



Canadian Environmental  
Assessment Agency

Agence canadienne  
d'évaluation environnementale

# Labrador-Island Transmission Link

Comprehensive Study Report



June 2013

Canada 

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## Executive Summary

Nalcor Energy (the proponent), a Newfoundland and Labrador Crown Corporation, is proposing the construction and operation of the Labrador-Island Transmission Link (the Project). The Project consists of a 1,100 km,  $\pm 350$  kilovolt (kV) High Voltage Direct Current (HVdc) electricity transmission system from Central Labrador to the Avalon Peninsula on the Island of Newfoundland and associated infrastructure. The Project would facilitate the transmission of electricity from the proposed Lower Churchill Hydroelectric Generation Project. It includes the following components:

- converter stations at Muskrat Falls (Labrador) and Soldiers Pond (Avalon Peninsula) to convert electricity from alternating current to direct current and vice versa
- 1,100 km overhead transmission line within a right of way ranging from less than 60 m-wide to approximately 80 m-wide
- transition compounds near the shorelines at Forteau Point and Shoal Cove
- Strait of Belle Isle submarine cable crossing consisting of three 35 km long cables (two for power transmission, one spare) approximately 150 m apart
- shoreline electrodes in the Strait of Belle Isle at L'Anse au Diable (connected to the Muskrat Falls converter station) and in Conception Bay at Dowden's Point (connected to the Soldiers Pond converter station)
- Island system upgrades

Fisheries and Oceans Canada and Transport Canada have regulatory responsibilities in relation to the Project and may issue authorizations under the *Fisheries Act* and the *Navigable Waters Protection Act*, respectively. These authorizations trigger the requirement for a federal environmental assessment under the former *Canadian Environmental Assessment Act* S.C. 1992, c. 37, 1992 (former Act). In addition, Natural Resources Canada has entered

into a Memorandum of Agreement with the Governments of Newfoundland and Labrador and Nova Scotia regarding a loan guarantee for the Project, triggering the requirement for a federal environmental assessment. This commitment was formalized on November 30, 2012 by a term sheet agreement between the Government of Canada, Nalcor Energy, Emera Inc., the Government of Newfoundland and Labrador and the Government of Nova Scotia. As per the November 30 agreement, the provision of the loan guarantee is conditional on, among other things, the completion of environmental assessments for all of the Lower Churchill projects, including the Labrador-Island Transmission Link. Public Works and Government Services Canada became a responsible authority for the Project as the department is the “administrator” of Canada’s ownership interest in the seabed of the Strait of Belle Isle across which Nalcor will be running its high voltage cables. A comprehensive study of the Project is required under the *Comprehensive Study List Regulations* of the former Act, before the above-referenced authorizations can be issued and the loan guarantee can take effect.

The Project is considered a major resource project and is therefore subject to the provisions of the *Cabinet Directive on Improving the Performance of the Regulatory System for Major Resource Projects*. Environment Canada and Health Canada participated in the environmental assessment as expert Federal Authorities.

Valued Environmental Components (VECs) are notable features of the natural and human environments that are likely to be affected by a project. The proponent identified and assessed the potential impacts of the Project on VECs including the atmospheric environment, vegetation, caribou, furbearers, avifauna, freshwater resources, freshwater fish and fish habitat, marine fish and fish habitat, marine mammals and sea turtles, marine birds and land and resource use.

Potential environmental effects and concerns identified during the environmental assessment include:

- the impacts of the Project on caribou;
- the impacts of electromagnetic fields (EMF) from the submarine cables and shoreline electrodes on marine life;
- concern that the transmission line right of way and access roads and trails will enable access to previously remote areas;
- the impacts of transmission line construction and maintenance on water bodies; and
- the impacts of the Project on outfitters and recreational use of the environment.

Methods to reduce or eliminate the Project's potential environmental effects were incorporated into overall project planning and design. For example, the proponent relocated a portion of the transmission line right of way to parallel the South Side Access Road from the Trans Labrador Highway Phase 3 to the Muskrat Falls generation site to avoid creation of new access in the range of the Red Wine Mountains Caribou herd. Additional mitigation is described throughout this Comprehensive Study Report.

A follow-up program is required under the former Act and is being developed to verify the accuracy of the environmental assessment and to determine the effectiveness of the proposed mitigation measures for this Project. The follow-up program would include consideration of impacts to vegetation (listed plants), avifauna, furbearers (marten), caribou and the marine environment. For example, the follow-up program would confirm effects predictions regarding EMFs that will be generated by the submarine cables and electrodes.

The Canadian Environmental Assessment Agency (the Agency) prepared this Comprehensive Study Report in consultation with Environment Canada, Fisheries and Oceans Canada, Health Canada, Natural Resources Canada, Public Works and

Government Services Canada, Transport Canada and the Province of Newfoundland and Labrador. It was prepared following a technical review of the proponent's Environmental Impact Statement and associated information. The Comprehensive Study Report was also informed by comments received from Aboriginal groups and the public.

Except for one component of the environment, the Red Wine Mountains Herd of woodland caribou, the Agency concludes that with the implementation of mitigation measures, the Project is not likely to cause significant adverse environmental effects. The Red Wine Mountains Herd is listed as threatened under the *Species at Risk Act*. While the Project itself is likely to result in minor, adverse, but non-significant environmental effects on the Red Wine Mountains Herd, the Herd continues to be under significant pressure when taking into account other projects and activities. The Agency therefore concludes that the Project, when cumulative environmental effects are taken into account, is likely to cause significant adverse environmental effects on the Red Wine Mountains Herd, even if the Project itself will only minimally contribute to these effects. The Agency recognizes that Nalcor would implement extensive measures to mitigate further impacts to the Red Wine Mountains Herd.

Following a public consultation on this Report, the Minister of the Environment will decide whether, taking into account the implementation of mitigation measures, the Project is likely to cause significant adverse environmental effects. The Project will then be referred back to Fisheries and Oceans Canada, Transport Canada, Natural Resources Canada and Public Works and Government Services Canada for appropriate course of action in accordance with section 37 of the former Act.

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## Acronyms

<b>Agency</b>	Canadian Environmental Assessment Agency
<b>CO<sub>2</sub>e</b>	carbon dioxide equivalent
<b>COSEWIC</b>	Committee on the Status of Endangered Wildlife in Canada
<b>EA</b>	environmental assessment
<b>EIS</b>	environmental impact statement
<b>EMF</b>	electromagnetic field
<b>EPP</b>	Environmental Protection Plan
<b>former Act</b>	former <i>Canadian Environmental Assessment Act</i> S.C. 1992, c. 37, 1992
<b>HDD</b>	horizontal directional drilling
<b>HVdc</b>	high voltage direct current
<b>Generation Project</b>	Lower Churchill Hydroelectric Generation Project
<b>GHG</b>	greenhouse gases
<b>GPR</b>	ground potential rise
<b>km</b>	kilometer
<b>kV</b>	kilovolt
<b>LSA</b>	local study area
<b>m</b>	meter
<b>Minister</b>	Federal Minister of the Environment
<b>MW</b>	megawatts
<b>NCC</b>	NunatuKavut Community Council
<b>nT</b>	nanoTesla
<b>Nalcor</b>	Nalcor Energy
<b>PPWSA</b>	Protected Public Water Supply Area
<b>Project</b>	Labrador-Island Transmission Link Project
<b>proponent</b>	Nalcor Energy
<b>province</b>	Newfoundland and Labrador
<b>RSA</b>	regional study area
<b>ROW</b>	right of way
<b>RWMH</b>	Red Wine Mountains Herd
<b>SHERP</b>	Safety, Health and Environment Emergency Response Plan
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>VEC</b>	valued ecosystem component



# 1. Introduction

## 1.1 Overview

Nalcor Energy (Nalcor, proponent), a Newfoundland and Labrador Crown Corporation, is proposing the construction and operation of the Labrador-Island Transmission Link (the Project). The Project consists of a 1,100 km, ±350 kilovolt (kV) High Voltage Direct Current (HVdc) electricity transmission system from Muskrat Falls in Central Labrador to Soldiers Pond on the Avalon Peninsula on the Island of Newfoundland and associated infrastructure (Figure 1, Table 1). The Project would facilitate the transmission of electricity from the proposed Lower Churchill Hydroelectric Generation Project.

**Table 1: Administrative Information**

<b>Proponent</b>	Nalcor Energy Marion Organ, Manager Environment and Regulatory Compliance Hydro Place, 500 Columbus Drive P.O. Box 12800 St. John's NL A1B 4K7  Telephone: 709-737-1255; Toll-Free: 1-888-576-5454 (within Canada) <b>L-ITransmissionLinkEA@nalcorenergy.com</b>
<b>Federal Environmental Assessment Contact</b>	Canadian Environmental Assessment Agency Bill Coulter, Project Manager 1801 Hollis Street, Suite 200 Halifax NS B3J 3N4  Telephone: 902-426-6632; Fax: 902-426-6550 <b>Labrador-Island.TransmissionLink@ceaa-acee.gc.ca</b>
<b>Canadian Environmental Assessment Registry</b>	<b><a href="http://www.ceaa-acee.gc.ca/050/index-eng.cfm">http://www.ceaa-acee.gc.ca/050/index-eng.cfm</a></b>  File number: 10-03-51746

**Figure 1: Labrador-Island Transmission Link Project**



Source: Nalcor Energy

## 1.2 Environmental Assessment Process

The former *Canadian Environmental Assessment Act* S.C. 1992, c. 37, 1992 (former Act) applied to federal authorities that contemplated certain actions or decisions that would enable a project to proceed in whole or in part. In November 2009, it was determined that a federal screening-type environmental assessment (EA) of the Labrador-Island Transmission Link Project was required under the former Act because Fisheries and Oceans Canada (DFO), Environment Canada, and Transport Canada would need to issue authorizations, permits and approvals in relation to the Project under the *Fisheries Act*, *Canadian Environmental Protection Act* and *Navigable Waters Protection Act*, respectively.

In April 2010, a revised Notice of Commencement was posted advising that the EA would continue as a comprehensive study in response to the decision of the Supreme Court of Canada in *MiningWatch v. Minister of Fisheries and Oceans et al.* (Red Chris Mine Project). The Project is subject to a comprehensive study-type EA because one of its components is described in the *Comprehensive Study List Regulations* of the former Act:

*The proposed construction of an electrical transmission line with a voltage of 345 kV or more that is 75 km or more in length on a new right of way.*

In accordance with amendments to the former Act that came into force in July, 2010, the Canadian Environmental Assessment Agency (Agency) became legally responsible for the conduct of the comprehensive study.

In August 2011, Natural Resources Canada became a responsible authority for the Project, when Canada announced a Memorandum of Agreement with the Government of Newfoundland and Labrador and the Government of Nova Scotia

regarding a loan guarantee for the Lower Churchill River projects, which include the proposed Project. This commitment was formalized on November 30, 2012 by a term sheet agreement between the Government of Canada, Nalcor Energy, Emera Inc., the Government of Newfoundland and Labrador, and the Government of Nova Scotia. As per the November 30 agreement, the provision of the loan guarantee is conditional on, among other things, the completion of environmental assessments for all of the Lower Churchill projects, including the proposed Labrador-Island Transmission Link Project. Based on the review of additional information, in December 2012 Environment Canada determined that a permit for the disposal of material at sea under the *Canadian Environmental Protection Act* would not be required for the Project and accordingly, that Environment Canada would no longer have a responsibility for this EA.

The *Canadian Environmental Assessment Act, 2012* came into force on July 6, 2012. In accordance with the transition provisions of this legislation, the comprehensive study of the Project is to be completed under the former Act.

Public Works and Government Services Canada became a responsible authority for the Project when it was determined that it is the “administrator” of Canada’s ownership interest in the seabed of the Strait of Belle Isle across which Nalcor will be running its high voltage cables.

In addition to federal requirements, the Project also requires a provincial EA pursuant to the Newfoundland and Labrador *Environmental Protection Act* and its associated *Environmental Assessment Regulations, 2003*. Further information on the provincial EA process is available on the Department of Environment and Conservation’s website ([www.env.gov.nl.ca](http://www.env.gov.nl.ca), registration 1407). The Governments of Canada and Newfoundland and Labrador conducted the federal and provincial EAs cooperatively to the fullest extent possible.

### **1.3 Purpose of the Comprehensive Study Report**

This Comprehensive Study Report presents a summary of the Agency’s analysis of whether the Project is likely to cause significant adverse environmental effects. The conclusions of this report are based on the review of Nalcor’s environmental impact statement (EIS) and associated documents, an assessment of the Project’s environmental effects and on consideration of public and Aboriginal comments in relation to the Project. The Agency prepared this report in collaboration with DFO, Environment Canada, Health Canada, Natural Resources Canada, Public Works and Government Services Canada, Transport Canada and the province of Newfoundland and Labrador.

The Minister of the Environment will consider this Comprehensive Study Report and comments received from the public and Aboriginal groups when issuing an EA decision statement in relation to the Project. The Minister may request additional information or require that public concerns be addressed further before issuing the decision statement. Following the EA decision statement, the Minister will refer the Project back to DFO, Transport Canada, Natural Resources Canada and Public Works and Government Services Canada to allow them to take the appropriate course of action in accordance with section 37 of the former Act.

**“The Minister of the Environment will consider this Comprehensive Study Report and comments received from the public and Aboriginal groups when issuing an EA decision statement in relation to the Project.”**

## 2. Project Description – Scope of Project

The scope of the Project for the federal EA includes physical works and activities associated with the construction, operation and maintenance, and decommissioning of the Project, as described below.

### 2.1 Project Components

The proposed Project consists of a  $\pm 350$  kV HVdc electricity transmission system extending over a distance of approximately 1,100 km. An on-land overhead transmission line would be constructed in an approximately 60 m-wide right of way (ROW) selected from within a 2 km-wide study corridor. The transmission system is proposed to include the following components:

- **Converter Stations:** Converter stations would be constructed at Muskrat Falls (Labrador) and Soldiers Pond (Avalon Peninsula on the Island of Newfoundland) to convert electricity from alternating current to direct current and vice versa.
- **Overhead HVdc Transmission Line:** Approximately 400 km of transmission line will be installed between Muskrat Falls and Forteau Point in Labrador (approximately 1,270 towers) and 700 km of transmission line between Shoal Cove and Soldiers Pond on the Island of Newfoundland (approximately 2,090 towers). About 90-percent of towers will be suspension-type structures, while the remaining 10-percent would be dead end towers (Figure 2). The on-land line would consist of three wires, one for each pole, and an optical ground wire suspended on towers approximately 35 to 45 m high (note: each pole would consist of an electric current-carrying conductor and associated equipment). The ROW for the transmission line will be between less than 60 m-wide to approximately 80 m-wide. The transmission line would have a carrying capacity of 900 MW (megawatts).
- **Transition Compound:** Approximately 1,000 m from the shorelines at Forteau Point and Shoal Cove, the overhead transmission line would enter a transition compound, which would terminate the overhead line and interconnect the conductors

with buried cables. Buried cables would be spliced to submarine cables crossing the Strait of Belle Isle.

- **Strait of Belle Isle Submarine Cable Crossing:** Three lined conduits would be horizontally directionally drilled approximately 1.5 to 2.5 km underground and exit into the Strait of Belle Isle. Three cables (two for power transmission, one spare) would be placed in a 500 m-wide corridor, each separated by approximately 150 m. Each cable would be approximately 35 km long and protected by an approximately 10 m-wide and 1 m-high rock berm.
- **Shoreline Electrodes:** Shoreline electrodes would be constructed in the Strait of Belle Isle at L'Anse au Diable (connected to the Muskrat Falls converter station) and in Conception Bay at Dowden's Point (connected to the Soldiers Pond converter station). A permeable berm approximately 15 m-high would be constructed to create a saltwater pond. Shoreline electrodes would be connected to their respective converter stations by two low-voltage lines.
  - In Labrador, the electrode line would be placed on the HVdc transmission towers

**“The proposed Project consists of a  $\pm 350$  kV HVdc electricity transmission system extending over a distance of approximately 1,100 km.”**

from the Muskrat Falls converter station to the Straits area where it would be placed on a wooden pole line to L'Anse au Diable, generally following existing access trails and the Labrador Straits Highway. The treated wood poles (i.e., Penta or chromate copper arsenate) would be approximately 10 to 12 m high and spaced approximately 70 to 90 m apart.

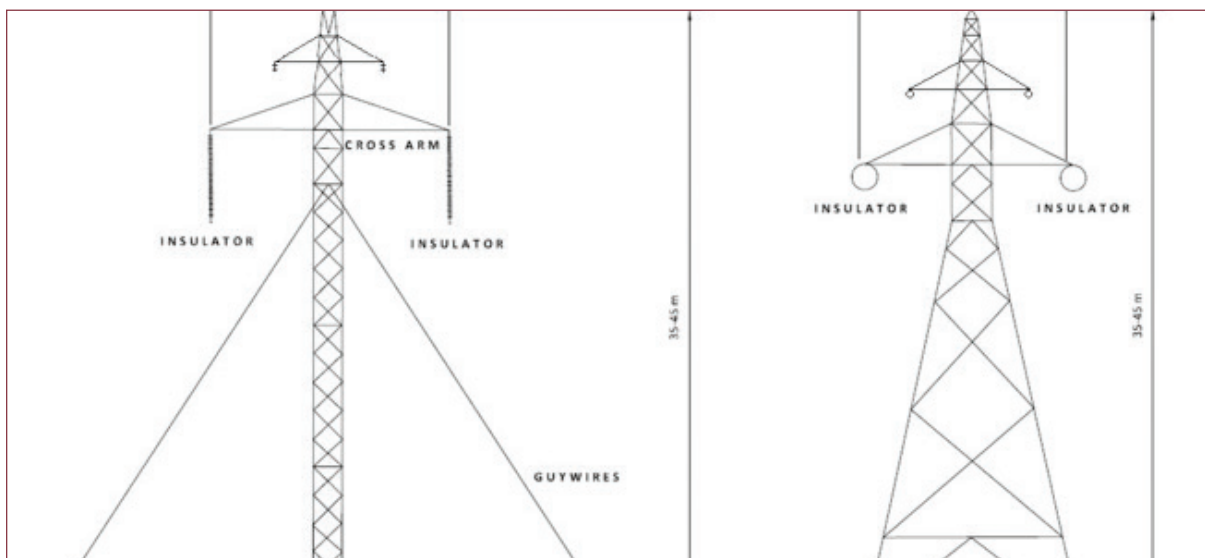
- On the Island of Newfoundland, an approximately 15 km long wooden pole electrode line from the Soldiers Pond converter station would follow an existing transmission ROW to a point near Conception Bay and then follow one of three options to Dowden's Point, which generally consist of existing roads or distribution ROWs.
- **Island System Upgrades:** New towers would be built in existing ROWs within 1.6 km of the converter station for existing transmission lines; lightning protection (i.e., an overhead ground wire) would be installed; two Holyrood generating units may be converted to synchronous condensers;

and circuit breakers at the Holyrood Thermal Generating Station, Sunnyside Terminal Station and Bay d'Espoir Hydroelectric Generating Station may be upgraded.

Existing roads and winter trails would be used to the extent possible and practical to access the ROW during project construction. Considerable access is already available on the Island of Newfoundland. Ground access for materials distribution may also be supplemented by helicopter transport. In addition, the Project could require:

- approximately 160 km of access road, approximately 5 m-wide, in Central and Southeastern Labrador (within a 20 m-wide ROW), 145 km of which follows the transmission line ROW where it deviates from the Trans Labrador Highway Phase 3 in areas with no access;
- approximately 60 km of access road, approximately 5 m-wide, on the Northern Peninsula (within a 20 m-wide ROW);

**Figure 2: Suspension Tower and Dead End Tower**



*Note: A suspension tower is a tower that is supported by four high strength guy wires. They are used on straight line sections of the transmission line or for up to 10 degree angles. A dead end tower is a self-supporting tower that stands on four legs. These are heavier and stronger than guyed towers. They are used for turning angles between 0 and 90 degrees, and also installed at optimum locations to limit a cascade failure event to 15 to 20 towers.*

Source: Nalcor Energy

- 40 km of which follows the transmission line ROW in areas with no access;
- a 4 m-wide access trail for off-highway vehicles within and near the transmission line ROW for use during construction, operations and for maintenance;
  - approximately 11 temporary construction camps;
  - five marshalling yards totalling approximately 5 ha; and
  - lay-down areas for temporary storage.

The December 2012 EIS Addendum included reference to a potential quarry and marine loading facility. However, the proponent subsequently clarified that these components (i.e., quarry and marine loading facility) were not being proposed as part of the Project.

## 2.2 Project Activities

The construction phase of the Project would include:

- **converter station construction**—site clearing; construction of foundations and station ground grid; erection of steel buildings; and installation of electrical components in switchyards and valve halls;
- **transmission line construction**—surveying and construction of infrastructure (i.e., access roads, bridges, marshalling yards and temporary construction camps); clearing of transmission ROW; construction of ROW access trails; staking of towers and guy locations; material distribution; installation of tower foundations, assembly and erection of transmission towers; installation of conductors and counterpoise; and inspection and commissioning;
- **Strait of Belle Isle cable crossing**—horizontal directional drilling (HDD) of three conduits for each landfall (i.e., Forteau Point and Shoal Cove); laying of cables on the sea floor; hauling cables through conduits to the onshore landing point; rock berm construction; and on-land cable trenching;
- **electrode and electrode line construction**—berm construction near shoreline at L’Anse au Diable and Dowden’s Point; clearing of ROW; staking of pole and guy locations;

- material distribution; installation of wood poles; installation of conductor and grounding wire; and inspection and commissioning and
- **upgrades on the Island of Newfoundland**—transmission line construction within existing ROWs and conversion of the Holyrood generating units, if required.

During operation, electrical equipment and facility systems will be remotely monitored and controlled from Nalcor’s Energy Control Centre in St. John’s. Project maintenance and repair would include:

- **annual transmission line inspections** using all-terrain vehicles, snowmobiles or helicopter; portions of the line will be inspected in detail each year;
- **transmission line maintenance** including minor adjustments, parts replacements or more extensive repairs necessitating the use of heavy equipment;
- **remotely operated vehicle inspections** of the Strait of Belle Isle crossing infrastructure and the shoreline electrode berms; and
- **removal of vegetation** exceeding two meters in height at maturity along the ROW and at converter stations through herbicide applications and manual cutting.

## 2.3 Project Schedule

Construction of the Project is estimated to take five years from the time of approval. At this time, the operations and maintenance phase of the Project is planned to continue indefinitely.



### 3. Scope of Environmental Assessment

The scoping process sets the limits of an EA. This focuses the study on relevant factors and concerns, which are described in the *Environmental Impact Statement (EIS) Guidelines and Scoping Document* (available at [www.ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=51746](http://www.ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=51746)). Public and Aboriginal comments on the *EIS Guidelines and Scoping Document* were sought from 7 February 2011 to 21 March 2011.

#### 3.1 Factors to be Considered

The following factors were considered as part of the comprehensive study pursuant to subsections 16(1) and 16(2) of the former Act:

- 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 that are received in accordance with the former Act and the regulations;
- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- the purpose of the Project;
- alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- the need for, and the requirements of, any follow-up program in respect of the Project, and
- the capacity of renewable resources that are likely to be significantly affected by the Project to meet present and future needs.

The Agency determined that, in accordance with paragraph 16(1)(e) of the former Act, the EA

should also include a description of the need for the Project, an evaluation of alternatives to the Project, and an articulation of benefits to Canadians from the EA process.

Under the former Act, an environmental effect is any change that a project may cause in the environment and the effect of any such change on:

- health and socio-economic conditions,
- physical and cultural heritage,
- the current use of lands and resources for traditional purposes by Aboriginal persons, or
- any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The definition of environmental effect also includes any change to a project that may be caused by the environment.

Based on the above definition, indirect economic and social changes that are caused by biophysical modifications of the environment are considered to be environmental effects under the former Act and may thus be assessed in a federal EA. However, an EA will not examine the direct economic and social effects of a project. For example, a federal EA may consider the economic effects of a decline in commercial fishing success that is related to a loss of fisheries resources, but not economic effects related to the construction of a project.

#### 3.2 Scope of the Factors Considered and the Spatial Boundaries

The EA focused on aspects of the natural and human environments that have particular value or significance and may be affected by the Project. These are referred to as valued ecosystem components (VECs). In the EIS, Nalcor assessed the impacts of the Project on the following VECs.

**Table 2: VECs Examined by Nalcor and EA Spatial Boundaries**

Valued Ecosystem Component	Components Considered	Spatial Boundaries (Local Study Area [LSA] & Regional Study Area [RSA])
Atmospheric Environment	<ul style="list-style-type: none"> <li>• Climate</li> <li>• Air Quality</li> <li>• Sound</li> </ul>	<p>LSA = 2 km transmission corridor</p> <p>RSA = 1 km out from each side of LSA</p>
Vegetation	<ul style="list-style-type: none"> <li>• Vegetation Abundance and Diversity</li> <li>• Wetlands</li> <li>• Riparian Shoreline</li> <li>• Listed Plant Species</li> <li>• Regionally Uncommon Species</li> <li>• Timber Resources</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA = 15 km surrounding LSA</p>
Caribou	<ul style="list-style-type: none"> <li>• Red Wine Mountains Herd</li> <li>• Mealy Mountains Herd (including the Joir River subpopulation)</li> <li>• Caribou in Newfoundland</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA (Labrador) = boundaries of herd ranges that intersect with the LSA</p> <p>RSA (Newfoundland) = total occupancy area</p>
Furbearers	<ul style="list-style-type: none"> <li>• Marten</li> <li>• Red Fox</li> <li>• Porcupine</li> <li>• Beaver</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA = 15 km surrounding LSA</p>
Avifauna	<ul style="list-style-type: none"> <li>• Waterfowl</li> <li>• Upland Game Birds</li> <li>• Raptors</li> <li>• Passerines</li> <li>• Species of Special Conservation Status</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA = 15 km surrounding LSA</p>
Freshwater Resources	<ul style="list-style-type: none"> <li>• Water Quality</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA = 1 km surrounding LSA</p>
Freshwater Fish and Fish Habitat	<ul style="list-style-type: none"> <li>• Fish Habitat</li> <li>• Fish Abundance and Species Assemblage</li> </ul>	<p>LSA = 2 km transmission corridor and other Project activities and elements</p> <p>RSA = 1 km surrounding LSA</p>
Marine Fish and Fish Habitat	<ul style="list-style-type: none"> <li>• Benthic Habitat</li> <li>• Marine Water Quality</li> <li>• Fish</li> </ul>	<p>LSA = 500 m submarine cable crossing; marine areas within 500 m radius of shoreline electrodes</p> <p>RSA (Strait of Belle Isle) = marine area approx. 75 km NE of L'Anse au Diable to 75 km SW of cable crossing</p> <p>RSA (Conception Bay) = 10 km radius of Dowden's Point</p>

**Table 2 continued**

<p>Marine Mammals and Sea Turtles</p>	<ul style="list-style-type: none"> <li>• Baleen Whales</li> <li>• Toothed Whales</li> <li>• Pinnipeds</li> <li>• Sea Turtles</li> </ul>	<p>LSA = submarine cable crossing corridor; marine areas within 500 m radius of shoreline electrodes</p> <p>RSA (Strait of Belle Isle) = marine area approx. 75 km NE of L'Anse au Diable to 75 km SW of cable crossing</p> <p>RSA (Conception Bay) = 10 km radius of Dowden's Point</p>
<p>Seabirds</p>	<ul style="list-style-type: none"> <li>• Migrating Shorebirds</li> <li>• Nesting Seabirds</li> <li>• At-Sea Seabirds</li> </ul>	<p>LSA = submarine cable crossing corridor including terrestrial landing site; marine areas within 500 m radius of shoreline electrodes</p> <p>RSA (Strait of Belle Isle) = marine area approx. 75 km NE of L'Anse au Diable to 75 km SW of cable crossing</p> <p>RSA (Conception Bay) = Conception Bay, Grates Point, Baccalieu Island and Cape St. France Important Bird Areas</p>

Nalcor also assessed impacts of the Project on the socioeconomic environment, including the following components:

- Historic and Heritage Resources
- Communities
- Economy, Employment and Business
- Land and Resource Use
- Marine Fisheries
- Tourism
- Visual Aesthetics

Temporal boundaries for the assessment were the construction phase (approximately five years) and operations and maintenance phase of the Project. Nalcor has stated that the Project will be operated for an indeterminate time period and that decommissioning is not anticipated. Decommissioning, if necessary, would be considered in accordance with relevant standards and regulatory requirements of the day.

