Cabot Strait, the Sydney Bight, and is continuous to the onshore region at Point Aconi. The sedimentary rocks, consisting of sandstone, siltstone, shale, conglomerate and coal seams, continue across the Strait to within a few kilometres of the south coast of Newfoundland. There they overlie much older deformed metamorphic and igneous rocks in the nearshore region which occur as isolated coastal shoals of rugged terrain. In the nearshore region of the Point Aconi area, bedrock crops out of the seabed as a series of north-west trending sedimentary ridges that are cut in places by ancient river channels trending seaward. These old river channels are filled with post glacial gravels and sands.

4.2.2.2 Surficial Sediments

In the Cabot Strait and Sydney Bight area, the bedrock is overlain by a nearly continuous cover of sediments with bedrock cropping out only in the nearshore regions. The unconsolidated sediments fill irregularities in the bedrock surface and range up to 100 m in thickness. The sediment distribution is largely controlled by both erosion and deposition from continental glaciers, submarine topography and post glacial sea level change. Soft, fine-grained muds and sandy muds occur in the deep water of the Laurentian Channel. Sandy muds and muddy sands occur on the channel flanks. The deep water muddy sediments range to 40 m in thickness. The clay content ranges between 45 and 65% and the silt content ranges between 30 and 50%.

The surficial sediment comprises a package of till above bedrock, overlain by glaciomarine stratified sediment and post glacial muds. In regions shallower than approximately 90 m, the interpreted depth of post-glacial sea level, pre-existing glacial sediments have been reworked and eroded into transgressive sands and gravels with a variety of bedforms.

The characteristics of surficial sediments in the Study Area were determined from side-scan sonar data; still images and video; and from detailed grain size analysis of sediment grab samples. Analysis of the side-scan sonar data revealed 18 distinct bottom types of the seafloor in the Study Area. Underwater video footage confirmed that the differences between the regions delineated acoustically were due to changes in substrate and bedforms. Particle size analysis showed that the substrate types ranged from sandy-silt to sand across the Study Area. On the Newfoundland side, the substrate is primarily sandy to approximately 7.5 km from shore; the substrate is silty through the central portions of the Study Area; and sandy-silt predominates from approximately 15 km east of the NS shoreline. Bedrock was noted in the nearshore of the island of Newfoundland up to water depths of approximately 130 m and off NS at water depths of up to 37 m. Coarser materials were also identified including: cobble/sand; cobble reef; and cobble/coralline algae. Video and still photography is important in characterizing these types of substrates as sampling coarse or compacted sediments is not possible with box-core sampling.

4.2.2.3 Seabed Features and Processes

The narrowing of the Laurentian Channel between NS and the island of Newfoundland results in faster currents which have produced a variety of seabed features, including linear depressions in the deep muddy sediments and sand bedforms in the nearshore, particularly near Newfoundland. There are numerous pockmarks in deep-water sediments in the Cabot Strait, formed by gas venting from the bedrock below; most are considered to be inactive (Fader pers. comm. 2012). Linear depressions (sedimentary furrows) up to 1 m in depth also occur in deep-water regions where pockmarks are found. On both flanks of the Laurentian Channel where till crops out on the seabed, regions of preglacial iceberg furrows and pits occur. These are interpreted largely as relict features and form a criss-cross pattern of ridges and troughs up to 10 m in depth and several hundred meters in width. Boulders can occur on the iceberg furrow berms and in places silty and sandy sediments have been deposited in the furrow troughs.

The Project crosses the deep section of the Laurentian Channel, with sediments composed of silt (muddy clay) and scattered with pockmarks and parallel furrows. Pockmarks are cone-shaped depressions on the seabed resulting from the escape of gas or liquids from the subsurface, and can range in size from a few metres to over 1 km in diameter and up to 50 m in depth off Nova Scotia on the Scotian Shelf. For the Study Area, pockmarks occur approximately 38 km from the NL shoreline, at about 460 m water depth, to approximately 53 km off NS (Figure 4.2.4). A total of 745 pockmarks were observed within the surveyed portions of the Study Area, ranging in diameter from 10 m to over 300 m. The average diameter of pockmarks is 42 m along the short axis and 74 m along the long axis; the average depth is 2.4 m.

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Geogratis- National Atlas

Scale: 1:800,000

Date: 18/12/2012

FIGURE 4.2.4

Seafloor Features
Cabot Strait

ENL126

Sedimentary furrows are trenches found in the deep water muddy seabed of the Laurentian Channel and are generally found in the same area as pockmarks. The furrows are parallel to one another and occur within the Study Area from 28 to 43 km from the Newfoundland shore (Figure 4.2.4). The furrows typically extend beyond the 2 km width of the Study Area. Large areas of furrows, created by ancient icebergs that grounded in the past, occur on either side of the Laurentian Channel (Figure 4.2.4).

Sand waves and megaripples are bedforms generated by flow over the seafloor, with crestlines oriented in the direction of the current. These features are formed by constructive and erosive processes that accompany sediment transport and are typically characterized by a lee face oriented in the direction of bedform migration and a stoss face. Sand waves and megaripples are found within 2% of the Study Area (Figure 4.2.4). The largest sand waves have wavelengths of 100 m and amplitudes of 1 to 2 m.

In the nearshore shallow region of Point Aconi, the seabed is largely exposed sedimentary bedrock, gravel and sand, and the sediments have been shaped into a complex pattern of bedforms as a result of waves and currents. A similar pattern also occurs off Cape Ray on the Newfoundland side of the Strait where sand and gravel dominate the nearshore region across a flat seabed with a few isolated bedrock shoals.

4.2.3 BIOLOGICAL ENVIRONMENT

The biological baseline conditions of Study Area in the Cabot Strait were characterized using existing information and field data collected for the deep water marine environment, and the nearshore marine environment, during 2011 and early 2012. Other field studies included coastal avifauna migration surveys and shoreline surveys.

4.2.3.1 Offshore Habitat

Seafloor video and stills from surveys undertaken for ENL revealed a diverse benthic environment within the Study Area traversing the Cabot Strait. Species of interest included soft and hard corals. Soft corals were abundant in the iceberg scours and cobble reefs throughout the survey area. Sea pens (*Pennatula* sp.) and other soft corals (*Anthoptilum* sp.) were commonly observed in high densities within the Laurentian Channel and along the slopes. Some soft coral species were difficult to identify from the video/stills, but could possibly be of the *Primnoa* or *Paramuricea* genera.

Sea anemones (*Bolocera* sp. and *Urticina* sp.) and sea urchins (*Strongylocentrotus droebachiensis*) were also commonly observed on either side of the Channel, as well as sea stars (*Ceramaster* sp. in the northern section, *Crossaster* sp, *Gorgonocephalus* sp. and *Solaster* sp. in the southern section). Two sites in the northern section of the Study Area contained *Crinoid* fields and display high densities of the feather star (unidentifiable to genus) from 8 to 11 individuals/m^2.

Using video and still photographs (50 camera stations), detailed statistical analysis of the benthic macrofauna data was used to compare faunal patterns among the 18 acoustically defined seafloor types across the Study Area. The analysis showed a trend in sediment composition from sediments with a high percentage of mud off NS to sediments with a high percentage of sand off NL. It was also evident that epifaunal community types are related to changes in sediment composition and geographical location, resulting in discrete epifaunal communities from the NS shelf, the NL shelf, and the deep-water channel.

Using the analysis of the underwater video, seafloor photographs, benthic grab grain size analysis, and sediment chemistry, discrete benthic habitat classes were designated along the length of the Study Area. The faunal and surficial sediment/geomorphology characteristics within each of the 18 acoustic classes were distinctive enough to be classified as separate habitats.

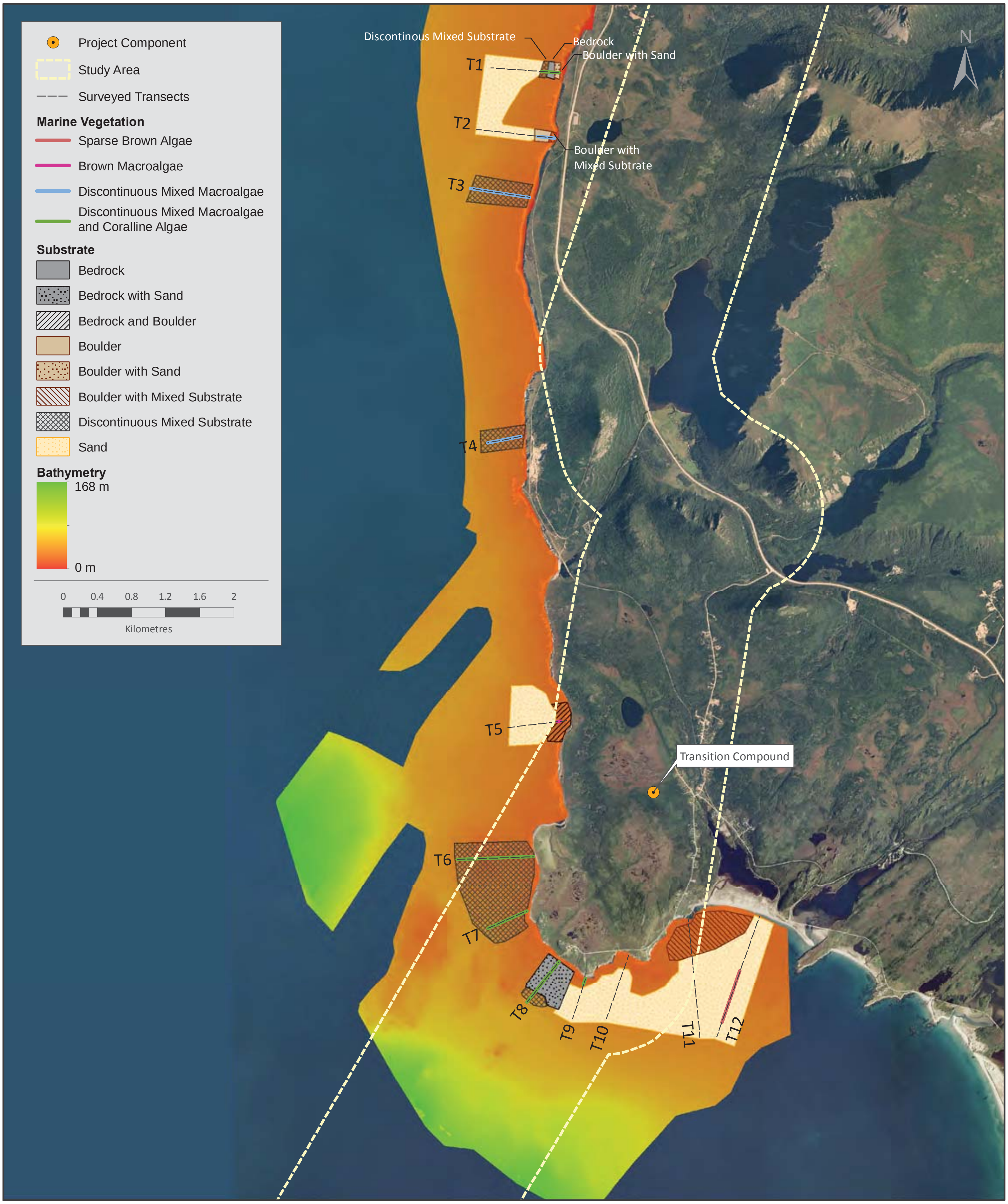
4.2.3.2 Nearshore Habitat - Landfall Sites

The nearshore marine environment of the Project encompasses the coastal areas of Cape Ray, NL and Point Aconi, NS to a water depth of 20 m. These two locations represent the landfall sites of the subsea cable. To characterize the marine environment at these sites, field surveys were conducted in 2011 to assess the benthic environment, water quality, and sediment chemistry and composition. The diversity and abundance of fish and shellfish are also included in this section.

<u>Cape Ray, NL</u>

Underwater video transect surveys using an ROV were completed at Cape Ray, NL in September and October of 2011. The surveys were conducted along 12 transects perpendicular to shore from a water depth of about 5 m out to a maximum depth of 20 m. The video results were analyzed and the substrate type, macroflora, and macrofauna were recorded for each transect. General observations of marine birds, shorebirds and marine mammals were also recorded during the field program. In addition to the ROV surveys, sediment samples and water quality profiles were collected. Fourteen sediment samples were collected from Cape Ray, NL and were analyzed and compared to CCME sediment quality guidelines and CEPA criteria for disposal at sea. Four of the sediment samples were analyzed for benthic macroinvertebrates. Water temperature profiles were recorded at each sediment sampling station at 1-m depth intervals throughout the water column.

The results of the nearshore benthic habitat survey are illustrated in Figure 4.2.5. The shoreline along the northern extent of the Study Area is characterized by exposed, narrow rocky beaches and sloping hills, with cliffs in places (transects T1 – T6 in Figure 4.2.5). In the vicinity of the Cape Ray lighthouse site and adjacent to the landfall site (T7 – T9, Figure 4.2.5), the shoreline is dominated by gently sloping rocky and boulder beaches as well as exposed headland. In the Study Area, semi-protected areas were observed at the landfall site (T10, T11 and T12, Figure 4.2.5).



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Substrate & Vegetation: Stantec; Bathymetry: Fugro

Scale: 1:60,000

Date: 22/11/2012

FIGURE 4.2.5

Marine Habitat Classification
Cape Ray

ENL088

Based on video surveys, the majority of the landfall site can be characterized as boulder, bedrock, and cobble habitat with dense coverage of macroalgae and epifauna in places, and devoid of fauna in other locations. Sandy habitat was observed within transects T1, T2, T5, T9 and T11. Coarse sand and gravel patches were also observed within the landfall survey area. Using the results of the field-based benthic survey, marine nearshore habitat types were classified along the extent of the Cape Ray, NL landfall site (Figure 4.2.5).The geophysical study confirmed that concentrations of bedrock existed nearshore and that the substrate was dominated by sand away from shore in the most northern extent of the landfall site (T1 – T3). In the vicinity of the Cape Ray lighthouse (approximately T6 – T10), the geophysical study confirmed that the substrate consisted of bedrock outcrops near the shore, while further from shore the substrate was dominated by sand with shell fragments overlying glacial till and bedrock. Analysis of sediment chemistry confirmed that total organic carbon was relatively low (*i.e.*, ≤ 4.1 g/kg) at all stations and that no sediment samples exceeded either the CCME sediment quality guidelines or the *CEPA* screening criteria for disposal at sea.

Coralline algae were commonly seen on the rocks throughout the landfall site. With the exception of transect T10 (Figure 4.2.5), the remainder of the transects had brown algae, (sea colander (*Agarum cribrosum*), sour weed (*Desmarestia* sp.), ribbon weed (*Punctaria* sp.), edible kelp (*Alaria esculenta*), Fucus, and kelp) and red algae throughout the rocky areas and occasionally in the sandy areas. Sand dollars (*Echinarachnius parma*) were abundant in many of the sandy areas, while green sea urchins (*Strongylocentrotus droebachiensis)* were abundant in many of the rocky intertidal areas. Sea stars and various species of fish were commonly seen throughout the landfall site. Table 4.2.4 provides a summary of the fauna and flora observed in the underwater video surveys completed at the Cape Ray, NL area including the landfall site.

Table 4.2.4 Flora and Fauna Observed in the Nearshore Marine Environment of Cape Ray, NL

Common Name	Scientific Name
Flora	
Rockweed	*Fucus* spp.
Sour Weed	*Desmarestia* sp.
Kelp	*Laminaria* sp.
Sea Colander	*Agarum cribrosum*
Ribbon Weed	*Punctaria* sp.
Coralline Red Algae	Not identified to species
Edible Kelp	*Alaria esculenta*
Fauna	
Cnidarians	
Jellyfish	Not identified to species
Sea Anemone	Not identified to species

Table 4.2.4 Flora and Fauna Observed in the Nearshore Marine Environment of Cape Ray, NL

Common Name	Scientific Name
Mollusks	
Bivalves	Not identified to species
Northern Moon Snail	*Lunatia heros*
Crustaceans	
American Lobster	*Homarus americanus*
Crabs	Not identified to species
Barnacles	Not identified to species
Echinoderms	
Sea Stars	*Asterias* and/or *Leptasterias* sp.
Sand Dollars	*Echinarachnius parma*
Green Sea Urchins	*Strongylocentrotus droebachiensis*
Other	
Sponges	Not identified to species
Fish	
Atlantic Cod	*Gadus morhua*
Atlantic Mackerel	*Scomber scombrus*
Cunner	*Tautogolabrus adspersus*
Flounder	Not identified to species
Shorthorn Sculpin	*Myoxocephalus scorpius*
Winter Skate	*Raja ocellata*
Marine Mammals	
Grey Seal	*Halichoerus grypus*
Harbour Seal (Atlantic & Eastern Arctic subspecies)	*Phoca vitulina*
Minke Whale	*Balaenoptera acutostrata*
Birds	
Herring Gull	*Larus argentatus*
Sooty Shearwater	*Puffinus griseus*
Great Black-backed Gull	*Larus marinus*
Northern Gannet	*Morus bassanus*
White-winged Scoter	*Melanitta fusca*
Storm Petrels	Not identified to species
Phalaropes	Not identified to species
Loons	Not identified to species
Terns	Not identified to species
Ducks	Not identified to species
Sandpipers	Not identified to species

The infaunal benthic macroinvertebrates in the Study Area of Cape Ray are typical of areas with fine, sandy sediments. Abundance ranged from 45 to 443 organisms per square metre at the four stations that were sampled (Table 4.2.5). The range is neither particularly low nor overly high, suggesting that toxic effects and nutrient loadings are not a major issue at the landfall site. Taxa richness ranged between 12 and 22 distinct taxa. In general, taxa richness increased with depth and distance from shore. Nearshore environments are typically less stable and are affected by shifts in salinity, temperature, and physical alterations due to storm events and tidal effects. Unstable environments can result in a decrease in taxa richness. Overall, the results summarized in Table 4.2.5 confirm that the infaunal benthic macroinvertebrate communities at Cape Ray are neither particularly productive nor indicative of pollutant or nutrient stress. The specific composition of benthic communities within the area appear to be driven by a combination of food availability and environmental stability relating to substrate, depth and distance from shoreline.

Table 4.2.5 Calculated Community Indices of Infaunal Benthic Invertebrates of Cape Ray, NL.

Parameter	Station ID			
	10A	11B	11C	11D
Abundance per m^2	118	443	45	83
Taxa Richness	15	22	12	14
Simpson's Diversity Index	0.731	0.740	0.825	0.815
Simpson's Evenness Index	0.248	0.175	0.475	0.385
Shannon-Wiener Index	1.759	1.776	2.023	2.033
Percent Composition				
Annelids	29.7	23.7	35.6	49.4
Crustaceans	11.0	3.4	31.1	28.9
Bivalves	2.5	43.6	24.4	9.6
Functional Feeding Groups				
Gatherers	84.7	54.4	44.4	61.4
Filterers	2.5	43.6	24.4	9.6
Shredders	10.2	2.0	31.1	28.9

Profiling of the water column for temperature was carried throughout multiple sites at Cape Ray, NL. No vertical thermal stratification was observed at the time of the survey (October, 2011). Surface water temperatures ranged from 11°C to 17.9°C. At the bottom, water temperatures ranged from 10.9°C to 16.6°C.

<u>Point Aconi, NS</u>

The nearshore marine environment at Point Aconi, NS was characterized using transect video surveys, sediment sampling, and water quality profiling as described above for Cape Ray, NL. The primary differences between the survey methods are that the Point Aconi nearshore marine environment was assessed in September of 2011, water profiling was completed for both temperature and salinity, and benthic macroinvertebrates could not be sampled. The hard, heavily compacted sand and underlying bedrock in the area prevented the collection of sediment samples for physical, biological or chemical analyses.

The landfall at the Point Aconi Generating Station is located on the northern coast of Cape Breton and is characterized by exposed cliffs and narrow sandy beaches. Coniferous trees grow to the edge of the cliffs and brown algae (*Fucus* spp.) were evident on the exposed rock at low tide. The results of the benthic habitat survey at Point Aconi are illustrated in Figure 4.2.6.

Based upon the video surveys conducted September 26-29, 2011, the majority of the nearshore benthic environment near Point Aconi is characterized by rocky habitat supporting zones of dense macroalgae cover interspersed with bare, rocky expanses lacking macroflora. Each transect had sections where rock or sand was predominant; however, the substrate continuously transitioned between various mixtures of substrate type. The rocky habitat included boulder, cobble and gravel. The geophysical survey in the area of the landfall site confirmed the presence of surficial coarse sand and gravel lying on bedrock (transects T1 and T2 (Figure 4.2.6). The geophysical survey also noted the presence of abandoned underground coal mines in this area.

Rockweed were predominant in the intertidal zone, with other species of brown algae being observed. Red algae were occasionally present. Beyond the intertidal zone, kelp, sour weed, and sea colander were the most commonly observed algal species. Irish moss (*Chondrus crispus*), dulse (*Palmaria palmate*), and bushy red weed (*Cystolonium purpureum*) were also observed in the deeper areas. Lobster were present in all transects surveyed, with the exception of T1. Cunner and unidentified fish were seen throughout the nearshore marine environment of the landfall site. Table 4.2.6 provides a summary of the fauna and flora observed in the video surveys completed in the Point Aconi area.