The Agency divided the VECs identified by Nalcor into the eight components listed below to focus the Comprehensive Study Report. The predicted environmental effects of the Project on the eight components are summarized in this Comprehensive Study Report and presented in

conjunction with the Agency's conclusions about the likely significance of environmental effects.

- Atmospheric Environment (Section 6.2)
- Vegetation (Section 6.3)
- Terrestrial Wildlife and its Habitat (i.e., caribou, furbearers, avifauna) (Section 6.4)
- Freshwater Environment (i.e., freshwater resources, fish and fish and habitat) (Section 6.5)
- Marine Environment (i.e., fish and fish habitat, mammals, sea turtles, birds) (Section 6.6)
- Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (Section 6.7)
- Land and Resource Use and Human Health (Section 6.8)
- Historical and Heritage Resources (Section 6.9)

This Comprehensive Study Report also discusses changes to the Project that may be caused by the environment (Section 6.10), as well as potential accidents and malfunctions (Section 6.11).

A list of species at risk that may be found within the regional study area for the Project is included in Appendix A. The impacts of the Project on these species were considered as part of the assessment of VECs.

### **3.3 Need for and Purpose of the Project**

Under the former Act, the need for a project describes the problem or opportunity that a project is intended to solve or satisfy. The purpose of a project describes what is to be achieved by carrying out a project. The need for the Labrador-Island Transmission Link Project relates to the transmission of electricity from Muskrat Falls to the Island of Newfoundland. The purpose of the Project is the continuous and efficient transmission of power in a cost efficient and environmentally responsible manner.

## 4. Alternatives

### 4.1 Alternatives to the Project

Alternatives to a project are functionally different ways to meet a project’s need and purpose. In response to a request from the Agency, Nalcor provided a discussion of alternatives to meet the Project’s need (i.e., the transmission of electricity from Muskrat Falls to the Island of Newfoundland).

Nalcor stated that in the electrical industry, transmission lines are universally used on a global basis to take electric power from a generation source to a destination. No other technology (e.g., wireless power transmission, energy carrier such as hydrogen in a pipeline) has been demonstrated as technically or economically feasible for utility application.

Nalcor maintains that overhead transmission lines represent the preferred alternative for long-distance power transmission where access to ROWs exists. While other technologies (i.e., buried cable, submarine cable) are used under specific circumstances, particularly when access to a ROW is constrained (e.g., densely populated areas), their use is neither economically or technically feasible as an alternative to the Project as configured, as described below.

**“Alternatives to a project are functionally different ways to meet a project’s need and purpose.”**

***Buried Cable*** – Nalcor considered the use of buried power transmission cables during early stages of project planning when it evaluated the option of routing the transmission system through Gros Morne National Park. It noted that two major issues arise with the buried approach: (1) the need to construct a suitable trench to receive the cable taking into consideration shallow soil and exposed bedrock along the route and (2) the logistical and operational concerns associated with shipping or trucking the cable sections. In Nalcor’s view, burying the transmission line for the Project would render it unfeasible, both technically and economically.

***Submarine Cable*** – In considering a submarine cable alternative, Nalcor notes that any route beyond the limited area of the Strait of Belle Isle would have to be routed through shallow water in coastal Newfoundland or Labrador and would thus be exposed to the threat of ice damage from icebergs traversing the area. The cable protection scheme used in the Strait of Belle Isle is dependent on the presence of a ‘bathymetric shield’ in the northeast end of the strait, and the techniques used in the strait would not be suitable for the entire route. The inability to protect a submarine cable from iceberg damage renders it technically unfeasible.

### 4.2 Alternative Means of Carrying out the Project

Alternative means of carrying out a project are the various technically and economically feasible ways that a project can be implemented or carried out. Nalcor considered several alternative means of carrying out the Project including different routes for the overland transmission line and locations for the Labrador converter station, as described below.

### ***Routing of the 2 km-Wide Overland***

***Transmission Corridor*** – Nalcor evaluated technically and economically feasible corridor alternatives between Muskrat Falls, Labrador and Soldiers Pond, Newfoundland (Appendix B). The route was chosen to limit the environmental footprint of the Project by following existing disturbance to the extent practical and avoiding environmentally sensitive areas. It took into consideration information collected during consultations, and engineering and construction requirements.

Nalcor initially planned to commence the transmission line in Labrador at Gull Island and proceed southeast to the Strait of Belle Isle. Following Nalcor’s decision to proceed with the construction of Muskrat Falls first and Gull Island at a later date, Muskrat Falls was determined to be the economically preferable location to commence the transmission line. As a result, Nalcor relocated approximately 200 km of the transmission corridor to parallel the Trans Labrador Highway Phase 3 rather than cutting through in-land territory. This alternative was determined to be economically preferable, while at the same time responding positively to requests from the public, Aboriginal groups and regulators. This change avoids the potential creation of new access in parts of Labrador.

Nalcor considered the option of routing the transmission line beside the Trans Labrador Highway Phases 2 and 3 across Southern Labrador to the Strait of Belle Isle, rather than cutting through in-land territory in response to government, Aboriginal, and public comments. However, this alternative was not economically preferred because it would increase: the length of the corridor by approximately 150 km; electrical losses by 10-percent; construction costs by approximately \$100 million or more; and the length of the transmission line requiring future maintenance.

**“Alternative means of carrying out a project are the various technically and economically feasible ways that a project can be implemented or carried out.”**

In addition to the information presented in Appendix B, another routing alternative was considered by Nalcor. Initially two options for the transmission corridor on the Island of Newfoundland were identified – one through the Long Range Mountains and another using the existing transmission ROW through Gros Morne National Park. Nalcor amended its provincial EA registration to exclude the Gros Morne route as an option, avoiding the potential for effects to this UNESCO World Heritage Site, after public consultation and engagement with Parks Canada.

In December 2012, Nalcor released an EIS Addendum, which included information on the proposed alignment for the 60 m-wide ROW within the 2 km-wide overland transmission corridor. The route was evaluated against technical, environmental, and socioeconomic factors, but remains subject to slight changes based on further analysis.

*Location of Converter Stations* – Nalcor considered locating the Labrador converter station at three locations (i.e., Muskrat Falls, further from Muskrat Falls, Gull Island). Following Nalcor’s decision not to proceed with the construction of Gull Island at this time, the Muskrat Falls converter station location was determined to be economically and environmentally preferable. Locating the converter station at Gull Island was excluded from further consideration by Nalcor.

### **4.3 Agency's Assessment**

The Agency is satisfied that Nalcor has considered alternatives to the Project. The Agency is also satisfied that, according to the results of the evaluation of alternative means, Nalcor has identified technically and economically viable alternative means of carrying out the Project. The environmental effects of these alternative means have been adequately considered by Nalcor in identifying preferred alternatives.

## 5. Consultation

The Agency provided opportunities for public and Aboriginal participation and held several Aboriginal consultation sessions to improve the quality of the EA. In addition, Nalcor provided information on the Project to the public and to Aboriginal groups, as described below.

### 5.1 Public Consultation

The former Act required that the public be provided with a minimum of three formal participation opportunities during a comprehensive study. For this Project, four public consultation periods were provided by the Agency, as listed in Table 3.

**Table 3: Public Consultation Opportunities during the EA of the Labrador-Island Transmission Link Project**

Document/Subject of Consultation	Dates
The Project and conduct of the comprehensive study	19 July 2010 to 20 August 2010
EIS Guidelines and Scoping Document*	7 February 2011 to 21 March 2011
EIS Summary*	13 April 2012 to 12 June 2012
Comprehensive Study Report	<b>Current</b>

\* Joint federal-provincial consultation period

The Agency is currently inviting the public to comment on this Comprehensive Study Report. The Minister of the Environment will consider this report and comments received from the public and Aboriginal groups in making his EA decision.

The Agency supports public participation through its Participant Funding Program. A total of \$138,417 was allocated to the Newfoundland and Labrador Outfitters Association, Grand

**“The Agency provided opportunities for public and Aboriginal participation and held several Aboriginal consultation sessions to improve the quality of the EA.”**

Riverkeeper Labrador Inc., and the Labrador Straits Development Corporation to facilitate their participation in the EA<sup>1</sup> of this Project.

***Participation Activities Reported by the Proponent*** – Since 2008, Nalcor held nearly 100 meetings with regulatory and/or stakeholder organizations, with a focus on face-to-face meetings and discussions. Twelve open houses in Newfoundland and Labrador focused on the EA in 2010 and 2011. In addition, another 17 open houses in 2011 provided general information on the Project. In 2012, Nalcor held seven open houses on the Project and the EA and it received and responded to numerous questions and information requests about the Project.

### 5.2 Aboriginal Consultation

The federal government has a legal duty to consult and, where appropriate, to accommodate, when its proposed conduct might adversely

<sup>1</sup> The 17 May 2011 report of the Funding Review Committee is available on the Agency’s website at <http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=51746>.



affect an established or asserted Aboriginal or treaty right. Aboriginal consultation is also undertaken more broadly as an important part of good governance and sound policy development and decision making. In addition to the federal government’s broader obligations, the former Act requires that federal EAs consider the effect of any project-related change in the environment and also the effect of that change on current uses of land and resources for traditional purposes by Aboriginal persons. The former Act also requires consideration of the effect of any project-related change in the environment on physical and cultural heritage, and “any structure, site, or thing that is of historical or archaeological significance,” such as sites historically occupied by Aboriginal peoples.

The Agency served as Crown consultation coordinator for the EA of this Project. The Agency, together with federal responsible authorities, integrated consultation activities into the EA process to the extent possible. Ten Aboriginal groups were identified as potentially having asserted Aboriginal rights that could be adversely affected by the Project: Innu Nation, Naskapi Nation of Kawawachikamach (Naskapi), Nunatsiavut Government, NunatuKavut Community Council Inc (NCC), and six Innu First Nations in Québec (i.e., Ekuanitshit, Nutashkuan, Pakuashipi, Matimekush-Lac John, Uashat mak Mani-Utenam, and Unamen Shipu). These groups were invited to participate in consultation activities for the Project, including the activities identified in Table 4. In addition, the Agency communicated with Aboriginal groups through phone calls, email, letters, and meetings.

**Table 4: Aboriginal Consultation Opportunities during the EA**

Stage	Activity	Timing
<b>Environmental Assessment Planning</b>	Opportunity to comment on the Project and conduct of the comprehensive study.	July 19 – August 20, 2010
<b>Environmental Assessment Planning</b>	Meeting or phone call with some groups to discuss the EA process, key points for consultation and integrated approach to Aboriginal consultation.	August – September 2010
<b>Consultation Plan</b>	Aboriginal groups were provided with the draft Consultation Plan and their feedback requested.	November 2010
<b>Draft EIS Guidelines</b>	Aboriginal 30-day review of <i>Draft EIS Guidelines and Scoping Document</i> (prior to general public review), including discussions with some groups during or after the review period.	November 5 – December 5, 2010
<b>Revised Draft EIS Guidelines</b>	Aboriginal and public 43-day review of <i>Draft EIS Guidelines and Scoping Document</i> , including discussions with some groups during or after the review period.	February 7 – March 21, 2011
<b>Component Studies</b>	Aboriginal and public review of component studies conducted by Newfoundland and Labrador in support of the provincial EA (35 day review period for each group of studies), including discussions with some groups during and/or after the review period.	Between May and December 2011
<b>EIS Summary</b>	Aboriginal and public 61-day review of EIS Summary, including discussions with some groups during or after the review period.	April 12 – June 12, 2012

**Table 4: Aboriginal Consultation Opportunities during the EA continued**

<b>Nalcor Response to Aboriginal Issues Raised during the Review of the EIS Summary</b>	Aboriginal 50-day review of Nalcor’s Response to Aboriginal Issues Raised during the EIS Summary, including discussions with some groups after the review period.	December 10, 2012 – January 29, 2013
<b>Draft Comprehensive Study Report</b>	Aboriginal 30-day review of <i>Draft Comprehensive Study Report</i> (prior to general public review), with the potential for discussions with some groups during or after the review period.	April 22 – May 22, 2013
<b>Comprehensive Study Report</b>	Aboriginal and public 30-day review of Comprehensive Study Report. This may be followed by teleconferences or meetings with some Aboriginal groups.	June 26 – July 26, 2013

Funds were provided through the Agency’s Participant Funding Program to reimburse eligible expenses incurred by Aboriginal groups that participated in the EA. Eight participating Aboriginal groups were awarded funding through the program<sup>2</sup>.

Through the EIS Guidelines, the Agency instructed Nalcor to inform and consult with all potentially affected Aboriginal groups, to collect information on the current use of lands and resources for traditional purposes by Aboriginal persons and to engage with Aboriginal groups to provide information on the Project and any potential environmental effects and mitigation measures. Nalcor’s consultation with the Innu Nation included studies, funding mechanisms and direct consultation with communities, including an open house in Sheshatshiu (April 2011). In addition, Nalcor entered into community engagement agreements with NCC (Phase I and II), Pakuashipi (Phase I and II) and Unamen Shipu. It states that it has attempted to engage in consultation activities with Nutashkuan, Ekuanitshit, Uashat mak Mani-Utenam and Matimekush-Lac John through meetings, conference calls, phone calls and emails. Nalcor also reports that it has initiated and continues to seek opportunities to engage

in appropriate consultation with the Naskapi. Nalcor would participate in open discussions with the Nunatsiavut Government, and has and will continue to provide information on the Project and its EA. Since the submission of the EIS, Nalcor offered to provide a plain-language summary of the EIS to Aboriginal groups. To date, a plain-language summary of the EIS has been presented to Ekuanitshit, Naskapi and the Nunatsiavut Government.

A number of Aboriginal groups have expressed concerns related to consultation efforts of Nalcor. Concerns have included insufficient funding provided by the proponent and the paucity of traditional knowledge in the EIS. Concerns have also been expressed about the federal government’s consultation efforts, including insufficient funding provided by government and the tight timelines provided to Aboriginal groups to review and comment on EA documents. Appendix C summarizes and responds to specific concerns raised by Aboriginal groups during the EA process.

The Agency considered the information collected by Nalcor in determining if the Project would cause potentially adverse impacts on asserted Aboriginal rights and title, and whether measures

<sup>2</sup> The 8 November 2010 report of the Funding Review Committee is available on the Agency’s website at <http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=51746>.

proposed by the proponent would adequately mitigate potential impacts.

### 5.2.1 Potential Adverse Impacts of the Project on Asserted Aboriginal Rights

Components of the Project are located within the lands covered by the Agreement in Principle between the Innu Nation, Newfoundland and Labrador, and the federal government. Although the final land selection for the agreement has yet to be made, the Innu Nation's lands may be affected by the Project, given its proposed location. The Project is also located within asserted traditional territories and/or in areas of asserted rights of NCC, Pakuashipi, Unamen Shipu and Ekuanitshit. Asserted Aboriginal rights relate to the use of the land and marine resources, specifically hunting, fishing, gathering for subsistence purposes, and use of lands and resources for social and ceremonial activities. The Project is located outside the asserted traditional territories of the remaining groups (i.e., Matimekush-Lac John, Nutashkuan, Uashat mak Mani-Utenam, Naskapi, Nunatsiavut Government). However, Uashat mak Mani-Utenam and the Naskapi expressed concern that the Project may affect resources (i.e., caribou) that move outside the project area and over which Aboriginal rights are asserted.

Although many technical and traditional use issues were evaluated and addressed within the EA, certain Aboriginal groups have identified potential residual impacts of the Project related to (1) impacts on caribou in Labrador (i.e., the Red Wine Mountains Herd (RWMH) and the Mealy Mountains Herd) and (2) impacts on wildlife resources, enabled by improved access in certain parts of Labrador. Other issues and concerns raised by Aboriginal groups include impacts on fish and fish habitat, marine mammals, water quality, vegetation and wetlands, navigation, visual aesthetics and human health (Appendix C).

The Agency has concluded that the Project may affect the exercise of asserted Aboriginal rights within the project area due to the presence of project components, improved access being created in certain parts of Labrador or other impacts (e.g., spraying of herbicides along the ROW affecting medicinal plants). The location of the Project may mean that Aboriginal users may be displaced from their preferred areas for hunting of certain species and for gathering. However, to date the Agency has not received information from Aboriginal groups that leads it to conclude that the general availability of resources in the regional study area, which are traditionally used by Aboriginal people, would diminish as a result of the Project. Notably, alternative locations surrounding the transmission corridor would remain available for affected Aboriginal groups to carry out traditional activities.

The RWMH and Mealy Mountains Herd are listed as threatened under the *Species at Risk Act* and there is currently a provincial hunting ban in effect with respect to these caribou herds. The Project is predicted to have a minor adverse effect that may affect the future exercise of an established or asserted right to hunt the RWMH and the Mealy Mountain Herd.

### 5.2.2 Proposed Accommodation Measures within the Context of the Environmental Assessment

Aboriginal consultation during the EA has provided Nalcor with opportunities to plan and redesign Project components to avoid or mitigate potential impacts of the Project on Aboriginal rights, lands and traditional practices. For example, early project design included a sea electrode in the Lake Melville area. However, further to consultation with Aboriginal groups, the electrode was moved to L'Anse au Diable, Labrador, in the Strait of Belle Isle, eliminating the potential for impacts to Lake Melville. The

realignment of the transmission corridor with part of the Trans Labrador Highway Phase 3 will minimize the creation of new access in Labrador and may therefore minimize potential impacts on resources used by Aboriginal groups for traditional purposes. Nalcor redesigned its Project to place the electrode line on HVdc transmission towers from the Muskrat Falls converter station to the Straits area in response to Aboriginal concerns about the potential impacts of a wooden pole line for shore electrodes.

In general, Nalcor states that it has avoided known land and resource use components and activities, where possible, as part of its project design and planning processes. In addition, activity schedules will avoid interactions with land and resource users in specific areas to the extent practical (e.g., Nalcor will communicate the project schedule and timelines to Aboriginal groups and seek to avoid interactions, where practical, based on relevant and timely input). Notably, measures proposed to mitigate project impacts to VECs would also mitigate potential impacts to the Aboriginal use of lands and resources (e.g., measures to limit disturbance and habitat alteration or loss, prevent spills, and limit interactions with fish and wildlife) (Appendix D).

If the Project proceeds, a number of follow-up studies would be conducted (Appendix F), including monitoring potential impacts of the Project to woodland caribou in Labrador. The caribou follow-up program would be developed through collaboration with the provincial Department of Environment and Conservation (Wildlife Division) and be informed by the Labrador Woodland Caribou Recovery Team, which includes the provincial and federal governments, NCC, Nunatsiavut and the Innu Nation. Potential impact on the future right to hunt the RWMH and Mealy Mountain Herd could be addressed using the outcomes of this follow-up program. In addition the Agency understands that the Province of Newfoundland and Labrador will consult Aboriginal groups on a woodland caribou

strategy, which will include the Mealy Mountains Herd and RWMH, as well as another threatened herd, the Lac Joseph Herd.

Nalcor and the Innu Nation have ratified the Lower Churchill Innu Impacts and Benefits Agreement, which includes the development of the Labrador-Island Transmission Link Project.

### *5.2.3 Issues to be Addressed During the Regulatory Approval Phase*

If the Project moves to the regulatory approval phase, this phase will consist of federal authorizations, approvals or permits related to impacts on fish and fish habitat and navigable waters protection. A federal loan guarantee is proposed to be provided by Natural Resources Canada. DFO will act as Crown consultation coordinator for the federal government during the regulatory phase.

Nalcor will develop and implement a fish habitat compensation plan to offset impacts predicted to occur as a result of the Project (pursuant to the *Fisheries Act* [section 35(2)]). Should impact predictions related to fish habitat be revised during the detailed project design, final fish habitat compensation measures may be revised accordingly. Aboriginal groups will be consulted by DFO on compensation/offsetting measures during the regulatory phase. Similarly, Transport Canada will consult with Aboriginal groups prior to the issuance of any *Navigable Waters Protection Act* approvals of components of the Project.

A number of regulatory issues fall under provincial jurisdiction and, where appropriate, the province may issue relevant permits and approvals, and consider the imposition of appropriate terms and conditions upon release or during the post-EA permitting phase.

If the EA decision is to allow the Project to proceed, departments with regulatory

responsibilities may consult further with the Aboriginal groups on the authorizations to be issued for the implementation of the Project.

### 5.3 Issues Identified During Consultations

The Agency considered comments received from the public and Aboriginal groups in preparing the comprehensive study report. Themes raised by the public and Aboriginal groups include:

- transmission line ROW and access roads and trails enabling access to previously remote areas and the subsequent potential for increases in hunting, poaching and fishing (see *Section 6.4: Terrestrial Wildlife and its Habitat*; *Section 6.5: Freshwater Resources and Freshwater Fish and its Habitat*; *Section 6.8: Land and Resource Use and Human Health*);
  - impacts of electromagnetic fields (EMF) from the submarine cables and electrodes on marine life (see *Section 6.6: Marine Environment*);
  - impacts of the Project on caribou (see *Section 6.4: Terrestrial Wildlife and its Habitat*);
  - impacts of herbicides on plants (e.g., berries, medicinal plants) (see *Section 6.7: Current Use of Land and Resources for Traditional Purposes by Aboriginal Peoples*);
  - impacts of construction and maintenance on water bodies (see *Section 6.5: Freshwater Resources and Freshwater Fish and its Habitat*); and
- impacts of the Project on outfitters and recreation (see *Section 6.8: Land and Resource Use and Human Health*).

Further information on these themes, and a selection of other public and Aboriginal comments, are included in *Section 6: Environmental Effects Assessment*. A more detailed summary of comments from Aboriginal groups is presented in *Appendix C: Summary of Concerns Raised by Aboriginal Groups* in conjunction with the proponent's and government's responses to these comments. *Section 8: Benefits to Canadians* describes changes to the Project that were made partially in response to public and Aboriginal comments.

## 6. Environmental Effects Assessment

### 6.1 Approach to Environmental Effects Assessment

The Agency, in collaboration with federal departments, identified and assessed the potential adverse environmental impacts of the Project on the basis of:

- the proponent’s EIS, EIS Addendum and responses to information requests from the federal government;
- information obtained during public and Aboriginal consultations; and
- expert advice obtained from federal and provincial government departments.

This Comprehensive Study Report summarizes the EA process and the proponent’s analysis of environmental effects of the Project, and presents the Agency’s conclusions on the likely significance of the Project’s environmental effects. Sections 6.2 to 6.12 of the report summarize the potential environmental impacts of the Project in relation to VECs and Key Indicators. These sections present Nalcor’s assessment of the project and cumulative effects using the methods described below. The proponent’s analysis is followed by an accounting of some Aboriginal, public and government comments. Finally, Agency conclusions on the significance of environmental effects in relation to each VEC and Key Indicator are articulated.

**Nalcor’s EA Methods** – Nalcor described the existing environmental conditions and proposed Project in the EIS and associated documents<sup>3</sup>. The environmental impacts of the Project on VECs and Key Indicators were predicted taking into account criteria including:

- magnitude—degree of change in the VEC from existing conditions,
- geographic extent—spatial area within which effects would occur,
- duration—period of time over which environmental effect would likely be evident, and
- frequency—how often an effect will occur (e.g., continuous or at specific time intervals).

Nalcor proposed measures to mitigate or avoid the adverse environmental effects of the Project. It further proposed definitions of significance in relation to each VEC or Key Indicator.

**“This Comprehensive Study Report summarizes the EA process and the proponent’s analysis of environmental effects of the Project, and presents the Agency’s conclusions on the likely significance of the Project’s environmental effects.”**

<sup>3</sup> Project documents are available on the Agency’s website ([ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=51746](http://ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=51746)), the Government of Newfoundland and Labrador Department of Environment and Conservation’s website ([www.env.gov.nl.ca/env/env\\_assessment/projects/Y2010/1407/index.html](http://www.env.gov.nl.ca/env/env_assessment/projects/Y2010/1407/index.html)) or by contacting the Agency.

***Nalcor's Cumulative Environmental Effects Assessment Methods*** – Nalcor assessed the cumulative environmental effects on VECs resulting from the Project in combination with other projects and activities. The cumulative effects assessment considered the effects of past and ongoing projects and activities to be reflected in the pre-project environmental baseline. It assessed the likely nature and degree of change in the baseline environment as a result of the Project in combination with other projects and activities. The following projects and activities were considered in the cumulative effects assessment:

- Lower Churchill Hydroelectric Generation Project (Labrador)
- Trans Labrador Highway, Phase 3 (Labrador)
- Proposed 5 Wing Goose Bay Supersonic Flight Training (Labrador)
- Commercial Forestry Activity (Labrador, Newfoundland)
- General Economic and Infrastructure Development (Labrador, Newfoundland)
- Proposed Labrador West Mining and Related Developments (Labrador)
- Long Harbour Processing Plant (Newfoundland)
- Oil and Gas Activities (Newfoundland)
- Potential future changes to the intensity, nature and distribution of fishing activity in the Strait of Belle Isle
- Maritime Link Project

## **6.2 Atmospheric Environment**

This VEC includes air quality, noise and climate. The air quality is generally good across Newfoundland and Labrador, and the total emissions of contaminants are relatively low. Background noise levels are also generally low, as most of the transmission corridor would be in a remote location.

### **6.2.1 Potential Environmental Effects and Mitigation**

***Air Contaminants*** – Nalcor states that air contaminants would be emitted from the combustion of fuel. In addition, dust would result from heavy equipment, vehicle movement, vessel operation, and blasting. Emissions would likely be concentrated at the converter stations, HDD locations and camps. Emissions would likely be sporadic during construction as the various crews move progressively along the ROW (e.g., ROW clearing, foundation construction, tower erection). There is potential for dust emissions to cause regulatory ambient standards for particulate matter<sup>4</sup> to be exceeded on occasion (i.e., less than once per week for 1-hour objectives and less than once per month for 24-hour objectives) when it is dry and windy. Mitigation proposed by Nalcor for the construction phase includes complying with relevant standards for vehicles and equipment, minimizing idling and limiting haul distances to the extent practical. Residual effects are expected to be low overall (Table 5). Additional mitigation measures are listed in Appendix D.

Emissions during operations and maintenance are predicted to be negligible and would occur primarily where inspections or repairs were being completed. In addition, chlorine gas dissolved in water would be emitted at the shoreline electrode, and form secondary and tertiary products, a small quantity of which could escape into the environment depending on conditions. However, any gas escaping into the air would be dispersed by the wind and chlorine concentrations are likely to be negligible (below 0.4 ppm).

***Greenhouse Gases*** – Nalcor states that greenhouse gases (GHGs) will result from the combustion of fuel during project construction.

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<sup>4</sup> Air Pollution Control Regulations (NL; <http://www.assembly.nl.ca/Legislation/sr/Regulations/rc040039.htm>); Air Quality Objectives for PM10 (BC; <http://www.bcairquality.ca/reports/pdfs/aqo-framework-consultation.pdf>); Canada-Wide Standards for Particulate Matter and Ozone ([http://www.ccme.ca/assets/pdf/pmozone\\_standard\\_e.pdf](http://www.ccme.ca/assets/pdf/pmozone_standard_e.pdf)); Regulations Related To Health And Air Quality (<http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/reg-eng.php#a3>)

At the same time, tree clearing would reduce carbon sequestration capabilities. The maximum yearly GHG emissions during project construction would be approximately 204,904 tonnes of carbon dioxide equivalent (CO<sub>2</sub>e), representing about 3.9-percent of provincial GHG emissions. Total GHG emissions during the five years of project construction are estimated at 660,953 tonnes of CO<sub>2</sub>e. Yearly GHG emissions during operations and maintenance are estimated at 60,120 tonnes of CO<sub>2</sub>e.

While overall GHG emissions are predicted to be low, mitigation includes complying with federal vehicle emission standards, minimizing idling and maintaining equipment (Table 5, Appendix D).

**Noise** – Nalcor predicts that sound would be generated by a number of sources during project construction. The assembly and installation of towers and the preparation and construction of submarine cables (e.g., HDD) have the greatest potential to generate noise during this phase of the Project.