Table 4.2.6 Flora and Fauna Observed in the Nearshore Environment at Point Aconi, NS

Common Name	Scientific Name
Flora	
Rockweed	*Fucus* spp.
Cord Weed	*Chorda filum*
Sour Weed	*Desmarestia* sp.
Kelp	*Laminaria* sp.
Sea Colander	*Agarum cribrosum*
Ribbon Weed	*Punctaria* sp.
Dulse	*Palmaria palmate*
Oarweed Kelp	*Saccharina lattisima*
Irish Moss	*Chondrus crispus*
Bushy Red Weed	*Cystolonium purpureum*

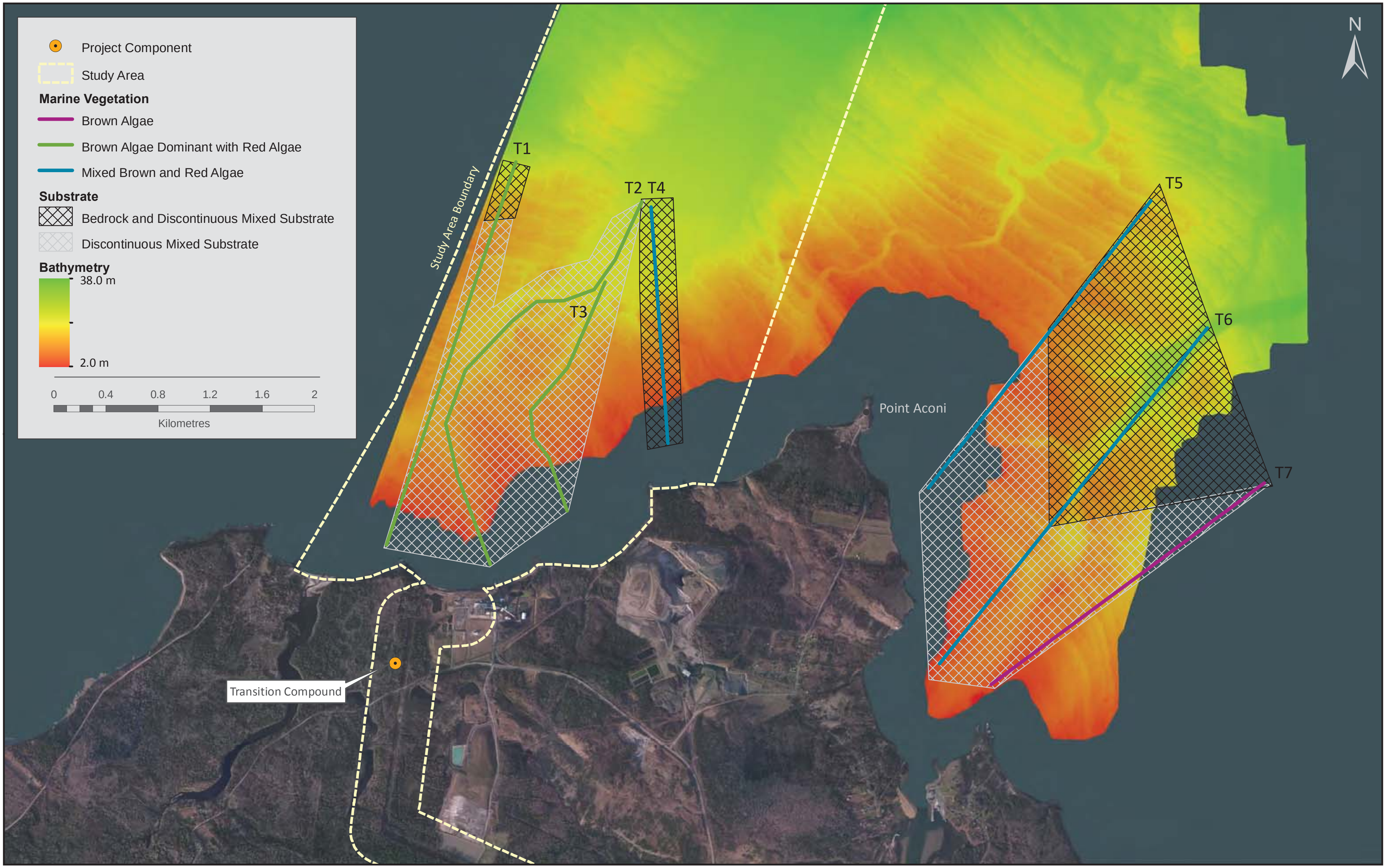
Table 4.2.6 Flora and Fauna Observed in the Nearshore Environment at Point Aconi, NS

Common Name	Scientific Name
Fauna	
Cunner	*Tautogolabrus adspersus*
Crabs	Not identified to species
American Lobster	*Homarus americanus*
Herring Gull	*Larus argentatus*
Great Black-backed Gull	*Larus marinus*
Double-crested Cormorant	*Phalacrocorax auritus*
Common Tern	*Sterna hirundo*

The Point Aconi nearshore environment exhibits a narrow range of surface and bottom water temperatures across the profiling stations. With the exception of Station 1.2 (located nearshore along T1, Figure 4.2.6), surface temperatures ranged from 15.2°C to 16.5°C and bottom temperatures ranged from 15.4 – 15.7°C. No strong vertical thermal stratification was observed at any station, suggesting the water column is well mixed. The general trend within the nearshore area was a minor decrease in water temperature with increasing water depth at the time of the water profiling (*i.e.*, September 2011). The exception to this trend was Station 1.2, which supported the reverse trend, anticipated to be the result of discharge from Mill Pond. The general salinity trend observed was an increase in salinity with increasing water depth. Salinity ranged from 27.0 – 28.33 psu (practical salinity unit) at the surface and 27.7 – 28.5 psu at the bottom of the water column at the time of the survey.

4.2.3.3 Nearshore Habitat - Grounding Site

The nearshore marine environment at several potential grounding sites was assessed in St. George's Bay, NL and Cape Breton, NS. The investigation included, but was not limited, to shoreline and benthic habitats, water quality, as well as sediment chemistry and composition. Additionally, underwater video surveys of the benthic environment were completed along transects running parallel to shore at the 2 m and 5 m depth contours, where conditions permitted. The two potential sites in St. George's Bay, NL (Figure 1.2.2); St. George's and Rothesay Bay were assessed from September 15-20, 2012 while another two potential sites in Cape Breton, NS; Big Lorraine and Little Lorraine were assessed from August 10-12, 2012.



Emera
Newfoundland & Labrador

Coordinate System:
UTM NAD 83 Zone 21

Scale: 1:40,000
Date: 21/11/2012

Data Source:
Imagery: CBRM
Bathymetry: Fugro
Marine Habitat Data: Stantec

FIGURE 4.2.6
Marine Habitat Classification
Point Aconi

ENL0086

Rothesay Bay

Rothesay Bay is located along the northern shore of St. George's Bay on the western coast of the Island of Newfoundland. The site is dominated by sheer, bedrock cliffs interspersed with cobble and sand beaches along the western two-thirds of the site. The backshore along this portion is steeply sloped and comprised of grass and moss along the cliff edge backed with dense coniferous trees. Knotted wrack (*Ascophyllum nodosum*) and barnacles (*Semibalanus balanoides*) were observed throughout intertidal rock faces while cobble beach areas contained fucoid algae. The eastern third of Rothesay Bay is characterized by a cobble beach peninsula, which protects a small lagoon as well as a small open cove (Seal Cove). The backshore around the lagoon is gently sloped and comprised of dense coniferous trees. Only sand with sparse boulders were observed along the intertidal zone in this section.

Along the 2 m depth contour, the substrate was almost exclusively a flat expanse of ripple sand with sparse boulders along the eastern half of the video transect. The filamentous red algae, *Cystoclonium purpureum*, was dense along the substrate and floating in the water column while boulders and cobble were covered with *Fucus* spp. and unidentified red algae. The western two-thirds of the transect were topographically complex outcrops of exposed bedrock and boulders covered with *Fucus* spp. and an unidentified red algae. Numerous unidentified whelks, eight seastars (*Asterias vulgaris*), and three rock crabs (*Cancer irroratus*) were noted. Extensive, flat zones of rippled sand with exposed bedrock, sparse boulders and cobble/gravel mixes predominated the 5 m habitat transect. Boulders and cobble were covered with *Fucus* spp. and an unidentified species of red algae. One individual eelgrass (*Zostera marina*) shoot was also observed. Macrofauna observed included one seastar, four rock crabs, two sand dollars (*Echinarachnius parma*), and an American lobster (*Homarus americanus*).

None of five sediment samples collected exceeded the *CEPA* screening criteria. Two samples however, marginally exceeded the Interim Sediment Quality Guideline (ISQG) for chromium, but these values were below the Probable Effects Level (PEL) and, therefore, no strong likelihood of adverse biological effects exists. Particle grain size at this site averaged 98.2% sand and had a relatively low mean total organic carbon (TOC) value of 0.42 g/kg. Water column profiles indicated this site was isothermal with a narrow range of temperatures from 15.6 – 16.6°C observed between 0.2 and 6.1 m depth, respectively. Salinity values at Rothesay Bay were noticably startified and exhibited a pycnocline transitioning from 23.6 - 25.6‰ at 2 m depth to between 30.2 - 31.4‰ by 4 m depth.

Table 4.2.7 Flora and Fauna Noted to Inhabit the Rothesay Bay, NL area

Common Name	Scientific Name
Flora	
Knotted wrack	*Ascophyllum nodosum*
Purple claw weed	*Cystoclonium purpureum*
Brown algae	*Fucus* spp.
Red algae	Not identified to species

Table 4.2.7 Flora and Fauna Noted to Inhabit the Rothesay Bay, NL area

Common Name	Scientific Name
Eelgrass	*Zostera marina*
Sea whip	*Chorda filum*
Fauna	
Barnacles	*Semibalanus balanoides*
Whelks	Not identified to species
Seastars	*Asterias vulgaris*
Rock crabs	*Cancer irroratus*
Sand dollars	*Echinarachnius parma*
American lobster	*Homarus americanus*

St. George's

The St. George's site is located along the southern shore of St. George's Bay on the western coast of the Island of Newfoundland. This site is protected seaward by an extensive sand bar system and Flat Island. Overall, the site is characterized by gentle slopes along the intertidal and backshore. Numerous private residences and cottages are located along the shoreline while two wharves are located in the central section of the study area. A large commercial loading pier is situated east of the study area. The intertidal zone consisted of sand beaches with boulders covered with knotted wrack and *Fucus* spp. Eelgrass wrack was also prominent along the high intertidal zone. The steep areas of the western section transition to a gentle sloping backshore of grasses and shrubs to the east. Intertidal areas here were characterized by a mix of sand and cobble/gravel beaches, each with boulders covered by knotted wrack and *Fucus* spp. Areas of anoxic sediment covered with mats of bacteria (*Beggiatoa* spp.) were also noted along the shoreline in areas of dense eelgrass wrack.

Along the 2 m depth contour, the substrate was a homogenous mix of fine sand/mud sediments with cobble/gravel patches and sparse boulders Macroflora was dominated by large areas of dense eelgrass (80-100% cover) while *Fucus* spp., sparse sea whip (*Chorda filum*) and sea moss *(Cladophora rupestris)* were found attached to boulders. The only macrofauna observed along the 2 m depth contour were periwinkles on *Laminaria* spp. wrack. Mixed sand, cobble, and gravel with shell fragments was dominant substrate type along the 5 m depth contour. Alternating zones of sparse and moderate-to-dense patches of eelgrass with isolated sea whip and patches of *Laminaria* spp. wrack were found throughout. The high prevalence and patches of dense sea scallops (*Placopecten magellanicus*) were the most notable aspect of the 5 m depth contour. Other macrofauna species commonly encountered were seastars and rock crabs.

No sediment samples collected from NLES 7A exceeded the *CEPA* or CCME screening criteria. Total organic carbon was much higher at this site as compared to Rothesay Bay, having a mean value of 5.13 g/kg. Further contrasting with Rothesay Bay, particle grain size at this site averaged only 75.6% sand and contained much higher percentages of gravel and silt, potentially explaining the elevated TOC values noted above. Water column profiles indicated this site was also isothermal with only 1°C of variation noted between minimum and maximum temperatures of 16.8°C and 17.8°C taken both from the surface and to a maximum depth of 7 m.

Table 4.2.8 Flora and Fauna Noted to Inhabit the St. George's, NL area

Common Name	Scientific Name
Flora	
Knotted wrack	*Ascophyllum nodosum*
Brown algae	*Fucus* spp.
Bacteria	*Beggiatoa* spp.
Sea whip	*Chorda filum*
Sea moss	*Cladophora rupestris*
Kelp	*Laminaria* spp.
Eelgrass	*Zostera marina*
Fauna	
Periwinkles	*Littorina* spp.
Sea scallops	*Placopecten magellanicus*
Seastars	*Asterias vulgaris*
Rock crabs	*Cancer irroratus*

<u>Big Lorraine</u>

The Big Lorraine site is located on the eastern coast of Cape Breton Island. The site is characterized by steep cliffs in the outer harbour region while the middle and inner harbour regions are composed of cobble and sand beaches with gentle slopes. The shoreline along the assessment area is characterized by exposed, steep rock cliffs at the eastern and westernmost quarters while the central section is predominantly boulder, cobble, and sand beaches with gentle back slopes. *Fucus* spp., *Laminaria* spp., and knotted wrack were observed attached to the rock along the shoreline in several places. Eelgrass was present within the inlet to the northern cove and the small cove to the west of the Grounding Site. Saltmarsh grasses were also observed between the northern and western coves in the assessment area.

Along the 2 m depth contour, the substrate was dominated by topographically complex, exposed bedrock and boulders interspersed with short expanses of sand with mixed rock. Macroflora consisted of areas of dense coverage of brown algae (*Fucus spp,* and *Laminaria* spp.) and short unidentified species of red and green algae as well as coralline algae. Patches of eelgrass with epiphytic algae were also noted. *Laminaria* spp. fronds were found to have high prevalence of the colonial bryozoan *Membranipora membranacea.* Macrofauna observed included periwinkles as well as dense aggregation of green urchins (*Strongylocentrotus droebachiensis*) in areas of exposed rock adjacent to *Laminaria* spp. fronds. Two seastars were also noted. Substrate and macroflora characteristics were along the 5 m depth contour were very similar to those observed at 2 m, except that no eelgrass was observed at 5 m. Additionally, sea colander (*Agarum cribosum*) was noted along the 5 m depth contour. In contrast to the 2 m depth contour, the macrofauna assemblage was more diverse. While fewer numbers of green urchins were noted, four cunner (*Tautogolabrus adspersus*), two American lobsters, and a school of approximately 20 Atlantic herring (*Clupea harengus*) were observed.

Of the two sediment samples collected at this site, one marginally exceeded the ISQG for zinc but values were below the PEL and, therefore, no strong likelihood of adverse biological effects exists. The second sample exceeded the ISQG for various PAHs (benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene, and pyrene) and metals (arsenic, cadmium, copper, lead and mercury) but these values were also below the PEL and, therefore, no strong likelihood of adverse biological effects exists. Total organic carbon from the second sample was almost 37-fold higher than the first sample (88 g/kg versus 2.4 g/kg). Particle grain size data demonstrated the second sample was comprised of 56% silt/clay while the first sample was 98% gravel/sand. Water column profiles did not show vertical thermal stratification. Water temperatures from the surface to a maximum depth of 7 m ranged from 18.1°C to 19.2°C. No vertical stratification in salinity existed either. Salinities ranged from 31.9 - 32.1 ‰ at the surface and from 30.5 - 31.6 ‰ at depth.

Table 4.2.9 Flora and Fauna Noted to Inhabit the Big Lorraine, NS area

Common Name	Scientific Name
Flora	
Kelp	*Laminaria* spp
Brown algae	*Fucus* spp.
Red algae	Not identified to species
Green algae	Not identified to species
Sea moss	*Cladophora rupestris*
Coralline algae	Not identified to species
Eelgrass	*Zostera marina*
Sea colander	*Agarum cribosum*
Fauna	
Colonial bryozoan	*Membranipora membranacea*
Green urchins	*Strongylocentrotus droebachiensis*
Seastars	*Asterias vulgaris*
Cunner	*Tautogolabrus adspersus*
American lobster	*Homarus americanus*
Atlantic herring	*Clupea harengus*

<u>Little Lorraine</u>

The Little Lorraine site is located on the eastern coast of Cape Breton Island. The location is comprised almost entirely of exposed bedrock cliffs vegetated with grass, moss, and sparse conifers and extending approximately 2-10 m from the water's surface. The lone exception to this is the grounding site itself, which is composed of a cobble beach with a wetland located on the backshore. The backshore along the western extent has a gentle slope while the eastern slope progressively increases. *Fucus* spp., *Laminaria* spp., knotted wrack, *Cystoclonium purpureum* (filamentous red algae) and coralline algae were observed attached to the rock along the intertidal in several places. Periwinkles and barnacles were noted in the intertidal zone while Greater Black-backed Gulls (*Larus marinus*) and Great Cormorants (*Phalacrocorax carbo*) were observed on exposed rock faces.

As a result of site bathymetry, it was not possible to obtain video coverage along the 2 m depth contour. At 5 m depth, the substrate was topographically heterogeneous and almost exclusively of exposed bedrock and boulders. Vegetation alternated between zones of dense kelp coverage (*Laminaria* spp., *Alaria esculenta*, and *Agarum cribosum*), barren segments with coralline algae, as well as areas with short filamentous green algae (*Cladophora rupestris*) and unidentified red algae. Dense aggregations of green urchins and periwinkles were noted while four cunner were observed above bare boulder habitat.

Sediment samples were not collected at this site due to hard substrate material. Vertical thermal stratification was evident and warm water appeared within the upper 2 m of the water column for some profile locations. The maximum water temperature surface recorded at the surface was 22.1°C and water temperatures across all five sampling stations averaged 20.2°C and 19.2°C at depths less than and greater than 3 m, respectively.

Table 4.2.10 Flora and Fauna Noted to Inhabit the Little Lorraine, NS Area

Common Name	Scientific Name
Flora	
Kelp	*Laminaria* spp
Brown algae	*Fucus* spp.
Knotted wrack	*Ascophyllum nodosum*
Purple claw weed	*Cystoclonium purpureum*
Coralline algae	Not identified to species
Dabberlocks	*Alaria esculenta*
Sea colander	*Agarum cribosum*
Filamentous green algae	*Cladophora rupestris*
Red algae	Not identified to species
Sea moss	*Cladophora rupestris*
Fauna	
Barnacles	*Semibalanus balanoides*
Periwinkles	*Littorina* spp.
Greater Black-backed Gulls	*Larus marinus*
Great Cormorants	*Phalacrocorax carbo*
Green urchins	*Strongylocentrotus droebachiensis*
Cunner	*Tautogolabrus adspersus*
Colonial bryozoan	*Membranipora membranacea*

4.2.3.4 Protected Areas

There is a range of different protected areas within the Cabot Strait. These include areas of interest (AOI), large ocean management areas (LOMA), and ecologically and biologically significant areas (EBSA). All areas have been designated as such under the federal *Oceans Act* and are established for planning purposes, guidance on the standard of management, and to form the basis for implementation of integrated-management plans.

Additionally, there are also sensitive marine areas that have been identified due to specialized lifecycle requirements of cod and redfish.

For additional information on protected areas in the Cabot Strait, refer to Section 7.1.

4.2.3.5 Marine Wildlife

The habitat within the Study Area for the Cabot Strait supports a wide diversity of organisms including phytoplankton, invertebrates, fish, birds and marine mammals. A large number of marine species found in the Cabot Strait are either at the northern or southern edge of their range, including a diverse assortment of groundfish [*e.g.*, cod, haddock(*Melanogrammus aeglefinus*)]; sharks and rays; pelagic fish (*e.g.*, herring, mackerel); as well as other species (*e.g.*, Atlantic salmon). This is a function of highly variable environmental conditions that include cold water combined with ice coverage in winter, and warmer water in summer (DFO 2005b).

<u>Fish and Shellfish</u>

A list of the most commonly occurring pelagic and demersal marine fish known to inhabit the Cabot Strait in the vicinity of the Study Area is presented in Tables 4.2.11 and 4.2.12. According to the Biodiversity Portrait of the St. Lawrence (EC 2002), the most abundant pelagic species found near the Study Area is Atlantic herring (*Clupea harengus*).

Table 4.2.11 Summary of Abundant Pelagic Fish Species with Potential to Occur in or Near the Study Area (Cabot Strait)

Common Name	Scientific Name	Relative Level of Occurrence in Study Area	Timing of Presence
Pelagic Fish Species			
Atlantic herring	*Clupea harengus*	Moderate	Year round presence
Atlantic soft pout	*Melanostigma atlanticum*	Moderate	Year round presence
Atlantic argentine	*Argentina silus*	Low	Year round presence
Atlantic mackerel	*Scomber scombrus*	Low	Seasonally
Capelin	*Mallotus villosus*	Low	Mature fish migrate inshore in summer (to spawn)
Atlantic bluefin tuna	*Thunnus thynnus*	Moderate (seasonal)	Abundant (summer and fall)
Atlantic salmon	*Salmo salar*	Transients	May – June (smolt migration), June - November (adults)

Table 4.2.11 Summary of Abundant Pelagic Fish Species with Potential to Occur in or Near the Study Area (Cabot Strait)

Common Name	Scientific Name	Relative Level of Occurrence in Study Area	Timing of Presence
American eel	*Anguilla rostrata*	Transients	Spring – Summer (elvers), Fall – early Winter (adults)
Swordfish	*Xiphius gladius*	Low (anticipated)[a]	Migrate in summer and fall
[a] Not included in the *Biodiversity Portrait of the St. Lawrence* (EC 2002) distribution mapping.			