Residents within 400 m of the HDD drill rig could experience noise levels that exceed Health Canada’s acceptable criteria during construction

in the absence of mitigation (i.e., the percentage of residents that are highly annoyed by project noise would increase more than 6.5-percent from current baseline levels)<sup>5</sup>. Accordingly, Nalcor will evaluate and apply appropriate mitigation to control noise based on the location and duration of drilling. For example, Nalcor states that a noise attenuating berm may be constructed on site, if required.

Noise would result from the operation of equipment, vessels and vehicles during operations and maintenance. Resulting noise could be a potential annoyance to nearby humans and potentially disruptive to wildlife; however, sound pressure levels are expected to be low and occur primarily in remote areas. In addition, noise known as “coronal discharge” would also be generated by the transmission line carrying a current. Nalcor predicts that the percentage highly annoyed associated with coronal discharge at the edge of the ROW will be within Health Canada’s acceptable criteria (i.e., the percentage highly annoyed would be less than 3 percent, which is below the Health Canada criteria of 6.5 percent).

Overall, a low adverse effect to the atmospheric environment is predicted (Table 5). The frequency

**Table 5: Atmospheric Environment: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<b>Low</b> Emissions would be low	<b>Local to Beyond Regional</b> Climate effects are global in nature; air contaminants and noise would be limited to the local study area	<b>Short-term to Far Future</b> Air contaminants would disperse quickly; noise will dissipate quickly; GHGs can persist for several hundred years	Effects would occur throughout construction and during maintenance activities; coronal noise would be constant through the life of the Project	<b>Low Adverse Effect</b>

<sup>5</sup> The percentage highly annoyed can be thought of as an aggregate indicator of assorted noise effects, present to varying degrees, that are creating a negative effect on a community, and that may not be measurable when considered as separate negative effects. High annoyance with noise is currently a reliable and widely accepted indicator of human health effects due to environmental noise. Based on Health Canada research, a 6.5-percent increase in the percentage highly annoyed corresponds to a severe noise impact and mitigation is advised.



of the likely residual effects for climate, air quality, and noise would be intermittent, with the exception of coronal noise, which is not expected to exceed Health Canada's criteria.

### 6.2.2 Cumulative Environmental Effects

Air contaminant emissions from the Project in combination with other emissions within the area considered in the EA are not likely to cause ambient standards (in units of micrograms per cubic meter) to be exceeded. The Project is not likely to result in a substantive change in the environment as it relates to climate in combination with other projects and activities because of the low magnitude of the GHG emissions. If the Project proceeds, Nalcor predicts a net reduction of 100 million tonnes of GHG emissions due to the displacement of thermal generation at the Holyrood Thermal Generating Station between 2017 and 2067.

The cumulative environmental effects of the Project on noise in combination with other projects and activities are unlikely to spatially overlap or substantively influence ambient conditions in the regional study area.

### 6.2.3 Monitoring and Follow-Up

No specific follow-up was proposed by Nalcor in relation to the atmospheric environment. However, it proposed a complaint-driven process to address the potential generation of excessive airborne dust or noise.

### 6.2.4 Government, Public and Aboriginal Comments and Proponent's Response

**Air Contaminants** – Given the limited number of human receptors in the project area and the transient nature of construction activities,

Health Canada indicated that adverse effects associated with human exposure to air pollutants were expected to be minimal.

**Noise** – Health Canada queried the proponent's calculation of noise and the percentage highly annoyed during HDD at Forteau Point and Shoal Cove. It recommended that a 10 dB adjustment be applied to predicted noise levels to account for the quiet rural location of the Project, as per ISO 1996-1 (2003)<sup>6</sup>. Health Canada also recommended implementing a noise monitoring program and additional mitigation in the event of public complaints. Nalcor did recalculate sound pressure levels from HDD, but maintained that it was not appropriate to consider a quiet rural adjustment in its calculations. It determined that the percentage highly annoyed among residents living within (and just beyond) 500 m of the drill rig would exceed Health Canada criteria. Nalcor would further evaluate and apply appropriate mitigation once drilling equipment had been chosen.

Given that Nalcor did not include an adjustment for the quiet rural location of the Project in its sound calculations, Health Canada stated that the predicted percentage change in highly annoyed may be underestimated. However, it recognized that the proponent will implement mitigation measures to ensure noise levels do not exceed acceptable levels and to on-going communication with nearby residents to identify and resolve any noise complaints. Health Canada indicated that with the proposed mitigation, the Project was unlikely to result in a significant adverse effect with respect to noise.

Newfoundland and Labrador and Environment Canada reviewed Nalcor's analysis of impacts to the atmospheric environment and are satisfied that overall impacts are unlikely to be significant.

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6 International Standards Organization (ISO). 2003. Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures. ISO 1996-1:2003.

### 6.2.5 Agency Conclusions on the Significance of the Residual Environmental Effects

It is understood that the percentage change in highly annoyed may exceed Health Canada's acceptable criteria during HDD in the absence of mitigation, but that Nalcor will evaluate and apply appropriate mitigation to control noise based on the location and duration of drilling. Nalcor has proposed a complaint-driven process to address the generation of noise. In addition, the Agency recommends that noise levels during HDD be assessed to determine if acceptable criteria are being exceeded and whether mitigation is required. With the implementation of this and other mitigation, the Agency concludes that the Project is not likely to result in a significant contribution to climate change or cause significant adverse environmental effects to the atmospheric environment.

## 6.3 Vegetation

The vegetation VEC includes consideration of wetlands, riparian shoreline, federal *Species at Risk Act*-listed plant species, provincial *Endangered Species Act*-listed plant species, and regionally uncommon plant species as ranked by the Atlantic Canada Conservation Data Centre. Most of the Project occurs within the Boreal Shield Ecozone. The most common habitat types in the vicinity of the Project include open conifer forest, conifer forest, mixed wood forest, wetland and scrub-heathland-wetland complex. The Northern Peninsula of Newfoundland in particular is known to support federally and provincially-listed plant species (e.g., Long's braya, Fernald's braya), which are endemic to the unique, coastal limestone barren ecosystems of the area.

### 6.3.1 Potential Environmental Effects and Mitigation

#### *Impacts of Construction*

Potential impacts of project construction on vegetation include:

- clearing and disturbance of vegetation,
- displacement of natural vegetation from the introduction of non-native and invasive species,
- reduced health of vegetation due to exposure or erosion,
- alteration of habitat including soil and water quality (e.g., due to spills),
- loss of merchantable timber,
- increased potential for the spread of insects and other diseases and
- alteration of mature and old growth forests from edge effects or as a result of altered natural disturbance regimes.

Clearing and disturbance of vegetation (e.g., individual plants or stands) and vegetation communities will occur in the ROW. Nalcor estimates that approximately 75 km<sup>2</sup> of vegetation in total would be lost or altered as a result of the Project, representing 4-percent of habitat within the local study area. In terms of area, the habitat types most affected along the ROW are predicted to be conifer forest and open conifer forest, with a potential loss of approximately 14 km<sup>2</sup> each. In addition, the Project will affect wetlands (up to approximately 8 km<sup>2</sup>) and riparian areas (approximately 229 km), which are recognized as valuable landscape features. It is currently expected that approximately 2-percent of all transmission towers will be located in wetlands.

Four plant species listed under the federal *Species at Risk Act* and under the provincial *Endangered Species Act* could be affected by the Project (Appendix A). In addition, 138 species of

regionally uncommon plants or areas comprising suitable habitat for those plants were identified by Nalcor within the local study area and could be affected. In conjunction with the Newfoundland and Labrador Department of Environment and Conservation (Wildlife Division), Nalcor identified 35 locations along the ROW for pre-construction surveys of regionally uncommon plants to be completed during the spring and summer of 2013.

Nalcor predicts that impacts of construction on vegetation will be limited based on the application of proven, accepted mitigation methods and approaches. In particular, the final ROW alignment was routed to avoid, to the extent practical, vegetation communities sensitive to disturbance (e.g., wetlands, riparian shorelines, listed plant habitats), that are difficult to reclaim, or are of stakeholder concern (e.g., uncommon habitat, limestone barrens). Existing access roads will be used and the development of new access roads will be minimized to the extent practical. In addition, if routing or siting cannot avoid areas for listed plants, Nalcor will conduct pre-construction surveys for these plants. Should a listed plant be observed during a pre-construction survey, Nalcor will retain a qualified botanist to assist in the development and implementation of an appropriate mitigation strategy, in consultation with the province. Potential effects will be mitigated through avoidance or by scheduling construction outside of the normal growing season and during periods of increased snow cover, as practical.

### *Impacts of Operations and Maintenance*

Potential impacts of project operations and maintenance on vegetation include:

- chronic disturbance and changes in site characteristics (e.g., shade, drainage pattern) from off-highway vehicle traffic, particularly near populated areas;

- displacement of vegetation due to the introduction of invasive species;
- increased domestic cutting of firewood enabled by increased access; and
- loss of vegetation resulting from accidental hydrocarbon spills.

Vegetation on the ROW greater than two meters in height will be removed with herbicides or by mechanical means during project operations and maintenance. Treatment of compatible species (i.e., those that will not reach energized lines or cause impediment or safety concerns to maintenance crews) on the ROW will be avoided or minimized. Once compatible species become established on the ROW, it will be more difficult for target species to re-establish and the length of time between herbicide treatments will be increased. Vegetation management will likely start in year eight of operations and be repeated every seven years, or as required for safety.

Nalcor states that herbicides would be applied by qualified, trained personnel, as per manufacturer and regulatory requirements, to limit the potential for impacts to water bodies and exposing wildlife species. It proposes to use Tordon 101 mixed with Sylgard 309, which it states is considered non-residual and non-toxic to wildlife or humans in the doses that would be used on the ROW. Buffer zones for foliar treatment would be applied to all water bodies, private land, wells and human habitation (temporary or permanent). At water bodies, buffers would be 30 m to 50 m depending on the slope, while buffers for wells, private land and human habitation would be 50 m. The cut and stump method of managing vegetation (cutting target species and applying herbicide to stumps to prevent re-sprouting) will be used in sensitive areas. A list of additional measures to mitigate impacts to vegetation is included in Appendix D. Overall, Nalcor predicts a low adverse effect of the Project on vegetation (Table 6).

**Table 6: Vegetation: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low</b></p> <p>Effect is limited to less than 5-percent of the available resource</p>	<p><b>Local to Regional</b></p> <p>Effects primarily confined to the project footprint, but some effects could extend slightly into the RSA</p>	<p><b>Medium-term to Far Future</b></p> <p>Wetlands crossed will recover within 4 years; clearing will be evident for the life of the Project</p>	<p>Effects will occur primarily during construction; vegetation management will occur intermittently during operations and maintenance</p>	<p><b>Low Adverse Effect</b></p>

### 6.3.2 Cumulative Environmental Effects

Effects of the Project on vegetation would combine with cumulative effects from other projects and activities, including loss or alteration of habitat (i.e., from clearing), displacement of native vegetation (i.e., by non-native and invasive species), and disturbance (i.e., from increased use of off-highway vehicles). The proponent predicts that impacts to vegetation will be spatially limited to the regional study area (relative to off-highway vehicle access) and of low magnitude. Other projects will have mitigation in place to minimize adverse effects. Overall, the likely effects of the Project in combination with other projects and activities are not expected to threaten the sustainability of vegetation’s contribution to ecosystem function within the regional study area.

### 6.3.3 Monitoring and Follow-Up

The proponent will design a follow-up program in consultation with the provincial Department of Environment and Conservation, to target known locations of listed plant species and their important habitats, coupled with a review of off-highway vehicle use facilitated by the Project (Appendix F). The success of mitigation efforts undertaken to protect listed plants during construction will be evaluated and resulting information will be used to develop mitigation, in consultation with vegetation experts, as appropriate, through Nalcor’s adaptive management program.

### 6.3.4 Government, Public and Aboriginal Comments and Proponent’s Response

Newfoundland and Labrador recommended that the routing of the transmission line follow corridor alternative A4 because it would avoid habitat for Long’s Braya (Appendix B). Nalcor accepted this recommendation and agreed to a number of mitigation measures to avoid Long’s braya and Fernald’s braya during construction and operation. Newfoundland and Labrador have noted that the mitigation of impacts to vegetation (e.g., impacts to rare plants; vegetation control) is provincial jurisdiction and, where appropriate, it may issue relevant permits and approvals, and consider the imposition of appropriate terms and conditions upon release during the post-EA permitting phase.

Environment Canada commented in relation to the Federal Policy on Wetland Conservation, including several recommendations to Nalcor for avoiding impacts on wetlands. It expressed concern for the potential of a wetland being transformed from a rare wetland type to a common wetland type due to changes in hydrology or nutrient availability. Acknowledging Environment Canada’s comments, Nalcor elaborated on its assessment and mitigation in relation to wetlands. For example, Nalcor agreed to use swamp mats, rather than corduroy bridges, for crossing wetlands.

Public comments were received on the cumulative effects of the Project in combination with other projects and activities on wetlands and riparian habitat. The comments discussed the need to consider the effects of the Project in tandem with the effects of the Upper and Lower Churchill Generation Projects. Because the Joint Review Panel Report for the Lower Churchill Hydroelectric Generation Project (Generation Project) concluded that the Generation Project was likely to result in significant effects on wetlands and riparian habitat<sup>7</sup>, one public comment noted that the “transmission project’s cumulative effects must also be considered significant”.

Nalcor stated that the prediction of significant effects in relation to the Generation Project does not indicate that the cumulative effects of the Transmission Project (and other projects) will likewise be significant. It assessed cumulative impacts to vegetation (including wetlands and riparian habitat) within a 15 km regional study area surrounding the transmission corridor. While the regional study area for the Transmission Project overlaps the eastern portion of the Generation Project, Nalcor found that the Transmission Project was not likely to contribute to the pathways that could affect the VECs (e.g., wetlands, riparian habitat) that the Joint Review Panel concluded would be significantly affected by the Generation Project. As such, Nalcor concluded that the cumulative effects to vegetation would not be significant.

From the Agency’s perspective, Nalcor’s conclusions on the significance of cumulative effects relative to wetlands and riparian habitat are appropriate within the spatial boundaries proposed

by the proponent. That said, a consideration of cumulative effects to wetlands and riparian habitat within a larger regional context in Labrador is merited given the findings of the Joint Review Panel for the Generation Project.

The Agency, Environment Canada and DFO considered the cumulative effects of the Transmission Project and other projects and activities on wetlands and riparian habitat within wetland divisions<sup>8</sup> mapped in the National Atlas of Canada<sup>9</sup>. A small part of the Transmission Project would be located within the Interior Atlantic Boreal wetland area, while several hundred kilometres of transmission line would run through the Eastern Atlantic Boreal wetland area. Cumulative effects within the Interior Atlantic Boreal wetland area result from the Upper and Lower Churchill Generation Projects and other projects and activities. Cumulative effects within the Eastern Atlantic Boreal wetland area result from recreational activities (e.g., off-highway vehicles), forestry and other projects and activities. Portions of the proposed transmission line will be twinned with existing ROWs, minimizing impacts to wetlands in the area. Although past, present and future activities have, are and will continue to affect wetlands and riparian habitat, overall there remains an abundance of healthy and productive habitat within both of the identified wetland areas, including riparian habitat in Labrador. The Agency, Environment Canada and DFO concluded that cumulative effects on wetlands and riparian habitat within the Interior Atlantic Boreal- and Eastern Atlantic Boreal wetland areas in Labrador are not likely to be significant.

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7 *Report of the Joint Review Panel – Lower Churchill Hydroelectric Generation Project.* [www.ceaa-acee.gc.ca](http://www.ceaa-acee.gc.ca)

8 Wetland regions are “areas within which similar characteristic wetlands develop in locations that have a similar topography, hydrology and nutrient region. Subdivisions of the wetland regions are made based on the distribution of these wetlands, the relative abundance of the various kinds of wetlands (bogs, fens, swamps, marshes and shallow water) or developmental trends somewhat divergent to those in the rest of the region”.

9 Canada Wetland Regions (map). 1986. Geographic Services Division/ Surveys and Mapping Branch. Energy, Mines and Resources Canada. <http://atlas.nrcan.gc.ca/site/english/maps/water.html#distributionofwater>

Overall, the Province of Newfoundland and Labrador has reviewed the information provided by Nalcor and is satisfied that the impacts of the Project to vegetation are unlikely to be significant.

### 6.3.5 Agency Conclusions on the Significance of the Residual Environmental Effects

The Agency concludes that the Project is not likely to result in a significant adverse environmental effect on vegetation, taking into account proposed mitigation measures.

## 6.4 Terrestrial Wildlife and its Habitat

This VEC focuses on caribou, furbearers and avifauna. The ranges of the RWMH and the Mealy Mountains Herd of caribou, which are listed as threatened under the *Species at Risk Act*, overlap with the project local study area in Labrador (Figure 3). Herds in Labrador have declined in number as a result of multiple factors, including hunting and habitat loss. Historically the RWMH and Mealy Mountain caribou herd numbered approximately 750, and 2600 individuals respectively (Schmelzer et al 2004). Surveys indicate that each of these populations are currently in decline (Table 7).

Eighteen species of furbearers have been confirmed in Labrador, while 13 species have been confirmed in Newfoundland. The Newfoundland population of marten is listed as threatened under the *Species at Risk Act*. A variety of avian communities, including waterfowl, passerines, raptors, upland game birds, seabirds and various federally-listed species at risk use the habitat crossed by the Project, including the Strait of Belle Isle (Appendix A).

**“The ranges of the RWMH and the Mealy Mountains Herd of caribou, which are listed as threatened under the Species at Risk Act, overlap with the project local study area in Labrador.”**

**Table 7: Population Estimates for Surveys Conducted Between 2000 and 2012 for Two Threatened Sedentary Woodland Caribou Herds and One Subpopulation in Labrador**

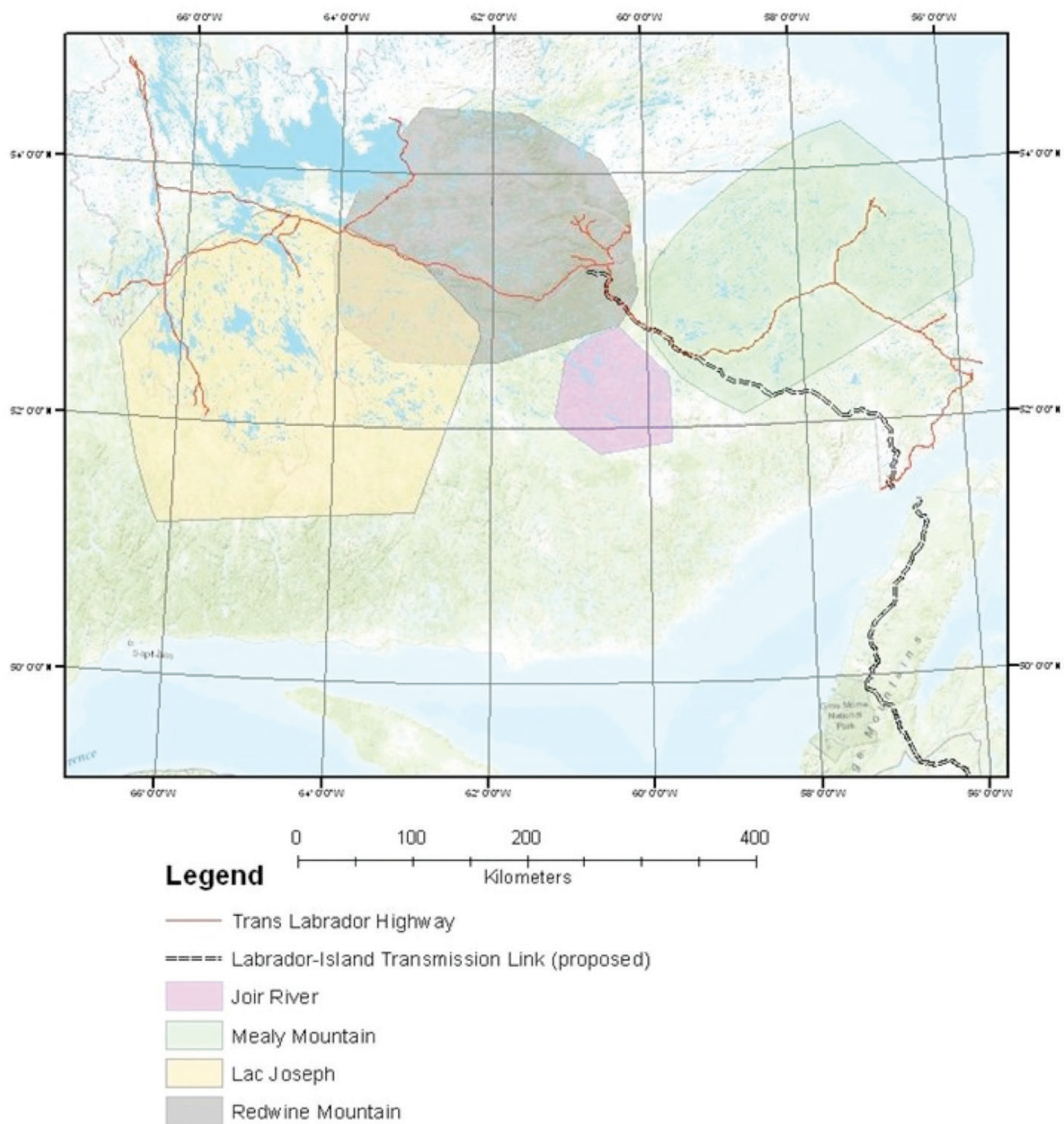
Herd	Estimate (Confidence Level)	Year of Census	Trend
Red Wine Mountain	97(72-189) (2001) 87 <sup>1</sup> 75 <sup>1</sup>	2001 2007 2009	Declining
Mealy Mountain	2581 (989-4181) 2106 (765 – 3447) <sup>2</sup> 1604 (1409-2171)	2002 2005 2012	Declining
Joir River	110 <sup>3</sup> 69 <sup>3</sup>	2008 2012	Minimum Count Minimum count

**Notes:**

1. Count of all animals in groups with collared individuals during early winter
2. Post-hoc analysis indicates estimate could have been as high as 2985 (Jeffrey 2005)
3. Count of individuals in main groups during late winter. Stratified search effort throughout the range.

Source: Newfoundland and Labrador Department of Environment and Conservation, Wildlife Division

**Figure 3: Boreal Woodland Caribou Ranges in Labrador in Relation to the Labrador–Island Transmission Link Project**



*Notes:* Range boundaries were generated using maximum convex polygons, and generated from pooled ARGOS + GPS telemetry data collected from: a) 46 adult female caribou from April 2002 to February 2011 in the Lac Joseph herd, b) 61 adult caribou from February 1998 to February 2011 for RWMH, c) 20 adult caribou from April 2002 to February 2011 for Mealy Mountains caribou and d) 20 adult caribou from April 2002 to September 2012 for the Joir River subpopulation.

Source: Newfoundland and Labrador Department of Environment and Conservation, Wildlife Division



### 6.4.1 Potential Environmental Effects and Mitigation

The effects of the Project on terrestrial wildlife and its habitat could include habitat alteration or loss, increased access and indirect mortality (e.g., through increased predation, hunting and trapping), changes to migration or movement routes and timing of travel, sensory disturbance, direct mortality (e.g., interactions with vehicles or equipment), and change in predator or prey availability.

**Woodland Caribou** – Potential impacts of the Project on caribou include alteration and loss of habitat, sensory disturbance, changes to migration or movement routes and direct mortality. The EIS states that the development of the ROW is not expected to substantially increase forage availability for moose, and therefore moose and subsequent predator densities (e.g., wolves) are also not expected to increase as a result of the Project. The Project will enable increased access by humans to certain areas, which could in turn result in increased illegal hunting of caribou populations.

The National Recovery Strategy for Woodland Caribou defines critical habitat for the threatened Mealy Mountains Herd and the RWMH as their respective identified ranges<sup>10</sup>. Habitat recovery objectives for the species include that 65-percent of critical habitat for each herd remains undisturbed, providing a measurable probability (60-percent) for a local population to be self-sustaining. The EIS states that 98-percent of the Mealy Mountains Herd range and 92-percent of the RWMH range are presently undisturbed. In Central and Southeastern

Labrador, the three kilometer wide assessment area overlaps with less than one-percent of both the Mealy Mountains Herd and RWMH ranges.

Management of caribou on the Island of Newfoundland differs from management of Labrador caribou (i.e., there is a longer history of telemetry data for caribou on the Island, so distribution maps are created differently). With respect to Island caribou, Nalcor states that three-percent of its Primary Core area<sup>11</sup> occurs within the project assessment area.

Among other mitigation listed in Appendix D, Nalcor avoided Primary Core area for caribou in Newfoundland, to the extent feasible, in routing the ROW. Furthermore, it would limit new access roads, and decommission roads following construction, to the extent practical. To the extent practical, new access roads were routed to avoid the Primary Core area of Newfoundland caribou by at least 500 m.

Nalcor states that it will develop access control measures to monitor and manage public off-highway vehicle use on project roads and trails. It took the precautionary step of realigning part of the transmission line along the existing South Side Access Road to the Muskrat Falls site to eliminate the creation of new access in the range of the RWMH; thereby mitigating potential effects of the Project on this herd. Additional measures to mitigation effects to caribou are listed in Appendix D.

Overall, the EIS predicts that likely residual effects on caribou may include: habitat loss or alteration due to vegetation clearing; possible mortality directly due to collisions with vehicles or indirectly as a result of sensory disturbance;

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10 Environment Canada. 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa. Note: this document had not been finalized when the EIS was prepared, although a draft version was available.

11 Primary Core Areas are based on a 50-percent use distribution kernel which is restricted to only half the telemetry data points but represents the greatest degree of clustering.

avoidance of human activity up to 250 m from project activities; a reduction in forage availability or access; and changes to migration or movement patterns. However, less than 5-percent of caribou herd ranges in Labrador or caribou Primary Core areas in Newfoundland will be exposed to the effects of the Project. The Project is not predicted to affect the viability or recovery of woodland caribou populations in Central and Southeastern Labrador or in Newfoundland (Table 7).

**Furbearers** – Nalcor’s assessment focussed on marten, red fox, porcupine and beaver. Nalcor predicts that disturbance from the Project may displace individuals for the short- to medium-term, but the regional distribution of furbearer populations is not likely to be affected. Increases in hunting or other land use pressure are not likely to affect species composition, distribution patterns, or densities at the regional level.

With respect to marten specifically, Nalcor notes that this is a sensitive species and there are limited and isolated areas of high quality marten habitat in Newfoundland. Individuals have large home ranges. Forest fragmentation is the most relevant effect of the Project on marten, which generally avoid forest edges. Other potential impacts of the Project include habitat reduction and disturbance, change in prey species, vehicle collisions, and mortality from hunting and trapping resulting from increased access.

Mitigation proposed by Nalcor to reduce project impacts on marten include the use of existing disturbed areas as much as possible, and the use of existing access roads to the extent practical. Nalcor will continue to consult with the provincial Department of Environment and Conservation (Wildlife Division) regarding final project component siting in the vicinity of marten habitat, particularly within the Northern Peninsula using detailed imagery of terrain and vegetation cover. This will involve strategic siting of project components to minimize the amount

of primary and secondary habitat altered or lost and the degree of habitat fragmentation. Nalcor will also consult with the province on areas where other mitigation options (e.g., restricting the width of the ROW) would be implemented. Nalcor may modify how cut timber (i.e., limbs and branches) is disposed of along the ROW to provide connectivity between marten habitat on either side of the ROW. Overall, less than 1-percent of primary marten habitat within the regional study area would be affected by the Project and impacts are predicted to be low in magnitude.

**Avifauna** – Potential effects of the Project on birds include habitat loss or alternation from clearing; however this is estimated to affect less than 1-percent of available habitat in the regional study area. Other potential impacts of the Project on birds include sensory disturbance, change in prey availability, mortality (e.g., from hunting, flying into lines and towers, vehicle collisions) and exposure to herbicides.

An avifauna management plan will be finalized to address vegetation clearing and reduce the possibility of inadvertent destruction of nests and eggs. Final ROW routing has avoided breeding sites for Harlequin duck, as technically and economically feasible, and considered locations of known high concentrations of waterfowl to the extent possible. Nest searches will be conducted prior to clearing if clearing activities are conducted during the breeding season of migratory birds and a 30 m buffer around active nests will be maintained during project construction. Osprey and Bald eagle nests will be identified through aerial surveys to determine possible nesting activity prior to construction. Overall, Nalcor concludes that disturbance associated with construction may displace individual animals for the short to medium term, but the regional distribution of avifauna is not likely to be affected and the magnitude of impacts is predicted to be low (Table 8).

Additional mitigation measures to reduce impacts to terrestrial wildlife and its habitat are listed in Appendix D.

### 6.4.2 Cumulative Environmental Effects

#### Caribou

##### Newfoundland Caribou

The EIS states that caribou populations in Newfoundland are declining<sup>12</sup>. It indicates that although there is not a clear understanding of limiting factors, black bears and coyotes are important predators. Overall, a low proportion of Primary Core area will likely be disturbed as a result of the Project and future projects and activities.

##### Mealy Mountains Herd

Nalcor states that the Mealy Mountains Herd is considered to be stable and that the factor preventing the population from increasing is

illegal hunting. Any increase in wolf predation or illegal hunting combined with any future developments could prevent the herd from increasing, or if sufficiently detrimental, could cause the population to decline.

##### Red Wine Mountains Herd

Nalcor states that the Project’s interaction with the RWMH is limited to the south-eastern portion of its range. It states that the effects of the Project are not expected to result in a further decline of the herd and therefore project effects relative to baseline are not significant. However, in recognition of the present status of the RWMH, and that other activities and pressures such as illegal hunting and predation may continue, Nalcor predicts that the overall fate of the herd is likely one of continued decline with or without the Project. Nalcor predicts that cumulative environmental effects on the RWMH would be significant if existing (pre-Project) factors remain unchecked, but not as a result of the Project.

**Table 8: Terrestrial Wildlife and its Habitat: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low</b></p> <p>Less than 5-percent of caribou herd ranges crossed in Labrador and Primary Core area in the RSA in Newfoundland will be exposed to the effects of the Project; less than 1-percent of primary marten habitat or habitat available for avifauna within the regional study area will be affected.</p>	<p><b>Local to Regional</b></p> <p>Although the alteration or loss of habitat will occur within the local study area, sensory disturbance could extend into the regional study area</p>	<p><b>Medium-term to Far Future</b></p> <p>Sensory disturbance will likely extend throughout construction; habitat alteration will extend throughout the life of the Project</p>	<p>Effects will occur primarily during construction; vegetation management will occur intermittently during operations and maintenance</p>	<p><b>Low Adverse Effect</b></p>

12 Note: The EIS notes that caribou populations on the Island are declining; however, the province of Newfoundland and Labrador has advised that recent census and demographic data suggest this decline has slowed and in some areas may be trending upwards.

**Furbearers** – The EIS states that much of the Labrador portion of the regional study area remains relatively undisturbed by anthropogenic activity and furbearer populations are considered to be in a “natural” state. The northwestern portion of the regional study area is subject to fragmentation and infrequent sensory disturbance. Furbearer habitat and populations in Newfoundland have been affected by anthropogenic effects to a greater extent, as evidenced by the presence of communities, cottage areas, highways, access roads, cut blocks and recreational activities.

Nalcor states that marten are stable within core areas, but past logging and trapping have resulted in a current population of approximately 600 to 800 individuals on the Island of Newfoundland. It predicts that future projects are likely to result in a limited increase in habitat alteration or loss and fragmentation, but that access will likely increase resulting in additional opportunities for hunting and trapping and vehicle disturbance. The proponent predicts that overall cumulative effects will be low in magnitude.

**Avifauna** – Nalcor states that avian populations are considered stable. Effects from future projects include habitat alteration or loss.

#### 6.4.3 Monitoring and Follow-Up

**Caribou** – Nalcor, as a member of the Labrador Woodland Caribou Recovery Team, will support research on woodland caribou populations (Appendix F). Monitoring and follow-up would be conducted in collaboration with the provincial Department of Environment and Conservation (Wildlife Division), which is informed by discussions with the Recovery Team.

**Furbearers** – A follow-up program will be conducted to investigate the effects of ROW construction and operation on marten habitat use in the Main River core area. If modified vegetation management techniques are adopted to

help facilitate marten movement across the ROW, the program would investigate their efficacy. Another study will be conducted to assess the degree of public access afforded by the ROW and access roads during the first winter following construction. Resulting information would be used in an adaptive management framework to adjust access control measures and help minimize potential effects on furbearers.

**Avifauna** - Harlequin duck surveys will be conducted along rivers crossed by the Project that are known to support breeding populations. Surveys would be conducted before construction to determine the extent of breeding activities and following construction for two years to determine the effects of the Project on breeding pairs.

Nalcor will note observations of Red knot or other species of conservation status (e.g., Species at Risk).

#### 6.4.4 Government, Public and Aboriginal Comments and Proponent's Response

**Caribou** – Potential impacts of the Project on caribou were of concern to the government, public and Aboriginal groups. It was suggested that construction take place later in the fall to reduce interaction with calving. In response, Nalcor referred to measures to minimize the effects on caribou as described in the EIS, including limiting (non-essential) activity in the Primary Core area of Newfoundland caribou during calving season and post-calving season as feasible. Aboriginal groups raised concerns about the impacts of habitat fragmentation and of increased predator densities on caribou. Nalcor acknowledged that caribou are sensitive to habitat loss, fragmentation and disturbance, but maintained that the effects of the Project relative to baseline are not likely to affect the viability or recovery of woodland caribou populations. Furthermore, it predicated that there would be little or no increase in local predator populations and subsequent predation on caribou.

The Innu of Unamen Shipu provided comments on impacts of the Project on the George River Herd. However, mapping from Newfoundland and Labrador shows the range for this herd to be north of the Project and thus the George River Herd is not predicted to be affected by the Project. The range of the Joir River Herd is also outside of the Project area (Figure 3).

Newfoundland and Labrador asked Nalcor to provide additional information on caribou herds, including an analysis of potential direct and indirect loss to the Labrador herds' wintering, calving and post-calving ranges at different spatial scales. Literature suggests that herds may avoid linear disturbance up to 2,000 m and thus the revised analysis should consider the potential for impact up to 2000 m on either side of the ROW. For example, the province advised that a recent study in Northeastern Quebec found a 500 m buffer was too conservative, and that avoidance extended up to 2 km (Rudolph *et al.*, 2012). Another study found that caribou avoided forest access road networks by 750 m, primary roads by 1.25 km, and highways by up to 5 km (LeBlond *et al* 2012). Nalcor provided additional information on caribou herds in its December 2012 EIS Addendum, including calculations of habitat that may be disturbed as a result of the Project (Tables 9 and 10). Nalcor also provided information on the potential overlap between 90-percent caribou probability of occupancy kernels in Labrador during winter and calving/post-calving (i.e., summer) (Table 11 and 12).

Nalcor's EIS addendum also contained further analysis with respect to land use by caribou on the Island of Newfoundland. The analysis utilized all available data collected between 1979 and 2011 and in addition examined seasonal use of habitat by island caribou and potential changes in seasonal habitat use as a result of the Project.

### *Mealy Mountains Herd*

The Innu Nation commented on the need to understand the impacts of the Trans Labrador

Highway Phase 3 on herd movement and mobility to inform the EA of the Transmission Project. In addition, it expressed concern about the cumulative effects of the highway and transmission line on caribou (e.g., that the transmission line would exacerbate avoidance of the corridor created by the road) and concluded that the Project will have significant effects (and significant cumulative effects) on the Mealy Mountains Herd. The Innu Nation requested that Newfoundland and Labrador analyse existing data to better understand how the Trans Labrador Highway Phase 3 may act as a barrier to caribou movement and that additional mitigation be developed based on study results.

Given that the Project would include the construction of a transmission line and access roads, Newfoundland and Labrador recognizes that the Project would expose the Mealy Mountains Herd to increased disturbance and increase human and animal predator access into previously inaccessible areas within the herd's range. That said, the predicted direct and functional loss of habitat that would result from the Project would be within acceptable ranges. Overall, the province predicts that the Project would result in a minor, adverse, but non-significant impact on the Mealy Mountains Herd. If the Project is approved, Newfoundland and Labrador will require Nalcor to obtain a Section 19 Economic Activity Permit under the provincial *Endangered Species Act*. As part of this permit, Nalcor will be required to prepare and submit to the provincial Minister of Environment and Conservation for approval a Species at Risk Project Impacts Mitigation and Monitoring Plan. Approval of this plan will be a precondition to the issuance to Nalcor of the required Economic Activity Permit under section 19 of the *Endangered Species Act*.

In response to the Innu Nation's comments, Newfoundland and Labrador has confirmed that it is currently collecting and in the process of analysing monitoring data to better understand potential impacts of the Trans Labrador Highway

**Table 9: Direct and Indirect Habitat Alteration/Loss for RWMH as a Result of the Labrador-Island Transmission Link Project** (Total Seasonal Habitat = 46 970 km<sup>2</sup>)

Area Considered	Total Seasonal Habitat (km <sup>2</sup> )	Total Seasonal Habitat (%)	Calving/Post Calving Primary Habitat Overlapping with Assessment Area (km <sup>2</sup> )	Winter Primary Habitat Overlapping with Assessment Area (km <sup>2</sup> )
60 m ROW	4	0.01	0.18	0
60 m ROW + 500 m buffer	66	0.1	1.2	0
60 m ROW + 1000 m buffer	129	0.3	2.0	0
60 m ROW + 2000 m buffer	258	0.5	11.6	0

**Table 10: Direct and Indirect Habitat Alteration/Loss for the Mealy Mountains Herd as a Result of the Labrador-Island Transmission Link Project** (Total Seasonal Habitat = 44 213 km<sup>2</sup>)

Area Considered	Total Seasonal Habitat (km <sup>2</sup> )	Total Seasonal Habitat (%)	Calving/Post Calving Primary Habitat Overlapping with Assessment Area (km <sup>2</sup> )	Winter Primary Habitat Overlapping with Assessment Area (km <sup>2</sup> )
60 m ROW	8	0.02	152.3	0.085
60 m ROW + 500 m buffer	143	0.3	238.9	0.1
60 m ROW + 1000 m buffer	277	0.6	267.5	0.3
60 m ROW + 2000 m buffer	544	1.2	365	104.2

**Table 11: Overlap between RWMH Herd 90-Percent Calving/Post-Calving and Winter Kernels and ROW plus Buffers**

Area Considered	Overlap with 90% Kernel in Summer (km <sup>2</sup> )	Overlap with 90% Kernel in Summer (%)	Overlap with 90% Kernel in Winter (km <sup>2</sup> )	Overlap with 90% Kernel in Winter (%)
60 m ROW and buffers (up to 2000m)	0	0	0	0

**Table 12: Overlap between Mealy Mountains Herd 90-Percent Calving/Post-Calving and Winter Kernels and the ROW and ROW plus Buffers**

Area Considered	Overlap with 90% Kernel in Summer (km <sup>2</sup> )	Overlap with 90% Kernel in Summer (%)	Overlap with 90% Kernel in Winter (km <sup>2</sup> )	Overlap with 90% Kernel in Winter (%)
60 m ROW	1.6	0.02	0	0
60 m ROW + 500 m buffer	27.6	0.33	0	0
60 m ROW + 1000 m buffer	51.5	0.62	0	0
60 m ROW + 2000 m buffer	99.3	1.19	0.6	0.01

Phase 3 on the Mealy Mountains Herd. At the same time, Nalcor would be required to address potential impacts through an Environmental Effects Monitoring Plan, which would be required for the issuance of a Section 19 Permit, under the provincial *Endangered Species Act*. If the provincial analysis of monitoring data from the Trans Labrador Highway Phase 3 suggests that additional mitigation or monitoring of the Transmission Project are warranted, this may be considered by the province, as appropriate. In the interim, Newfoundland and Labrador has advised that reliance on existing scientific literature is satisfactory to inform the analysis of environmental effects in the absence of local data.

#### *Red Wine Mountains Herd*

In response to Agency questions, Nalcor provided additional analysis of potential impacts of the Project on the RWMH. Nalcor's analysis concluded that the Project will not likely result in any increase in RWMH mortality due to illegal hunting. In addition, Nalcor stated that the limited amount of clearing required for the Project within the RWMH's range will likely result in negligible increases in early seral stage habitat (e.g., early/young forest) and associated potential increases in moose and wolves. Overall, Nalcor concluded that with the additional mitigation of re-routing the transmission line ROW to follow the existing South Side Access Road and a portion of the Trans Labrador Highway Phase 3, the likely adverse residual project effects on the RWMH would be negligible.

Environment Canada provided the following four comments.

- Based on the National Recovery Strategy, critical habitat is not currently a limiting factor for the survival and recovery of the RWMH. Further, any potential critical habitat disturbance caused by the project's activities will be minimal. The amount of undisturbed critical habitat maintained post-project will continue to exceed 90-percent, well above the 65-percent threshold set out

in the National Recovery Strategy for a local population of boreal caribou to be self-sustaining based on habitat conditions within the range of a boreal caribou herd (local population). As this is consistent with critical habitat identification in the National Recovery Strategy, the Project is not likely to have a discernible effect on the RWMH through its impact on habitat.

- Similarly, the National Recovery Strategy describes the relationship between the overall habitat disturbance level within a range and the self-sustaining nature of a local population. As the Project will have virtually negligible impact on the overall level of habitat disturbance within the range of the RWMH, the Project is not likely to have a discernible impact on the rate of predation of this herd.
- Given that the Project parallels existing ROWs, rather than creating new linear disturbance and access to other parts of the range of the RWMH, and as expansion of existing ROWs is relatively minimal, the Project is not likely to have a discernible impact on movement of caribou within this range beyond that which existing disturbance has caused.
- Finally, Environment Canada noted that the proponent has made extensive efforts to minimize and mitigate human induced mortality from vehicles or equipment. In addition, based upon the small size of the herd and the minimal footprint of the Project within its range, the Project is unlikely to have a discernible effect on the rate of human caused mortality.

In summary, Environment Canada stated that it is of the view that based on the best information available, there is likely no discernible impact of the Project on the survival rate and recovery of the RWMH. The Department recognizes that the population condition of this herd is of concern. As noted in the National Recovery Strategy, management of boreal caribou mortality may be required for some local populations if they are to persist and in time become self-sustaining. A decision on the use of such measures is the responsibility of Newfoundland and Labrador.

Environment Canada further recommended that, as part of the follow up program for the Project, appropriate jurisdictions should identify regional mechanisms to assess and mitigate the cumulative effects of current and future development on caribou in Labrador, particularly to manage direct mortality of caribou. Similar recommendations have been made by (1) the Joint Review Panel in relation to the Lower Churchill Hydroelectric Generation Project and (2) the Innu Nation in relation to the proposed Labrador-Island Transmission Project. In March 2012, the Government of Newfoundland and Labrador responded to the Joint Review Panel's recommendation as follows<sup>13</sup>:

*The Government of Newfoundland and Labrador accepts the intent of this recommendation. The Government of Newfoundland and Labrador will identify regional mechanisms to assess and mitigate the cumulative effects of future development projects in Labrador.*

The Province of Newfoundland and Labrador commented that at a population level, the transmission corridor, the Generation Project and associated infrastructure were likely to affect connectivity between northern and southern parts of the RWMH range due to caribou having to cross a highway with increased traffic, an access road, and a transmission corridor in order to reach the Churchill River. However, it was further noted that although the Project 'splits' the southeast portion of the RWMH range, this region receives less use than other areas. Overall, the province predicts that the Transmission Project alone would result in a minor, adverse, but non-significant impact to the RWMH. If the Project is approved, Newfoundland and Labrador will require Nalcor to obtain a Section 19 Economic Activity Permit under the provincial *Endangered Species Act*. As part of this permit, Nalcor will be

required to prepare and submit to the provincial Minister of Environment and Conservation for approval a Species at Risk Project Impacts Mitigation and Monitoring Plan. Approval of this plan will be a precondition to the issuance to Nalcor of the required Economic Activity Permit under section 19 of the *Endangered Species Act*.

Public and Aboriginal comments received in relation to the proposed Project reflected on the findings of the Joint Review Panel Report for the Generation Project and the cumulative effects of the proposed Transmission Project in combination with other projects and activities. The Report of the Joint Review Panel arrived at the following conclusion with respect to impacts of the Generation Project on the RWMH:

*Based on the imperiled status of the Red Wine Mountain caribou herd and the uncertainty and disagreement over the range of factors that might be important for its recovery, the Panel concludes that any adverse effects of the Project on individual animals within the Red Wine Mountain caribou herd would be significant. Nalcor correctly pointed out that there is sufficient primary habitat outside the area directly affected by the Project. It is nevertheless clear that the Project, if it were to proceed, would pose a variety of risks to members of the herd, including possible displacement, possible increase in animal predation resulting from changes in the predator-prey dynamics and possible road kills from increased traffic, among others.*

***The (Joint Review) Panel concludes that in light of the current state of the herd and the cumulative effects on its recovery, the (Generation) Project would cause a significant adverse environmental effect on the Red Wine Mountain caribou herd.***<sup>7</sup>

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13 Government of Newfoundland and Labrador's Response to the Report of the Joint Review Panel for Nalcor Energy's Lower Churchill Hydroelectric Generation Project, March 15 2012. Recommendation 16.1.



The Innu Nation commented that “(u)nless the proposed Project would have a certain and meaningful net benefit to the RWMH, which it does not, the only conclusion that can be reached in this instance is that the adverse cumulative effects of the proposed Project in combination with other projects and activities are significant.”

**Marten** – The NCC and the public asked about the potential impacts of increased trapping of marten. Nalcor responded that roads and linear facilities provide increased access for hunters, trappers and predators, which may result in increased accidental snaring of marten and subsequent mortality. To avoid or mitigate this potential effect, Nalcor reiterated some of its earlier proposals such as working with the Newfoundland and Labrador Department of Environment and Conservation on final ROW routing. It stated that access control measures will be implemented to manage public off-highway use of project roads and trails. As well, project personnel will not be permitted to possess firearms on-site, and Nalcor will enforce a no-harvesting policy. As a result, Nalcor predicts that increased trapping and hunting due to increased access are not likely to have a measurable effect on marten abundance.

Newfoundland and Labrador is satisfied with the information provided by Nalcor and concludes that the impacts of the Project to furbearers are unlikely to be significant. Mitigation and monitoring programs relative to furbearers, including marten, are provincial jurisdiction and, where appropriate, Newfoundland and Labrador may issue relevant permits and approvals, and consider the imposition of appropriate terms and conditions upon release or during the post-EA permitting phase.

**Avifauna** – Environment Canada provided a number of comments on impacts to birds including the effects of herbicide use and electrode ponds during monopolar operations. The department recommended that cutting be avoided between May 1 and July 31 to

accommodate the breeding season and the development and implementation of a management plan that includes appropriate preventive measures to minimize the risk of impacts on birds. Nalcor confirmed that it will not violate the *Migratory Birds Convention Act* and that it will develop an avifauna management plan. Nalcor agreed to consider avian species at risk in final ROW routing to the extent possible, in response to Environment Canada concerns.

Environment Canada disagreed with Nalcor’s conclusion that avian populations are stable, given that many species at risk are showing dramatic declines. Nalcor confirmed that mitigation, findings, conclusions and predications in the EIS are accurate and that effects of the Project on species of special conservation concern were considered to not be significant.

Public comments included concerns about the effects of increased access on birds (e.g., increased harvesting of endangered birds and disturbance by recreational vehicles). Comments were also received about the impacts of transmission lines themselves on birds. Nalcor recognized that transmission lines may result in bird mortality from collisions and electrocution; however, the impacts were mitigated and would be low; that is limited to short-term disturbances, to localized portions of the ROW and to individual animals.

Overall, Environment Canada and Newfoundland and Labrador agree that Nalcor’s analysis is reasonable and that the impacts of the Project on avifauna are unlikely to be significant.

**Other** – Members of the public asked why moose and black bear were not selected as VECs. Nalcor responded that while moose and black bear are important species, they are ubiquitous in Labrador and Newfoundland. Nalcor believes they would not make appropriate VECs because of the limited effect of the Project on these species. Moose were evaluated in relation to the

creation of edge and vegetation regeneration on the ROW (i.e., habitat creation) and the potential for a population increase as it relates to woodland caribou. In addition, the potential for increased access was assessed under all terrestrial focus groups (e.g., vegetation, wildlife, fisheries, land use). Black bears was evaluated and discussed in relation to caribou, as a top predator, but was not a focus because the project effects on black bears are likely to be negligible and not measurable.

#### 6.4.5 Agency Conclusions on the Significance of the Residual Environmental Effects

##### *Caribou*

##### *Red Wine Mountains Herd*

Nalcor defined a significant effect on caribou as “one that would cause a population decline, such that the viability or recovery of that population is threatened”. It states that the overall fate of the RWMH is likely one of continued decline with or without the Project, as a result of pressures such as poaching and predation that are ongoing. Nalcor also noted that if existing factors (e.g., poaching and predation) remain unchecked, cumulative effects to the RWMH are predicted to be significant as the herd’s viability will be at risk.

Newfoundland and Labrador predicts that the Transmission Project alone would likely result in a minor, adverse, but non-significant impact on the RWMH. It is recognized that Nalcor would implement extensive measures to mitigate any further impacts to the RWMH (e.g., by rerouting the ROW along existing roads) and that the disturbance footprint of the Project is small.

While the Project’s adverse effects on the RWMH are likely to be minimal, they will nevertheless cumulate with adverse environmental effects caused by other projects and activities that were

found by the Joint Review Panel for the Generation Project to be significant. The Agency has considered information from Nalcor, Aboriginal groups, the public and government experts and recognizes that, irrespective of the Transmission Project, the RWMH continues to be at risk given the small size of this declining caribou population. The RWMH has declined over 85-percent since 1989 and population numbers are currently between 75 and 100 individuals<sup>14</sup>. The 2012 National Recovery Strategy for Woodland caribou prepared under the *Species at Risk Act* identifies the RWMH as a non-self-sustaining population that is declining in number.

The Agency is not aware of changes in the status of the RWMH that would have occurred since the Joint Review Panel reached its conclusion and that would make the Agency reach a different conclusion. The Agency concludes that, taking into account cumulative effects, the Project is likely to cause significant adverse environmental effects on the RWMH, even if the Project itself will only minimally contribute to these effects.

In addition to the follow-up proposed by Nalcor, the Agency recommends that, at a minimum, follow-up related to the RWMH and Mealy Mountains Herd, include monitoring of:

- off-highway vehicle use within the ranges of the RWMH and Mealy Mountains Herd in Labrador;
- caribou use of the Project area within the ranges of the RWMH and Mealy Mountains Herd in Labrador; and
- caribou crossing of the project ROW in Labrador.

The follow-up program related to caribou should be acceptable to the Newfoundland and Labrador Department of Environment and Conservation (Wildlife Division). Based on the outcomes of the follow-up program, Nalcor should implement adaptive management measures, as appropriate

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14 Schmelzer, I. 2012 draft. *Range Use, Life History and Trends in Abundance of Forest-Dwelling Threatened Caribou Populations in Labrador: An Overview*. Wildlife Division, Department of Wildlife and Conservation. Government of Newfoundland and Labrador.

and recommended by the province (e.g., access control measures to limit off-highway vehicle access) (Appendix F).

### *Mealy Mountains Herd*

Nalcor states that the Mealy Mountains Herd is considered to be stable and that the factor that prevents the population from increasing is illegal hunting. It recognizes that increases in wolf predation or illegal hunting combined with future developments could prevent the herd from increasing, or if sufficiently detrimental, cause the herd to decline.

Newfoundland and Labrador predicts that the Transmission Project alone would likely result in a minor, adverse, but non-significant impact on the Mealy Mountains Herd. Again, Nalcor would implement extensive measures to mitigate any further impacts to the herd. Although some new access within the range of this herd would be created by the Project, threats to the population are multi-faceted and the disturbance footprint of the Project is small.

The Agency has considered information from Nalcor, Aboriginal groups, the public and government experts. The Mealy Mountains Herd fluctuated in size over the past 50 years, undergoing a dramatic decline and recovery. Between 1958 and 2012, the herd is estimated to have declined from historical numbers of approximately 2600 to 1604 individuals. However, between these two points in time, the population dipped to around 250 animals in 1975, increasing again to over 2000 animals by 2005 after hunting of the herd was banned. A range-wide survey in 2012 indicates that the population is once again declining (Schmelzer and Wright 2012)<sup>12</sup>. The 2012 National Recovery Strategy for Woodland caribou prepared under the *Species at Risk Act* identifies the Mealy Mountains Herd “as likely as not self-sustaining” population.

The Agency recognizes that the population of the Mealy Mountains herd has fluctuated considerably over time and has recovered from a low of 250 individuals in the 1970s. At this time, the population is near abundance levels recorded during the late 1980s. Further, survival rates of adult females, which often drive population trends, remain high, though calf recruitment appears to be declining. The Agency concludes that impacts of the Project on the Mealy Mountains Herd, in combination with the cumulative effects of other projects and activities, are not likely to be significant, taking into consideration the implementation of mitigation measures.

### *Herds in Newfoundland*

The Project is not likely to result in significant adverse cumulative environmental effects on caribou herds in Newfoundland, considering the implementation of the proposed mitigation measures.

***Avifauna and Furbearers*** – The Agency concludes that the Project is not likely to result in significant adverse environmental effects on furbearers and avifauna, considering the implementation of the proposed mitigation measures.

## **6.5 Freshwater Environment**

The freshwater environment assessment includes freshwater resources and freshwater fish and fish habitat along the proposed overland transmission corridor. The transmission corridor intersects 586 watercourses, which range in size, flow morphology, riparian vegetation and dominant substrate type. Twenty-four fish species, including Atlantic salmon and American eel (COSEWIC, threatened) are included in Nalcor’s component study on the freshwater environment.

### 6.5.1 Potential Environmental Effects and Mitigation

Nalcor predicted that the following Project activities could affect water quality, fish or fish habitat within the freshwater environment:

- fording of equipment and materials and installation of various stream crossing structures (e.g., culverts and bridges)
- removal of riparian vegetation during ROW preparation and access road construction
- spills or leaks of hydrocarbons from equipment and waste water from camps
- increased access to watercourses
- application of herbicides

The above activities may affect the water quality of streams and wetlands through increases in total suspended solids, hydrocarbons or nutrients. Potential impacts of the above activities on fish and fish habitat include:

- increased suspended sediments and habitat disruption;
- noise and vibration in and near watercourses, which may cause fish to move from an area thereby reducing fish abundance;
- impairment of water and habitat quality, potentially resulting in a change in fish abundance or species assemblage;
- reduced abundance of recreational species in some locations from increased accessibility of watercourses;
- increased fish mortality (e.g., from crushing as streams are forded); and
- prevention of or delays in upstream fish passage if culverts are installed improperly.

Nalcor has proposed various measures to mitigate impacts on water quality, fish and fish habitat. The proposed mitigations follow DFO guidance, consider standard best management practices and are designed to limit disturbance, prevent spills and limit access to the extent practical. For example, construction activities near water bodies

and watercourses will be scheduled to occur during low flow or frozen conditions to avoid sensitive periods and habitat for fish and will be shut down during heavy precipitation to the extent practical. In addition, Nalcor will maintain suitable buffer zones along watercourses for erosion protection.

Fording is regulated under Newfoundland and Labrador's *Water Resources Act*, and DFO provides guidance on fording activities in its freshwater guidelines, factsheets and national operational statements to avoid adverse effects on fish and fish habitat as per the habitat protection provisions of the *Fisheries Act*. Nalcor will conduct site evaluations during final ROW routing so that, to the extent practical, the selected crossing locations will have the least possible adverse effect on watercourses (note: preliminary site evaluations have been conducted; however, additional site evaluations will occur prior to construction). Additional mitigation measures are described in Appendix D.

Overall, Nalcor predicts that any changes to physical fish habitat will be confined to only a small section of each watercourse (i.e., at the stream crossing location). Any changes to the water quality that may occur are not predicted to affect its baseline functions over the lifetime of the Project. Project impacts to fish habitat, fish abundance and species assemblage will be limited in geographic extent and/or duration with the implementation of mitigation measures (Table 13).