Approximately two-thirds of all marine fish species known to occur in the Gulf of St. Lawrence are demersal (*i.e.*, groundfish) (Table 4.2.12). The most abundant of these groundfish species include white barracudina (*Arctozenus risso)*, marlin-spike grenadier (*Nezumia bairdi)*, Atlantic cod, longfin hake (*Urophycis chesteri)*, white hake (*Urohycis tenuis)*, redfish, lumpfish (*Cyclopterus lumpus)*, witch flounder (*Glyptocephalus cynoglossus)*, American plaice (*Hippoglossoides platessoides*), and the Greenland halibut (*Reinhardtius hippoglossoides*) (EC 2002). DFO summer research survey data, collected since 2000, also includes common species such as thorny skate (*Amblyraja radiata*), turbot (*Scophthalmus maximus*), and Atlantic wolffish (striped wolffish) (*Anarhichas lupus*).

Table 4.2.12 Summary of Abundant Groundfish/Demersal Fish Species with the Potential to Occur in or Near the Study Area (Cabot Strait)*

Common Name	Scientific Name	Relative Level of Occurrence in Study Area	Timing of Presence
Greenland halibut	*Reinhardtius hippoglossiodes*	High	Year round presence
Longfin hake	*Urophycis chesteri*	High	Year round presence
Marlin-spike grenadier	*Nezumia bairdi*	High	Year round presence
Haddock	*Melanogrammus aeglefinus*	Low	Move to deeper water in winter; inhabit shallow banks in summer
Pollock[a]	*Pollachius virens*	Low	Migrate inshore during summer, winter offshore
Atlantic cod	*Gadus morhua*	High	Year round presence
American plaice	*Hippoglossoides platessoides*	High	Year round presence
Redfish	*Sebastes* sp.	High	Year round presence
Atlantic wolfish	*Anarhichas lupus*	High	Year round presence
Thorny skate	*Raja radiate*	High	Year round presence
White hake	*Urohycis tenuis*	High	Year round presence
Witch flounder (greysole)	*Glyptocephalus cynoglossus*	High	Year round presence
Atlantic hagfish	*Myzine glutinosa*	Moderate	Year round presence
Atlantic halibut	*Hippoglossus hippoglossus*	Moderate	Migrate to shallow waters in summer, return for winter
Black dogfish	*Centroscyllium fabricii*	Moderate	Year round presence
Lumpfish	*Cyclopterus lumpus*	Moderate	Migrate to shallow waters to spawn, return during fall

Table 4.2.12 Summary of Abundant Groundfish/Demersal Fish Species with the Potential to Occur in or Near the Study Area (Cabot Strait)*

Common Name	Scientific Name	Relative Level of Occurrence in Study Area	Timing of Presence
Monkfish (goosefish)	*Lophius americanus*	Moderate	Year round presence
Smooth skate	*Raja senta*	Moderate	Year round presence
Spotted barracudina	*Notolepis rissoi*	Moderate	Year round presence
White barracudina	*Arctozenus risso*	Moderate	Year round presence
Atlantic hookear sculpin	*Artediellus atlanticus*	Low	Migrate inshore in the spring; occupy moderately deep waters in winter
Checker eelpout	*Lycodes vahilii*	Low	Year round presence
Fourbeard rockling	*Enchelyopus cimbrius*	Low	Year round presence
Greater eelpout	*Lycodes esmarki*	Low	Year round presence
Polar sculpin	*Coltunculus microps*	Low	Year round presence
Sea raven	*Hemitripterus americanus*	Low	Year round presence
Silver hake	*Merluccius bilinearis*	Low	Year round presence
Threebeard rockling	*Gaidropsarus ensis*	Low	Year round presence
Windowpane flounder	*Scophthalmus aquosus*	Low	Year round presence
Wrymouth	*Cryptacanthodes maculatus*	Low	Year round presence
Yellowtail flounder	*Limanda ferruginea*	Low (anticipated)[b]	Move from shallow to deep waters in the fall

* Additional common groundfish species that are commercially fished are provided below in Section 4.2.3.6 (Commercial Fisheries)
[a] This species is actually a semi-pelagic species but is generally classified with the groundfish species listed above
[b] Not included in the *Biodiversity Portrait of the St. Lawrence* (EC 2002) distribution mapping.

Field studies confirmed the presence of several of the above-listed marine species within the Study Area. Among species with commercial value, crustaceans and fish were observed and noted. Common crustaceans observed in the southern section of the Study Area included Atlantic lobster in the nearshore waters (less than 60 m water depth) These were replaced in deeper waters by snow crabs, which were numerous in the Sydney Bight area. Atlantic stone crabs were occasionally encountered within the Laurentian Channel and in the northern section of the Study Area. Flatfish (identified only as *Pleuronectidae*) were commonly observed, with high occurrences on the southern slope of the Channel. Redfish were found throughout the Study Area around hard bottom structures, with high concentrations within and on the slopes of the Channel. The depth at which the redfish were found suggest that they belong to the species Deepwater Redfish *(Sebastes mentella)* which are found in 350 to 500 m of water. Atlantic cod were observed once in the southern section of the Study Area, and occasionally in the northern section. Construction activities for the Project will likely occur during the ice-free season. Therefore, those commercial fish and shellfish species known or suspected to spawn within the Cabot Strait in all seasons except for winter are of higher concern for potential interactions with Project activities.

The annual spawning periods for the principal commercial fish and shellfish species recorded in the Cabot Strait are provided in Table 4.2.13. Additional information on commercial fish species is provided in Section 4.2.3.6. Detailed information on commercial fish catches is provided in Appendix D.

Table 4.2.13 Summary of Spawning and Hatching Periods for Principal Commercial Fisheries Species with the Potential to Occur in the Cabot Strait

Common Name	Scientific Name	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Atlantic halibut	*Hippoglossus hippoglossus*												
Atlantic herring	*Clupea harengus*												
Atlantic mackerel	*Scomber scombrus*												
Atlantic cod	*Gadus morhua*												
Greenland halibut	*Reinhardtius hippoglossoides*												
Haddock	*Melanogrammus aeglefinus*												
Monkfish	*Lophius americanus*												
Pollock	*Pollachius virens*												
Redfish (Gulf of St. Lawrence – Laurentian Channel population and Atlantic population)	*Sebastes mentella/Sebastes fasciatus*												
White hake	*Urophycis tenuis*												
Witch flounder (greysole)	*Glyptocephalus cynoglossus*												
Lobster[a]	*Homarus americanus*												
Snow crab	*Chionoecetes opilio*												
Rock crab	*Hemigrapsus sexdentatus*												
Scallop	potential for multiple species												
	potential spawning and hatching periods												
	pre-spawning aggregation in Laurentian Channel												
	peak spawning period anticipated												
	mating period												
	overlap of spawning and mating periods												

[a] Including planktonic larval lobster periods (post-hatch) and late hatching

Fish SOC include both freshwater and marine species for the Cabot Strait Study Area (Table 4.2.14).

Table 4.2.14 Fish Species of Conservation Interest Potentially Present in the Study Area (Cabot Strait)

Common Name	Scientific Name	Status		
		SARA[a]	NL *ESA*	NS *ESA*
Fishes				
American eel (catadromous)	*Anguilla rostrata*	No Status	Vulnerable	No Status
Marine Fishes				
Atlantic cod [Laurentian North and Laurentian South designatable units (DU)]	*Gadus morhua*	No Status (Special Concern, Schedule 3)	No Status	No Status
Atlantic wolffish	*Anarhichas lupus*	Special Concern	No Status	No Status
Northern wolffish	*Anarhichas denticulatus*	Threatened	No Status	No Status
Spotted wolffish	*Anarhichas minor*	Threatened	No Status	No Status
White shark	*Carcharodon carcharias*	Endangered	No Status	No Status

[a]*SARA* designations are within Schedule 1 unless otherwise noted
Source: *SARA* Public Registry, NL *ESA*, NS *ESA*

Marine Mammals and Reptiles

The Cabot Strait is also an important migratory route and a major summer feeding area for marine mammals, particularly cetaceans, moving in and out of the Gulf of St. Lawrence (DFO 2005b, Hammill *et al.* 2001). A total of 22 species of marine mammals, including cetacean (whales, dolphins and porposies) and Pinnipedia (seals), and sea turtles can be found in the Gulf of St. Lawrence (LGL 2007) and may be expected to occur in the Cabot Strait. A summary of the occurrence of these species is provided in Table 4.2.15.

Table 4.2.15 Marine Mammals and Sea Turtles Potentially Present Within or Near the Study Area (Cabot Strait)

Common Name	Scientific Name	Potential Occurrence in Relation to the Project
Cetaceans		
Mysticetes (Toothless or Baleen Whales)		
North Atlantic right whale[a]	*Eubalaena glacialis*	Rare
Humpback whale (Western North Atlantic population)	*Megaptera novaeangliae*	Common
Minke whale	*Balaenoptera acutorostrata*	Common
Fin whale[a] (Atlantic population)	*Balaenoptera physalus*	Common
Blue whale[a] (Atlantic population)	*Balaenoptera musculus*	Common

Table 4.2.15 Marine Mammals and Sea Turtles Potentially Present Within or Near the Study Area (Cabot Strait)

Common Name	Scientific Name	Potential Occurrence in Relation to the Project
Sei whale (Atlantic population)	*Balaenoptera borealis*	Uncommon
Odontocetes (Toothed Whales)		
Harbour porpoise[a] (Northwest Atlantic population)	*Phocoena phocoena*	Common
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	Common
Short-beaked common dolphin	*Delphinus delphis*	Common
White-beaked dolphin	*Lagenorhynchus albirostris*	Common
Long-finned pilot whale	*Globicephala melas*	Common
Killer whale[a] (Northwest Atlantic/Eastern Arctic population)	*Orcinus orca*	Uncommon
Beluga[a] (St. Lawrence Estuary population)	*Delphinapterus leucas*	Rare
Northern bottlenose whale (Scotian Shelf population)	*Hyperoodon ampullatus*	Rare
Sperm whale	*Physeter macrocephalus*	Common
Pinnipedea		
Harp seal	*Phoca groenlandica*	Common
Hooded seal	*Crystophora cristata*	Common
Grey seal	*Halichoerus grypus*	Common
Harbour seal (Atlantic & Eastern Arctic population)	*Phoca vitulina*	Uncommon
Sea Turtles		
Leatherback sea turtle[a] (Atlantic population)	*Dermochelys coriacea*	Seasonally Common
Loggerhead sea turtle[a]	*Caretta caretta*	Uncommon
Kemp's ridley turtle	*Lepidochelys kempii*	Uncommon
[a] An at-risk species discussed in Section 7.1		

Several observations of marine mammals were made during various marine studies undertaken by ENL in 2011. During nearshore benthic surveys off Cape Ray, a harbour seal and minke whale were observed in late September 2011 and several grey seals, up to 10-15 individuals, were observed from early-to-mid October 2011. During marine offshore surveys a trained Marine Mammal Observer (MMO) spotted five humpback whales in the Study Area over two days of observations in November 2011. Two of these humpback whales were observed closer to NL, on the slope of the Laurentian Channel, and the other two were observed in the Gutter area of Sydney Bight off Cape Breton, where water depth is approximately 140 m. The analysis of ambient underwater sound sources also showed that fin whales were present throughout the Cabot Strait during autumn. The peak frequency of distant shipping sounds is between 40–100

Hz, which is above the calling band of the whales; however, localized shipping sounds often contained higher energy levels in the 20 Hz band used by fin (and blue) whales.

Several marine mammal species were also detected during a field-based passive acoustic monitoring (PAM) program from mid-October to early December 2011 (Table 4.2.16).

Table 4.2.16 Results of PAM Program for the Study Area (Cabot Strait)

Species Detected	Time of Detection
Cetaceans	
Fin whale (Atlantic population)	Daily
Dolphin (presumably predominantly Atlantic white-sided dolphin and short-beaked common dolphin)	Daily
Sperm whale	Almost daily
Pilot whale	Almost daily
Blue whale (Atlantic population)	Consistent but less during late October to late November
Humpback whale (Western North Atlantic population)	Restricted to southern station close to NS in November
North Atlantic right whale	Once on the shelf off Cape Breton in early November
Minke whale	Detected twice at the southern edge of the Laurentian Channel
Pinnipedea	
Unidentified seals	Periodically

The number of acoustic detections of several species showed either increasing or decreasing gradients across the Cabot Strait. There were no periods when marine mammals were not detected for more than a few hours, indicating that the Strait has a high level of marine mammal activity in autumn. Data from other months would be required to determine seasonal variation in the presence of marine mammals.

There are several species of marine mammals and reptiles of conservation interest that have the potential to occur within the Study Area (Table 4.2.17).

Table 4.2.17 Marine Mammal and Reptile Species of Conservation Interest Potentially Present in the Study Area (Cabot Strait)

Common Name	Scientific Name	Status		
		SARA[a]	NL *ESA*	NS *ESA*
Marine Mammals				
Fin whale (Atlantic population)	*Balaenoptera physalus*	Special Concern	No Status	No Status
Blue whale (Atlantic population)	*Balaenoptera musculus*	Endangered	No Status	No Status

Table 4.2.17 Marine Mammal and Reptile Species of Conservation Interest Potentially Present in the Study Area (Cabot Strait)

Common Name	Scientific Name	Status		
Beluga whale (St. Lawrence Estuary population)	*Delphinapterus leucas*	Threatened	No Status	No Status
North Atlantic right whale	*Eubalaena glacialis*	Endangered	No Status	No Status
Northern bottlenose whale (Scotian Shelf population)	*Hyperoodon ampullatus*	Endangered	No Status	No Status
Harbour porpoise (Northwest Atlantic population)	*Phocoena phocoena*	Threatened Schedule 2	No Status	No Status
Humpback whale (Western North Atlantic population)	*Megaptera novaeangliae*	Special Concern	No Status	No Status
Marine Reptiles				
Leatherback Sea turtle (Atlantic population)	*Dermochelys coriacea*	Endangered	No Status	No Status
Loggerhead Sea turtle	*Caretta caretta*	No Status	No Status	No Status

Source: *SARA* Public Registry

<u>Avifauna</u>

Four groups of marine birds depend on the resources of the Gulf and the Cabot Strait (DFO 2005b) including: inshore seabirds (*e.g.*, cormorants, gulls and terns); offshore or pelagic seabirds (*e.g.*, petrels and auks); waterfowl (*e.g.*, eiders and scoters); and shorebirds (*e.g.*, Piping Plover). There are a number of avifauna SOCI that have the potential to be present in the Cabot Strait Study Area (Table 4.2.18).

Table 4.2.18 Avifauna Species of Conservation Interest Potentially Present in the Study Area (Cabot Strait)

Common Name	Scientific Name	Status		
		SARA[a]	NL *ESA*	NS *ESA*
Harlequin Duck (Eastern pop.)	*Histrionicus histrionicus pop. 1*	Special Concern	Vulnerable	Endangered
Barrow's Goldeneye (Eastern pop.)	*Bucephala islandica*	Special Concern	Vulnerable	Vulnerable
Peregrine Falcon *anatum/tundrius* subspecies	*Falco peregrinus* spp. *anatum/tundrius*	Special Concern	No Status	No Status
Piping Plover *melodus* subspecies	*Charadrius melodus* spp. *melodus*	Endangered	Endangered	Endangered

Table 4.2.18 Avifauna Species of Conservation Interest Potentially Present in the Study Area (Cabot Strait)

Common Name	Scientific Name	Status		
Red Knot *rufa* subspecies	*Calidris canutus* ssp. *Rufa*	Endangered	Endangered	Endangered
Ivory Gull	*Pagophila eburnean*	Endangered	Endangered	No Status

[a] Source: *SARA* Public Registry

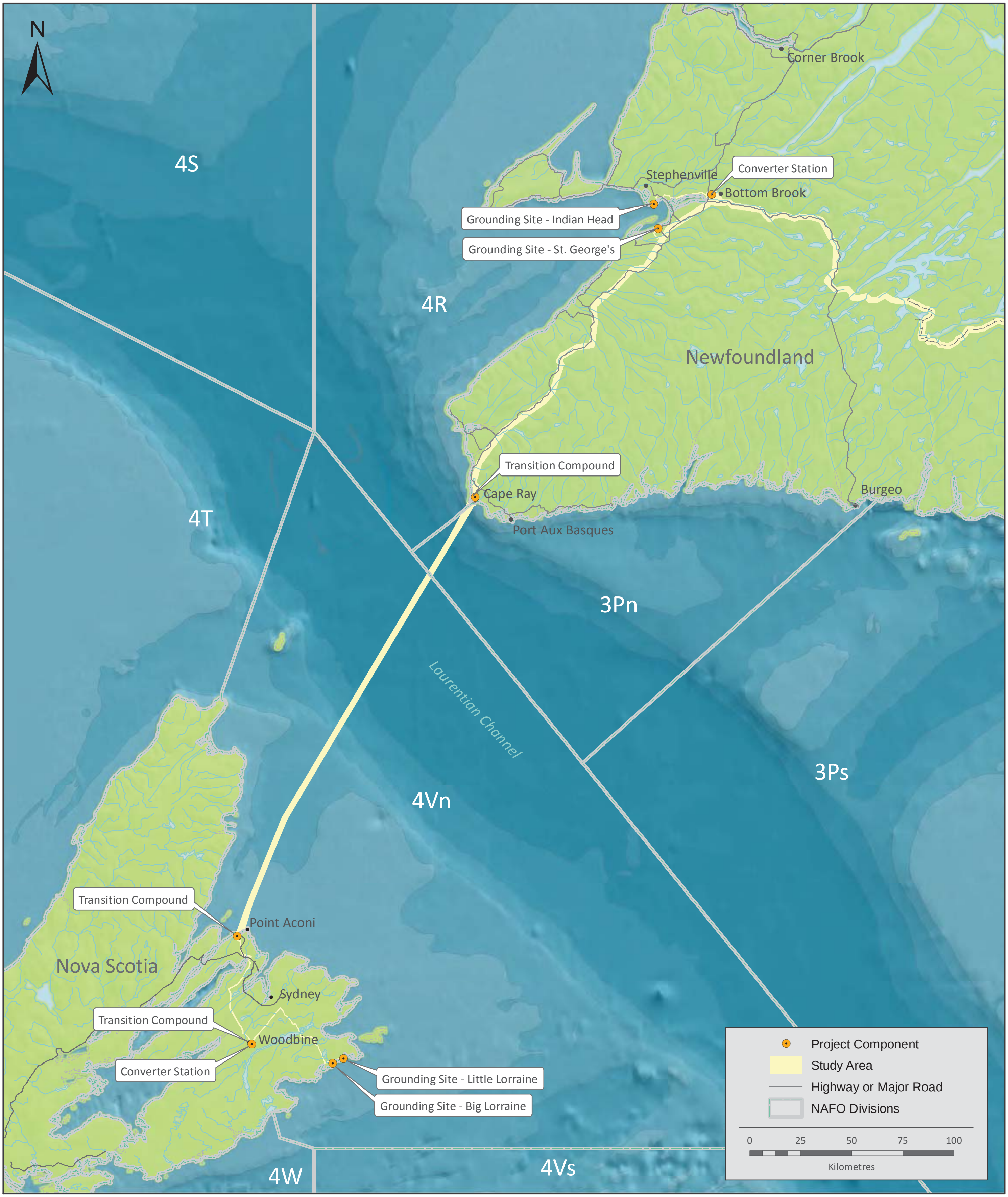
No additional SOCI have been identified within the Study Area from the avifauna surveys.

4.2.3.6 Commercial Fisheries

Marine waters surrounding Point Aconi are known as the Sydney Bight which extends from Cape North to Scatarie Island. Sydney Bight lies within Northwest Atlantic Fisheries Organization (NAFO) Division 4Vn which also includes: LFA 27; CFA 21 and 22; and DFO Statistical Districts 1, 4, 6, and 7 (Figure 4.2.7 and Figure 4.2.8). The shrimp fishery is predominant in the area; however, snow and rock crab, lobster, groundfish, mackerel and herring are also fished.

Marine waters surrounding Cape Ray and the Stephenville area lie within the NAFO Divisions 3Pn, and 4R (Figure 4.2.7). Within the boundaries of 3Pn and 4R are LFA 12 and 13, as well as CFA 11, 12B, 12C, 0S8, and DFO Statistical Districts 39-43 (Figure 4.2.8). Crustaceans and pelagics make up the majority of the fishery, with fisheries for herring, mackerel, capelin, snow crab and lobster being predominant.

Landing data for DFO Statistical Districts 1, 4, 6, 7 (4Vn) and 39-43 (3Pn, 4R) were obtained from DFO Maritimes Region Statistical Branch and Newfoundland and Labrador Economics Branch, respectively. Distribution of catches by location for groundfish, pelagics, and invertebrates in the Study Area between 2007 and 2010 were also reviewed. However, since geographical coordinates are not recorded for lobster catches, lobster fishing locations are not depicted. Based on consultations with local lobster harvesters and DFO, it is assumed that lobster fishing occurs in all coastal areas within the Study Area.