### 6.5.2 Cumulative Environmental Effects

Nalcor states that many project activities during the construction phase of the Project would be short-term as construction proceeds along the corridor, limiting disturbance to any one area. There may be increased angling pressure within the regional study area due to improved accessibility to watercourses during operations. Overall, the proponent predicts that the impacts

**Table 13: Freshwater Environment: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low to Moderate</b></p> <p>Effects limited primarily to the footprint; moderate effect is related to increased access to populations of sportfish species</p>	<p><b>Local to Regional</b></p> <p>Effects are predicted to occur at the crossing location and downstream within the regional study area</p>	<p><b>Short-term to Far Future</b></p> <p>Noise effects and suspended sediments would be short-term; effects of eutrophication would last for months; vegetation removal would persist through the life of the Project</p>	<p>Effects will occur primarily during construction; effects will occur intermittently during operations and maintenance</p>	<p><b>Low Adverse Effect</b></p>

of the Project in combination with other projects and activities (e.g., sedimentation and vegetation removal resulting from forestry practices and road maintenance) would be localized.

### 6.5.3 Monitoring and Follow-Up

Regular testing of total suspended solids will be conducted during construction activities to ensure that the Canadian Council of the Ministers of the Environment Protection of Aquatic Life Guidelines are not exceeded. Activities would be modified based on test results to avoid guideline exceedances. If mitigation measures for sediment run-off are proven to be effective, regular testing for nutrients will not be conducted.

### 6.5.4 Government, Public and Aboriginal Comments and Proponent's Response

The public and Aboriginal groups commented on potential impacts of the Project on the freshwater environment, including impacts of herbicides and impacts of increased access along the ROW. In response to these comments, Nalcor stated that it will comply with provincial regulations and to apply standard mitigation (e.g., buffers around watercourses, avoiding overspraying). Nalcor agreed to use existing

access roads and limit the creation of new access roads to the extent practical, and to forbidding its employees from fishing to mitigate the potential for increased fishing pressure. Nature Newfoundland and Labrador expressed concern about the transmission corridor enabling new access to the upper reaches of rivers systems and corresponding impacts on salmon. In considering this comment, DFO responded that management measures for recreational salmon fishing in Newfoundland and Labrador are developed in consultation with user groups and stakeholders, including anglers, outfitters, conservationists, Aboriginal groups and the provincial government.

The Town of Forteau stated that the Project should not affect the town's watershed. If there are activities within Forteau's Protected Public Water Supply Area (PPWSA) requiring provincial authorization, Newfoundland and Labrador may, where appropriate, issue relevant permits and approvals, and consider the imposition of appropriate terms and conditions upon release or during the post-EA permitting phase.

DFO reviewed components of the Project that could affect freshwater fish and fish habitat, including ROW and watercourse crossings associated with access roads. It observed that all watercourses intersected by the Project are

considered generically in the EIS, although they are not necessarily equal from a fishery resource perspective (e.g., scheduled Atlantic salmon rivers versus non-scheduled rivers). DFO advised that Nalcor should consider the timing of project activities as a means of mitigating effects on salmon spawning (i.e., mid-October to mid-November) and the main fishing season (i.e., mid-June to August). Nalcor will comply with applicable legislation and regulations, and also intends to follow applicable guidance documents, standard practices and mitigation measures where technically and economically possible.

Although the effects of sedimentation should be localized and of short duration, DFO advised that sedimentation could result in significant effects on fish health and production and fishery values within any given river system if it occurs during sensitive periods. In response, Nalcor described additional mitigation measures to minimize the impacts of fording on fish and fish habitat. In response to other questions from DFO, the proponent stated that it will ensure that the abutments of any bridges would be installed above the high water mark. It further agreed to consult with DFO on the development of alternate approaches to ensuring compliance with applicable legislation and regulations in situations where following certain aspects of DFO's operational statements prove to be impractical. DFO agrees that impacts of the Project on freshwater fish are not likely to be significant, taking into consideration the implementation of mitigation proposed by Nalcor.

### *6.5.5 Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on the freshwater environment, considering the implementation of the proposed mitigation measures.

## **6.6 Marine Environment**

This VEC includes marine fish and fish habitat, marine mammals and sea turtles, and marine birds. The Strait of Belle Isle is an important migratory corridor for a large number of marine species (e.g., seals, cetaceans, Atlantic salmon, Atlantic sturgeon, American eel, mackerel, capelin). Twenty-two species of marine mammals may occur in the Strait of Belle Isle and Conception Bay, including several species at risk (Appendix A). Certain whale species are expected to occur in relatively high densities in and near the project area (e.g., Humpback, Minke). Loggerhead and leatherback turtles occur in both areas. Seabirds that may occur in the study area, include the Harlequin duck (special concern), Barrow's goldeneye (special concern), and the Ivory gull (endangered).

### *6.6.1 Potential Environmental Effects and Mitigation*

Nalcor states that the potential effects of the Project on the marine environment are primarily related to the installation and operation of three submarine cables across the Strait of Belle Isle and construction and operation of two shoreline electrode sites (L'Anse au Diable and Dowden's Point), which includes placement of rock berms, dredging at electrode sites, and noise generated from vessels, drilling, and dredging operations.

***Marine Fish and Fish Habitat*** – This section considers impacts on fish, invertebrates, plankton, macroalgae and the physical and chemical characteristics of seawater and bottom substrates.

#### *Impacts of Construction*

Nalcor predicted that project construction may result in impacts on:

- benthos – through the direct loss of benthic habitat, and changes in the health of benthos,

bottom substrate class (i.e., possible increase in structural complexity), benthic community structure, and in surficial sediment chemistry (i.e., from spills);

- water quality – through increased turbidity (resulting reduction in phytoplankton biomass) and changes in chemistry (i.e., from spills), and zooplankton distribution; and
- fish – through changes in macro-invertebrate and fish distribution and behaviour, and in the health of macro-invertebrates and fishes.

Nalcor predicts that marine fish habitat could be lost during construction of shoreline electrode sites and while laying the submarine cables; however, any lost habitat could be mitigated through appropriate fish habitat compensation measures approved by DFO.

HDD muds will be recovered from the bore holes and the conduit, to the extent possible, and will be recycled. Cuttings will be disposed of on land.

Acoustic modelling was conducted to estimate underwater sound levels associated with the submarine cable installation in the Strait of Belle Isle. Nalcor states that available literature suggests that fish behavioural responses to noise are temporary, but are a concern to fishers who believe that this impact will alter fishing efficiency and therefore catch. Construction time will be minimized to decrease exposure to noise.

Further mitigation measures to minimize impacts of construction are included in Appendix D. Overall, Nalcor predicts that the likely effects of construction on marine fish and fish habitat are low to moderate in magnitude (Table 13).

### *Impacts of Operations and Maintenance*

Potential effects of the Project may result from exposure to electric fields and EMFs generated from electrodes and submarine cables and exposure to electrode electrolysis products,

all of which are described further below.

Other potential impacts during operations and maintenance include injury or direct mortality of macro-invertebrates and fishes during major repairs of the submarine cable or dredging at the electrode sites. Repairs could also cause the re-suspension of sediment (i.e., resulting in increased seawater turbidity), which in turn could have harmful effects on both macro-invertebrates and fishes.

#### (1) Electromagnetic Fields

Submarine cables and shoreline electrodes from the proposed Project have the potential to produce EMFs. Species most likely to be affected by EMFs include:

- Atlantic salmon and American eels, which migrate long distances and have magnetite-containing organs that play an important role in geomagnetic field detection, orientation and navigation, and
- elasmobranchs (i.e., sharks, skates, rays) which contain sensitive electroreceptive organs that are used for prey detection and possibly for orientation and navigation.

Nalcor states that the primary effects of EMFs are likely related to potential behavioral disturbances in fish. The EMFs generated by shoreline electrodes have the potential to cause greater effects than the cable, and these would be strongest under monopolar operations, which are predicted to occur for approximately 40 hours per year. The zones of influence of the electrodes were predicted to be 50 to 100 m during bipolar operations ( $\geq 99.5$ -percent of operational time) and 500 m during monopolar operations ( $\leq 0.5$ -percent of operational time). Nalcor predicts that if EMFs emitted by electrode sites were to be detected by salmonid fishes as they move close to shore, the most likely behavioural response, if there was one, would be to move away from the source of the EMF, thereby adjusting their path slightly.

Nalcor calculated that the EMF's produced by submarine cables would be approximately 150 m in size. However, the magnetic field strength attenuates rapidly and at 10 m from the cable (i.e., 26,000 nT) would be less than the natural magnetic field value in the Strait of Belle Isle (i.e., 54,000 nT).

Mitigation for the EMFs includes designing the electrode system to be required less than 40 hours per year of monopolar operations and ensuring the submarine cable is located in water greater than 60 m in depth.

## (2) Electric Fields

Nalcor predicts that there may be a small electric current emanating from shore electrodes. Shore electrodes include a saltwater pond and breakwater. The ground potential rise gradient on the seaside of the breakwater will be designed to be less than 1.25 V/m, which has been presented as a safe design value (design considerations include size of saltwater pond and breakwater, number and spacing of electrode elements, etc.). The rock breakwater will also prevent invertebrates and fish from entering the site.

The submarine cable will be surrounded by two sheath armour layers. When two conductive surfaces have an electric potential difference between them, any electric field will be confined within this space. Thus, there will be no electric field outside the submarine cable, unless there is current leakage or stray current (which are unlikely to produce effects).

## (3) Electrolysis Products

Electrolysis at the operating electrode site anode will change water chemistry, with the potential to affect macro-invertebrate and fish health. However, electrolysis product emissions (e.g., chlorine gas) and heat produced at the electrodes are expected to be low and disperse quickly with flushing.

Overall, Nalcor predicts that the likely residual effects of the Project on marine fish and fish habitat is minimal. Where the duration of impacts is far future and the frequency is continuous, the magnitude and extent of impacts are limited (Table 13).

***Marine Mammals and Sea Turtles*** – Marine mammals rely on underwater sounds to communicate and gain information about their environment.

### *Impacts of Construction*

Nalcor predicted that potential impacts on marine mammals and sea turtles include:

- airborne noise affecting behaviour of hauled out seals,
- underwater noise affecting behaviour and hearing (e.g., temporary hearing impairment from vessel operations), and
- underwater noise masking communication.

Nalcor predicts that marine mammals and sea turtles will exhibit localized and temporary avoidance responses that will not seriously affect migration or foraging. Other potential effects include collisions with vessels and accidental spills that may affect health, and prey distribution and abundance. The impacts of construction will be mitigated by vessels maintaining a constant course and speed, whenever possible, and by construction being completed as quickly as safety allows, decreasing the amount of vessel noise. Additional mitigation measures are described in Appendix D.

### *Impacts of Operations and Maintenance*

Potential effects on marine mammals and sea turtles include:

- EMFs affecting behaviour,
- underwater noise affecting behaviour and masking communication, and



- spills affecting health and the distribution and abundance of prey.

Overall, Nalcor predicts that avoidance by marine mammals and sea turtles of vessels conducting maintenance, or of EMFs is expected to fall within the normal range of behavioural variability and thus the overall impacts will be low.

**Seabirds** – Potential effects on seabirds during construction include disturbance from noise (e.g., from drilling) and human activity, direct loss of habitat, restricted access to foraging areas and habitat, strandings on land and vessels, and collisions with drilling equipment and vessels.

Construction time will be minimized to decrease interactions with seabirds. During operations and maintenance, impacts on seabirds include potential disturbance from human activity and noise, restricted access to habitat, and strandings on vessels. Overall, the Project is not predicted to affect the behaviour, distribution or populations of seabirds at the regional scale.

Further mitigation measures related to the marine environment are described in Appendix D. Overall, low adverse effects are predicted (Table 14).

### 6.6.2 Cumulative Environmental Effects

Nalcor states that the cumulative environmental effects on marine fish and fish habitat result from fishing activities and marine traffic (e.g., shipping, ferries). Future projects include potential future change in the intensity/nature/distribution of fishing activity. Nalcor predicts that the cumulative environmental effects of the Project in combination with other projects and activities are not expected to affect more than 10-percent of the physical and biological components of the marine fish and fish habitat within the regional study area for a period exceeding a year.

Cumulative effects to marine mammals and sea turtles from other projects and activities stem from vessel traffic, hunting and fishing, and have resulted in behavioural responses to underwater noise and mortality from collisions with vessels or as a result of fishing by-catch. Cumulative effects to marine birds are predicted to be limited to marine vessel traffic within the regional study area and are related to disturbance and potential for strandings.

**Table 14: Marine Environment: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low to Moderate</b></p> <p>Effects are unlikely to pose a serious risk to the VEC or represent a management challenge.</p>	<p><b>Local to Regional</b></p> <p>Physical and chemical changes, sedimentation and turbidity changes would be local; behavioural changes in marine fish or mammals or avoidance by several species could extend into the RSA.</p>	<p><b>Short-term to Far Future</b></p> <p>Disturbances during construction would be short-term; changes to habitat (e.g., rock berm) or the presence of EMF would persist through the life of the Project.</p>	<p>Effects will occur primarily during construction; effects will occur intermittently during operations and maintenance.</p>	<p><b>Low Adverse Effect</b></p>

### 6.6.3 Monitoring and Follow-Up

Monitoring of any marine fish habitat compensation works required under a section 35 *Fisheries Act* authorization would be conducted according to a protocol acceptable to DFO. In addition, Nalcor will conduct a follow-up program to confirm effects predictions regarding EMFs generated by the submarine cables and electrodes and will apply an adaptive management approach by refining and optimizing mitigation measures, if required (Appendix F). A second follow-up program will evaluate the level of production of electrolysis products at electrode sites. Monitoring and follow-up programs will be designed in consultation with DFO and other regulators, as appropriate.

### 6.6.4 Government, Public and Aboriginal Comments and Proponent's Response

**Marine Fish and Fish Habitat** – DFO agreed with Nalcor's prediction that marine fish habitat could be lost during the construction and installation of the submarine cables and shoreline electrodes. If required, the development and implementation of an acceptable fish habitat compensation plan will offset the loss of fish habitat. DFO further agreed that the predicted likely adverse effect of the Project on water quality would be of low magnitude and duration. The timing and placement of sediment-free rock cover over the cable from a height of six to ten m above the sea floor will mitigate some of the potential effects.

Aboriginal groups and the public requested additional information on the effects of EMFs on fish, particularly on migrating Atlantic salmon. Ekuanitshit commented that the Strait of Belle Isle is an important migration route for salmon whose spawning grounds are found in the rivers of the Gulf of St. Lawrence. Ekuanitshit stated that the community fishes salmon, which originate in the Strait and articulated the cultural and economic important of this species to the community.

Nalcor has stated that the depth of subsea cables would put salmon outside the zone of magnetic field influence from the cables. It stated that although the American eel are known to swim at greater depths, there is no evidence for significant effects on eel movement across HVdc cables emitting a magnetic field.

DFO commented that knowledge gaps exist in relation to EMFs and their potential effects on bony fishes (e.g., salmonids), elasmobranchs and marine mammals. It stated that fish behaviour may be affected by EMFs since many species; particularly elasmobranchs (i.e., sharks, rays and skates) use EMFs for prey, predator or mate detection. DFO noted that this may be particularly important for species that live or feed in close proximity to the bottom and for species with limited ranges, such as Wolffish.

**Submarine Cables** – DFO noted that Gill and Bartlett (2010) found that exposure to EMFs could result in a relatively trivial change in swimming direction, or more seriously, a potential avoidance response or delay in migration for some species, specifically Atlantic salmon, Brown trout, and European eels, particularly in shallow water (< 20 m). However, since the submarine cables proposed by Nalcor would enter and leave the marine environment approximately 65 m below the surface (i.e., well below the 20 m depth), DFO predicted that EMF emissions were not likely to have significant effects on migrating salmon. Moreover, DFO noted that in coastal waters, reliance on magnetic cues for navigation (which could be affected by EMFs) may be overridden by the role of olfaction, which guides Atlantic salmon during the final stages of homing to natal streams. Any potential effects of EMFs from submarine cables would be transitory, given that Atlantic salmon do not remain stationary, but would be passing through the project area.

**Shoreline Electrodes** – DFO asked Nalcor to provide additional information on the risks of EMFs on Atlantic salmon in near-shore

waters during monopolar operations, which are estimated to occur for 40 hours per year and are predicted to have a 500 m zone of influence. This information was requested taking into consideration the timing of monopolar operations in relation to fish movements, feeding, physiological state and abundance. Nalcor responded that if EMFs were detected by salmonid fishes, the most likely behavioural response, if there was one, would be to move away from the source of the EMF, adjusting course slightly. DFO cautioned that EMFs could also result in complete avoidance and resultant changes in migratory routes or delays in migration.

Overall, DFO confirmed that the state of knowledge in relation to EMFs did not warrant significant mitigation, but that monitoring was recommended given data gaps in relation to the effects of anthropogenic EMFs on marine organisms. Nalcor states that it will monitor EMFs generated by the electrodes and by the submarine cables and to applying an adaptive management approach by refining and optimizing mitigation measures, if required. In addition, DFO will require Nalcor to monitor electrode sites to verify its predictions related to the effects of monopolar operations on specific fish species, particularly those of fisheries importance, within the vicinity of the electrode site (Appendix F).

**Marine Mammals** – DFO recommended that Nalcor consider the timing of construction in the Strait of Belle Isle to avoid sensitive periods for key species (e.g., feeding period for cetaceans). Nalcor noted that Humpback and to a lesser degree Minke whales were expected to occur in relatively high densities near construction and would be exposed to noise associated with cable installation and rock berm construction. Other species of special conservation concern were expected to occur in lower densities (e.g., Blue whale, Fin whale, Killer whale, Harbour porpoise). Nalcor predicted that any disruption to marine mammals feeding was expected to be localized and temporary. Migrating whales

were expected to detour around the slow moving project vessels, and any behavioural disturbance was likely to be temporary and localized.

DFO stated that there is more uncertainty about the impacts of underwater sound from construction on marine mammal migration than indicated in the EIS. Although most fish and marine mammal species are, as Nalcor indicates, likely to adjust their route through the Strait of Belle Isle to move around a noise source, some species may delay their migration or avoid entering the Strait of Belle Isle altogether. As such, DFO has recommended that Nalcor utilize a mammal observer during cable installation and document any marine mammal and sea turtle sightings and report them to DFO. Nalcor has agreed to incorporate a marine mammal observation program into its Environmental Protection Plan for the construction of the Strait of the Belle Isle marine cable crossing.

DFO concludes that with the implementation of mitigation (e.g., an acceptable fish habitat compensation program, vessel speed) supported by monitoring (e.g., EMF monitoring, marine mammal observer), the environmental effects on fish, fish habitat, fisheries resources and marine mammals are unlikely to be significant.

#### *6.6.5 Agency Conclusions on the Significance of the Residual Environmental Effects*

Considering the implementation of the proposed mitigation measures, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the marine environment.

### **6.7 Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons**

The current use of land and resources for traditional purposes by Aboriginal persons includes travel routes, camp sites, cabins, hunting, trapping, gathering (e.g., berries,

medicinal plants), fishing, and places of cultural significance. The EA considered the effects of the Project on the current land and resource use for traditional purposes of Ekuanitshit, Innu Nation, Matimekush-Lac John, Naskapi, NCC, Nunatsiavut Government, Nutashkuan, Pakuashipi, Qalipu Mi'kmaq First Nation, Uashat mak Mani-Utenam and Unamen Shipu.

### *6.7.1 Potential Environmental Effects and Mitigation*

Nalcor assessed the effects of the Project on current land and resource use for traditional purposes by Aboriginal persons using available literature, community interviews, and Aboriginal Ecological Knowledge to the extent it was available. Nalcor defined the local study area for the EA in considering impacts to land and resource use as the two kilometer transmission corridor and the regional study area as the regions through which the Project extends (i.e., Central and Southeastern Labrador, Strait of Belle Isle, Northern Peninsula, Central and Eastern Newfoundland, and Avalon Peninsula).

The EIS predicts that project-related components may overlap with the contemporary land use activities of the Innu Nation, NCC and Pakuashipi. The potential environmental effects of the Project on contemporary uses would result from project-induced disturbances (e.g., visual and noise disturbance, dust, disturbance from human presence, project activities or component footprints). Nalcor predicts that disturbance resulting from noise would be short-term, while the impacts associated with other activities (e.g., cleared ROW) would extend throughout the life of the Project. Vegetative resources will be removed or disturbed in the immediate project area. Wildlife may also be affected by project activities.

Nalcor states that it has avoided known land and resource use components and activities, where possible, as part of its project design and

**“The EA considered the effects of the Project on the current land and resource use for traditional purposes of Ekuanitshit, Innu Nation, Matimekush-Lac John, Naskapi, NCC, Nunatsiavut Government, Nutashkuan, Pakuashipi, Qalipu Mi'kmaq First Nation, Uashat mak Mani-Utenam and Unamen Shipu.”**

planning processes (e.g., during the selection of the transmission corridor and identification of locations for shoreline electrodes, submarine cable landing sites, converter stations). Land and resource use components and activities were also avoided, where possible, during the detailed ROW route selection process within the transmission corridor. For example, the transmission line was re-routed to parallel a portion of Trans Labrador Highway Phase 3, avoiding the creation of new access in parts of Labrador and reduce potential interaction with land and resource users. Nalcor will communicate the project schedule and the associated timelines with project-related activities to Aboriginal groups in order to avoid interactions with land and resource users in specific areas to the extent practical.

Measures proposed to mitigate project impacts on other VECs, would also mitigate potential impacts on the current use of land and resources for traditional purposes by Aboriginal persons. These include measures to limit disturbance and habitat alteration or loss, prevent spills, and limit interactions with fish, wildlife, and sites or things of archaeological, heritage or historical importance (e.g., burial grounds) to the extent possible and practical. Nalcor states that existing access roads, trails, industrial sites, and other developed areas will be used wherever possible, and existing transmission lines will be followed where possible while respecting technical design requirements. Bridges and culverts to be installed on watercourses identified as navigable under the *Navigable Waters Protection Act* will meet the standards set out in this Act and its regulations to ensure their navigability. Nalcor predicts that the Project will not affect navigation.

Even with mitigation, the Project will overlap areas currently used by Aboriginal groups and organizations and is therefore likely to disrupt some users, affecting their quality of experience in specific areas (e.g., where construction is occurring). However, Nalcor predicts that the amount of overlap would be limited, representing a small proportion of the total land available within which contemporary land use activities could be pursued. The amount of new access created by the Project would be minimal and Nalcor asserts that it is expected to benefit some Aboriginal users by providing access into areas for contemporary land use activities. Nalcor states that it will provide information and updates to Aboriginal organizations regarding project activities, with the goal of facilitating good communication and planning to proactively avoid interactions between the Project and Aboriginal land users and address any safety concerns.

Nalcor states that it will continue to use information from discussions with potentially affected Aboriginal groups and communities to avoid or limit conflicts with contemporary

land use to the extent possible and practical. Furthermore, it will finalize land and resource use studies under current community engagement agreements with NCC, Pakuashipi and Unamen Shipu, and to considering and incorporating resulting information where relevant, including the potential for mitigation and adaptive management. Should new, relevant information regarding contemporary land use activities of the Nunatsiavut Government, Uashat mak Mani-Utenam, Matimekush-Lac John, Nutashkuan, Ekuanitshit, or the Naskapi become available, Nalcor will consider this information in relation to the project components.

Additional mitigation measures related to current use of land and resources for traditional purposes by Aboriginal people are presented in Appendix D. Overall, Nalcor states that project design, consultation, permitting, communications and other measures will identify and address issues by avoiding sensitive areas as much as possible and by complying with development regulations and guidelines. It predicts that the Project would have a low adverse effect on current use of land and resources for traditional purposes by Aboriginal people (Table 15).

### 6.7.2 Cumulative Environmental Effects

Nalcor states that the cumulative environmental effects on the current use of land and resources for traditional purposes by Aboriginal people are primarily related to those projects and activities within the regional study area that result in direct or indirect habitat loss, direct or indirect mortality of wildlife or fish, or increased presence of people. Project-related environmental effects management measures described for the relevant VECs and appropriate management, regulation and enforcement of other ongoing and future developments and activities will minimize cumulative effects.

**Table 15: Current Use of Lands and Resources for Traditional Purposes by Aboriginal People: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low to Moderate</b></p> <p>Although Project components will occupy areas that may prevent or restrict land and resource use, this land area will be small compared to that used by or available to current users. Nalcor asserts that the creation of access in certain areas may be beneficial for some land users.</p>	<p><b>Local</b></p> <p>Most interactions will occur within or near the local study area.</p>	<p><b>Short-term to Far Future</b></p> <p>Disturbance due to noise and light would be short-term; clearings related to project components would extend throughout the life of the Project.</p>	<p>Effects will occur primarily during construction; effects will occur intermittently during operations and maintenance.</p>	<p><b>Low Adverse Effect</b></p>

### 6.7.3 Monitoring and Follow-Up

No specific follow-up is proposed for the current use of land and resources for traditional purposes by Aboriginal people. However, Nalcor indicates that it is planning initiatives for ongoing communication with Aboriginal groups and communities to identify and help address project-related issues and effects as they arise.

### 6.7.4 Government, Public and Aboriginal Comments and Proponent's Response

A summary of Aboriginal comments provided during the EA process is included in Appendix C. Aboriginal comments related to impacts on specific VECs are described in the sections above. For example, impacts of EMFs on Atlantic salmon are described in *Section 6.6: Marine Environment*. A general discussion of impacts of project-induced changes to the environment on socio-economic components is included in *Section 6.8: Land and Resource Use and Human Health*.

Some Aboriginal groups asserted that improved access would not be a benefit. Concerns were expressed about the impact of the Project on hunting and trapping in areas where the transmission line would cross hunting grounds. Nalcor responded that the Project would generally not prevent or otherwise restrict hunting or trapping. Although project components would occupy areas currently used by Aboriginal groups and organizations, Nalcor stated that these would be a small proportion of the total land available. It reiterated that the creation of new access would be minimal. Although Project activities would likely disrupt some types of users and affect their quality of experience, Nalcor stated that they would be able to use alternative areas in the regional study area. Nalcor stated that project design, consultation, permitting, communications and other effects management measures are predicted to identify and address issues by avoiding sensitive areas as much as possible and by complying with development regulations and guidelines.

Some Aboriginal groups expressed concerns about the impacts of project herbicides (which would be used to manage vegetation) on food sources. In response, Nalcor provided additional information on its plans to manage herbicide use and to mitigate associated impacts (see also Section 6.3: Vegetation). In addition, Nalcor states that it will advise communities of locations of the ROW scheduled for vegetation management through signage in the ROW (including information on the date of application), so that plant and berry harvesting would not occur in these locations until the plants are again safe for consumption. Nalcor has also agreed to notify municipal governments whose boundaries encompass treatment and storage areas. Health Canada confirmed that the effect of herbicide use on food plants, such as berries, should be localized around the immediate area of application, given the selective application of pesticides and the fate and transport of the individual pesticides intended for use.

Concerns were expressed about the potential impacts of an accompanying wooden pole line for the shore electrodes or any second power line through Labrador. However, Nalcor redesigned its Project to place the electrode line on HVdc transmission towers from the Muskrat Falls converter station to the Straits area, rather than constructing a wood pole line over the same distance. Nalcor also advised that it is not planning a second power line.

Unamen Shipu questioned the impacts of electrolysis products on the marine environment; noting that the lack of independent study to confirm the absence of effects on its communities' fisheries. In response, Environment Canada confirmed that chlorine residuals are expected to be non-toxic to fish and algae. This conclusion is supported by monitoring studies conducted in the Baltic Sea and New Zealand, which indicate a lack of avoidance by fishes and invertebrates, and no observable effects on fisheries (catch rates), or fish.

### *6.7.5 Agency Conclusions on the Significance of the Residual Environmental Effects*

The residual effects of the Project on the current use of land and resources for traditional purposes by Aboriginal peoples are likely to be limited in magnitude and geographic extent. The Agency concludes that the Project is not likely to cause significant adverse environmental effects on the current use of land and resources for traditional purposes by Aboriginal peoples, taking into account the implementation of the mitigation proposed.

## **6.8 Land and Resource Use and Human Health**

The EA considered the effects of project-induced changes in the environment on land and resource use and on human health. Land and resource use in Newfoundland and Labrador includes hunting, trapping, fishing, agriculture, wood cutting, berry picking, off-highway vehicle use and snowmobiling, bird watching, boating, hiking and various other consumptive and non-consumptive activities, many of which are focused in particular locations and are seasonal. There are also cabins, cottages, and outfitting camps in the vicinity of the transmission corridor.

### *6.8.1 Potential Environmental Effects and Mitigation*

**Land and Resource Use** – Nalcor studied land and resource use to determine if there were any issues that could be avoided during final routing.

The Project could affect **commercial outfitters** and their operations, particularly on the Northern Peninsula. Modelling indicates that the transmission line will be visible from several lodges, some of which are fly-in operations in relatively remote areas. Routing has and will continue to be explored to limit the potential for human access to these areas and any associated

harvesting. Nalcor will work directly with active commercial outfitters with any existing camp within five km of the transmission corridor. Nalcor predicts that outfitters will eventually incorporate the presence of the Project into their operations and can adjust the specific areas in which they take any guests to avoid areas from which the transmission line is visible.

The Project would be located in areas used for **recreational activities** (e.g., hunting, trapping, hiking). The presence of the Project is not predicted to prevent these activities; however, the visible presence of large transmission towers, a cleared ROW, or other project components may detract from the experience of going into the country for some recreational users. Whether and to what degree land users would be concerned by the presence of the Project would be subjective. Nalcor states that any recreational user disturbed by the Project at a given location will be able to use other areas, given the overall land area available for recreational activities in any given region.

Although the transmission corridor overlaps the edges of six **parks and ecological reserves**<sup>15</sup>, Nalcor states that it will completely avoid existing protected areas during ROW selection. Nonetheless towers likely will still be visible from some locations. Nalcor will work with the provincial Natural Heritage Branch, Parks and Natural Areas Division, and other organizations as it proceeds with project planning. The proposed corridor also crosses the International Appalachian Trail Newfoundland and Labrador trail system. Transmission lines can easily span the trails, but visual interactions between the Project and trails would occur, potentially affecting the enjoyment of some users. Nalcor will continue to meet with International Appalachian Trail Newfoundland and Labrador to discuss routing and tower placement, and to reduce visual affects where technical and cost considerations will facilitate this.

The Project has the potential to be used as a transportation corridor, given that vegetation within the ROW will be kept below two meters in height. Existing access was a key consideration for Nalcor in routing the transmission corridor. Nalcor has and will continue to explore possible routing to minimize the use of the ROW by off-road vehicles and snowmobiles in areas that are currently remote and inaccessible, including consulting with government, Aboriginal groups, outfitters, and other stakeholders on the matter. The EIS states that management of improved access into previously remote areas will be primarily achieved through sound resource management and active regulatory enforcement by relevant government agencies. Creation of access in certain areas may be beneficial for some land users.

The EIS predicts that project construction is not likely to affect the overall use and enjoyment of **cabins**, given that it is short-term in nature. On or near the Avalon Peninsula, where there is more concentrated cabin development, the transmission line would parallel existing, large, high-voltage transmission systems for several hundred kilometers, which will minimize disruptions to existing cabins and their users in that region.

Nalcor assessed the impacts of the Project on commercial and recreational marine fisheries. The key **commercial fisheries** in the Strait of Belle Isle include lobster, scallops, herring, capelin and cod, while recreational fishing is focussed on cod. Commercial fisheries do not usually occur at the Dowden's Point electrode site, but there is nearby harvesting of lobster and some pelagic species, and some recreational fishing. The EIS concluded that there would not be any significant effects on marine fish and fish habitat (see *Section 6.6: Marine Environment*). It is therefore extrapolated that there would also not be any significant adverse effects on users of

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15 Butter Pot Provincial Park, Hawke Hills Ecological Reserve, Jack's Pond Provincial Park, Main River Waterway Provincial Park Reserve, T'Railway Provincial Park, West Brook Ecological Reserve



that resource. Nalcor states that it will develop a Vessel Traffic Management Plan to manage vessel-traffic interactions.

Although some land and resource use may be prevented or restricted, the area will be small compared to that used by or available to current users. Most issues will be identified and addressed through design, consultation, communications and other effects management measures. Mitigation proposed for other VECs is also relevant to many of the components identified above because it is designed to limit disturbance and habitat alteration or loss, prevent spills and limit interactions with fish, wildlife, and viewscapes to the extent practical. Additional mitigation measures are described in Appendix D. The proponent predicts that the presence of the Project is not likely to change the ecological integrity, cultural value or societal use and enjoyment of the land. Overall, Nalcor predicts that the Project would have a low adverse effect on land and resource use (Table 16).

**Human Health** – Project components will produce EMFs, which are a combination of electric and magnetic fields produced by

electrically charged objects. EMFs from the Project will be within limits recommended by the Electrical Power Research Institute.

### 6.8.2 Cumulative Environmental Effects

The EIS states that a number of other development projects or activities have affected or may affect land and resource use. Within Labrador, human presence and activity are focussed in or near communities, while the interior portion of the local study area is not subject to substantial activity. In the Strait of Belle Isle, cumulative effects may be caused by marine vessel traffic. On the Island of Newfoundland there is a wide and varied range of land use activities. Overall there are limited proposed new development activities in these regions.

### 6.8.3 Monitoring and Follow-Up

To determine the use of ROW by snowmobiles, Nalcor would conduct an aerial survey during the first winter following construction in areas that were previously difficult to access (i.e., within the Main River Marten Core Area in Newfoundland) (Appendix F). Resulting information would be used in an adaptive management framework to

**Table 16: Land and Resource Use: Predicted Degree of Effect after Mitigation**

Magnitude	Extent	Duration	Frequency	Overall Degree of Severity of Residual Adverse Effect
<p><b>Low to Moderate</b></p> <p>In many cases, the land area occupied by the Project will be small compared to that used by or available to current users, and other effects management measures will serve to identify and address most issues.</p>	<p><b>Local to Regional</b></p> <p>Most if not all project interaction will occur within the local study area, and particularly at the project sites and adjacent areas, with regional effects potentially occurring due to an expanding zone of influence (e.g., visual).</p>	<p><b>Short-term to Far Future</b></p> <p>Maintenance-related disturbance will end quickly, whereas others (such as the presence of the ROW and transmission towers) will continue throughout the life of the Project.</p>	<p>Low to continuous frequency as some disruptions will occur only once or occasionally, whereas others will extend throughout the life of the Project.</p>	<p><b>Low Adverse Effect</b></p>

adjust access control measures. In addition, Nalcor states that it will use its ongoing processes of communication with government departments, communities, stakeholder groups and individual land and resource users to identify and address any project-related issues and effects as they arise.

#### 6.8.4 Government, Public and Aboriginal Comments and Proponent's Response

**Land and Resource Use** – The public, Aboriginal groups and the Agency commented on the potential for increased **access** to be enabled by the Project. Nalcor states that it will limit the potential for new access by using existing access to the extent practical and by decommissioning access roads and trails. It does not believe that substantial new access would be created anywhere along the transmission line route. In considering the major sections of line, it states that:

- upon leaving Muskrat Falls, the line parallels the South Side Access road;
- for the next 200 km, the line generally follows the Trans Labrador Highway Phase 3;
- for the next 175 km, the line takes a direct path to Forteau – although there are limited access trails and roads, the area is already accessed by Aboriginal groups; and
- mapping of existing forest access roads indicates that a high degree of accessibility exists throughout the Island of Newfoundland portion of the route.

Nalcor notes that the proposed access trail along the ROW is intended for specialized vehicles and will not be useable by road vehicles, such as cars or trucks. Nalcor states that government regulators have the jurisdiction to directly control access because most of the land-based portion of the transmission route passes over provincial crown land. Nonetheless, it will consider methods to control, manage and restrict public use of the ROW (e.g., berms, slash rollback, gates, excavation, signage) as determined through consultation with the province.

Public comments expressed concern about the impacts of the Project on outfitting operations, including impacts on game, increased access to remote areas, and a decrease in visitor experience (i.e., reduced quality of wilderness experience offered by outfitters). Public comment was also received on the impact of the Project on viewsapes, as well as the methodology used by Nalcor to assess associated impacts. Newfoundland and Labrador noted that a viewsapes component study had been conducted by Nalcor and accepted by the province, and that no further analysis of impacts to viewsapes was required. The province is aware of potential impacts to outfitters affected by the Project and has discussed the issue with Nalcor.

Several stakeholders questioned the potential impacts of project construction on fisheries in the Strait of Belle Isle. As described in *Section 6.6: Marine Environment*, the Project is not predicted to result in significant effects on marine fish nor on users of the resource. Additional public and Aboriginal comments related to impacts on specific VECs are described in the VEC-specific subsections above.

Overall, the Province of Newfoundland and Labrador has reviewed the information provided by Nalcor and is satisfied that the impacts of the Project on land and resource use are unlikely to be significant.

**Human Health** – Aboriginal and public concerns were expressed regarding the impacts of electric and magnetic fields on human health. In response, Nalcor stated that the evidence that EMFs may contribute to an increased risk of cancer is very weak. It reiterated that field intensity at the edges of the ROW would be consistent with accepted standards and practices. Health Canada confirmed that no adverse human health effects were anticipated based on the estimated electric and magnetic field intensities beneath and adjacent to the proposed transmission line. Estimated EMF levels throughout the transmission line would be

mainly dc (static) and well within science-based international EMF exposure guidelines<sup>16</sup>.

### 6.8.5 Agency Conclusions on the Significance of the Residual Environmental Effects

The residual effects of the project on land and resource use and on human health are likely to be limited in magnitude and geographic extent. The Agency concludes that these impacts are not likely to be significant, taking into account the implementation of mitigation.

## 6.9 Historical and Heritage Resources

The EA considered the effects of project-induced changes in the environment on historical and heritage resources. These include pre-contact and historic archaeological sites, structural remains and objects, paleontological materials (i.e., fossils), architectural sites and buildings, historic and natural sites, and burial, cultural, spiritual and other heritage sites and resources.

### 6.9.1 Potential Environmental Effects and Mitigation

Nalcor reports that the Project could result in the loss of- or disturbance to a site, specimen or adjacent landscape through ground disturbance or clearing. Increased human presence as a result of improved access enabled by the Project or accidental events could result in further adverse impacts on historical or heritage resources.

Known resources have been identified and mapped, and detailed Historical Resources Potential Mapping has been completed to identify areas of high potential for resources that have not yet been discovered. In these areas of high

potential, Nalcor will conduct a Stage 2 Historic Resource Assessments prior to construction. Nalcor's key and initial objective is to avoid potential interactions and effects through project planning and design. It proposes to maintain a 50 m no work buffer around all known historical and heritage resources. In the event that unregistered resources are discovered, work would be halted immediately at that location, the Provincial Archaeology Office would be notified, and a Stage 1 Historic Overview Assessment would be initiated. Mitigation in the form of Systematic Data Recovery would be undertaken in accordance with provincial guidelines and in consultation with the Provincial Archaeology Office if resources were encountered that could not be avoided.

Periodic inspections during construction would be undertaken in areas known to have high potential to contain paleontological resources. In addition, Nalcor will continue to consult with relevant Aboriginal organizations, as appropriate, to further understand any sites of cultural-historical importance or other historical and heritage resources that may be located within or near project activities. Additional mitigation measures are described in Appendix D. Overall, a low adverse effect on historical and heritage resources is predicted.

### 6.9.2 Cumulative Environmental Effects

Nalcor states that any new projects and activities will be governed by routine application of assessment and mitigation policies in accordance with the Newfoundland and Labrador *Historic Resources Act* (1985), which would serve to minimize any potential adverse effects. It predicts that any effects on historical and heritage resources resulting from the Project and other projects and activities are not likely to negatively

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<sup>16</sup> International Commission on Non-Ionizing Radiation Protection (ICNIRP) general public exposure limit: 4000 Gauss. Guidelines include recommendations by the *International Commission on Non-Ionizing Radiation Protection* and the *Institute of Electrical and Electronics Engineers*, and are to be distinguished from several municipal and/or state guidelines, which are based on socio-political considerations.

affect the overall understanding of the history of the region or the province as a whole.

### *6.9.3 Monitoring and Follow-Up*

No specific monitoring and follow-up activities are proposed for historical and heritage resources.

### *6.9.4 Government, Public and Aboriginal Comments and Proponent's Response*

The Innu Nation commented that historical resource studies should contain sufficient Innu traditional knowledge. Nalcor responded that no known locations of cultural or spiritual importance to the Labrador Innu described in the *Innu of Labrador Contemporary Land Use Study* (Armitage, 2010) are located within the project area. Similarly, available information and the results of Nalcor's consultation with other Aboriginal groups have also not identified any cultural or spiritual sites within the project area. Any additional relevant information that is obtained through further consultation with Aboriginal groups will be considered and used to inform project planning.

The Province of Newfoundland and Labrador has reviewed the information provided by Nalcor and is satisfied that the project impacts on historical and heritage resources are unlikely to be significant.

### *6.9.5 Agency Conclusions on the Significance of the Residual Environmental Effects*

The residual effects of the Project on historic and heritage resources are likely to be limited. The Agency concludes that these impacts are not likely to be significant, taking into account the implementation of the mitigation.

## **6.10 Effects of the Environment on the Project**

This section addresses the effects of potential changes in the environment on the Project, as required under the former Act.

### *6.10.1 Potential Environmental Effects and Mitigation*

The EIS states that the environment has, and will continue to play a key role in project design. Potential effects could result from various environmental components including vegetation, lightning, wind, freezing precipitation and ice accretion, salt spray, bathymetry, currents, tides, waves, sea ice and icebergs, seismicity and climate change. Nalcor states that most of the effects of the environment on the Project and any resulting effects to the environment have been mitigated through project design, including siting of the transmission corridor.

### *6.10.2 Government, Public and Aboriginal Comments and Proponent's Response*

The Agency asked Nalcor to describe environmental effects that may occur as a result of environmental conditions or events (e.g., icebergs, climate change) acting on the Project. Nalcor responded that if the Project were to be damaged by the environment, these components would subsequently require repair. Associated environmental effects would therefore result, in part, from the replacement and repair of equipment and thus be similar to the effects of repair and maintenance activities. Nalcor stated that various components of the Project have been designed to withstand weather conditions that are expected, including extreme values that may occur over the operating life of the Project.

Natural Resources Canada determined that the information related to future sea level rise, and iceberg and sea ice activity from a marine geology and coastal geomorphology perspective was sufficient and indicated that Nalcor should consider this information, including the ongoing coastal erosion of coastal bluffs, during the detailed design of the Project. Additionally, Natural Resources Canada reviewed the information related to seismicity and confirmed that the impact of earthquakes on the Project was likely to be small. Nalcor has indicated that they will follow National Building Code standards.

Public comments included consideration of winter storms and salt-spray icing on conductors, particularly in the Long Range Mountains. Environment Canada confirmed that the analysis of wind, weather and icing conditions conducted by Nalcor was satisfactory (e.g., their description of the environment is accurate).

### *6.10.3 Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the environment will not likely cause significant adverse environmental effects on the Project, taking into account the implementation of the proposed mitigation.

## **6.11 Effects of Potential Accidents or Malfunctions**

The environmental effects caused by accidents and malfunctions are among the factors to be examined pursuant to the former Act.

### *6.11.1 Potential Environmental Effects and Mitigation*

**Low Risk Incidents** – Low risk incidents include small spills and leaks and small fires. Nalcor assessed the impacts of these incidents in conjunction with other impacts to relevant

VECs (e.g., in VEC-specific sections of the EIS). It referred to proven and effective prevention and mitigation measures for low risk incidents, which would be incorporated into its construction and maintenance procedures. Nalcor will screen third-party contractors for compatibility with its policies and procedures and hire only those that meet required criteria.

**Moderate to High Risk Incidents** – Nalcor identified several potential moderate to high risk scenarios that could be associated with the Project, including transmission tower failure, electrocution, spills and leaks of hazardous material, frac-out during HDD, slope failure, fires, waste management incidents, and motor vehicle-, marine vessel- and aviation collisions. It determined that the most likely accident or malfunction would be a spill or leak of hydrocarbons. Potential effects and mitigation are described in Appendix E.

Nalcor will proactively identify potential accidents and malfunctions. Prevention measures and response procedures will be described in Nalcor's Environmental Protection Plan; Safety, Health and Environment Emergency Response Plan; and Occupational Health and Safety Plan.

### *6.11.2 Government, Public and Aboriginal Comments and Proponent's Response*

Members of the public questioned how accidents or forest fires in remote areas could be responded to and whether equipment and supplies for clean-up would be available on-site. The EIS states that Nalcor will develop an Environmental Protection Plan, which will include procedures for firefighting and spill response. Further, it states that spill response kits and fire-fighting equipment would be located on-site and that the spill response team would engage in mock responses.

A public comment asked about the potential for unexploded ordinances in the Strait of Belle Isle. The Department of National Defence determined that the unexploded ordinances risk of the Forteau Point route is “negligible”, but volunteered to provide safety briefings for construction personnel on site.

### *6.11.3 Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that accidents and malfunctions are not likely to cause significant adverse environmental effects, taking into account the implementation of the proposed mitigation and prevention measures.

## **6.12 Effects on the Capacity of Renewable Resources**

The former Act requires every comprehensive study to consider “the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future”. The effects of the Project on renewable resources were addressed by Nalcor as an integral part of applicable VECs (e.g., vegetation, aquatic resources, wildlife). It determined that the Project is not likely to result in significant effects on renewable resources. The Agency concurs with this conclusion.

## 7. Follow-Up Program

Under the former Act, every comprehensive study must consider the need for, and the requirements of, a follow-up program. The purpose of a follow-up program is to verify the accuracy of an EA and to determine the effectiveness of any measures taken to mitigate the adverse environmental effects of a project.

Nalcor has proposed to monitor various environmental components potentially affected by the Project, as described in VEC-specific sections above and in Appendix F. In addition, additional monitoring requirements have been identified by the Agency in relation to specific environmental components (i.e., caribou, noise) (Appendix F).

Nalcor recognizes that further monitoring requirements could be stipulated by regulators in potential project permits (e.g., scheduling, sampling design, frequency, reporting). It has agreed to working with regulators and other stakeholders to finalize the details of many of its proposed follow-up programs. If unforeseen adverse environmental effects are identified during project monitoring or follow-up, existing mitigation measures would be adjusted or, if necessary, new mitigation or other measures developed to address those effects through Nalcor's adaptive management program.

**“The purpose of a follow-up program is to verify the accuracy of an EA and to determine the effectiveness of any measures taken to mitigate the adverse environmental effects of a project.”**

## 8. Benefits to Canadians

The Canadian public and Aboriginal groups participating in the EA process had the opportunity to provide information and comments, potentially influencing Project design, and thereby helping to reduce the environmental effects of the Project. As a result, the design, construction, and operation of the Project are not based solely on technical and economic criteria, but also incorporate environmental criteria that promote a balanced approach in keeping with the principles of sustainable development. For example, Nalcor incorporated precautionary approaches, conservatism and best management practices (e.g., avoidance) to minimize the ecological footprint of the Project, including:

- Routing Alternatives – The transmission line was routed along existing ROWs to use existing disturbance corridors to the extent practical. In addition, the corridor was selected to avoid sensitive areas such as parks, protected areas and sites of cultural and historical importance, to the extent practical. Initially, Nalcor identified two options for the transmission corridor; one through the Long Range Mountains and another using the existing transmission ROW through Gros Morne National Park. Nalcor amended its provincial EA registration to exclude the Gros Morne route as an option following public consultation and engagement with Parks Canada, thus avoiding any potential effect to this UNESCO World Heritage Site.
- Mitigation – The use of HDD for the submarine cable landings avoids disturbing near-shore habitat in the Strait of Belle Isle. Drilling sites were located to avoid *Species at Risk Act*- and *Endangered Species Act*-listed plant species and their habitat.

In addition, Nalcor modified its Project partially in response to information and comments received from the public and Aboriginal groups, including:

- relocation of the ROW corridor to parallel an access road from the Trans Labrador Highway Phase 3 to the Muskrat Falls generation site (i.e., along the

- South Side Access Road) to avoid creation of new access within the range of the RWMH;
- design of a shoreline electrode at the Strait of Belle Isle in place of a sea electrode in Lake Melville;
- removal of the proposed wood-pole electrode line from Muskrat Falls to the Strait of Belle Isle (electrode line will now be placed on HVdc transmission towers);
- removal of the corridor option through Gros Morne National Park;
- relocation of the transmission line ROW at Forteau Point to avoid potential interaction with a nearby float plane basin;
- selection of the A4 alternative corridor segment at Shoal Cove that immediately goes inland, thereby avoiding community interaction; and
- selection of the A8 alternative corridor segment, which was suggested by International Appalachian Trail Newfoundland and Labrador and consists of a deviation to the east from the A7 alternative corridor segment.

**“The Canadian public and Aboriginal groups participating in the EA process had the opportunity to provide information and comments, potentially influencing Project design, and thereby helping to reduce the environmental effects of the Project.”**



## 9. Conclusion of the Agency

The Agency took the following elements into account in its analysis to reach a conclusion on the environmental effects of the Project:

- the documentation submitted by Nalcor, including the EIS, EIS Addendum and responses to Information Requests
- the opinions and comments of federal and provincial expert departments, Aboriginal groups, and the public
- the analysis and findings of this Comprehensive Study Report
- the obligation to obtain authorization under subsection 35(2) of the *Fisheries Act*
- the approval required under subsections 5(1) and 5(3) of the *Navigable Waters Protection Act*
- the need for Nalcor to implement a follow-up program

With the exception of the RWMH, the Agency concludes that with the implementation of the mitigation measures, the Project is not likely to cause significant adverse environmental effects. The RWMH is listed as threatened under the *Species at Risk Act*. While the Project itself is likely to result in minor, adverse, but non-significant environmental effects on the RWMH, the Herd continues to be under significant pressure when taking into account other projects and activities. The Agency therefore concludes that the Project, when cumulative environmental effects are taken into account, is likely to cause significant adverse environmental effects on the RWMH, even if the Project itself will only minimally contribute to these effects.

Following a public consultation on this Report, the Minister of the Environment will decide whether, taking into account the implementation of mitigation measures, the Project is likely to cause significant adverse environmental effects. The Project will then be referred back to DFO, Transport Canada, Natural Resources Canada and Public Works and Government Services Canada for appropriate course of action in accordance with section 37 of the former Act.

**“With the exception of the RWMH, the Agency concludes that with the implementation of the mitigation measures, the Project is not likely to cause significant adverse environmental effects.”**

## 10. References

- Armitage, P. 2010. *Innu of Labrador Contemporary Land Use Study*. Report submitted to Innu Nation, Sheshatshiu and Natuashish, NL.
- British Columbia Ministry of Environment. 2006. *Air Quality Objectives for PM10*. Retrieved: April 4, 2013 from <http://www.bcairquality.ca/reports/pdfs/aqo-framework-consultation.pdf>
- Canadian Council of Ministers of the Environment. 2000. *Canada-Wide Standards for Particulate Matter (PM) and Ozone*. Retrieved: April 4, 2013 from [http://www.ccme.ca/assets/pdf/pmozone\\_standard\\_e.pdf](http://www.ccme.ca/assets/pdf/pmozone_standard_e.pdf)
- Energy, Mines and Resources Canada. 1986. *Canada Wetland Regions* (map). Geographic Services Division, Surveys and Mapping Branch. Retrieved: April 4, 2013 from <http://atlas.nrcan.gc.ca/site/english/maps/water.html#distributionofwater>
- Environment Canada. 2012. *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa.
- Gill, A.B. and Bartlett, M. 2010. *Literature Review On The Potential Effects of Electromagnetic Fields and Subsea Noise From Marine Renewable Energy Developments on Atlantic Salmon, Sea Trout and European Eel*. Scottish Natural Heritage Commissioned Report No. 401. Retrieved: April 4, 2013 from [http://www.snh.org.uk/pdfs/publications/commissioned\\_reports/401.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/401.pdf)
- Government of Newfoundland and Labrador. 2004. Newfoundland and Labrador Regulation 39/04, *Air Pollution Control Regulations*. Retrieved: April 4, 2013 from <http://www.assembly.nl.ca/Legislation/sr/Regulations/rc040039.htm>
- Health Canada. 2006. *Regulations Related To Health And Air Quality*. Retrieved April 4, 2013 from <http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/reg-eng.php#a3>
- International Commission on Non-Ionizing Radiation Protection. 1998. Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). *Health Physics Society*. 74 (4): 494-522. Retrieved: April 4, 2013 from [www.icnirp.de/documents/emfgdl.pdf](http://www.icnirp.de/documents/emfgdl.pdf)
- Institute of Electrical and Electronics Engineers (IEEE). 2002. Standard C95.6-2002. *IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz*. Retrieved: April 4, 2013 from [http://ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?tp=&isnumber=22412&arnumber=1046043&punumber=8105](http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?tp=&isnumber=22412&arnumber=1046043&punumber=8105)
- International Standards Organization. 2003. *Acoustics – Description, Measurement and Assessment of Environmental Noise – Part 1: Basic Quantities and Assessment Procedures*. ISO 1996-1.
- Jeffrey, R. 2005. Mealy Mountain Caribou Herd – Collaring and Population Size. Wildlife Division. Department of Environment and Conservation. Government of Newfoundland and Labrador. Internal report; Addendum.
- Joint Review Panel. 2011. *Report of the Joint Review Panel – Lower Churchill Hydroelectric Generation Project*. Retrieved: April 4, 2013 from <http://www.ceaa.gc.ca/052/details-eng.cfm?pid=26178>
- Leblond, M., C. Dussault and J.P. Ouellet, 2012. Avoidance of Roads by Large Herbivores and its Relation to Disturbance Intensity. Print ISSN 0952-8369, July 2012.

Nalcor Energy. 2012. *Labrador-Island Transmission Link Environmental Impact Statement* (including Addendum and additional information).

Rudolph, T.D., P. Drapeau, M. Hugues St-Laurent, L. Imbeau. 2012. *Status of Woodland Caribou (Rangifer tarandus caribou) in the James Bay Region of Northern Quebec*. Scientific report presented to the Ministère des Ressources naturelles et de la Faune du Québec and the Grand Council of the Crees (Eeyou Istchee). Montreal, QC. 72 pp. Retrieved: April 5, 2013 from <http://chaireafd.uqat.ca/communiquer/nouvellesE.asp?Date=2012-10-22%2009:42:10>

Schmelzer, I. 2012 draft. *Range Use, Life History and Trends in Abundance of Forest-Dwelling Threatened Caribou Populations in Labrador: An Overview*. Wildlife Division, Department of Wildlife and Conservation. Government of Newfoundland and Labrador.

Schmelzer, I. and Wright, C. 2012. An Estimate of Population Size and Trend for the Mealy Mountain Caribou Herd and Joir River Subpopulation: Results of an aerial census and calf classification conducted during March 2012. Wildlife Division. Department of Environment and Conservation. Government of Newfoundland and Labrador. Internal report.