Emera Newfoundland & Labrador

Coordinate System: WGS 94 Mercator

Data Sources: CEF, DFO, CHS, EDM

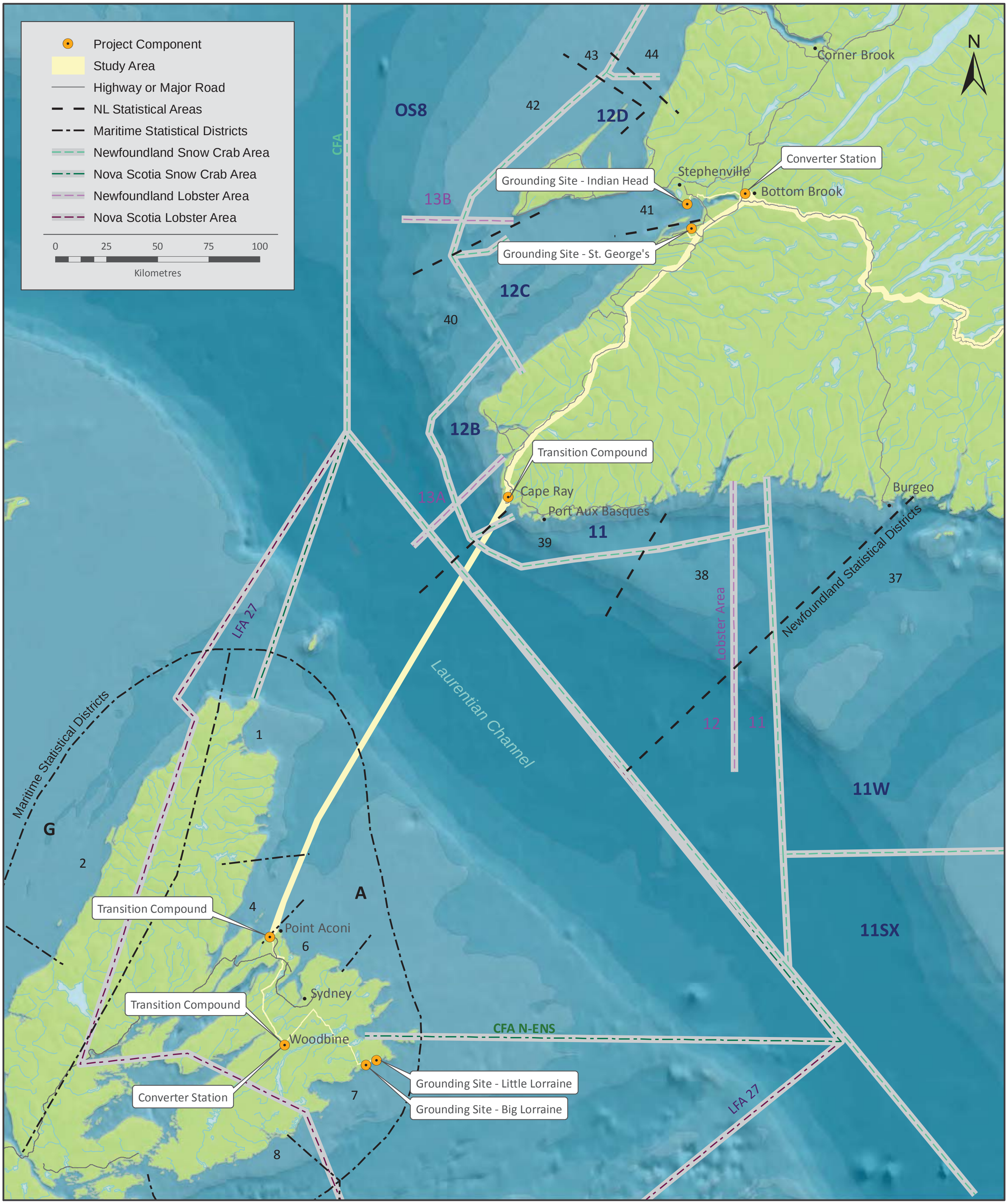
Scale: 1:2,500,000

Date: 18/12/2012

FIGURE 4.2.7

NAFO Divisons
Cabot Strait

ENL094 a



Emera Newfoundland & Labrador

Coordinate System: WGS 94 Mercator

Data Sources: CEF, DFO, CHS, EDM

Scale: 1:2,500,000

Date: 18/12/2012

FIGURE 4.2.8

Commercial Fisheries Administrative Boundaries
Cabot Strait

Note: Including Lobster Fishing Areas (LFAs), Snow Crab Fishing Areas (CFAs), and DFO Maritime and Newfoundland Statistical Districts

ENL-079 a

In 2010, in NL the total landed value of fisheries (Statistical Areas 39-43) was $11,646,000 (47% from pelagic fisheries, 39% from crustaceans). The total landed value of fisheries in NS (Statistical Districts 1, 4, 6, and 7) was $59,337,000 (95% from crustacean species). Key commercial fisheries relevant to the Study Area are described below.

Commercial Catches within the Study Area

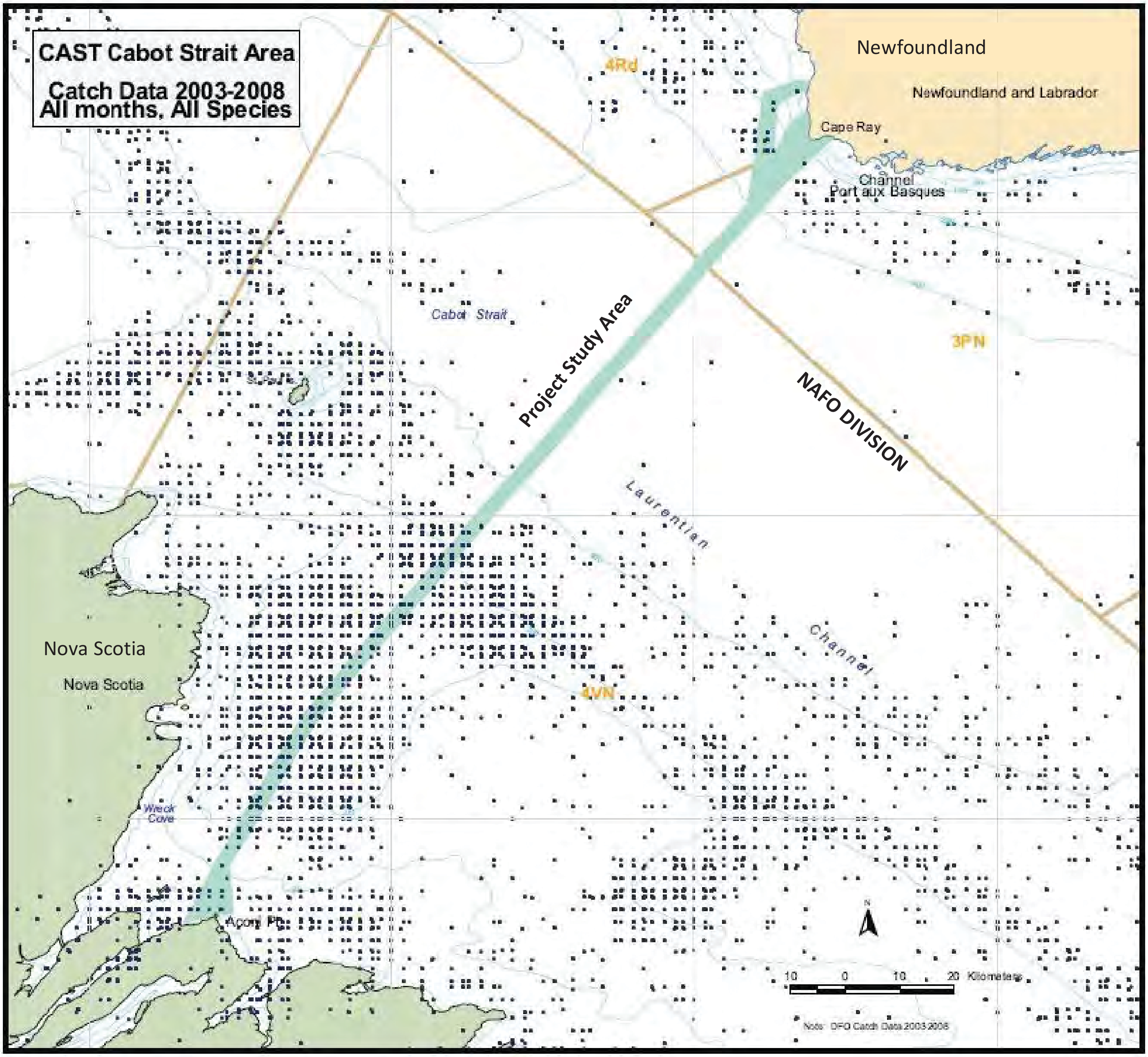
Most of the fishing activity in the Study Area appears to be located in NS waters, with 50% of activity in waters less than 200 m deep (Figures 4.2.9 and 4.2.10). There is some activity close to the island of Newfoundland, although it is of a far less magnitude compared to the NS effort. Eighty percent of the total fishing effort within the Study Area appears to be on the NS side of the Laurentian Channel (Figure 4.2.10, Bins 11-13). Bin 11 is particularly important, comprising 45% of the total catch records and 26% of the total catch weight within the Study Area. The nearshore areas of NL (Bins 1-3) are not heavily exploited accounting for only 2.5% of total catch records, and 7% of total catch weight.

The subsea cable route does not appear to pass through a uniquely important fishery area; average catch is 76,000 kg per year. Most of the harvesting occurs in shallower waters, with little activity within the Laurentian Channel (Figure 4.2.10). Half of the subsea cable route is fished using fixed gear such as crab pots. Approximately 98% of the mobile gear used in the Study Area is trawled by small vessels within a 30 km stretch at depths greater than 200 m (Bins 11-13). Scallops are harvested in a small area close to Point Aconi.

Island of Newfoundland Nearshore Fisheries (NAFO 3Pn and 4R)

NAFO areas 3Pn and 4R include the DFO Statistical Areas 39-41, which extend from Rose Blanche on the southwest coast to Port au Port on the west Coast (Figures 4.2.7 and 4.2.8). In this nearshore area, crustacean and pelagic catches comprised 76% - 85% of all landed value for commercial fisheries for 2008-2010, and for the pelagic species, herring and mackerel made up 90% of the catch. Lobster accounted for 71% of the crustacean species being caught. Herring and mackerel are the most commercially important species in southwestern Newfoundland; between 2008 and 2010, the nearshore commercial fishery landed almost $12 million in districts 39-41 (districts 42 and 43 were excluded because they will not be affected by the Project), with the majority of activity occurring between April and November.

Small vessels fishing for groundfish and pelagic fish in the area generally use set gillnets, whereas larger vessels (>12 m) typically fish with fixed longlines, Danish seines or otter trawls. Lobster, snow crab, and whelk are typically fished with fixed traps set individually, or in a series. Vessel size provides an indication of nearshore or offshore fisheries, with the larger vessels most likely fishing offshore.



Data Sources: Department of Fisheries

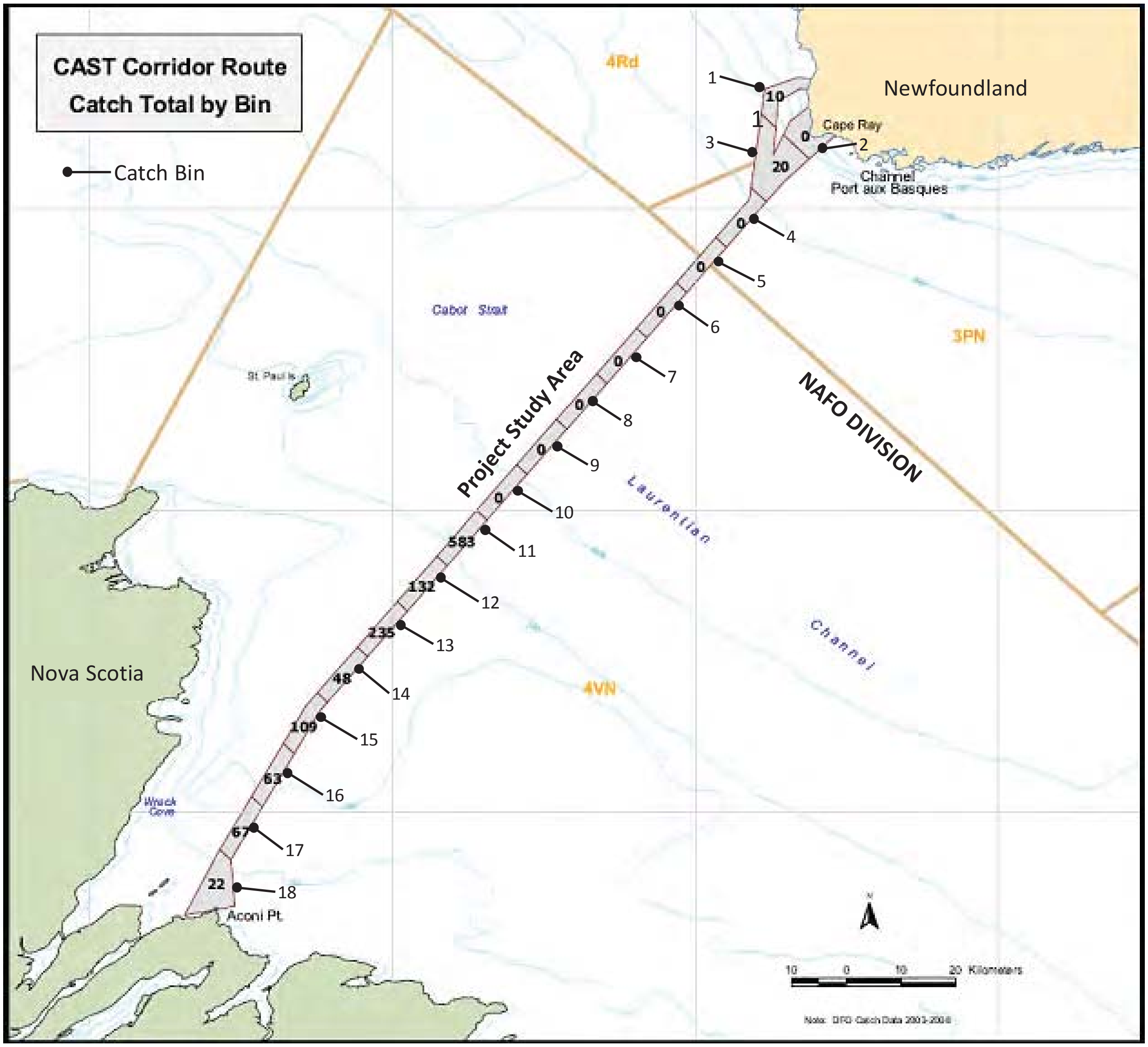
Date: 21/11/2012

FIGURE 4.2.9

Catch Data (2003-2008) All Species

Cabot Strait

ENL124



Emera Newfoundland & Labrador

Data Sources: Department of Fisheries

Date: 21/11/2012

FIGURE 4.2.10

Total Catch Numbers per Section of the Study Area 2003-2008
Cabot Strait

ENL125

Nova Scotia Nearshore Fisheries (NAFO 4Vn)

NAFO area 4Vn covers DFO Statistical Districts, 1, 4, 6, and 7 which extend from the northern tip of Cape Breton's Highlands Peninsula at the boundary between Inverness and Victoria Counties east to the boundary between Cape Breton and Richmond Counties.

In 4Vn the most important nearshore commercial fisheries are for lobster, snow crab, rock crab, sea urchin and scallop. In 2009 and 2010 the largest number of licences held were for lobster and snow crab. Although shrimp are shown to have supported a substantial fishery in 4Vn from 2008 to 2010, they are harvested primarily in offshore waters outside of the Study Area. Together, lobster and shrimp landings accounted for 97% of the landed value of commercial fisheries in 2010 for 4Vn. Lobster stocks in LFA 27 are historically among the most productive in coastal NS waters (Schaefer *et al.* 2004.)

Snow crab are found in depths of 45-245 m and are distributed mainly in the deep water areas of Sydney Bight (approximately 30-40 km offshore) (Schaefer *et al.* 2004). The snow crab fishing season in CFAs 20 to 22 is April 16th to May 14th, and July 23rd to September 30th (Penny pers. comm. 2011). In Sydney Bight, snow crabs are fished from the end of July to the middle of September and are harvested using fixed gear (crab traps/pots) set singly on the seafloor and marked with a buoy (Schaefer *et al.* 2004). Other crustacean species supporting active commercial fisheries in the Sydney Bight include lobster, rock crab, toad crab, northern shrimp, sea urchins and sea scallops (Tremblay *et al.* 2001). Sea scallop is also fished in nearshore waters, primarily by dredging. The scallop fishery in the Sydney Bight area generally has low landings but covers an extensive area in Mira Bay (Gromack *et al*. 2010).

Key commercial finfish species fished in the nearshore waters of Sydney Bight include herring and mackerel. The bait fishery, which is largely to supply bait for the lobster fishery, includes catches of Gaspereau, generally as a bycatch, and begins by mid-April continuing until the end of the lobster season (July 15). Set nets, swing nets and trapnets are the gear types used in the bait fishery (Clark *et al.* 1999 cited in Schaefer *et al.* 2004). The roe fishery occurs primarily off Glace Bay in September and October but may also extend into November. The roe fishery usually employs gillnets although trapnets are used less frequently (Collins *et al.* 2001, cited in Schaefer *et al.* 2004).

Mackerel is fished commercially primarily between May and November, with the largest landings in NS occurring in May and June. The largest landings occur in September and October, primarily using jiggers, handlines, and purse seines (Schaefer *et al.* 2004).

Offshore Fisheries (NAFO 3Pn, 4R, and 4Vn)

In the offshore fisheries of the Cabot Strait mackerel is the predominant commercial species for southwestern Newfoundland, while shrimp is the predominant species in the NS fishery, by weight.

A summary of 2007 catch data from offshore vessels is provided below:

- Pelagic species comprise 66% of the total offshore catches, 95% being mackerel, herring and capelin, the majority of which are caught within the coastal areas of southwestern Newfoundland.
- Groundfish comprise 21% of the offshore catch, with 63% of this being cod and redfish, the two dominant species by weight. Atlantic halibut has a higher monetary value and is caught in relatively deep waters near the edge of the Laurentian Channel, with catches being less concentrated near the Study Area. Cod is still in relatively low abundance, with many stocks assessed as endangered or threatened under *SARA* and listed similarly by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Some populations of cod migrate out of the Gulf of St. Lawrence and into Sydney Bight to overwinter in the deep water along the Laurentian Channel from November to April (Campana *et al.* 1999; Swain *et al.* 2001).
- Crustaceans make up the remaining 13% of the offshore catch, the majority (92%) of which is snow crab that is fished in the three geographical regions. Snow crab plays an important role in the Gulf of St. Lawrence and Maritimes offshore fisheries (Biron *et al.* 2002, DFO 2005a and DFO 2010b). In the Québec and NL regions, catches are closer to shore than in other regions. Shrimp is an important fishery for the Maritimes region, with most shrimp being caught near the Misaine Bank, located southeast of the Study Area. Scallops are mostly fished in the Sydney Bight area offshore Cape Breton but a few small scallop beds occur off southwestern Newfoundland. Lobster is also important to the area but due to the fact that the lobster reporting systems are different, lobster catch data do not appear in the Interzonal Database.
- Catches of shark species as well as bluefin tuna are important in the Study Area, but many of these fish do not appear in landings that are reported.

Aquaculture

During 2010, aquaculture in NL accounted for exports of $116.3 million. Atlantic salmon, steelhead trout and blue mussel are the most common species being farmed. There are three marine-based aquaculture licences for blue mussels and scallops located within DFO statistical districts 39-43, in Piccadilly Bay on the north side of the Port au Port Peninsula. There are also two land-based licences; one for an eel facility in Robinsons, and one for a new salmon hatchery in Stephenville.

In 2010, aquaculture in NS produced exports worth over $41 million. Finfish accounted for the largest proportion of production with over 5 million kilograms. Atlantic salmon is the primary species raised, worth approximately $30 million annually. Blue mussels are the primary shellfish produced, with an annual value of over $2.5 million. American oysters, giant sea scallops, and bay quahogs are also farmed. The closest aquaculture locations to the Study Area are located in St. Anns Bay, Aspy Bay, and the Bras d’Or Lakes.

4.3 NOVA SCOTIA

Project components located in Cape Breton, NS include approximately 46 km of new transmission line, parallel to an existing transmission corridor, between the Point Aconi Generating Station and an existing substation at Woodbine. Associated infrastructure includes one converter station; one transition compound; one anchor site; approximately 50 km of grounding site transmission line; and an estimated 1 km of underground cable (refer also to Figure 1.2.4 and Section 2).

4.3.1 ATMOSPHERIC ENVIRONMENT

This description of the atmospheric environment considers climate, ambient air quality, and ambient sound in the region of Project components in Cape Breton.