# 11. Appendix

## Appendix A

### Species at Risk that May Occur within the Study Area

Species of Special Conservation Concern		Status	
Common Name	Scientific Name	Species At Risk Act Registry (SARA 2011)	National Status (COSEWIC 2012)
<b>Vegetation</b>			
Long's Braya	<i>Braya longii</i>	Schedule 1, Endangered	Endangered
Fernald's Braya	<i>Braya fernaldii</i>	Schedule 1, Threatened	Threatened
Fernald's Milk-vetch	<i>Astragalus robbinsii</i> var. <i>fernalduii</i>	Schedule 1, Special Concern	Special Concern
Boreal Felt Lichen (boreal population)	<i>Erioderma pedicellatum</i>	Schedule 1, Special Concern	Special Concern
<b>Caribou</b>			
Woodland caribou (Boreal population)	<i>Rangifer tarandus caribou</i>	Schedule 1, Threatened	Threatened
<b>Furbearers</b>			
Newfoundland Marten (American Marten Newfoundland population)	<i>Martes americana atrata</i>	Schedule 1, Threatened	Threatened
<b>Avifauna</b>			
Harlequin Duck	<i>Histrionicus histrionicus</i>	Schedule 1, Special Concern	Special Concern
Rusty Blackbird	<i>Euphagus carolinus</i>	Schedule 1, Special Concern	Special Concern
Red Crossbill perca subspecies	<i>Loxia curvirostra perca</i>	Schedule 1, Endangered	Endangered
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Schedule 1, Threatened	Threatened
Short-eared Owl	<i>Asio flammeus</i>	Schedule 3, Special Concern	Special Concern
Common Nighthawk	<i>Chordeiles minor</i>	Schedule 1, Threatened	Threatened
Barrow's Goldeneye (eastern population)	<i>Bucephala islandica</i>	Schedule 1, Special Concern	Vulnerable
Ivory Gull	<i>Pagophila eburnea</i>	Schedule 1, Endangered	Endangered
Piping Plover, <i>melodus</i> subspecies	<i>Charadrius melodus</i>	Schedule 1, Endangered	Endangered
Eskimo Curlew	<i>Numenius borealis</i>	Schedule 1, Endangered	Endangered
<b>Marine Fish</b>			
White Shark Atlantic population	<i>Carcharodon carcharias</i>	Schedule 1, Endangered	Endangered
Atlantic Wolffish	<i>Anarhichas lupus</i>	Schedule 1, Special Concern	Special Concern
Northern Wolffish	<i>Anarhichas denticulatus</i>	Schedule 1, Threatened	Threatened
Spotted Wolffish	<i>Anarhichas minor</i>	Schedule 1, Threatened	Threatened
<b>Marine Mammals and Sea Turtles</b>			
Blue Whale (Northwest Atlantic Ocean population)	<i>Balaenoptera musculus</i>	Schedule 1, Endangered	Endangered
Fin Whale (Atlantic Ocean population)	<i>Balaenoptera physalus</i>	Schedule 1, Special Concern	Special Concern
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Schedule 1, Endangered	Endangered

## Appendix B

### Alternative Transmission Line Corridor Segments

The transmission corridor includes the alternative corridor segments **A2, A4, and A7 with A8** (Table 1, Figures 1 to 3). Following an analysis

of routing alternatives, Nalcor has determined that this corridor alignment is technically and economically feasible, and respects the environmental and social objectives identified. A summary of the proponent’s analysis is presented in Table 1.

**Table 1: Alternative Transmission Line Corridor Segments**

Alternative No. and Name	Description	Analysis
A1: Gull Island to Strait of Belle Isle		<p>The transmission line was initially planned to commence in Labrador at Gull Island and proceed southeast to the Strait of Belle Isle. Following the decision to proceed with the construction of Muskrat Falls first and Gull Island at a later date, Muskrat Falls was determined to be the economically preferable location to commence the transmission line. As a result, approximately 200 km of the transmission corridor was relocated to parallel the Trans Labrador Highway Phase 3 rather than cutting through in-land territory. This alternative was determined to be economically preferable, while at the same time responding positively to requests from the public, Aboriginal groups and regulators. This change avoids the potential creation of new access in parts of Labrador.</p> <p>The option of routing the transmission line beside the Trans Labrador Highway Phases 2 and 3 across Southern Labrador to the Strait of Belle Isle, rather than cutting through in-land was also considered. This alternative is not economically preferred because it would increase: the length of the corridor by approximately 150 km; electrical losses by 10-percent; construction costs by approximately \$100 million or more; and the length of the transmission line requiring future maintenance.</p>
<b>A2: North-west of Strait of Belle Isle</b> <b>Alternative Segment</b>	<b>Alternate transmission corridor segment near the end of Labrador portion of the transmission corridor, just east of the Quebec border and north of the Strait of Belle Isle.</b>	<b>A2 alternative is favoured because it avoids an extreme icing zone with high altitude and high exposure. As such, A2 avoids the associated construction and operations issues and has a lower cost. From an environmental perspective there is little difference, although A2 has less adverse effects on Vegetation (i.e., wetlands and timber resources) and Avifauna (e.g., Wetland affiliated species), and greater adverse effects on Furbearers (i.e., marten, red fox, porcupine, beaver) and Avifauna (i.e., Conifer Scrub and Lichen Heathland affiliated species) as compared to the corresponding proposed corridor segment.</b>
A3: Point Amour Alternative Segment	Alternate transmission corridor segment to possible Point Amour cable landing site on Labrador side of the Strait of Belle Isle.	Originally Point Amour was identified as a potential cable landing site, however it is no longer being considered as an option. A3 is not preferred from a Tourism, Visual Aesthetics or a Land and Resource Use perspective (e.g., the Point Amour Lighthouse). A3 is also associated with the presence of a federally and provincially listed species – Fernald’s milk-vetch.
<b>A4: Strait of Belle Isle Newfoundland Side</b> <b>Alternative Segment</b>	<b>Alternate transmission corridor segment near the beginning of the Island portion of the transmission corridor, near the Strait of Belle Isle.</b>	<b>A4 alternative is favoured because it limits the exposure to salt contamination, increases the electrical reliability and has a lower cost. From an environmental perspective there is little difference, with greater adverse effects on Furbearers (i.e., red fox, beaver) and Avifauna (i.e., Open Conifer Forest and Scrub / Heathland / Wetland complex affiliated species) for A4 as compared to the original corridor segment. The A4 alternative would have less adverse effects on Visual Aesthetics because the towers would be approximately 3 km from the highway. It also reduces interaction with the community.</b>

**Table 1: Alternative Transmission Line Corridor Segments continued**

Alternative No. and Name	Description	Analysis
A5: Great Northern Peninsula (GNP) North-east Alternative Segment	Alternate transmission corridor segment to the east of the proposed corridor on the northeastern side of the Northern Peninsula.	A5 occurs in an extreme icing zone due to its lower altitude and exposure. As such, the preferred corridor avoids the associated construction issues and has a lower cost, and from a maintenance and operations perspective it greatly improves system reliability.
A6: GNP West-central Alternative Segment	Alternate transmission corridor segment to the west of the proposed corridor near the centre of the Northern Peninsula.	The A6 alternative is not preferred from a constructability view. The level and quality of existing access in the original corridor is in keeping with Nalcor's mitigation to use existing access wherever possible. Using higher quality access will require less upgrading of roads, and is therefore also economically preferred. The A6 alternative has greater adverse effects on Furbearers (i.e., red fox, beaver), Tourism (i.e., more recreational vehicles and mobile trailers) and Visual Aesthetics (i.e., scenic area crossed) as compared to the proposed corridor segment. The effects on Avifauna (i.e., coniferous habitat affiliated species) are less for A6 alternative and the effects on Caribou are almost the same (1-percent for Primary Core area in the alternative and 2-percent in the proposed corridor segment).
A7: GNP Eastern Long Range Mountain Crossing Alternative Segment	Alternate transmission corridor segment to the east of the proposed corridor where the corridor crosses the Long Range Mountains.	A7 avoids an extreme icing zone due to its lower altitude and exposure. As such, A7 avoids the associated construction issues and has a lower cost, and from a maintenance and operations perspective it greatly improves system reliability. (Note: A7 was selected partially)
<b>A7 + A8: GNP Eastern Long Range Mountain Crossing Alternative Segment + A8: GNP International Appalachian Trail Newfoundland and Labrador Alternative Segment</b>	<b>Another alternate transmission corridor segment in the Long Range Mountains area. Suggested by International Appalachian Trail - NL. Makes use of most of A7 (above) and deviates further east for a section.</b>	<b>The A7 plus A8 alternative avoids an extreme icing zone due to its lower altitude and exposure. As such, A7 plus A8 avoids the associated construction issues and has a lower cost, and from a maintenance and operations perspective it greatly improves system reliability. From an environmental perspective A7 plus A8 has less adverse effects on Vegetation (i.e., less wetlands, riparian vegetation and timber resources), Caribou (i.e., less Primary Core area), Land and Resource Use (i.e., better for recreation as it is further away from the proposed International Appalachian Trail network), Tourism (i.e., towers less visible from backcountry trails) and Visual Aesthetics (i.e., avoids a scenic area). The alternative corridor segment A7 plus A8 has greater adverse effects on Furbearers (i.e., red fox, beaver) and Avifauna (i.e., Conifer Habitat affiliated species and Wetland affiliated species).</b>
A9: Birchy Lake Alternative Segment	Short alternate transmission corridor segment in the Birchy / Sandy Lakes area of west-central Newfoundland.	Alternative A9 in Central and Eastern Newfoundland will affect considerably more habitat associated with the Key Indicators (KIs) of Vegetation Abundance and Diversity, Wetland and Riparian Shoreline. Alternative A9 will also affect a greater proportion of primary winter habitat, and a greater proportion of primary calving / post-calving habitat.

**Table 1: Alternative Transmission Line Corridor Segments continued**

Alternative No. and Name	Description	Analysis
A10: Newfoundland and Labrador Outfitters Association Alternative Segment	Alternate transmission corridor segment in west-central Newfoundland. Suggested by the NL Outfitters Association.	Alternative A10 in Central and Eastern Newfoundland will affect considerably more habitat associated with the KIs of Vegetation Abundance and Diversity, Wetland and Riparian Shoreline. The proposed corridor segment is 87 km in length, while the alternative corridor segment is 130 km. This represents an increase of approximately 43 km in length which would be expected to result in greater effects on many species of wildlife (i.e., greater caribou occupancy area, greater habitat alteration or loss in the core area of the west-central population for marten).
A11: Avalon Alternative Segment	Short alternate transmission corridor segment in the east-central portion of the Avalon Peninsula	Alternative segment A11, has potential to intersect marginally more habitat for federally and provincially listed species – boreal felt lichen, and will likely have greater effects on Vegetation.

In December 2012, Nalcor released an *Environmental Impact Statement Addendum*, which included information on the proposed alignment for the 60 m-wide ROW within the 2 km wide

study corridor. The route was evaluated against technical, environmental, and socioeconomic factors, but remains subject to slight changes based on further analysis.

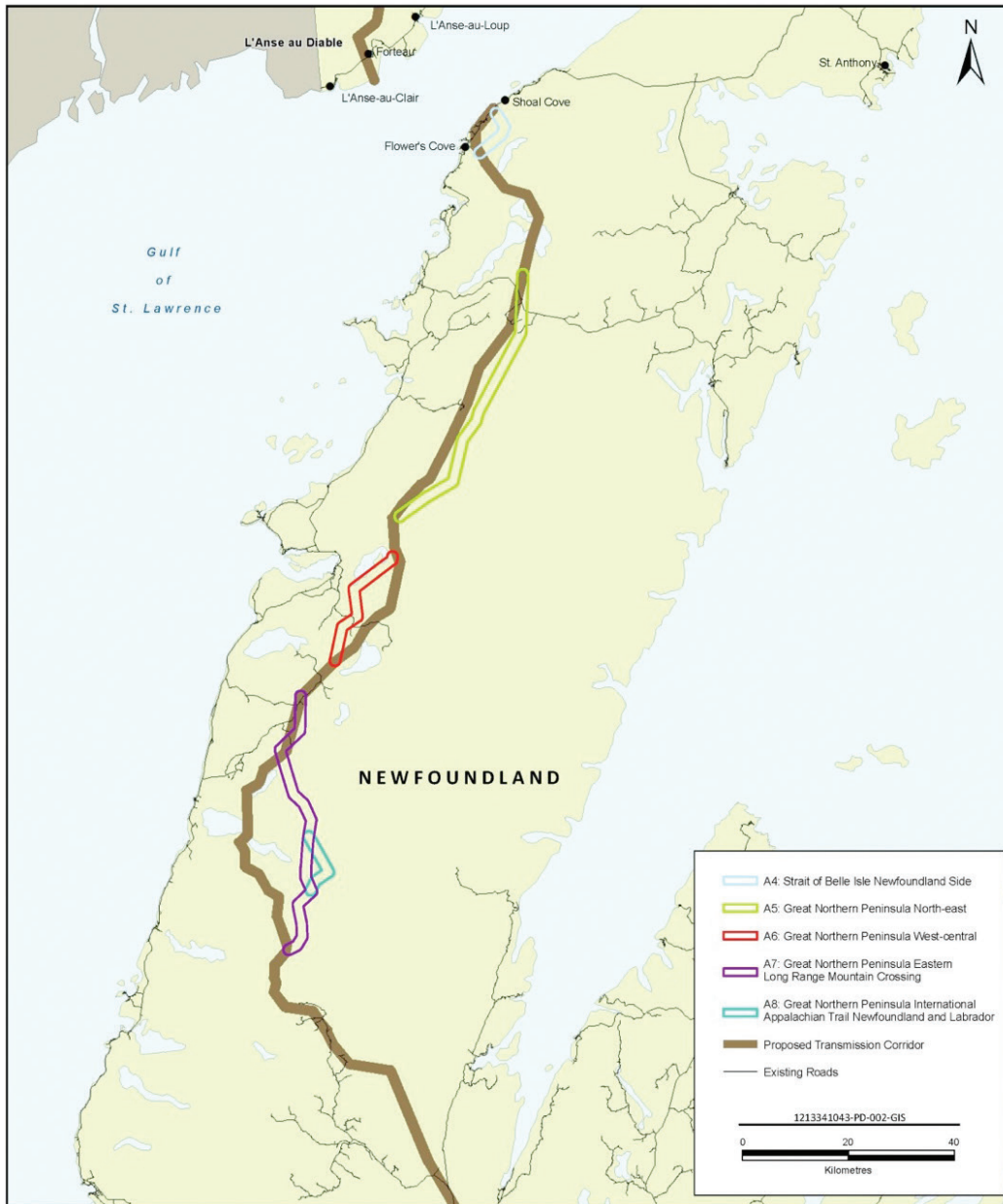
**Figure 1: Alternative Transmission Corridor Segments - Central and Southeastern Labrador**




**FIGURE A-1**  
**Alternative Transmission Corridor Segments - Central and Southeastern Labrador**

Source: Nalcor Energy

**Figure 2: Alternative Transmission Corridor Segments – Northern Peninsula**



	<p><b>FIGURE A-2</b></p>
	<p><b>Alternative Transmission Corridor Segments - Northern Peninsula</b></p>

Source: Nalcor Energy



**Figure 3: Alternative Transmission Corridor Segments – Central and Eastern Newfoundland and Avalon Peninsula**

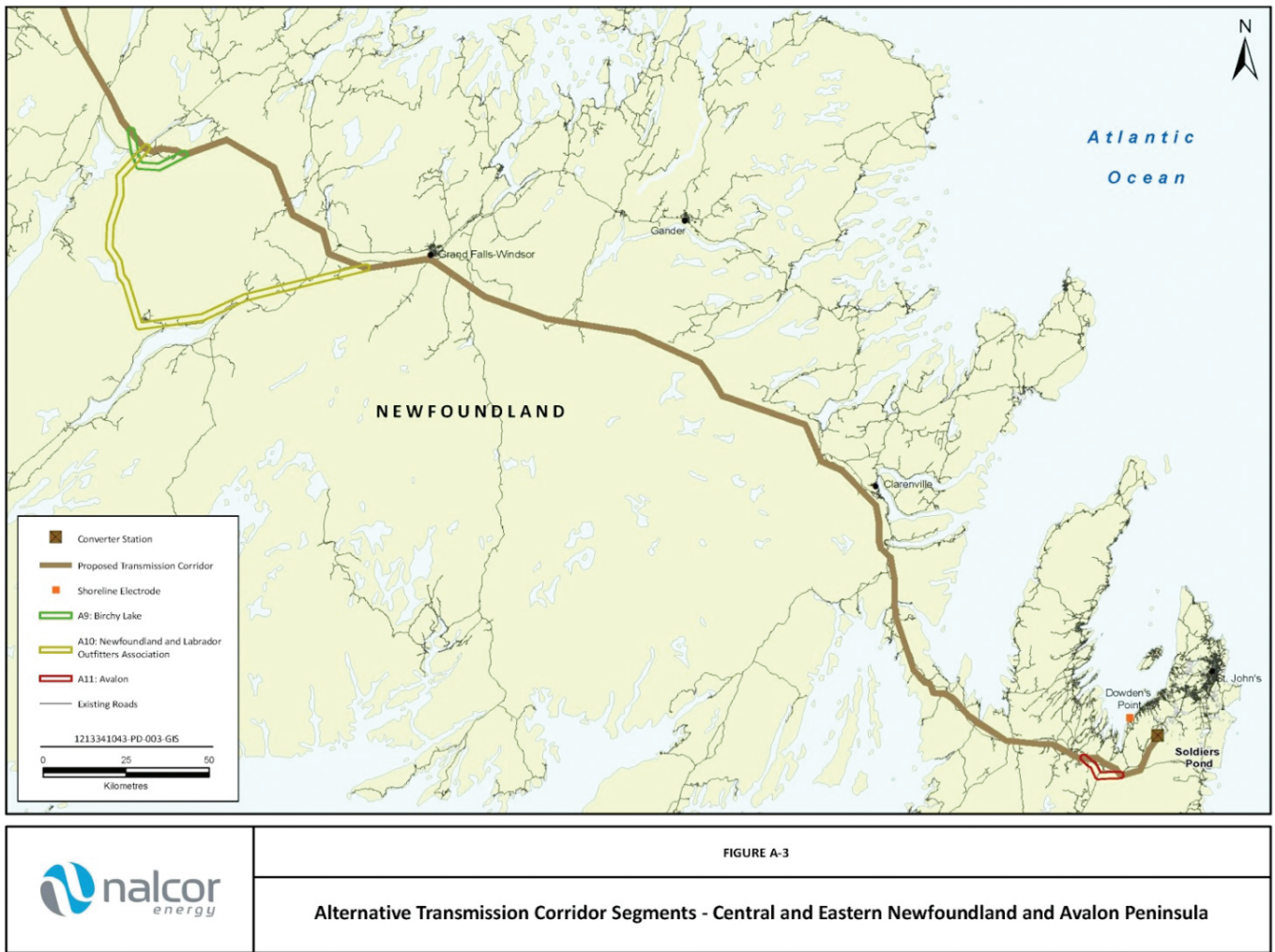


FIGURE A-3



**Alternative Transmission Corridor Segments - Central and Eastern Newfoundland and Avalon Peninsula**

Source: Nalcor Energy

## Appendix C

The following table summarized concerns raised by Aboriginal groups as part of consultations conducted in support of the environmental assessment for the Labrador-Island Transmission Link Project (Table 1).

**Table 1: Summary of Concerns Raised by Aboriginal Groups**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
1	Nunatu-Kavut Community Council (NCC)	EA Methods	There is a lack of use of traditional knowledge in the EA. A more comprehensive description of issues raised through traditional knowledge is required.	<p>Aboriginal ecological knowledge (AEK) has been provided to Nalcor as part of the body of knowledge informing the prediction and assessment of environmental effects of the Project, and such knowledge has been incorporated into the Environmental Impact Statement (EIS). In all cases, Nalcor has not used direct quotes of AEK gathered from members of NCC in the EIS, as it was restricted from doing so pursuant to the terms of the interview consent forms.</p> <p>Opportunities were provided throughout the EA process for Aboriginal groups to clarify Nalcor's application of AEK (or provide any additional AEK).</p> <p>All sources of relevant information acquired, including AEK, have been and will continue to be used during Project planning and design.</p>	The Agency is satisfied that the proponent has made use of Aboriginal traditional knowledge to the extent it was made available for incorporation in the EA process and resulting documents.
2	NCC, Unamen Shipu, Innu Nation, Qalipu Mi'kmaq First Nation (Qalipu)	Historic, Heritage, and Archaeological Resources	Potential damage to historic, heritage, and archeological sites and other resources during construction and preconstruction phases.	The proponent has agreed to adopting precautions prescribed under provincial permits to avoid damaging archaeological resources. The potential adverse effects of the Project on historic and heritage resources (e.g., damage to or loss of archaeological resources) are predicted to be not significant.	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to preservation of historic and heritage resources.</p> <p>Newfoundland and Labrador (NL) is satisfied with Nalcor's proposed mitigation and the EIS conclusions.</p> <p>The Agency is satisfied that Nalcor has considered this issue within the EIS and, taking into account the identified mitigation measures, concludes that there are not likely to be significant adverse environmental effects to historic and heritage resources (including archaeological resources) as a result of the Project.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
3	Unamen Shipu, NCC	Project Design	Transmission line should follow the TransLabrador Highway Phase 3 (TLH III) to reduce impacts from constructing a new corridor.	Routing alternatives were explored and the route was modified from its originally proposed path. The transmission corridor will extend from Muskrat Falls to the TLH III, and then follow generally along the south side of the highway to approximately its southernmost point before meeting and continuing along the previously identified corridor from that location to the Strait of Belle Isle. The option of following the TLH to the Strait of Belle Isle was not deemed feasible on economic grounds.	The Agency is satisfied that the proponent has redesigned the Project to minimize intrusion into wilderness areas between Muskrat Falls and the Strait of Belle Isle.
4	NCC	Project Design	Concerned about potential impacts of an accompanying wooden pole line necessary for the shore electrodes or any second power line through Labrador.	Nalcor has no plans to build a second line parallel to the Project. Based on the current engineering design, the electrode line will be placed on the HVdc transmission towers from the Muskrat Falls converter station to the Straits area.	The Agency is satisfied that the proponent has refined the project design to eliminate the need for a wooden pole electrode line from Muskrat Falls to the Strait of Belle Isle.
5	Innu Nation, Labrador Inuit, NCC	Need for Project/ Benefits to Labrador	Unsure of need for more electricity and what markets would be supplied. Will project help meet electricity needs of Labrador communities? Will there be effects on Labrador electricity rates?		The electricity needs of Labrador communities are outside the scope of federal EA.  Electricity needs are an area of provincial responsibility; NL is aware that this issue has been raised.

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
6	All groups	Access	<p>Concerns over general environmental impacts and induced development related to opening up new land in what was previously inaccessible/wilderness areas (i.e., new access roads and permanent bridges, lack of enforcement, cumulative effects, resource depletion, etc.)</p>	<p>The analysis determined that while certain parts of the corridor have little or no existing access, most parts of the corridor already have considerable existing accessibility due to forest access roads and other trails.</p> <p>Measures to limit access include using existing access to the extent practical and decommissioning access roads and trails. Nalcor will further consider methods to control, manage and/or restrict public use of access (e.g., berms, slash rollback, gates, excavation, signage, reduced road standard, visual screen plantings) as determined through consultation with the province.</p> <p>Nalcor states that government regulators rather than Nalcor have the jurisdiction to directly control access. It observed that mitigation techniques (e.g., harvesting restrictions and quotas, closed areas, enforcement activities) are available to regulators to reduce hunting or harvesting pressure.</p> <p>To determine the use of right-of-way (ROW) by snowmobiles, Nalcor has proposed to conduct an aerial survey during the first winter following construction.</p> <p>Nalcor is not considering the establishment of permanent bridges for this Project and will adhere to permit conditions for Project activities on or near the freshwater environment.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures, , and follow-up measures relating to increased access to wilderness areas.</p> <p>NL is satisfied with Nalcor's proposed mitigation and the EIS conclusions.</p> <p>The Agency is satisfied that the proponent has considered this issue. It concludes that there are not likely to be significant adverse Project-specific environmental effects associated with the establishment of and access to the ROW.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
7	Innu Nation	Waste	Concerned about establishment of marshalling yards and laydown areas during the construction and maintenance of the transmission line. All construction site and fuel caches must be cleaned up (e.g., helicopter fuel drums).	Approximately 10 assembly yards will be required for the Labrador portion of the transmission line and the location of each is yet to be identified. These yards will contain approximately 20,000 litres of fuel storage. Handling and fuelling procedures will comply with the provincial Storage and Handling of Gasoline and Associated Products regulations. Required fuel caches will be established as per a letter of consent that will be obtained from designated officials of Service NL for fuel caches of 10 or more 205 L drums. Empty drums will be stored and backhauled to nearest receiving community, as per the Waste Management Plan. Following the completion of construction all fuel drums will be removed. Spill contingency measures will be developed as part of the Environmental Protection Plan (EPP).	<p>Environment Canada is satisfied with Nalcor's response and conclusions. Furthermore, the pollution provisions of the <i>Fisheries Act</i> section 36(3) would apply to any spills.</p> <p>The movement of dangerous goods (including fuel) to, from, and within the marshaling yard must be conducted in compliance with federal <i>Transportation of Dangerous Goods Act</i> and applicable regulations, which are administered by Transport Canada.</p> <p>NL is satisfied with Nalcor's proposed mitigation and the EIS conclusions.</p> <p>The Agency is satisfied that the proponent has considered this issue and, taking into account the identified mitigation measures, concludes that there are not likely to be significant adverse environmental effects associated with laydown areas.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
8	NCC, Innu Nation, Qalipu	Herbicide Use	<p>Concern related to the use of herbicides for clearing corridors. Particular concern related to impacts on fish and fish habitat as well as food plants such as berries.</p>	<p>During project operations and maintenance, vegetation on the ROW greater than 2 m in height will be removed with herbicides or by mechanical means. The herbicide used is considered to be non-residual and non-toxic to wildlife or humans in the doses that would be applied and will be applied by certified personal in compliance with all provincial regulations. Buffers will be established around watercourses in accordance with provincial permit requirements. The adverse residual effect of herbicide use on water quality during operations is determined to be low in magnitude, local, short term and not significant. The potential adverse effects of the Project on vegetation are predicted to be not significant.</p> <p>Effects management measures will be implemented such as providing notice to communities of locations of the ROW where vegetation management will be undertaken. Notification would include correspondence with municipal governments prior to commencing the transmission line program within municipal boundaries, and advertising in a regional newspaper at least one week prior to vegetation management activities occurring, and signage posted in the ROW upon treatment, stating the date of application and product used.</p> <p>Treatment of compatible species (e.g., berry shrubs, Labrador tea, Kalmia, trailing juniper, dwarf birch) found on the ROW will be avoided or minimized. Once compatible species have established, it will become more difficult for the target species to re-establish and the length of time between treatments will be increased.</p> <p>The “cut and stump” method can also be used to manage vegetation. This technique consists of cutting target species and applying herbicide to stumps using backpack sprayers or sprayers mounted on brushsaws, killing the root system and preventing re-sprouting. Nalcor states that the “cut and stump” method is expensive, labour intensive and is typically used in sensitive areas.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to herbicide use on the ROW. NL has indicated that they agree with Nalcor’s analysis and conclusions.</p> <p>Health Canada concluded that the effect of herbicide use on food plants, such as berries, should be localized around the immediate area of application, given the selective application of pesticides and the fate and transport of the individual pesticides intended for use. If the type(s) of pesticides to be used differ from those that have been identified by Nalcor, Health Canada would be available to re-evaluate the potential for adverse health effects.</p> <p>DFO is satisfied that Nalcor has considered the impacts of herbicides to freshwater fish and fish habitat and that these are unlikely to be significant.</p> <p>Taking into account the identified mitigation measures, the Agency concludes that the impacts of herbicide use along the ROW are not likely to be significant.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
9	Innu Nation	Aquatic environment - Fish and Fish Habitat	Concern over impacts to fish and fish habitat due to water abstraction and therefore decreasing water levels in ponds and rivers during the construction phase and maintenance of winter access roads.	<p>No issues have been identified with respect to the interaction of the Project with water quantity. Application of mitigation measures will minimize the potential for rutting, damming or redirection of water during high flow events such as snow melt and heavy rainfall. All stream crossings, including culverts, will be constructed and sized so as not to impede water flow and hydrologic regime of the watercourses, and in compliance with applicable regulatory requirements.</p> <p>Nalcor is not planning to build ice roads, including ice bridges and ice crossings, for the Project.</p>	<p>Nalcor has identified mitigation measures to avoid impacts on water quantity. Nalcor states that it will not construct ice roads, including ice bridges and ice crossings.</p> <p>Taking into account the identified mitigation, DFO concludes that impacts on freshwater fish and fish habitat are unlikely to be significant.</p> <p>The Agency concludes that environmental effects from water use and abstraction are not likely to be significant.</p>
10	NCC, Ekuanishit, Innu Nation, Nunatsiavut, Qalipu	Aquatic Environment – Fish, Fish Habitat, & Fisheries	General concern about the impacts on watercourses, watersheds, and fish and fish habitat from the construction and maintenance of the transmission line, compounded by a lack of knowledge on fish species and populations in Labrador and impacts on Aboriginal fishing rights.	<p>The potential adverse effects of the Project on freshwater fish and fish habitat are predicted to be not significant. Residual effects on fish species and assemblages will be limited both spatially and in duration (i.e., at the stream crossing location). Any changes to freshwater water quality that may occur as a result of the Project are not predicted to affect its baseline functions over the lifetime of the Project.</p> <p>Nalcor has committed to implementing a number of mitigation options to avoid or limit adverse effects on fish and fish habitat.</p> <p>During stream crossing design, Nalcor will consider clear span bridges as DFO's preference for water course crossings, followed by bottomless arch culverts, then cylindrical culverts and, lastly, one-time fording events. Nalcor also acknowledges that DFO has a National Operational Statement for Clear Span Bridges. During construction, if there is a potential issue regarding compliance with the operational statement, Nalcor will contact DFO for advice.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to impacts on fish and fish habitat.</p> <p>Taking into account the identified mitigation, DFO concludes that impacts on freshwater fish and fish habitat are unlikely to be significant. Based on implementation of mitigation measures designed to avoid impacts on fish and fish habitat, DFO will not require a follow-up program for freshwater fish and fish habitat.</p> <p>The Agency is satisfied that Nalcor has considered this issue and concludes that the impacts on fish and fish habitat are not likely to be significant.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
11	NCC, Ekuanishit, Innu Nation, Nunatsiavut	Aquatic Environment Fish, Fish Habitat & Fisheries	Concerns about potential impacts from the electromagnetic fields (EMF) emitted from the transmission line and shoreline electrodes in the Strait of Belle Isle on Atlantic salmon migration and other marine fish species.	<p>Submarine cables and shoreline electrodes from the proposed Project have the potential to produce EMFs. Nalcor has determined that the EMFs emitted by the submarine cables will not pose a significant navigation problem for Atlantic salmon. Nalcor predicts that if EMFs emitted by electrode sites were to be detected by salmonid fishes as they move close to shore, the most likely behavioural response, if there was one, would be to move away from the source of the EMF, thereby adjusting their path slightly.</p> <p>The effects of EMFs on marine fish species are not predicted to be significant.</p> <p>A follow-up program will be conducted by Nalcor to confirm effects predictions regarding EMFs that will be generated by the submarine cables and electrodes. The programs will be designed in consultation with DFO and other regulators, as appropriate.</p> <p>The potential adverse effects of the Project on marine fish and fish habitat and marine fisheries are predicted to be not significant.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to impacts from EMFs in the Strait of Belle Isle.</p> <p>DFO commented on the knowledge gaps which exist in relation to the operational hazards of subsea power cables, and of emissions of EMFs and their potential effects on fish. However, since the submarine cables proposed by Nalcor would enter and leave the marine environment approximately 65 m below the surface, DFO predicted that EMF emissions were not likely to have significant effects on migrating salmon. Moreover, DFO noted that in coastal waters, reliance on navigation (which could be affected by EMFs) may be overridden by the role of olfaction, which guides Atlantic salmon during the final stages of homing to natal streams. Any potential effects of EMFs would be transitory, given that Atlantic Salmon do not remain stationary, but would be passing through the Project area</p> <p>DFO confirmed that the state of knowledge in relation to EMFs did not warrant significant mitigation for EMFs from the electrode. However, DFO will require Nalcor to monitor electrode sites to verify its predictions related to the effects of monopolar operations on specific fish species, particularly those of fisheries importance, within the vicinity of the electrode site.</p> <p>The Agency is satisfied that Nalcor has considered the impacts of EMFs and, taking into account the identified mitigation and monitoring measures, concludes that there are unlikely to be significant adverse environmental effects.</p>