4.3.1.1 Climate

The landfall site for the subsea cables is located at the Point Aconi Generating Station, within the Bras d'Or Lowlands Ecodistrict of the Nova Scotia Highlands Ecoregion. The climate within this Ecodistrict is moderated by the Bras d'Or Lakes, and by the shelter afforded by surrounding uplands. The site is located approximately 28 km northwest of the Sydney Airport, the nearest meteorological station, and is within a cool, temperate climatic zone. Northern Cape Breton has the highest annual precipitation levels (average annual precipitation of 1,504.9 mm at Sydney Airport) in NS. Winters are typically cold with frequent snowfall and freezing precipitation. Spring comes typically in May and is cool and cloudy. Summers are generally short and warm with less precipitation than the other seasons.

In late spring and summer, sea fog is common along the coastline of Cape Breton. Sea fog is created when warm, moist air moves over cooler surfaces. On average, fog occurs along the coastline 15 to 25 percent of the year (NSMNH 1996a).

The greatest influence on offshore weather is the Gulf Stream, which passes approximately 250 nautical miles southeast of NS. The Gulf Stream brings warm water to the region, which affects storm tracks and can intensify storms, leading to stronger winds. In the winter, very strong winds and snow squalls can occur, influenced by cold Arctic air moving south over the Atlantic Ocean. This leads to freezing spray in coastal areas, common from November to April in the Cape Breton region (NSMNH 1996a).

Tropical cyclones, although uncommon in the region, can occur. These are intense low pressure systems that form in tropical waters and can affect weather in areas as far north as NL. NS experiences tropical cyclones from June to November, with the most active months being August, September, and October (EC 2009). Since 2000, five hurricanes have made land landfall in NS or have passed close to shore.

The description of the climate for the region is based on climate normals from 1971-2000 for the Sydney weather station at Sydney Airport, operated by EC, as well as weather extremes observed since 1946 (Table 4.3.1).

Table 4.3.1 Summary of Climate Normal Data for Sydney Airport - 1971 to 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Daily Mean (°C)	-5.7	-6.5	-2.7	2.1	7.8	13.3	17.7	17.7	13.4	8	3.3	-2.1
Daily Maximum (°C)	-1.3	-1.9	1.5	6.1	12.9	18.9	23	22.7	18.3	12.2	6.8	1.6
Daily Minimum (°C)	-10	-11.1	-6.9	-1.9	2.6	7.6	12.3	12.6	8.5	3.8	-0.2	-5.8
Extreme Maximum (°C)	16.9	18	17.8	27.2	31.1	34.4	33.9	**35.5**	32.3	25	22.2	16.7
Date of Occurrence (yyyy/dd)	1995/ 16	2000/ 28	1945/ 29	1942/ 25	1960/ 31	1944/ 29	1975/ 19	**2001/ 10**	2001/ 10	1950/ 03	1961/ 05	1951/ 06
Extreme Minimum (°C)	-26.2	**-27.3**	-25.6	-14.6	-7.8	-3.9	2.2	2.8	-1.7	-5.6	-12	-22.2
Date of Occurrence (yyyy/dd)	1994/ 26	**1994/ 08**	2001/ 02	1995/ 05	1972/ 02	1956/ 09	1961/ 15	1965/ 31	1971/2 9	1944/ 31	1999/ 19	1993/ 29
Precipitation												
Rainfall (mm)	82.4	66.7	88.4	103.7	100.1	92.6	86.8	93.1	113.4	143.8	134.4	107.6
Snowfall (cm)	70.8	66.8	51.4	26.1	2.7	0	0	0	0	2	15.7	62.8
Precipitation (mm)	151.5	132.1	138.9	130.4	102.9	92.6	86.8	93.1	113.4	146	149.7	167.5
Extreme Daily Precipitation (mm)	57.2	62.2	73	73.4	93.5	84	68.2	**128.8**	90.9	96.4	97.3	95
Date of Occurrence (yyyy/dd)	1948/ 14	1996/ 17	1992/ 08	1982/ 29	1967/ 26	1998/ 17	1998/ 09	**1981/ 17**	1947/ 30	1992/ 19	1944/ 05	1979/ 26
Days with:												
Maximum Temperature > 0 °C	0.97	0.6	1.5	6.9	23.8	29.7	31	31	29.8	25.7	12.5	3.8
Measureable Rainfall (≥ 0.2 mm)	8.6	6.7	10.1	12.3	13.4	13.3	11.9	12.8	13.7	15.4	14.7	10.4
Measureable Snowfall (≥ 0.2 cm)	16.4	12.9	11.1	6.6	0.9	0.03	0	0	0	0.73	6.3	15.7
Measurable Precipitation (≥ 0.2 mm)	20.3	16.3	16.9	15.7	13.8	13.3	11.9	12.8	13.7	15.6	18.3	21.3
Wind												
Mean Wind Speed (km/h)	21.3	20.6	20.8	19.5	17.9	16.9	15.8	15.1	16.2	18.2	19.8	21
Most Frequent Wind Direction	W	W	SW	N	S	S	S	S	SW	SW	W	W
Extreme Wind Gust Speed (km/h)	121	124	129	115	109	114	87	89	129	138	129	**161**
Date of Occurrence (yyyy/dd)	1960/ 03	1976/ 03	1959/ 13	1986/ 10	1961/ 23	1973/ 17	1975/ 28	1963/ 14	1958/ 29	1974/ 20	1959/ 25	**1964/ 01**
Days with winds ≥ 52 km/h	4.1	2.3	2.7	1.2	0.6	0.3	0.1	0.1	0.5	1.4	2.3	3.7

Table 4.3.1 Summary of Climate Normal Data for Sydney Airport - 1971 to 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days with winds ≥ 63 km/h	1.6	0.5	0.8	0.2	0.1	0.1	0	0	0.2	0.4	0.8	1.3
Visibility												
Less than 1 km (hours)	29.8	26.2	46.8	61.1	60.2	38.9	28.9	17.5	8	11.8	17.4	24.7
1 km to 9 km (hours)	136.4	119.4	137.7	144.2	123.6	106.4	119.1	110.5	85.4	85.2	92.4	139.9
Greater than 9 km (hours)	577.7	532	559.5	514.7	560.2	574.7	596	616	626.6	647.1	610.1	579.4

EC 2012d

4.3.1.2 Ambient Air Quality

Due to the relatively remote location, sources of air emissions in close proximity to the Study Area are fairly limited, with the exception of two coal-fired power generation stations. The Point Aconi Generating Station, located immediately east of the landfall site, is a source of air emissions in the region, as is the Lingan Generating Station, located approximately 20 km east of the Project. The annual emissions from the Point Aconi and Lingan Generating Stations, as reported through EC's National Pollutant Release Inventory (NPRI) database, are provided in Table 4.3.2.

Table 4.3.2 2010 Annual Reported Emissions – Lingan and Point Aconi Thermal Generating Stations

Facility	Criteria Air Contaminants (tonnes/yr)					
	Sulphur Dioxide (SO_2)	Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Total Particulate Matter (TSP)	Particulate Matter < 10 Microns (PM_{10})	Particulate Matter < 2.5 Microns ($PM_{2.5}$)
Lingan	33,479	379	5,219	663	418	124
Point Aconi	3,365	81	1,747	77	37	13

EC 2011a

Ambient air monitoring stations are operated across Canada under the National Air Pollution Surveillance (NAPS) network. The monitoring site closest to the Study Area is in Sydney, approximately 24 km away. This station samples SO_2, CO, NO_2, O_3 and PM. A summary of the data collected at this site in 2005 and 2006 is provided in Table 4.3.3.

Table 4.3.3 NAPS Data Summary for Sydney, NS – 2005 and 2006

Year	SO_2 (ppb)	CO (ppb)	NO_2 (ppb)	O_3 (ppb)	PM2.5[1] ($\mu g/m^3$)
2005	3.0	0.2	-	24	5.3
2006	1.4	0.3	1.8	27	6.0
[1] Tapered Element Oscillating Microbalance (TEOM) – 1 hour periods					

NAPS 2008

4.3.1.3 Ambient Sound

As indicated in Section 4.1.1.3, the acoustic environment in rural areas is dominated by the sound of wind in the trees and vegetation, sound of running water in the vicinity of streams and rivers, and wildlife sounds (*e.g*., bird calls). Where the Study Area is closer to populated/industrial areas (*e.g*., Point Aconi), the ambient sound is influenced by traffic, industrial sounds, and other human activity. Sound levels in the overall Study Area are expected to be in the range of 45 to 50 dBA during the day and 35 to 40 dBA at night.

Baseline sound monitoring was conducted at three sites surrounding the Woodbine converter station in November 2011. Table 4.3.4 presents the recorded sound values for each monitoring site, during baseline conditions.

Table 4.3.4 Baseline Noise Monitoring Sites – Woodbine converter station

Noise Monitoring Site	UTM Coordinates		Distance to converter station	Residential Receptor (Yes/No)	Ldn (dBA)
	Easting (m)	Northing (m)			
1	710599	5097070	740 m	No	50.6
2	711270	5097062	490 m	Yes	49.2
3	713155	5095151	2.2 km	Yes	46.3

These baseline results are influenced by the existing substation at Woodbine but are considered to be fairly representative of baseline noise levels in other parts of the Study Area.

Baseline noise measurements were also taken at the landfall site in July 2012. Table 4.3.5 presents the calculated L_{dn} values for two monitoring sites at Point Aconi, during baseline conditions.

Table 4.3.5 Baseline Noise Monitoring Sites - Landfall Site (Point Aconi)

Noise Monitoring Site		UTM Coordinates		Distance to Landfall Site (m)	Residential Receptor (Yes/No)	L_{dn} (dBA)
		Easting (m)	Northing (m)			
Point Aconi, NS	Site A	703843	5133413	1,200	Yes	48.9
	Site B	702571	5131944	1,800	No	50.8

4.3.2 GEOPHYSICAL ENVIRONMENT

Cape Breton is an island separated from the NS peninsula by the Strait of Canso but connected to the mainland by the Canso Causeway. As previously noted, the Study Area in NS is located within the Bras d'Or Lowlands Ecodistrict of the Nova Scotia Highlands Ecoregion (Webb and Marshall 1999, Neily *et al*. 2003) (Figure 4.3.1). The lowlands are underlain by Carboniferous sediments covered by shallow, stony, moderately coarse-textured glacial till (Webb and Marshall 1999, Neily *et al*. 2003). This ecoregion includes a band of plateaus separated by lower-elevation uplands and lowlands extending across northern NS. The following description of the geophysical environment focuses on key Project locations including the transition compound, and the converter station.

4.3.2.1 Topography and Drainage

The transition compound site is relatively flat (mean elevation of 15 m), sloping gently north and northeast towards the sea and Mill Pond. The nearest surface water is situated 45 m southwest (Mill Pond) and 75 m south (a series of ponds south of Mill Pond Road).

The converter station site is located near the existing Woodbine power sub-station on the east end of Huntington Mountain at an elevation of about 140 m. The site is relatively flat, with regional drainage from the site being to the north, east and south towards Mira River.

4.3.2.2 Surficial Geology

The overburden at the Point Aconi Generating Station is described as a brown, compact, well graded, non-calcareous stoney silty basal ablation till plain derived from local bedrock sources (Baechler 1986, Stea *et al.* 1992). A minor area of sand and gravel glaciofluvial outwash is noted along the beach area north of the property and silty till drumlin features are noted to the northwest of the transition compound site and southeast of the Point Aconi Generating Station. A review of 145 borehole logs (NSE 2012a) from the Point Aconi and McCreadyville areas indicates a range of till thickness from 0.1 to 13.7 m.

The Woodbine converter station site is overlain by stony sandy glacial till (Stea, Conley and Brown, 1992). A review of 8 well logs situated along Morley Road in Glen Morrison, Woodbine, East Bay and Portage indicates overburden thicknesses ranging from 3.7 to 15.5 m, with a median of 7.7 m.

4.3.2.3 Bedrock Geology

The transition compound and landfall site area is underlain by fluvial and lacustrine mudstone, shale, siltstone, sandstone, limestone and coal of the early Permian-aged Sydney Mines Formation (Upper Morien Group). The contact with older fluvial sandstone, minor conglomerate, mudstone and minor coal of the South Bar Formation (Lower Morien Group), which conformably lies beneath the Upper Morien bedrock, occurs about 3 km to the south. Structurally, the area is situated on the eastern limb of the northeast trending Boisedale anticline, the crest of which is indicated to pass directly through the generating station site. The bedrock bedding strike is northwest to southeast across the site, dipping 2 to 3 degrees to the northeast and under the ocean.

The Woodbine converter station site is underlain by lightly metamorphosed, felsic, intermediate and mafic volcanic tuff, calc-alkaline volcanic arc basalt, andesite, rhyolite, sandstone, and siltstone of the pre-Cambrian-aged (599 to 623 MA) East Bay Hills Group (Keppie 2000). Contact with the younger, lower-Carboniferous-aged (350 MA) Windsor Group (anhydrite, gypsum, shale, marine limestone and dolomite) occurs immediately north of the site.

4.3.2.4 Hydrogeology

The site of the transition compound has silty glacial till overburden that is a poor aquifer, but is locally tapped by dug wells suitable for individual domestic use. About 13% of domestic supplies in the area were found to be derived from dug wells (Jacques Whitford 1992); the majority of water supplies are derived from drilled wells in the underlying sandstone and shale bedrock.

The Upper Morien bedrock that underlays the site of the transition compound is considered to be a moderate aquifer in the Point Aconi area. The coal-bearing shale of the Upper Morien Group exhibits much lower well yield potential than the underlying Lower Morien strata. The lower units of the Morien sequence are more permeable and productive, and host the majority of the high capacity production wells in the Coal Field Area.

The closest major water supply wells include the Point Aconi Generating Station well field located 4 km south of the site in Boularderie (Lower Morien), and the former Prince Mine supply well located 2 km to the east (Upper Morien). The aquifer is considered to be a semi-confined stratiform bedrock aquifer with seasonal water level fluctuations of about 1.5 m.

Well construction statistics are available for residential and commercial supply wells in the Point Aconi, McCreadyville, Millville, Mill Creek and Mill Pond areas (NSE 2012a). Based on 110 well logs in the area, the depth to groundwater table ranges from flowing above ground to 27.4 m below grade, with an average of 7.1 m below grade. The same set of statistics indicates a wide range of yields (2 to 341 L/min, mean 50 L/min) proportional to well depth and domestic demand (typically 22 to 45 L/min). Based on the topography, the dominant direction of groundwater flow is north and northeast towards the sea and Mill Pond.

The fractured metasedimentary bedrock underlying the area of the Woodbine converter station is considered to be a poor aquifer. Based on the NSE pumping test inventory (6 wells), drilled wells completed in the fractured bedrock of the Fourchu Group metavolcanics and Georges River Metamorphic Suite typically yield an average 143 L/min and 11 L/min, respectively. Dug wells completed in sand and gravel are common in the area.

Based on regional topography, this area would be considered to be a recharge area, with downward vertical hydraulic gradients expected from overburden to bedrock. Based on the topography, the dominant direction of groundwater flow is north, east and southeast from the site.

4.3.2.5 Groundwater Quality

Representative groundwater quality data for Point Aconi can be characterized as a clear, slightly hard (mean hardness 150 mg/L) and alkaline (mean alkalinity 135 mg/L, mean pH 8.0) calcium-bicarbonate water type of low TDS (mean TDS 201 mg/L). With the occasional exceptions of manganese and iron, all inorganic parameters meet Guidelines for Canadian Drinking Water Quality (Health Canada, 2011).

Based on the seasonal monitoring of 418 drilled wells and 60 dug wells in the Point Aconi area (Jacques Whitford 1992); the most common water quality problems have included elevated iron and manganese concentrations in areas with shallow coal seams, and sodium, chloride and elevated dissolved solids and hardness in areas of saline intrusion or road salt impacts.

No water quality data were available for the metasediments in the Woodbine area. Based on general knowledge, and assuming these aquifers would resemble upland granite and crystalline bedrock, good groundwater chemistry with most parameters meeting drinking water guidelines would be expected. An increasing degree of hardness, sulfate and TDS would be expected in the Windsor lowlands to the north.

Based on two chemistry samples at Fortress Louisbourg and Michaud Park, wells completed into the Fourchu Group bedrock can be expected to yield a clear, moderately hard (156 to 210 mg/L), and neutral (alkalinity 123-203 mg/L, pH 7.3 to 7.9, LI +0.34 at 4 ° C) calcium-bicarbonate water type of low dissolved solids (244 to 255 mg/L). All parameters except manganese typically meet drinking water guidelines.

4.3.2.6 Domestic and Industrial Water Wells

All of the residential and small commercial properties in the vicinity of the various components of the Project can be assumed to be supplied by on-site water wells and septic fields. The nearest domestic water supply wells to the transition compound are 2.5 km east (McCreadyville), 3.0 km northeast (Point Aconi), 19 km southwest (Boularderie Island) and 2 km south at Kings Grove Road, Mill Pond.

The closest residential water supplies to the converter station are Morley Road about 250 m to the northeast of the sub-station, 1 km north on the Woodbine road, 4 km west at Glen Morrison and 2.6 km south on Hillsdale Road.

The Cambrian aged or older fractured bedrock aquifers between Mira River and the grounding site are considered to have poor groundwater well development potential for commercial or industrial uses. However, the aquifers can supply sufficient yields of potable groundwater for individual family domestic uses from properly drilled water wells. Numerous residential wells are located along Highway 22. These are likely drilled or dug completions in bedrock or overburden respectively. Proximity to residential wells would need to be considered if any underground transmission lines or major towers are to be installed.

There are several domestic well users identified along Louisburg-Main-a-Dieu Road in the vicinity of Big Lorraine and Little Lorraine. Development is sparse around Big Lorraine, with two apparent summer homes or cottages on the shoreline at West Shore Road, one residence on the point accessed by Big Lorraine Road and one residence along the highway on the north. A higher degree of development (more than 25 residences) appears to be present around the shoreline of Little Lorraine accessed by Burkes Lane, Kennedy Lane and Oceanside Crescent. In consideration of the limited numbers of drilled well logs found in the NSE database, it is likely that many of these homes are serviced by dug wells.

Several large industrial and municipal well fields are present in the Cape Breton Coalfields area. The Middle Lake Road Well Field (3,300,000 gallons/day capacity) is a series of deep wells along Middle Lake Road, about 31 km southeast of Point Aconi, and about 10 km northeast of the transition compound (CBRM 2012a). This well field provides drinking water to Sydney, Coxheath, Westmount, Sydney River, Grand Lake Road, and Mira Road (CBRM 2012a). Sources of contamination and assessed risks have been discussed and a process to implement some sort of protected status for the well field has been initiated. A final groundwater protection plan is under development and ENL will inquire with the well field operator about any requirements that may apply to the Project, prior to beginning work in the area. High-capacity industrial supply wells are present at the Point Aconi Generating Station, the former Prince Mine site, and 4 km south of the transition compound near Milleville.

4.3.3 BIOLOGICAL ENVIRONMENT

4.3.3.1 Terrestrial Habitat

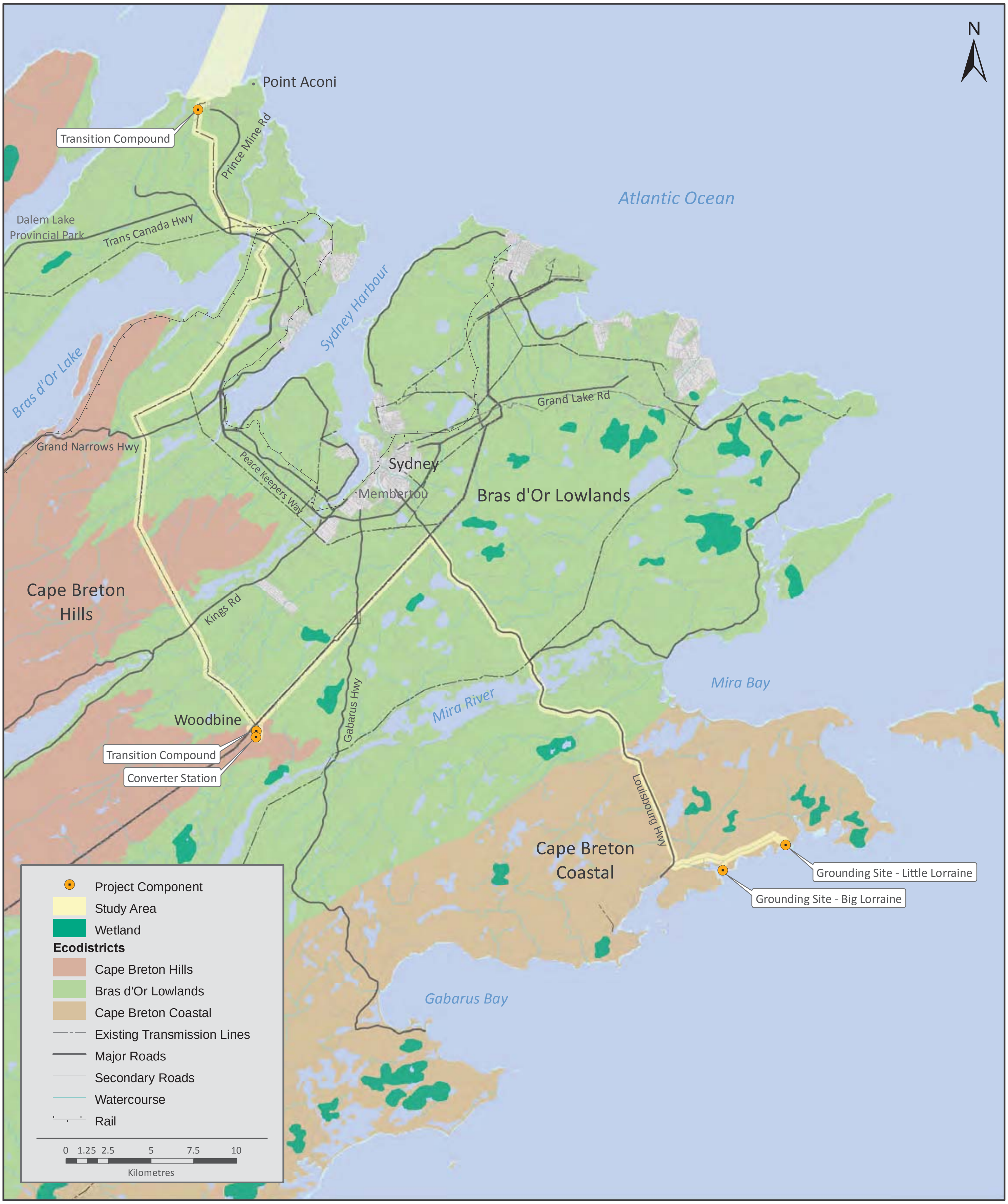
The Study Area for NS falls within the Atlantic Maritime Ecozone, and crosses three ecoregions and ecodistricts (Figure 4.3.1). Table 4.3.6 lists the ecoregions, and the associated ecodistricts, and provides a summary of the sizes of the areas within which Project components are located.

Table 4.3.6 Summary of Ecoregions and Ecodistricts within the Study Area (NS)

Ecoregion	Ecodistrict	Area within the Study Area	
		km^2	% Total
Nova Scotia Uplands	Cape Breton Hills	5 km^2	11.1%
Northumberland Bras d'Or Lowlands	Bras d'Or Lowlands	27 km^2	60.0%
Atlantic Coastal	Cape Breton Coastal	13 km^2	28.9%

The southern section of the NS Study Area falls within the Cape Breton Coastal Ecodistrict of the Atlantic Coastal Ecoregion. This ecodistrict is dominated by coastal forest comprising a mix of white spruce, balsam fir and black spruce; hardwood species include red maple and white birch.

The majority of the Study Area in NS is located within the Bras d'Or Lowlands Ecodistrict which is characterized by sheltered lowland areas (elevation ranging from 25-30 m asl) dominated by black and white spruce in poorly drained soils. Other species include balsam fir, white pine, red spruce (*Picea rubens*) and hemlock; tolerant hardwood species are found in better drained hills in the region.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Scale: 1:300,000

Data Sources: CanVec 1:50,000 NSDNR 1:250,000

Date: 18/12/2012

FIGURE 4.3.1

Environmental Overview
Cape Breton, Nova Scotia

ENL135

A portion of the Study Area from Point Aconi to Woodbine, and the area surrounding the substation and converter station at Woodbine, fall within the Cape Breton Hills Ecodistrict of the Nova Scotia Uplands Ecoregion. The ecoregion is an area of relatively high elevation in NS (ranging from 150 to 300 m asl) with the hilly topography influencing local microclimates. The Cape Breton Hills Ecodistrict primarily supports tolerant hardwood forest, with spruce and fir also scattered throughout the region.

An ELC study was also undertaken for this region of the Project to provide a landscape-level analysis of major vegetation communities and habitat. A summary of each vegetation type, size, and relative occurrence is provided in Table 4.3.7.

Table 4.3.7 Summary of ELC Habitat Types in the Study Area (NS)

NS ELC Habitat Type	Point Aconi Generating Station to Woodbine	
	Area (ha)	% of Project
Coniferous Forest	33.6	12.3
Coniferous Scrub	5.4	2.0
Cutover	9.1	3.3
Deciduous Forest	141.9	52.0
Deciduous Scrub	0	0.0
Ericaceous/Coniferous Scrub Complex	4.2	1.5
Exposed Rock/Unvegetated Anthropogenic	3.5	1.3
Imagery Cloud and Shadow	8.8	3.2
Mixed Wood Forest	3	1.1
Vegetated Anthropogenic	20	7.3
Water	0.8	0.3
Wetland: Bryoid/Graminoid	0.2	0.1
Wetland: Coniferous Forested	13.3	4.9
Wetland: Deciduous Forested	20.2	7.4
Wetland: Deciduous Scrub	0	0.0
Wetland: Ericaceous/Coniferous Scrub	5.2	1.9
Wetland: Graminoid/Herbaceous	2.6	1.0
Wetland: Mixed Wood Forested	0.7	0.3
Wetland: Unvegetated Peat or Bog Pool	0.3	0.1
TOTALS	**272.8**	**100.0**

Based on the 2004 inventory, Nova Scotia's 5.5 million hectares of land is comprised of 360,462 hectares (6.6% of total land area) of freshwater wetlands and 17,060 hectares (0.3% of total land area) of salt marsh (NSE 2011b).

To characterize wetlands in the Study Area, a wetland classification model was developed as part of the ELC model and delineated wetlands at a 1:25,000 scale. Wetland habitat was classified along the transmission corridor through a combination of modeling and field work. Table 4.3.8 summarizes the wetland forms present along the NS portion of the proposed transmission corridor and provides information about relative coverage. Approximately 18.2 % of the transmission corridor contains wetland habitat, of which swamps (*i.e.*, flat, riparian, slope, discharge, and other types) represent 85% of the wetland forms found. Recognizing the importance of wetlands as a landscape feature performing many biological, hydrological, social/cultural, and economic functions, Project design and planning has focused on avoiding wetlands to the extent feasible.

Table 4.3.8 Summary of Wetland Forms along Transmission Corridor (NS)

Wetland Form	Point Aconi Generating Station to Woodbine	
	Area (ha)	% of Project Corridor
Shallow Water	0.8	0.3
Basin Bog	0.5	0.2
Riparian Fen	1.9	0.7
Basin Marsh	1.3	0.5
Riparian Marsh	0.02	0.0
Discharge Swamp	3.1	1.1
Flat Swamp	16.5	6.0
Riparian Swamp	16	5.9
Slope Swamp	7.5	2.7
Swamp (Other Types)	1.9	0.7
TOTAL	**49.52**	**18.2**

Rare plant species modeling, which involved using ELC data and existing information on rare plant species (ranked as S1 and greater), identified four SOCI which could be encountered within the Study Area (Table 4.3.9).

Table 4.3.9 Plant Species of Conservation Interest that may Occur in the Study Area (NS)*

Common Name	Scientific Name	Status	
		SARA	NS *ESA*
Prototype Quillwort	*Isoetes prototypus*	Special Concern	Vulnerable
New Jersey Rush	*Juncus caesariensis*	Special Concern	Vulnerable
Boreal Felt Lichen	*Erioderma pedicellatum*	Endangered	Endangered
Frosted Glass Whiskers (NS population)	*Sclerophora peronella*	Special Concern	Not listed
*Based on rare species habitat modeling employing ELC data			

Rare flora surveys were conducted in 2012 along the proposed transmission corridor to determine presence/absence and abundance of rare plants and identify areas that might be particularly sensitive to disturbance. ELC data and rare flora potential modeling were used to focus field efforts within the Study Area. Five rare plant species were encountered at a total of four different locations: Frenchvale, Mill Pond, Big Ridge, and Georges River (refer to Table 4.3.10). None of the SOCI listed in Table 4.3.9 were encountered during the surveys and none of the species observed during the surveys (Table 4.3.10) are listed by *SARA* or the NS *ESA*.

Table 4.3.10 List of S1, S2 Species Encountered in the Survey Area (NS)

S-Rank	Scientific Name	Common Name
S2	*Pyrola minor*	Lesser wintergreen
S2S3	*Stuckenia filiformis*	Slender pondweed
S3	*Agrimonia gryposepala*	Tall hairy groovebar
	Corallorhiza trifida	Early coralroot
	Platanthera orbiculata	Large roundleaf orchid

<u>Protected Areas</u>

The Project crosses the Pottle Lake Watershed Protected Water Area; however, all works associated with the Project will remain within the existing right of way. There are no other known protected areas (as per municipal, provincial or federal designation) crossed by the Project, although there are several protected areas in the vicinity of the Study Area. Bird Islands IBA and the Central Cape Breton Highlands IBA are located 6.1 km and 13.8 km respectively from the Study Area. For additional information on protected areas refer to Section 8.1.

4.3.3.2 Wildlife

The habitat within the NS Study Area supports a variety of wildlife common for this area of the province. Winter track surveys, conducted in 2012 in the Study Area, confirmed the presence of various wildlife species considered common to NS (Table 4.3.11). No mammal species listed under *SARA* or the NS *Endangered Species Act* were encountered.

Table 4.3.11 Common Wildlife Species Recorded in the Study Area (NS)

Common Name	Scientific Name
Beaver	*Castor canadensis*
Red Squirrel*	*Tamiasciurus hudsonicus*
Northern Flying Squirrel	*Glaucomys sabrinus*
Red-backed Vole	*Clethrionomys gapperi*
Meadow Vole	*Microtus pennsylvanicus*
Varying Hare*	*Lepus americanus*
Ermine	*Mustela erminea*

Table 4.3.11 Common Wildlife Species Recorded in the Study Area (NS)

Common Name	Scientific Name
Mink	*Mustela vison*
River Otter	*Lontra canadensis*
Bobcat	*Lynx rufus*
Red Fox	*Vulpes vulpes*
Coyote*	*Canis latrans*
White-tailed Deer*	*Odocoileus virginiana*
* These species were the most frequently encountered during the surveys	

Various avifauna surveys were conducted during 2011 and 2012 as summarized in Table 4.3.12. In addition, ACCDC data, North American Breeding Bird Survey, Nature Counts, and Maritime Breeding Bird Atlas databases were combined with habitat mapping to model potential presence of Species of Conservation Interest in the Study Area.

Table 4.3.12 Summary of Nova Scotia Avifauna Field Program (2011-2012)

Dates	Survey Type	Protocol/Method
Late June/Early July 2011	Breeding Bird Survey	Point counts
Late June/Early July 2011	Shoreline Survey	Point counts and incidental observations during travel between point count locations
August, September, October 2012	Shorebird Survey	Atlantic Canada Shorebirds Survey Protocol
June 2012	Breeding Bird Survey	Point counts; area searches
May 2012	Owl Surveys	Nova Scotia owl monitoring protocol (silent listening and playback)
May 2012	Woodpecker and Raptor Surveys	New Brunswick forest hawk and spring woodpecker survey protocol (silent listening and raptor playback)
June 2012	Common Nighthawk Survey	Point count
August, September, October 2012	Shorebird and Directed Whimbrel Surveys	Atlantic Canada Shorebird Survey Protocol

Breeding bird surveys were conducted in late June/early July 2011 and in early June 2012. During the 2011 surveys, a total of 712 birds of 78 species were recorded. A total of 1,846 birds representing 80 species were recorded during the 2012 breeding bird surveys. Shoreline surveys were conducted in 2011 with 16 birds representing three species recorded east of Point Aconi and 62 birds representing 22 species recorded west of Point Aconi. The most abundant species observed during the 2011 and 2012 avifauna surveys are listed below (in alphabetical order):

- Alder Flycatcher (*Empidonax alnorum)*
- American Goldfinch (*Carduelis tristis*)

- American Robin
- Bank Swallow
- Blue-headed Vireo (*Vireo solitaries*)
- Common Yellowthroat
- Greater Black-backed Gull
- Hermit Thrush (*Catharus guttatus*)
- Herring Gull
- Magnolia Warbler
- Ovenbird (*Seiurus aurocapillus)*
- Red-eyed Vireo (*Vireo olivaceus*)
- Ring-billed Gull (*Larus delawarensis*)
- White-throated Sparrow

The 2012 general shorebird surveys recorded a total of 11 shorebird species with 86% of the 238 shorebirds recorded represented by three species (Semipalmated Plover, Semiplamated Sandpiper, and Sanderling (*Calidris alba*)). Directed Whimbrel (*Numenius phaeopus*) surveys recorded a total of 22 Whimbrel in the vicinity of Little Lorraine, most of which were observed flying over the area.

The NS spring avifauna survey 2012 program also included owl playback surveys, woodpecker and raptor playback surveys, and Common Nighthawk (*Chordeiles minor*) point count surveys. An overview of the results of these surveys is presented below.

- During the 2012 owl surveys, owls were recorded at five of 27 survey sites. The only species recorded during the surveys was Barred Owl (*Strix varia*). Additional records of Barred Owl were also collected during the spring avifauna surveys (one bird) and the woodpecker and owl surveys (four birds).
- Five species of woodpecker and four raptor species were recorded during the woodpecker and raptor surveys conducted in May 2012. Woodpecker species included Northern Flicker (*Colaptes auratus*), Downy Woodpecker (*Picoides pubescens*), Hairy Woodpecker (*Picoides villosus*), Yellow-bellied Sapsucker (*Sphyrapicus varius*), and Pileated Woodpecker (*Dryocopus pileatus*). No additional woodpecker species were recorded during the spring avifauna surveys.
- Raptor species encountered during the 2012 woodpecker and raptor surveys included Red-tailed Hawk (*Buteo jamaicensis*), Bald Eagle (*Haliaeetus leucocephalus*), Sharp-shinned Hawk (*Accipiter striatus*), and Merlin. Two more species, American Kestrel (*Falco sparverius*) and Osprey, were recorded during the spring avifauna surveys in June 2012. Red-tailed Hawk was the only raptor species for which evidence of nesting was noted. A

pair of Red-tailed Hawks scolded one of the observers at approximately the same location near Johnson Lake on two occasions suggesting the presence of a nearby nest.

- One Common Nighthawk was observed in one of the reference point count sites in 2011. None were recorded at any of the spring avifauna surveys conducted in 2012. The directed Common Nighthawk surveys conducted in 2012 did not reveal the presence of this species.

Several avifauna SOCI were identified in the Nova Scotia Study Area during the 2011 and/or 2012 surveys (Table 4.3.13). All species were associated with coniferous or mixed wood treed swamps, or agricultural land (pastures) (refer to Section 8.1 for additional information on SOCI including bird species that could potentially interact with the Project).

Table 4.3.13 Bird Species of Conservation Interest Identified during Avifauna Surveys (NS)

Common Name	Scientific Name	Status	
		SARA	NS *ESA*
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened
Chimney Swift	*Chaetura pelagica*	Threatened	Endangered
Barn Swallow	*Hirundo rustica*	No Status	
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened
Canada Warbler	*Wilsonia canadensis*	Threatened	
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Vulnerable
Bobolink	*Dolichonyx oryzivorus*	No Status	

A freshwater fish and fish habitat survey identified approximately 53 stream crossings in the Study Area. Fifteen of the streams were selected for chemical analyses and 11 sites were surveyed. Dominant habitat types in surveyed streams were riffle (49.5%) and run (41.9%) with sand and gravel as the dominant substrate type. Water chemistry data suggested that the surveyed streams were representative of natural, relatively pristine waters; however CCME guidelines were exceeded for aluminum, cadmium, iron, lead and selenium in various samples. These exceedances were likely natural occurrence with the possible exception of one stream which may have been impacted by human activities. There are several scheduled salmon rivers in the Study Area including Sydney River, Northwest Brook and Frenchvale Brook (between Point Aconi and Woodbine), Aconi Brook (between the grounding site and landfall site at Point Aconi Generating Station), and Catalone River and Mira River (associated with grounding line). Other anadromous fish species, including shad (*Alosa sapidissima*) and gaspereau (alewife) (*Alosa pseudohargenus*), have been documented in areas near the Study Area including Power Lake, Sydney River, Balls Creek, Leitches Creek, Northwest Brook, Grand Lake and at the entrance to the Bras D'Or Lakes.

American eel are fished commercially at the mouth of Northwest Brook. Nearly all streams surveyed were determined to contain valued, recreational fish species with most streams surveyed containing brook trout (*Salvelinus fontinalis*).

There are four aquatic SOCI that could potentially be found in the Study Area (Table 4.3.14). The Eastern Cape Breton population of Atlantic salmon is designated as endangered by COSEWIC although is not listed by *SARA* or the NS *ESA.* Brook trout listed as Sensitive by NSDNR, is a dominant species in the Study Area.

Table 4.3.14 Aquatic Species of Conservation Interest Potentially Present in the Study Area (NS)

Common Name	Scientific Name	Status	
		SARA	NS *ESA*
American eel	*Anguilla rostrata*	No Status	
Striped bass	*Morone saxatilis*	No Status	
Atlantic sturgeon	*Acipenser oxyrhynchus*	No Status	
Yellow lamp mussel	*Lampsilis cariosa*	Special Concern	Threatened

5.0 ENVIRONMENTAL ASSESSMENT METHODS AND SCOPE OF ASSESSMENT

The methodological framework used in this EA has been developed to meet the requirements of *CEAA*, NL*EPA*, and the NS*EA*. This framework is based on a structured approach that:

- focuses on issues of greatest concern;
- considers the issues raised by the Mi'kmaq;
- considers the issues raised by the public and stakeholders; and
- integrates engineering design and programs for mitigation and follow-up into a comprehensive environmental planning process.

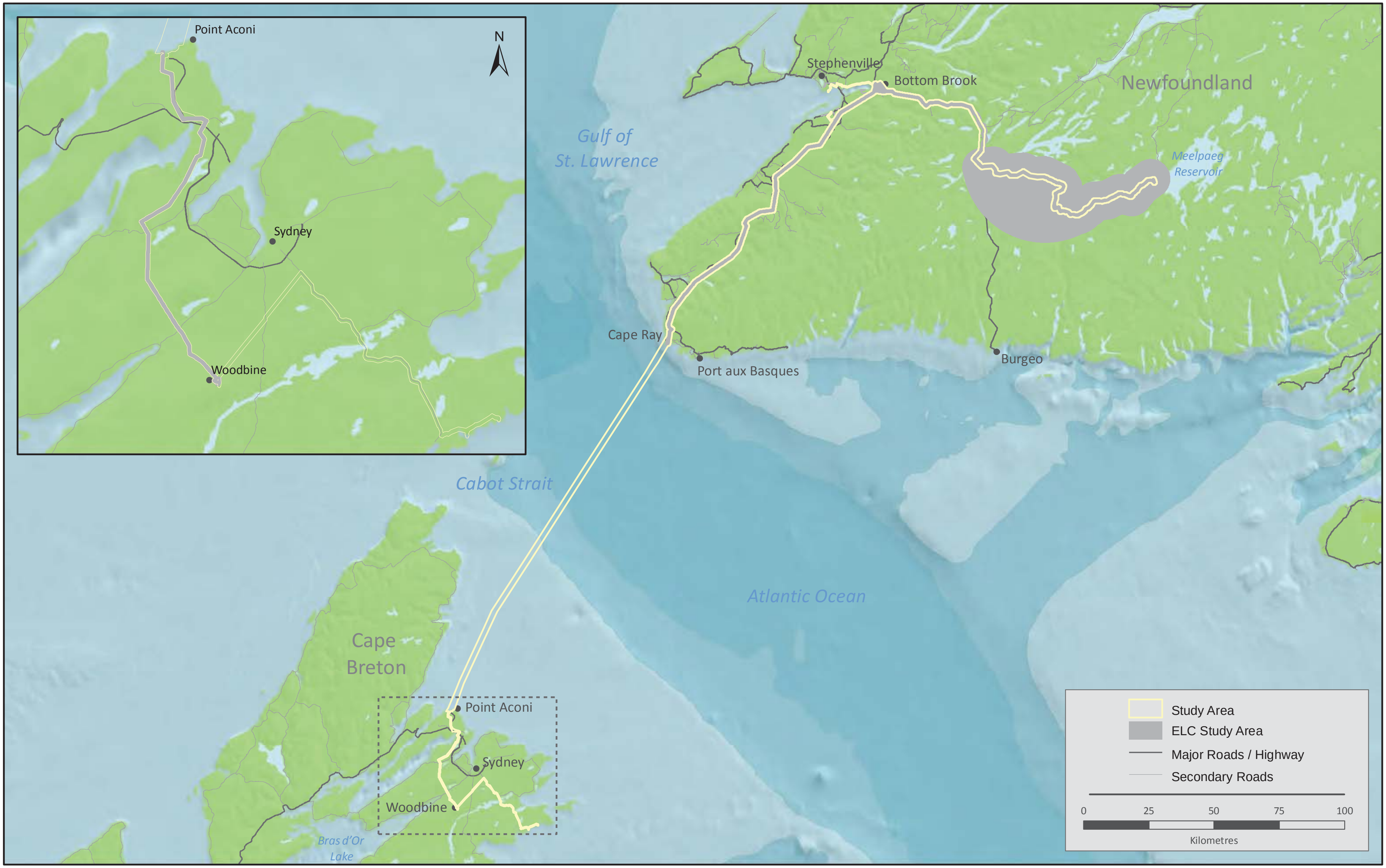
The EA focuses on specific environmental components called VECs. VECs are specific components of the biophysical and human environments that, if altered by the Project, may be of concern to regulatory agencies, Aboriginals, stakeholders, resource managers, scientists, and/or the general public.

It is noted that "environment" is defined to include not only biological systems but also human, social, and economic conditions that are affected by changes in the biological environment. As such, VECs can relate to ecological, social, cultural or economic systems that comprise the environment as a whole.

5.1 STUDY AREA

In consideration of the opportunities and constraints for Project development, and in consultation with regulators, the study boundaries were defined to facilitate the environmental assessment of the Project. The Study Area for the Project was determined by establishing a balance among the need to (i) establish spatial boundaries within which the various assessment activities will be focused; (ii) avoid sensitive areas where mitigation measures may not be feasible; and (iii) provide flexibility for minor spatial adjustments to the proposed Project footprint. Variations in the dimensions of Study Area reflect the geographic extent of the Project and differences in environmental settings, *i.e*., terrestrial vs. marine.

For the purpose of conducting the EA, the project is divided geographically into three regions: Newfoundland, the Cabot Strait, and Nova Scotia; the intent is to facilitate the regulatory review within the respective jurisdictions (Figure 5.1.1).



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Geobase - Road Network, Geogratis - National Atlas

Scale: 1:2,000,000

Date: 18/12/2012

FIGURE 5.1.1

Overview of the Study Area and ELC Boundary

ENL0152

On the island of Newfoundland the Study Area is a 2 km wide area centered on the proposed transmission corridor, which generally runs in close proximity to existing linear features (existing transmission corridors, roads). In the Cabot Strait the Study Area is a 2 km-wide corridor centered on the proposed route of the subsea cables. The Study Area in Cape Breton is 500 m wide, centered on the proposed transmission corridor which runs parallel to an existing transmission corridor. This Study Area defines a reasonable area around the proposed 60 m wide transmission corridor, within which the effects assessment is completed and routing alternatives considered. The cumulative effects assessment in many cases encompasses a broader assessment area specific to the context of a given VEC.

The exception to the proposed 2 km-wide Study Area on the island of Newfoundland is the 27 km long Area of New Access. This is defined as the area between the departure point from the Burgeo Highway (in the west) through to the Victoria Lake Hydro control structure (in the east). In discussions with the NLDEC, this was identified as an area of elevated concern with respect to migratory movements of caribou and their utilization of habitat. Caribou on the Island are less abundant than in the recent past and their status is receiving much attention from the public, media, and resource managers at provincial and national levels. For this reason the Study Area in this area was widened to 20 km in the event that predicted environmental effects require a realignment of the proposed transmission corridor.

The Study Area was identified as an initial step in the planning process to facilitate the identification of constraints; set manageable boundaries to assess potential environmental effects; and to facilitate discussions with stakeholders, regulators, and other interested parties. Within this Study Area, a comprehensive characterization of habitat was undertaken to facilitate the assessment of potential effects for identified environmental components, *i.e.*, assessing the potential effects of Project activities on habitat as the basis for conducting the VEC effects assessment, with some exceptions such as SOCI and socio-economic VECs.

For the terrestrial components, this characterization was achieved through the development of a comprehensive Ecological Land Classification (ELC) model. Potential Project interaction with identified habitat types, and more specifically known habitat utilization for a given species, is used as the basis for the effects assessment. In general, the ELC modeling covered a larger area than the Project Study Area and the information from this wider coverage formed the basis for subsequent analyses, *e.g.*, wetland model, rare plant model and wildlife habitat suitability. However, for the purpose of the assessment of potential effects only the information from within the 2- km-wide Study Area was used. During the fall of 2011 a field team collected data on vegetation using aerial surveillance or ground sampling. Ground plots and aerial rapid assessment points were sampled to catalogue vegetation species and percent cover of individual strata. These sample data were used in the development of the ELC model as both a source of training samples and for validation of the model. These data also informed descriptions of the vegetation communities and subsequent ELC Units, particularly in terms of the dominant species which define each community.

In the development of the ELC model the GIS employed a supervised image classification based on a combination of high resolution multi-band imagery at 20 cm, 50 cm and 5 m scales, and the spectral signatures of areas of known vegetation characteristics. Within specified boundaries, the model defined ELC units for the island of Newfoundland and Cape Breton (Table 4.1.5 and 4.3.7). Post-processing of the model outputs included an accuracy assessment using reserved field surveyed plots for validation, and generalization of the data to a functional 1:25,000 scale.

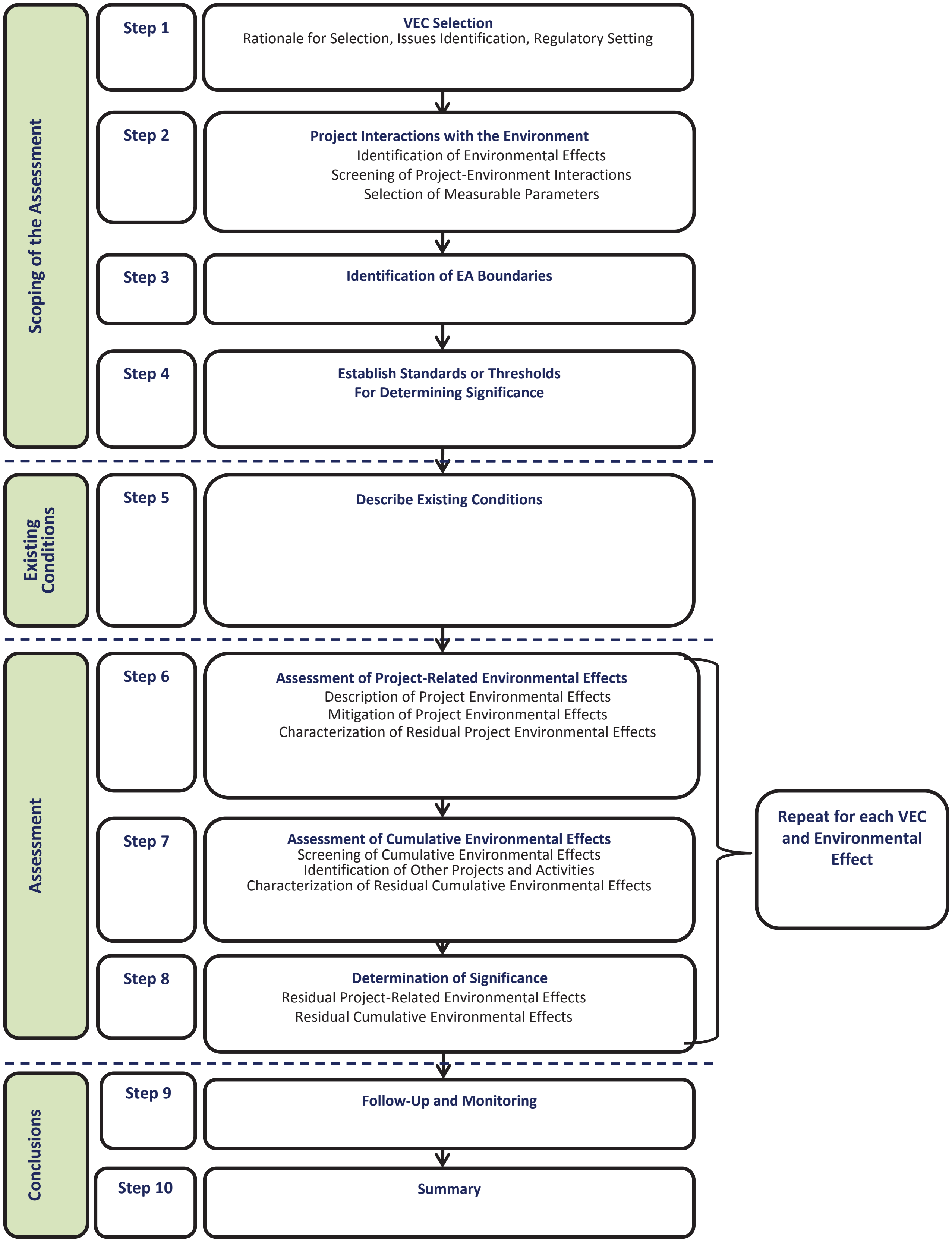
It is important to note that the use of the Study Area in the environmental assessment is also important in Project planning and design, as well as the subsequent regulatory permitting process. Much of the detailed information collected, *e.g.*, wetlands, can be a key consideration in the route selection process. The development of the ELC model for the Study Area has been further used to develop models for wetlands and rare flora. These models will be used extensively in the permitting phase of the Project and for the micrositing of towers within the final alignment.

In the Cabot Strait, marine geophysical and benthic ecology surveys were undertaken to characterize benthic habitat within the 2-km-wide Study Area. This information was used in the design and selection of the marine route, as well as the basis for the effects assessment in the marine environment.

5.2 ENVIRONMENTAL ASSESSMENT METHODS

Project-related environmental effects are assessed using a standardized methodological framework for each VEC, with standard tables and matrices used to facilitate and support the evaluation. The residual Project-related environmental effects, *i.e.*, after mitigation has been applied, are characterized using specific criteria (direction, magnitude, geographic extent, duration, frequency, and reversibility) that are applied to each VEC. The significance of these residual effects is then determined based on pre-defined and VEC-specific thresholds (also called significance criteria). The environmental effects assessment approach used in this report is shown graphically in Figure 5.2.1 and includes the following general steps.

- **Scope of Assessment** – The scope of the overall assessment is defined, including: selection of VECs; identification of environmental effects; definition of the parameters that are used to characterize the Project-related environmental effects; description of temporal and spatial assessment boundaries; and identification of the standards or thresholds that are used to determine the significance of residual environmental effects. This scoping step relies upon direction from regulatory authorities (including the Guidelines); consideration of the input from the public, stakeholders, and Aboriginal groups (as applicable); and the professional judgment of the study team.



Emera Newfoundland & Labrador

FIGURE 5.2.1
Overview of Environmental Assessment Method

ENL-127

- **Existing Conditions** - Existing (baseline) environmental conditions for each of the VECs are established. In most cases existing conditions expressly and/or implicitly include those environmental effects that have been caused by other past or present projects or activities, and can thus generally be considered to represent the cumulative impacts of all such projects and activities.

- **Assessment of Project-Related Environmental Effects** - Project-related environmental effects are assessed including: potential interactions; mitigation and environmental protection measures proposed to reduce or eliminate adverse environmental effects; and the characterization of the residual environmental effects of the Project. The ultimate focus of the assessment is on residual environmental effects that remain after planned mitigation has been applied. For this Project, the phases to be assessed include construction, and operation and maintenance. Accidents, malfunctions, and unplanned events are addressed separately.

  It is common practice in environmental assessment to rank project-environment interactions to ensure that the level of assessment undertaken is in accordance with perceived risk and severity of the potential environmental effect. Although somewhat subjective, the ranking process applied in this assessment carefully weighed the objective evidence drawn from the following sources:

  - published scientific literature related to the known effects of similar interactions;
  - the results of focused studies undertaken as part of the assessment;
  - the results of monitoring other similar project-environment interactions;
  - the experience with mitigation measures that are employed in similar interactions;
  - lists of species at risk that have potential to occur in the project area;
  - expert opinion and the professional judgment of the study team;
  - commitment to monitoring; and
  - spatial and temporal scale.

  Integrating these information sources, the study team developed and applied the following criteria and rankings in addressing the environmental components as identified in the Guidelines:

Approach to Assessment	Criteria	Rank
Information throughout report	Potential interaction addressed with more information	
Addressed as a VEC	Nil or extremely limited risk of interaction with the Project	0
	Limited risk can be mitigated with standard procedures	1
Further addressed as a VEC	Potential interaction can be mitigated with standard procedures and Project-specific mitigation measures	2

- **Effects of the Environment on the Project** – The evaluation also considers the potential effects of the environment on the Project, *e.g.*, weather events.

- **Assessment of Cumulative Environmental Effects** – As stated above, baseline conditions generally reflect the cumulative effects of past and present projects and activities. In some situations, however, there is a need to assess the potential for additional Project-related cumulative effects, particularly in regard to potential interactions with other pending projects that are in advanced planning stages, or existing ones that may be subject to modifications or expansion. In such cases, a Project-related cumulative environmental assessment is completed to determine if there is potential for substantive interaction with such projects or activities. The residual cumulative environmental effects are then evaluated.

- **Determination of Significance** - The significance of residual Project-related and cumulative environmental effects is then determined based upon specified criteria. In environmental assessment methodology, this determination of a “significant effect” is an important step. For some VECs significance criteria relate to changes at the population level. However, since the numbers of most species can be highly variable both in space and time, it is difficult to measure statistically significant changes in natural populations over the relatively short time frames or within the limited spatial boundaries inherent in environmental assessment studies. In such cases the EA methodology is based on comparing current, *i.e.*, “baseline”, population levels, within specified time and space boundaries, with future levels as determined by monitoring to assess (i) the effectiveness of mitigation measures and (ii) the potential relationship between project activities and measured changes in population levels.

- **Recommendations for Follow-up** – Where applicable, follow-up and monitoring to verify the predictions of environmental effects or to assess the effectiveness of the planned mitigation is recommended.

5.3 PRELIMINARY ASSESSMENT AND VEC SELECTION

5.3.1 SCOPE OF THE PROJECT

The scope of the Project for the purpose of this EA Report includes all activities and physical works associated with construction, operation and maintenance described in Section 2 (Project Description), as summarized in Table 5.3.1.

Table 5.3.1 Project Activities and Physical Works

Project Activities and Physical Works	Jurisdiction			Details
	NL	Cabot Strait	NS	
Construction Activities				
Site Access	✓		✓	Safe construction, operation and maintenance of the on-land component of electrical power transmission systems include developing and maintaining a cleared corridor. An access plan will be developed for the Project including crossing of watercourses and wetlands.
Site Preparation	✓		✓	Clearing vegetation for all transmission corridors; the grounding lines; static Project infrastructure such as converter stations, transition compounds and switchyards; construction of permanent and temporary access roads, laydown areas, and temporary accommodation facilities. Clearing of transmission corridors typically requires minimal grubbing, but some may be required for dead-end towers, depending on foundation requirements. In addition to the large tower foundations, any infrastructure footprint and permanent and temporary access roads will also require grubbing.
Transmission and Grounding Line Infrastructure	✓		✓	Installing transmission and grounding line infrastructure involves the distribution of materials, preparation of foundations, tower assembly and erection, installation of counterpoise wire and stringing of conductor.
Converter Stations	✓		✓	The access road and the overall site will be cleared and prepared for construction. Fill materials may be brought onsite to construct the road and to level the site.
Grounding Facilities	✓		✓	The main activities associated with the construction of the grounding facilities is the creation of a breakwater structure and associated impoundment pond.
Subsea Cables		✓		This activity involves a cable laying vessel, seabed preparation and cable laying, cable protection, cable landing, and nearshore HDD.
Operation				
Overland Power Transmission	✓		✓	Transmission towers will transmit both AC and DC power overland.
Power Conversion	✓		✓	Converter stations will house the technology that performs the power conversion between AC and DC. The Project will utilize two 500 MW +/- 200 kV asymmetric bipole DC converter stations.
Subsea Power Transmission		✓		Two +/- 200 kV HVdc subsea power cables will extend across the Cabot Strait connecting the island of Newfoundland and Cape Breton.

Table 5.3.1 Project Activities and Physical Works

Project Activities and Physical Works	Jurisdiction			Details
	NL	Cabot Strait	NS	
Maintenance				
Regular Inspection	✓	✓	✓	Various modes of operation will be used to inspect land-based infrastructure and the subsea cable.
Repair to Infrastructure	✓	✓	✓	Infrequent repairs may be required for land-based infrastructure and subsea cables.
Vegetation Management	✓		✓	General inspection activities will include monitoring of vegetation as part of a long-term vegetation management plan.

5.3.2 FACTORS TO BE CONSIDERED

As indicated in the Guidelines, the EA Report must consider the following factors:

- the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or shall be carried out;
- the significance of the environmental effects referenced above;
- comments from the public, stakeholder and Aboriginal groups received during the EA and consultation processes;
- comments from the Mi’kmaq of Nova Scotia that are received during the EA and consultation processes;
- measures that are technically and economically feasible and that would accommodate any adverse impact of the Project on potential or established Aboriginal and Treaty rights;
- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- the need for and purpose of the Project; and
- alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means.

5.3.3 PRELIMINARY ASSESSMENT OF PROJECT ENVIRONMENT INTERACTIONS

The potential interaction between the Project and the environment is at the core of environmental assessment. Table 5.3.2 is a preliminary assessment of potential interactions as reflected in the Guidelines. For some of the identified components, additional information has been provided in the report. Many of the interactions can be addressed using industry best management practices to mitigate potential effects. Where environmental best practices are considered to be insufficient to fully mitigate potential effects, or where additional information is required to assess these effects. these interactions are identified as valued environmental components and are subject to further assessment in this report. Specific environmental requirements and mitigation practices are identified in this assessment and will be refined in subsequent environmental regulatory permitting processes, and are applicable through the life of the Project.

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
Geophysical Environment	Geophysical hazards, *e.g.,* active geological zones, active seabed features (pockmarks and iceberg furrows) and processes (gas-charged sediments), coastal erosion, and sediment transport are risks considered in detail as part of the subsea cable design and routing. An overview of the geophysical environment is provided in the Environmental Setting section. The physical environment of the Study Area within the Cabot Strait is discussed in the Marine Environment VEC, based on the summary of findings from the various baseline studies pertaining to the following features: • bathymetry; • surficial sediments; • pockmarks; • sedimentary furrows and preglacial iceberg scour; and • sand waves and megaripples. Technical research and studies carried out in support of the Project are described in the Environmental Setting section and in the Marine Environment VEC. Benthic surveys were conducted at the grounding sites and the following surveys undertaken in the Cabot Strait: • marine geophysical surveys; • metocean study; • icebergs and pack ice study; • ambient underwater sound surveys; • benthic surveys; and • sediment transport and dispersion surveys. Marine sediment transport and the geophysical characteristics of the marine environment are addressed in the Environmental Setting section. The results of these technical studies were used to further refine the design of the Project as the planning process advanced. Geophysical and natural hazards are addressed in the sections on Effects of the Environment on the Project and Accidents and Malfunctions.	Section 4 - Environmental Setting Section 7 - Marine Environment Section 9 - Effects of the Environment on the Project Section 10 - Accidents and Malfunctions
Atmospheric Environment	Atmospheric Environment includes consideration of air quality, climate conditions, acoustic environment and EMFs. These components are considered in several sections of the report.	Section 2 - Project Description

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	A minimal amount of dust may be generated by Project construction activities. Dust control will be employed as necessary, including limiting exposed soils (*e.g.*, through re-vegetation) and application of water to dry and/or dust-prone soils, if required. There is expected to be a minor interaction with air quality due to exhaust emissions, including GHG emissions, from Project equipment and vehicles during construction. Air emissions will be mitigated through regular equipment inspection and maintenance and restriction of engine idling. Given that Project-related air emissions are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in a measurable change in ambient air quality. Onshore construction activities will result in localized and temporary noise emissions as described in the Project Description. Potential environmental effects of noise on land use enjoyment are addressed in the Socio-economic Environment VEC (Land Use). Potential environmental effects of noise on wildlife are addressed in the SOCI VECs, and the Caribou VEC. The following general mitigation will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the respective VEC sections. Dust and Noise • Dust will be controlled, where required, by using water or a suitable, approved dust suppressant. • Construction equipment will be maintained in good working order and properly muffled. • Noise control measures (*e.g.*, sound barriers, shrouds, enclosures) will be used where warranted. • Noise-generating construction activities will comply with the requirements of existing by-laws (where applicable). Blasting • Should blasting be necessary for rock excavation, it will be conducted in accordance with provincial legislation and subject terms and conditions of applicable permits. • Landowners will be notified of any blasting activities through a communication plan, to be developed as part of the EPP. • All blasts are to be conducted and monitored by certified professionals. • Where blasting is planned within 500 m of residences, activities will comply with the requirements of existing by-laws (where applicable).	Section 4 - Environmental Setting Sections 6, 8 - Socio-economic Environment (Land Use) Sections 6, 8 - SOCI Section 6 - Caribou

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	Electromagnetic fields (EMFs) are discussed in the Project Description and Socio-economic VECs, including a review of existing literature in the context of public concern.	
Water Resources	Watercourse crossings are discussed in detail in the Project Description and Environmental Setting. It is expected that approximately 200 watercourses, of various sizes, will be crossed by the transmission route in both provinces. Transmission lines will span watercourses, suspended from towers on either side, and strategic locations for watercourse crossings will be established for equipment mobilization, material distribution, tower construction, stringing and tensioning of lines, and all other associated activities. The access plan being developed is premised on the optimum use of existing roads, and will also identify locations for crossing watercourses. Previously established crossings, with existing culverts and bridges, will be utilized to reduce the number of permanent and temporary crossings; however, in some cases upgrades to accommodate the expected transport load weights may be required. Any temporary bridge crossings will be removed following completion of construction. Fording of watercourses will be considered only under unique and well-defined circumstances. When existing access and temporary crossings options are ruled out, Letters of Advice for Fording will be sought from DFO and NL's Environmental Guidelines for Fording (NLDEC 1992) will be adhered to. All fording activity that may be required will be carried out in compliance with the terms and conditions of a Certificate of Approval for Alternation to a Water Body under Section 48 of the *Water Resources Act*. In the event of a leak or spill due to an accident or malfunction, contaminants could leach through the soil and affect groundwater quality. The occurrence of such a release is considered in the assessment of Accidents and Malfunctions. Standard mitigation best practices for Dangerous Goods will be employed to manage this risk. Potential project interactions with protected and unprotected public water supplies are assessed in the Socio-economic VEC (land use). Potential project effects on freshwater systems (*i.e.,* streams, wetlands) are addressed in the SOCI VECs. The following general mitigation will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the individual VEC sections. • Watercourses will be crossed utilizing existing structures where feasible. Where no permanent	Section 2 - Project Description Section 4 - Environmental Setting Sections 6, 8 - Socio-economic Environment Sections 6, 8 - SOCI Section 10 - Accidents and Malfunctions

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	crossings are present, temporary engineered structures will be used. Clear span bridges will be the preferred option for temporary crossings and will comply with regulatory requirements. ENL is aware of the DFO National Operational Statement for Clear Span Bridges and will contact DFO for advice, if required, during construction. In locations where temporary crossings are not possible, fording will be considered as a last resort. • All watercourse crossings will be done in compliance with existing regulatory requirements. • Crossing of watercourses or wetlands will not result in permanent diversion, restriction or blockage of natural flow. • Crossings will be restricted to a single location and occur at right angles to watercourses or wetlands. Crossings should be located in areas which exhibit a stable soil type and where grades approaching the crossings will not be too steep. • Temporary spans will be located at a narrow point on the watercourse. • The approaches to watercourse crossings will be stabilized with brush mats, where necessary. Stream banks prone to erosion may require additional stabilization. Material used to stabilize/repair stream banks will be clean, non-erodible and will not come from the stream bank or bed. • If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements. • Removal of beaver dams will be undertaken only where required to facilitate construction or access. Beavers will be removed by licenced control officers and dam removal will be in accordance with applicable permits and/or guidelines. • Where possible, refueling in the field will not occur within 30 m of watercourses and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors (*e.g.* absorbent pads located below nozzles and spill response kits fully stocked and located at the refueling location). • Temporary storage of waste materials on-site will be located 30 m from watercourses, wetlands, and water supply areas (including known groundwater wells). Onshore construction activities may involve blasting which could potentially adversely affect water quality and quantity. These potential effects will be avoided and/or mitigated through standard mitigation including pre-blast surveys, proper blast design, and replacement of potable water as necessary.	

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	The following general mitigation will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the individual VEC sections. • Should blasting be necessary for rock excavation, it will be conducted in accordance with provincial legislation and subject terms and conditions of applicable permits. • Landowners will be notified of any blasting activities through a communication plan, to be developed as part of the EPP. • All blasts are to be conducted and monitored by certified professionals. • A pre-blast survey of all structures (*e.g.*, homes, wells, *etc.*) will be completed within a radius of the blasting zone that is consistent with regulatory requirements. The survey will include analysis of well water quality (*e.g.*, chemistry, bacteria). • Where blasting is planned within 500 m of residences, activities will comply with the requirements of existing by-laws (where applicable). • Blasting near watercourses will only occur in consultation with DFO, and will follow the requirements of the *Fisheries Act* as well as the requirements of the DFO Factsheet: Blasting – Fish and Fish Habitat Protection (DFO 2010c); and/or the DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998), as applicable. • If sulphide bearing materials are identified through pre-construction geotechnical surveys, these areas will be included in the EPP. Rock removal in known areas of elevated potential will conform to relevant legislation (*e.g.*, the Sulphide Bearing Material Disposal Regulation of the NS*EA*), and in consultation with relevant regulatory departments.	
Aquatic Environment (marine and freshwater)	<u>Marine</u> Marine fish habitat includes various aspects of the marine environment (*e.g.*, aquatic vegetation, substrate composition, water quality parameter). The marine environment is addressed in the Environment Setting and the Marine Environment VEC. <u>Freshwater</u> Watercourse crossings are discussed in detail in the Project Description and Environmental Setting. It is expected that approximately 200 watercourses, of various sizes, will be crossed by the transmission route in both provinces. Transmission lines will span watercourses, suspended from towers on either side, and strategic locations for watercourse crossings will be established for equipment mobilization, material distribution, tower construction, stringing and tensioning of lines, and all other associated activities.	Section 2 - Project Description Section 4 - Environmental Setting Section 7 - Marine Environment Sections 6, 8 - SOCI

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	The access plan being developed is premised on the optimum use of existing roads, and will also identify locations for crossing watercourses. Previously established crossings, with existing culverts and bridges, will be utilized to reduce the number of permanent and temporary crossings; however, in some cases upgrades to accommodate the expected transport load weights may be required. Any temporary bridge crossings will be removed following completion of construction. Fording of watercourses will be considered only under unique and well-defined circumstances. When existing access and temporary crossings options are ruled out, Letters of Advice for Fording will be sought from DFO and NL's Environmental Guidelines for Fording (NLDEC 1992) will be adhered to. All fording activity that may be required will be carried out in compliance with the terms and conditions of a Certificate of Approval for Alternation to a Water Body under Section 48 of the *Water Resources Act*. All construction activities near watercourses will comply with the applicable regulations and guidelines. No in-stream work is required, and no permanent effects to fish habitat are anticipated. The following general mitigation will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the individual VEC sections. • Watercourses will be crossed utilizing existing structures where feasible. Where no permanent crossings are present, temporary engineered structures will be used. Clear span bridges will be the preferred option for temporary crossings and will comply with regulatory requirements. ENL is aware of the DFO National Operational Statement for Clear Span Bridges and will contact DFO for advice, if required, during construction. In locations where temporary crossings are not possible, fording will be considered as a last resort. • All watercourse crossings will comply with existing regulatory requirements. • Crossing of watercourses or wetlands will not result in permanent diversion, restriction or blockage of natural flow • Crossings will be restricted to a single location and occur at right angles to the watercourse or wetland. Crossings should be located in areas which exhibit a stable soil type and where grades approaching the crossings will not be too steep. • Temporary spans will be located at a narrow point on the watercourse. • The approaches to watercourse crossings will be stabilized with brush mats, where necessary. Stream banks prone to erosion may require additional stabilization. Material used to stabilize/repair stream banks will be clean, non-erodible and will not come from the stream bank or	

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	bed. • If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements. • Removal of beaver dams will be undertaken only where required to facilitate construction or access. Beavers will be removed by licenced control officers and dam removal will be in accordance with applicable permits and/or guidelines. • Where possible, refueling in the field will not occur within 30 m of watercourses, and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors (*e.g.*, absorbent pads located below nozzles and spill response kits fully stocked and located at the refueling location). • Temporary storage of waste materials on-site will be located 30 m from watercourses, wetlands, and water supply areas (including known groundwater wells). Potential project environmental effects on species of conservation concern are assessed in the SOCI VECs.	
Vegetation	Terrestrial ecosystems and plant communities are described in Section 4, Environmental Setting. These descriptions incorporate the results of the ELC, which provides a landscape-level analysis of major vegetation communities and habitat within the Project Study Area. Habitat loss and potential effects on biodiversity are addressed in detail with respect to SOCI VECs. Vegetation harvested or grown for subsistence, social, cultural, ceremonial or medicinal purposes is addressed in the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC. The following general mitigation will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the individual VEC sections. • Vegetation management will be focused on removing trees and shrubs which may impede the reliable operation of the transmission system. • Procedures for removal and control of vegetation will range from manual cutting to selective use of approved herbicides. • Herbicides will be applied by certified applicators, in accordance with standard industry practices and applicable regulations. • Where feasible, vegetation management activities will take place outside of the identified bird	Section 2 – Project Description Section 4 - Environmental Setting Sections 6, 8 – SOCI Section 8 - Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	breeding season; and • work near wetlands and watercourses will adhere to the conditions of relevant permits.	
Wetland Ecosystems	Wetland habitats are an important feature of the landscape, performing many biological, hydrological, social/cultural, and economic functions. They are also important considerations in the design and routing of transmission lines for technical and economic reasons. In Newfoundland and Labrador, wetlands are protected under the *Water Resources Act*. Developments in wetlands are subject to approval under this Act and in accordance with the Policy for Development in Wetlands (NLDEC 2001). Under this policy a proposed development may be permitted if it does not adversely affect the characteristics and functions of wetlands. In Nova Scotia, if wetland alteration cannot be avoided approval must be sought under the NS *Environment Act*. The core objective of the Nova Scotia Wetland Conservation Policy (NSE 2011a) is no net loss of wetland area and function. Accordingly, if wetlands are to be permanently altered as a result of the Project, compensation measures will be required. Avoidance of wetland habitat, to the extent feasible, has been taken into consideration in Project planning and design. Some of these considerations include: • route delineation; • design of tower foundation; and • seasonal timing of construction activities. A GIS-based Ecological Land Classification (ELC) study was undertaken for the Project to provide a landscape-level analysis of major vegetation communities and habitat. A summary of each vegetation type, size, and relative occurrence is provided in Section 4. A wetland classification model was developed as part of the ELC model and delineated wetlands at a 1:25,000 scale. Wetland habitat was classified along the transmission corridor through a combination of modeling and field work. This model, which classified wetlands under the Canadian Wetland Classification System (Section 4), will be used to assist with route delineation and infrastructure design, specifically as in input to Project design. In particular, the model was used to identify high potential habitats for wetlands and rare plants. These models will be used extensively in the permitting phase of the Project and for the micrositing of towers within the final alignment. The following general mitigation will be implemented to minimize erosion and sedimentation and reduce or avoid effects on wetlands. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the SOCI VEC sections.	Section 2 - Project Description Section 4 - Environmental Setting Sections 6, 8 - SOCI

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
	• Guidance on wetland conservation in Nova Scotia will follow the Nova Scotia Wetland Conservation Policy (NSE 2011a). • Guidance on wetland conservation in Newfoundland will adhere to the Policy for Development in Wetlands (NLDEC 2001). • Where feasible, access for the purpose of construction will utilize existing roads (public roads, resource roads, trails) and cleared transmission corridor. The preferred approach is for construction equipment and materials to advance sequentially along the cleared corridor in order to minimize disturbance outside the corridor. In situations where wetlands traverse the entire corridor width, access will deviate from the corridor around the wetland where feasible or temporary mitigation such as swamp mats or brush mats will be employed for the purpose of crossing. Only minor disturbance is expected with the use of mats since they displace the load weight over a much larger area, and the disturbed area is expected to quickly rehabilitate to original condition. Mats will be removed at the end of construction following the crossing of the last piece of equipment. • Alteration as a result of tower foundations will be permanent. Mitigation by design considers lengthening spans between towers and moving towers laterally to avoid wetlands. It is worth noting that wetland avoidance is also a priority from safety and technical perspectives, since establishing stable tower foundations in wetlands of substantive depth is a costly and technically challenging operation. Natural vegetated buffers or engineered sedimentation controls will be used if construction activities are undertaken within 30 m of a wetland. • Hydrologic function of the wetland will be maintained. • Runoff from construction activities will be directed away from wetlands. ENL recognizes that riparian shoreline habitat (*i.e.,* refers to habitat adjacent to watercourses and inland waterbodies) can also be wetland habitat (refers to land that has the water table at, near or above the ground surface, such as bogs, fens, marshes, swamps and other shallow open water areas, as defined by the *Newfoundland and Labrador Water Resources Act*).	
Wildlife and Wildlife Habitat	Baseline avifauna and wildlife surveys were undertaken to support the environmental assessment process. A summary of this information is provided in Section 4. Potential effects of the Project on SOCI are addressed in Sections 6 and 8. The assessment is focussed on those species that are most susceptible to the effects of the Project, specifically habitat loss or alteration. Newfoundland Woodland Caribou are assessed separately in Section 6.	Section 4 – Environmental Setting Sections 6, 8 - SOCI Section 6 - Caribou

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
Newfoundland Woodland Caribou	Newfoundland Woodland Caribou are currently being reviewed for legal listing under *SARA* and the NL *Endangered Species Act*. Given the high level of conservation concern for this species and its importance to Newfoundland and Labrador, caribou is assessed as a VEC. Caribou were selected for this EA over other ungulate species (*e.g.,* moose) primarily due to their value to the public, their sensitivity to disturbance and the ongoing attention to their sustainability in Newfoundland and Labrador.	Section 6 - Caribou
SOCI	Due to their special status under federal and provincial federal legislation, SOCI were identified as an issue through early public engagement activities and a review of potential environmental constraints. SOCI are those species defined as being at risk to some degree under *SARA*; the Newfoundland and Labrador *Endangered Species Act*; or the Nova Scotia *Endangered Species Act*. Selection of the SOCI to be considered in the assessment was determined based on a review of existing information and the results of an associated habitat modeling exercise and field work. In addition, conservation areas designed to protect SOCI were also considered, including IBAs, AOIs and Marine Protected Areas (MPAs), EBSAs, LOMAs, and International Biological Programme (IBP) sites. Project interactions with SOCI may include direct and indirect adverse environmental effects on habitat (loss or alteration) and direct mortality of individuals. The potential for Project-related activities to have adverse environmental effects on SOCI are assessed in separate VECs for each geographical region.	Sections 6, 8 - SOCI
Protected Areas and Areas of Conservation Interest	Protected areas must be considered due to their legal designation. However, they are also important for the functions they serve in protecting habitat for SOCI and commercial/non-commercial species, as well as the socio-economic services they provide (*e.g.*, recreation). Interaction with protected areas and areas of conservation interest are addressed as applicable through a discussion of land use in the Socio-economic Environment VECs, the SOCI VECs, and the Marine Environment VEC.	Section 4 - Environmental Setting Sections 6, 8 - Socio-economic Environment Section 6, 8 - SOCI Section 5 - Marine Environment
Economy, Business and Employment	Socio-economic aspects such as economy, employment and business will be affected by the Project. Effects on the economy, including effects on tourism, are assessed in the Socio-economic VECs.	Section 6, 8 - Socio-economic Environment

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
Land and Resource Use (including Navigation)	Assessment of the effects on land and resource use includes potential interactions with local communities, associated infrastructure, and current uses of land in the immediate vicinity of the Project. These potential effects are addressed in the Project Description, Environment Setting, the Marine Environment VEC, Socio-economic Environment VEC, Archaeological and Heritage Resources VEC, and SOCI VEC.	Section 2 – Project Description Section 4 - Environmental Setting Section 5 – Marine Environment Sections 6, 8 - Socio-economic Environment Sections 6, 8 - Archaeological and Heritage Resources Section 6, 8 - SOCI Section 8 - Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq
Commercial and Recreational Fisheries	Commercial and recreational fisheries are assessed in order to address potential Project-related effects on traditional, existing and potential commercial and Mi’kmaq fisheries in the marine environment. Commercial fishing is assessed in the Commercial Fisheries VEC. Recreational fishing is assessed in the Socio-economic Environment VECs, as part of recreational land use. The Nova Scotia Mi’kmaq fishery is assessed in both the Commercial Fisheries VEC, and the Current Use of Land and Resources for Traditional Purposes VEC.	Section 7 - Commercial Fisheries Sections 6, 8 - Socio-economic Environment Section 8 - Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Table 5.3.2 Scoping and Selection of VECs

Environmental Component	Description	Applicable Report Section
Archaeological and Heritage Resources	Archaeological and heritage resources are addressed in recognition of the interest of potentially affected First Nations, the general public, and provincial and federal regulatory agencies. Project construction could potentially result in the disturbance of previously unknown archaeological and heritage resources in both Newfoundland and Nova Scotia, and are addressed under the Archaeological and Heritage Resources VEC.	Sections 6, 8 - Archaeological and Heritage Resources
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Archaeological and heritage resources are addressed in recognition of the interest of potentially affected First Nations, the general public, and provincial and federal regulatory agencies. Project construction could potentially result in the disturbance of previously unknown archaeological and heritage resources in both Newfoundland and Nova Scotia, and are addressed under the Archaeological and Heritage Resources VEC.	Section 8 - Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Based on the screening process summarized in Table 5.3.2, the final list of VECs addressed in this assessment is provided in Table 5.3.3.

Table 5.3.3 Selected VECs

VEC Name	Jurisdiction of VEC		
	Newfoundland	Cabot Strait	Nova Scotia
Caribou	✓		
SOCI	✓	✓	✓
Socio-economic Environment	✓		✓
Archaeological and Heritage Resources	✓		✓
Marine Environment		✓	
Commercial Fisheries		✓	
Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq		✓	✓

5.3.4 Cumulative Environmental Effects Assessment Scoping

There is potential for environmental effects from various sources to interact in a cumulative manner. For that reason, it is standard practice to conduct a cumulative effects assessment (CEA) as part of a project-specific environmental assessment. The CEA methodology in this report generally conforms to the approach recommended in the *Cumulative Effects Assessment Practitioners Guide* published by the CEA Agency (1999).

According to the *Guide*, a project-specific CEA should do the following:

- Determine if the project will have an effect on a VEC.
- Determine if the incremental effect acts cumulatively with the effects of other past, existing or future actions.
- Determine if, after mitigation, the combined effects may cause a significant change in the VEC.

As mentioned in the *Guide*, the assessment of cumulative effects may be undertaken from two different perspectives: project-specific assessments and regional planning studies. It also explains that a properly executed project-specific environmental assessment is, in effect, a cumulative effects assessment, since the objective is to assess the incremental effects of the project compared to the cumulative effects of all past and current projects and activities, as defined by the baseline studies. A project-specific CEA, therefore, tends to focus on current projects or activities for which modifications or expansions are planned and future projects that can reasonably be predicted. Regional planning studies address the cumulative effects resulting from more general development activities that occur incrementally over longer periods of time, such as those associated with general economic growth, population increase and gradual infrastructure expansion.

Table 5.3.4 identifies the other projects and activities that were considered in the CEA for the Maritime Link, as identified through consultations with stakeholders and regulators, and research.

Table 5.3.4 Other Projects and Activities for Consideration of Cumulative Environmental Effects

Name of Project or Activity	Past, Present or Future	Brief Description of Project or Activity
Newfoundland		
Existing Linear Facilities	Past, Present	The major linear features in the Study Area are Route 1, and the existing transmission line.
Recreational Land Use	Past, Present	Motorized recreation, hunting and fishing, camping and cottages.
Resource Land Use	Past, Present, Future	Resource land use includes forestry, agriculture, and small-scale quarries. The Project is located in forest management zones 13 and 14, where commercial forestry has been active, particularly between Granite Canal and Bottom Brook. Forestry activities have resulted in a change to the landscape, including a change to habitat types, through harvesting activities, development of access roads, and possibly effects to watercourses and wetlands. There are no planned activities between Granite Canal and Bottom Brook in the current 5 year operating plan (2011-2016) in Zone 13. There are agriculture areas in southwest Newfoundland with a number of active farms, and areas that have been zoned for future agriculture development in the general area of the Project. There are no official registries of active aggregate pits or quarries, however there are likely a number of small operations in the Study Area.
Cabot Strait		
Port of Sydney Dredging and Infilling	Current	As of October 2011, Sydney Ports Corporation initiated dredging of a navigation channel in Sydney Harbour for the development of a marine container terminal in the Sydport Industrial Park. Approximately 72 ha of land will be infilled to accommodate the marine container terminal and on-dock Intermodal Container Transfer. Provincial Energy Ventures is proposing to deepen the approach to their wharf facility at the former Sydney Steel Corporation docks. All dredged sediment will be disposed of within a newly constructed Confined Disposal Facility. The Port of Sydney is approximately 27 km from the Project.
Donkin Export Coking Coal Project	Planned	The proposed Donkin Export Coking Coal Project is to be located at the existing Donkin Mine site on Donkin Peninsula, Nova Scotia. This project involves underground mining, processing and transport of coal. The Project will also involve construction of an approximately 25 km long 138 kV transmission line within existing corridors from Victoria Junction to Donkin Mine.

Table 5.3.4 Other Projects and Activities for Consideration of Cumulative Environmental Effects

Name of Project or Activity	Past, Present or Future	Brief Description of Project or Activity
Marine Atlantic Passenger Ferry (Trans-Canada Highway Ferry)	Current	As part of the Trans-Canada Highway Transportation System, Marine Atlantic Inc. provides daily services for the North Sydney-Port aux Basques route (two trips per day, *i.e.*, ferry leaving and arriving at North Sydney per day), and from mid-June to late September a tri-weekly ferry service between Argentia, NL and North Sydney, NS.
Existing cables	Past, Present	Other cables are present in the Cabot Strait, and others may be installed in the future. Environmental effects associated with the laying of cables are generally limited and localized to the area of initial disturbance. The locations of other cables have been factored into the assessment.
Nova Scotia		
Port of Sydney Dredging and Infilling	Current	As of October 2011, Sydney Ports Corporation initiated dredging of a navigation channel in Sydney Harbour for the development of a marine container terminal in the Sydport Industrial Park. Approximately 72 ha of land will be infilled to accommodate the marine container terminal and on-dock Intermodal Container Transfer. Provincial Energy Ventures is proposing to deepen the approach to their wharf facility at the former Sydney Steel Corporation docks. All dredged sediment will be disposed of within a newly constructed Confined Disposal Facility. The Port of Sydney is approximately 27 km from the Project.
Donkin Export Coking Coal Project	Planned	The proposed Donkin Export Coking Coal Project is to be located at the existing Donkin Mine site on Donkin Peninsula, Nova Scotia. This project involves underground mining, processing and transport of coal. The Project will also involve construction of an approximately 25 km long 138 kV transmission line within existing corridors from Victoria Junction to Donkin Mine.
Existing Linear Facilities	Past, Present	The major linear features in the Study Area are the existing road network, and the existing transmission line.
Recreational Land Use	Past, Present	Motorized recreation, hunting and fishing, camping and cottages.

Each of these projects or activities is considered in the cumulative effects analysis for each VEC in Sections 6, 7 and 8.