**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
12	NCC, Ekuanishit, Innu Nation, Nunatsiavut	Aquatic Environment – Fish, Fish Habitat, & Fisheries	Concern about the impacts of rock/berm placement in Straits of Belle Isle; and potential impact to marine fish species.	<p>The rock used for berm construction will be extracted from a quarry, and Nalcor expects this material to be clean and free of sediment. The rock placement vessel will use a fall pipe to place the rock on the seafloor at depths greater than 60 m, and mostly greater than 90 m. During installation, the fall pipe will be between 6 and 10 m from the bottom. This controlled rock placement with a fall pipe will minimize direct loss of habitat.</p> <p>Nalcor predicts that marine fish habitat could be lost during construction of the submarine cables, however, harmful, alteration disruption or destruction of fish habitat would be mitigated through a fish habitat compensation program approved by DFO.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to the construction of berms.</p> <p>Taking into account the identified mitigation, DFO concludes that impacts on marine fish and fish habitat are unlikely to be significant.</p> <p>The Agency is satisfied that the impacts of rock/berm placement have been appropriately considered by the proponent and impacts to marine fish and fish habitat are unlikely to be significant.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
13	Kawawa-chikamach, Innu Nation, NCC, Unamen Shipu, Pakuashipi, Uashat mak Mani-Utenam (ITUM), Ekuanitshit, Qalipu	Caribou	Concerned with the possible impacts from the project on the Red Wine Mountain, Joir River, and Mealy Mountains herds (e.g., impacts on caribou movement, migration and habitat; increased predation; cumulative impacts).	<p>Less than 5-percent of caribou herd ranges in Labrador will be exposed to the effects the Project.</p> <p>For caribou, habitat loss or fragmentation and increased access, will continue over the life of the Project. Although the ROW is narrow, there will be improved access for off-highway vehicles which could cause the ROW to be avoided and to act as a permeable barrier to caribou. Movements across the ROW are expected to continue, although there may be a reduction in use of habitat in the vicinity of the ROW and a reduction in crossing frequency.</p> <p>Sensory disturbance effects are not likely to occur beyond 250 m of infrastructure or clearings during project operation. Anticipated disturbance along access roads is expected to decline to levels similar to, or slightly above, baseline wherever roads are decommissioned.</p> <p>Neither predator populations nor predation pressure on caribou are anticipated to increase as a result of the Project. Overall, the Project is not likely to result in significant adverse environmental effects on caribou.</p> <p>The cumulative effects assessment for caribou determined that the cumulative effects were not significant, with one exception [Red Wine Mountains Herd (RWMH)]. The effects of the Project are not expected to result in a further decline of the RWMH; therefore, the Project effects relative to baseline are not significant. However, in recognition of the present status of the RWMH, and that other activities and pressures such as poaching and predation may continue, its overall fate is likely one of continued decline with or without the Project. If these existing (pre-Project) factors remain unchecked, the cumulative environmental effects to the RWMH are predicted to be significant, but not a result of the Project effects.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to impacts to caribou.</p> <p>Taking into account the identified mitigation measures, NL concludes that impacts to the Mealy Mountains Herd (including Joir River subpopulation) are unlikely to be significant.</p> <p>The Project is predicted to result in a minor, adverse, but non-significant impact to the RWMH, which is listed as threatened under the <i>Species at Risk Act</i>. Recognizing that Nalcor would implement extensive mitigation measures to mitigate further impacts to the RWMH, they require consideration in light of cumulative effects. The Agency concludes that, taking into account cumulative effects of other projects and activities, the Project is likely to cause significant adverse environmental effects on the RWMH, even if the Project itself will only minimally contribute to these effects.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
14	NCC, Innu Nation, Ekuanitshit, Qalipu	Wildlife	Impacts to wildlife (moose, black bear, American marten, migratory birds) due to Project activities and footprint.	<p>Nalcor states that the Project is not likely to affect migratory routes or divert birds from traditional hunting areas. The amount of habitat altered or lost to the ROW and other Project components is likely to have minimal effects on avifauna populations at the regional level, considering specific mitigation and vegetation regeneration within the ROW. Disturbance during project construction may displace individual animals for the short to medium-term, depending on the activity type, but the regional distribution of avifauna is not likely to be affected. Nalcor predicts that the Project is not likely to result in significant adverse environmental effects on avifauna.</p> <p>The effects of the Project on moose were assessed indirectly in the assessment of caribou. Although development of the ROW will increase forage availability for moose, the increase will not be sufficient to result in an increase in moose population density.</p> <p>The greatest potential effects of the Project on furbearers, including black bear, are predicted to occur as a result of habitat alteration and loss during construction. Other interactions are related to increased human activity, noise, dust, light pollution, and increased access to previously remote areas. However, overall, the likely residual effects of the Project on furbearers are predicted to be not significant. No detectable change in population is likely to occur as a result of the Project. Mitigation and avoidance strategies to avoid impacts to American marten will be applied in consultation with NL Wildlife Division.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to impacts of the Project on wildlife.</p> <p>NL has reviewed information provided by the proponent and concluded that impacts to furbearers, including moose, black bear and marten, are unlikely to be significant.</p> <p>Environment Canada is satisfied with the information provided in reference to migratory birds and has concluded that the impacts of the Project on migratory birds are unlikely to be significant.</p> <p>Taking into account proposed mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect to furbearers and migratory birds.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
15	Innu Nation, NCC, Qalipu	Vegetation and Wetlands	<p>Concern over impacts to rare/uncommon (e.g. Boreal Felt Lichen) and valued plants (e.g. medicinal plants, food plants) and the lack of baseline information and traditional information on such species.</p> <p>Impact of equipment/machinery on wetlands during construction phase. Impacts on wetlands in general, including cumulative impacts.</p>	<p>Nalcor states that it has proposed appropriate mitigation, including continued consultation and surveys of areas of habitat with high potential to support listed plants. It has also agreed to mitigation specific to limiting the effects of the Project on wetlands. During the routing of the final ROW, Nalcor will avoid crossing wetlands and erecting towers within these areas, to the extent practical.</p> <p>AEK and Local Ecological Knowledge has been collected from consultation initiatives with Aboriginal groups in the Study Area. Sources of AEK include, but are not limited to, land use surveys, interviews, and open houses, reviews of existing published and unpublished literature and through the provision of information to Nalcor by an Aboriginal group or organization.</p> <p>The potential adverse effects of the Project on vegetation (including rare and valued plants and wetlands) are predicted to be not significant.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to impacts to vegetation, including wetlands and rare plants.</p> <p>Environment Canada provided several recommendations to Nalcor for avoiding impacts to wetlands and is satisfied that impacts are not likely to be significant.</p> <p>NL advises that, the proponent would be required to carry out pre-construction surveys, or any other work deemed essential by the Department of Environment and Conservation, to augment the current level of data regarding previously identified vegetation issues. This work would be submitted to the Department of Environment and Conservation prior to the commencement of any site specific construction activities. NL concludes that impacts to vegetation are unlikely to be significant.</p> <p>Taking into account mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect to vegetation.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
16	Innu Nation, Qalipu	Vegetation	Potential for the transmission corridor to facilitate the expansion of the range of invasive (plants) species.	<p>Nalcor has proposed mitigation to limit the potential for the spread of invasive plant species. This includes inspecting equipment for the presence of soil that could contain seeds and/or propagules of invasive and non-native species (prior to the commencement of construction). Equipment found to have soil attached will be cleaned (e.g., pressure washed) to remove the potential seed source. Nalcor will manage topsoil stripping within or near areas with existing non-native or invasive species populations to reduce the potential spread of these species, where practical.</p> <p>Nalcor predicts that the potential adverse effects of the Project on vegetation are unlikely to be significant.</p>	<p>Nalcor has provided information about the potential effects and mitigation measures relating to the potential for invasive species.</p> <p>The potential for invasive species to spread is recognized, taking into account potential activity along the ROW.</p> <p>NL has concluded that the potential for invasive species is not likely to cause a significant environmental effect to vegetation.</p> <p>Taking into account proposed mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect to vegetation.</p>
17	NCC	Wood Resources	Access to wood cleared from the transmission line ROW	<p>Nalcor's conclusion that the timber is non-merchantable is based on an assessment of where the timber is located (in remote locations along the ROW).</p> <p>Notwithstanding this conclusion, Nalcor is prepared to cooperate with a forestry operator who determined the wood to be merchantable, had appropriate permits from the Government of NL, and wished to remove it from the ROW.</p>	<p>Not within the scope of federal environmental assessment. Access to wood resources is an area of provincial responsibility; NL is aware that this issue has been raised.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
18	NCC	Navigation	Concern about disruption of boat travel along the coast during construction activities in the Strait of Belle Isle	<p>A Safety Zone of 500 m radius around the marine construction activities will be established, within which no other vessels will be permitted to operate. All Project-related vessels will be required to stay within the Safety Zone except when transiting to and from their home port or service base or to any onshore supply facilities. When transiting to and through the Strait of Belle Isle, these Project vessels will follow the existing Canadian Coast Guard voluntary traffic separation scheme. Beyond the Safety Zone(s), marine vessels unrelated to the Project will be able to transit the Strait of Belle Isle in accordance with the relevant regulations and vessel traffic procedures.</p> <p>A Vessel Traffic Management Plan will help to minimize the “footprint” of Project marine activities that might interfere with vessel traffic by ensuring their containment within relatively focused and prescribed areas. Through mechanisms such as the Canadian Coast Guard’s Notices to Shipping and the Canadian Broadcasting Corporation’s Fisheries Broadcast, Nalcor will ensure that all non-Project vessels operating in the Strait of Belle Isle are given advanced notice of planned construction work.</p> <p>As a result of the relatively small area that will be subject to Project-related marine construction work at any one time, the overall size of the Strait of Belle Isle area, the relatively short-term duration of cable and electrode construction activities in the marine environment (likely one season), and the proposed effects management measures, Nalcor predicts that project construction is not likely to result in measurably adverse effects on marine vessel activity in the Strait or around the L’Anse au Diable and Dowden’s Point electrode sites.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to navigation.</p> <p>Transport Canada has concluded that the Project is not likely to result in significant adverse environmental effects to navigation.</p> <p>Taking into account proposed mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect to navigation.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
19	Innu Nation, NCC	Visual Aesthetics	<p>Impacts on visual aesthetics/ viewsapes in terms of their land use, recreation and tourism values. Particular concern about visual impacts on the Kenamu River and analysis of the underground alternative to overhead transmission lines</p>	<p>Nalcor states that Project infrastructure and/or activities will not dominate the visual landscape of any area in such a way that causes an unacceptable change in the overall aesthetic character, quality, value and use of that location for the overall population.</p> <p>Nalcor considered the use of buried power transmission cables during early stages of project planning when it evaluated the option of routing the transmission system through Gros Morne National Park. It noted that two major issues arise with the buried approach: (1) the need to construct a suitable trench to receive the cable taking into consideration shallow soil and exposed bedrock along the route and (2) the logistical and operational concerns associated with shipping/ trucking the cable sections. In Nalcor's view, burying the transmission line for the Project would render it unfeasible, both technically and economically.</p> <p>In order to use existing access, including the existing TLH III crossing on the Kenamu, the transmission line is expected to cross the river approximately 200 m upstream of the existing bridge for the TLH III. Given the topography of the area, this represents the minimum distance achievable from the road. Nalcor expects the structures to be visible for approximately 1 km upstream and downstream of the crossing.</p> <p>Overall, Nalcor concludes that the Project is not likely to result in significant adverse effects on visual aesthetics.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to viewsapes and visual aesthetics.</p> <p>NL has reviewed the information provided by Nalcor and concluded that impacts of the Project to viewsapes and visual aesthetics are not likely to be significant.</p> <p>Taking into account proposed mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect to viewsapes and visual aesthetics.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
20	Ekuanishit, NCC, Innu Nation, ITUM, Qalipu	Traditional Land Use	<p>Impacts (both from Project and cumulative) on current land use (e.g., hunting, fishing, trapping, gathering) and occupancy. Failure to assess the nature, scope, depth, and strength of the rights and interests of First Nations in the Project area. Lack of baseline data on the historic and contemporary use of the project area by First Nation communities.</p>	<p>Nalcor has planned, offered and undertaken various consultation processes and activities with Aboriginal groups with the purpose of providing and receiving information on the Project and its potential environmental effects, and collecting AEK on the existing environment for incorporation into the EIS.</p> <p>Where community agreements were reached between Nalcor and an Aboriginal community the information collected from Phase I has been incorporated. Subsequent information received will be considered and incorporated, where relevant, in site specific mitigation and adaptive management measures during detailed design and routing.</p> <p>No known locations of cultural or spiritual importance to the Labrador Innu described in Armitage (2010) will be disturbed by the proposed Project. Available information and the results of consultation with other Aboriginal groups in Labrador and Québec have also not identified any cultural or spiritual sites that could be affected by the Project.</p> <p>Nalcor states that while Project activities will disrupt some users, the area affected is a small part of the territory used and there are other areas available to use. It is likely that the Project will not result in a decrease in use of the area by Aboriginal peoples for traditional purposes. The likely residual effect of the Project on the Aboriginal contemporary traditional land use was predicted to be not significant. Cumulative effects on land and resource use are predicted to be not significant.</p> <p>Nalcor states that the assessment of the nature, scope, depth, and strength of rights as well as similar determinations are not proponent responsibilities in an EA.</p>	<p>Nalcor has provided information about the potential effects and mitigation measures relating to current use of lands for traditional purpose by Aboriginal people.</p> <p>The Project may result in an increase in the use of the area due to increased access along the ROW</p> <p>Taking into account the implementation of the mitigation proposed, the Agency concludes that the Project is not likely to cause significant adverse environmental effects on the current use of land and resources for traditional purposes by Aboriginal peoples.</p> <p>Further consultation with Aboriginal groups will occur prior to issuance of federal permits as follows:</p> <ul style="list-style-type: none"> <li>• Any aerial cable installation over navigable waterways that results in an interference to traditional Aboriginal travel routes will be considered by Transport Canada during the regulatory phase and prior to the issuance of any <i>Navigable Water Protection Act</i> approvals.</li> <li>• During the regulatory phase, DFO will be consulting with Aboriginal groups prior to the issuance of <i>Fisheries Act</i> Authorizations.</li> </ul>



**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
21	ITUM, NCC, Innu Nation	Cumulative Effects – General	<p>Concern about cumulative environmental and socio-economic effects due to hydroelectric, mining, and forestry projects.</p> <p>Concern about the approach used in the EIS wherein the environmental effects of prior projects and activities are reflected in the existing baseline environment.</p>	<p>The cumulative effects assessment assesses and evaluates the overall (total) environmental effect resulting from the likely residual effects of the Project in combination with those of other relevant past, present and reasonably foreseeable future projects and activities. In doing so the cumulative effects assessment considers the effects of past and ongoing projects and activities as part of the pre-Project environment baseline, and integrally considers and incorporates this baseline — and the resulting current “condition” — into the environmental effects assessment;</p> <p>The projects and activities assessed in the cumulative effects assessment for each VEC were appropriate and are discussed in the EIS.</p>	<p>Nalcor has assessed the cumulative effects of the Project in combination with other projects and activities.</p> <p>In general, the Agency is satisfied with the proponent’s approach of considering the effects of past and on-going projects in the existing baseline for this Project.</p> <p>With respect to caribou in Labrador, NL states that monitoring data that could help inform the cumulative effects analysis about the impacts of the TLH III on caribou has been collected, but not yet analyzed. However, NL has advised that existing scientific literature can be used to inform the EA of the Project in the absence of local data.</p>
22	Innu Nation	Cumulative Effects – Noise	<p>Cumulative effects of sound from the Project and sound from projects and activities that overlap spatially and temporally with the Project.</p>	<p>Nalcor evaluated the cumulative noise effects resulting from the Project, the Lower Churchill Hydroelectric Generation Project and the TLH III. Due to the distance between the different projects and activities, and the location of receptors, the cumulative noise effects are predicted to be not significant.</p>	<p>Nalcor has provided information about the potential effects, mitigation measures and follow-up measures relating to noise from the Project.</p> <p>Health Canada concluded that due to their distance, the projects considered by the proponent (Lower Churchill Hydroelectric Generation Project and TLH III) are unlikely to substantially increase noise levels in the Project area.</p> <p>Taking into account proposed mitigation measures, the Agency concludes that the Project is not expected to result in a significant adverse environmental effect on noise levels.</p>

**Table 1: Summary of Concerns Raised by Aboriginal Groups continued**

#	Group	Subject	Comment or Concern	Summary of Proponent Response	Agency Response
23	Innu Nation	Human Health	Concern over electromagnetic radiation from the transmission line and its potential effects on human health.	<p>Nalcor states that project components will produce EMFs, which are a combination of electric and magnetic fields produced by electrically charged objects. EMFs from the Project will be within limits recommended by the Electrical Power Research Institute.</p> <p>The ROW is planned to avoid existing development and electromagnetic field intensity at the edges of the ROW will be consistent with accepted standards.</p> <p>Research findings to date on the health effects of EMF are often conflicting and have uncovered only weak and inconsistent associations between exposures to EMF and human health (see, for example, Connecticut Siting Council 2007, internet site; Feychting et al. 2005. Health Canada (2010) states, “when all of the studies are evaluated together, the evidence suggesting that EMFs may contribute to an increased risk of cancer is very weak”. The research has not established a causal relationship between exposure to magnetic fields and human disease, nor a plausible biological mechanism by which exposure to EMF could cause disease. The magnetic fields produced by electricity do not have the energy necessary to break chemical bonds and cause DNA mutations (PSC Wisconsin 2010, internet site). In addition, the Federal-Provincial-Territorial Radiation Protection Committee (Health Canada 2008) states ‘that there is insufficient scientific evidence showing exposure to EMFs from power lines can cause adverse health effects such as cancer. Therefore, a warning to the public to avoid living near or spending time in proximity to power lines is not required.”</p>	<p>Nalcor has provided information about the potential effects of EMF on human health.</p> <p>Health Canada confirmed that no adverse human health effects were anticipated based on the estimated electric and magnetic field intensities beneath and adjacent to the proposed transmission line. Estimated EMF levels throughout the transmission line are mainly dc (static) and well within science-based international EMF exposure guidelines.</p> <p>It is Health Canada’s position that there is no compelling scientific evidence that EMFs in living and school environments, regardless of locations from power transmission lines, cause ill health such as cancer. This position is consistent with the overall opinions from most national and international scientific bodies.</p> <p>The Agency concludes that there are unlikely to be significant adverse environmental effects associated with electromagnetic radiation from the Project.</p>
24	NCC	Monitoring and Follow-Up	Need to ensure Aboriginal & community environmental monitors are in place.	Nalcor will provide information and updates to Aboriginal groups and organizations regarding ongoing and planned Project activities, including follow up programs.	Further consultation with Aboriginal groups will occur prior to the issuance of authorizations related to fish and fish habitat under the <i>Fisheries Act</i> .

## References

Connecticut Siting Council. 2007. *Electric and Magnetic Fields Best Management Practices for the Construction of Electric Transmission Lines in Connecticut*. Approved on December 14, 2007. Retrieved April 11, 2013 from <http://tinyurl.com/ckkfv67>

Feychting, M., A. Ahlbom and L.Kheifets. 2005. EMF and Health. *Annual Review of Public Health*. 26: 165-189. Retrieved April 11, 2013 from <http://www.annualreviews.org/doi/abs/10.1146/annurev.publhealth.26.021304.144445>

Health Canada. 2008. *Federal-Provincial-Territorial Radiation Protection Committee – Canada Response Statement to Public Concerns Regarding Electric and Magnetic Fields (EMFs) from Electrical Power Transmission and Distribution Lines*. Retrieved April 11, 2013 from <http://www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/emf-cem-eng.php>

Health Canada. 2010. *Electric and Magnetic Fields from Power Lines and Electrical Appliances*. Retrieved April 11, 2013 from <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php>

Public Service Commission of Wisconsin. *Environmental Impacts of Transmission Lines*. Retrieved April 11, 2013 from <http://psc.wi.gov/thelibrary/publications.htm>

## Appendix D

### *Summary of Mitigation Measures*

The following list includes measures that the Canadian Environmental Assessment Agency considers necessary to mitigate the environmental effects of the Labrador-Island Transmission Link Project (the Project). Mitigation measures in relation to accidents and malfunctions are listed in a separate appendix (Appendix E).

Note that Nalcor has agreed to implement additional mitigation described in its environmental assessment documents (e.g., Environmental Impact Statement [EIS], responses to Information Requests) and/or additional mitigation may also be articulated in authorizations that may be issued by the federal or provincial governments.

#### *Atmospheric Environment*

- Assess activities that generate airborne dust and implement corrective actions to ensure that dust emission remain below ambient standards for particulate matter. Such actions could include avoidance of certain activities when conditions are unfavourable, use of dust suppressants, windbreaks.
- Minimize engine idling and conduct environmental awareness training with key contract personnel.
- Minimize haul distances for construction material (C)<sup>17</sup>.
- Use well-maintained equipment with quality mufflers.
- Place high noise-producing construction equipment as far away as practical from receptors (C).
- Use blasting mats in environmentally sensitive areas as defined in the Environmental Protection Plan (EPP) (C).
- Limit the size of explosive charges to the requirement of blasting activity (C).

- Ensure noise levels at horizontal directional drilling sites remain below Health Canada's acceptable criteria (e.g., related to change in the percentage highly annoyed) using mitigation such as the strategic placement of equipment away from noise-sensitive receptors combined with partial or full enclosures, noise attenuating barriers, limiting the operation of ancillary equipment (e.g., trucks, heavy equipment) during night hours, quieter equipment (as available), proper equipment maintenance, on-going communication with potentially affected receptors, and possible temporary relocation of affected residents (C).
- Address complaints regarding noise on a case by case basis and investigate mitigation options, including temporary relocation during high sound generating construction activities (i.e. blasting).
- Complete inspections, maintenance and/or repairs as quickly and efficiently as safety allows.
- Ensure proper handling and storage of fuels and fire suppression systems available as per the EPP.

#### *Vegetation*

- In relation to the siting of Project components that will occur "on the ground" during project construction, site these to limit disturbance to sensitive vegetation communities (e.g., wetlands, riparian shorelines, listed plant habitats), communities difficult to reclaim, or of stakeholder or management concern (i.e., uncommon Habitat Types, limestone barrens) (C).
- Maximize the use of existing trails, roads, and cut-lines and minimize development of new access (C).
- Restrict ground travel within the ROW to existing and/or approved trails.
- Clear trails to the width of the vehicles that will use them, as safety allows (C).
- After construction, return disturbed areas not required for operations/maintenance to comparable land use capability (C).

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<sup>17</sup> C represents mitigation specific to the construction phase of the Project.

- For clearing of vegetation (C):
  - cut vegetation within 150 mm of the ground;
  - cut vegetation exceeding 2 m at maturity;
  - fell trees onto the ROW away from standing forest and water bodies;
  - selectively clear vegetation from the ROW to secure the transmission line (i.e., ensure there are no danger trees that could affect the operation of the line);
  - clear, de-limb, and pile merchantable timber at a right angle to, but within the ROW; and
  - pile tree tops, limbs, brush and debris along the edge of the ROW or use for brush mats.
- Do not grub within 2 m of standing timber (C).
- Do not grub in saturated conditions, during or immediately following a precipitation event. Where appropriate, re-spread or stockpile grubbed materials and leave as many stumps and roots as possible on the ground surface (C).
- Limit the time that grubbed areas are left exposed to natural elements to prevent surface run-off and erosion (C).
- Implement erosion and sediment control measures (e.g., surface water diversion ditches, silt fences, stone or brush cover, erosion control fabrics, settling ponds and drainage channels) in areas prone to soil loss (C). Inspect and maintain required erosion control measures installed during or after construction (O&M<sup>18</sup>).
- Ensure a 6.5 m break between slash piles at least every 200 m to facilitate drainage and wildlife passage (C).
- Maintain vegetation buffer zones, established at environmentally sensitive areas during construction, and only remove danger trees from these areas (O&M).
- Prior to the commencement of construction, inspect equipment for the presence of soil that could contain seeds and/or propagules of invasive and non-native species. Clean equipment found to have soil attached (e.g., pressure washed) to remove the potential seed source. In addition:
  - wash equipment in or near Deer Lake if it has been used on the Northern Peninsula or in western Newfoundland and is traveling east by road (i.e., from Western Newfoundland to Eastern Newfoundland);
  - wash equipment being moved along the ROW from areas north or west of where the line crosses the TransCanada Highway at Birchy Lake to areas east or south of the TransCanada Highway (i.e., to Central and Eastern Newfoundland); and
  - wash equipment at point of arrival, if arriving from out of province.
- Manage topsoil stripping within or near areas with existing non-native or invasive species populations to reduce the potential spread of these species, as technically and economically feasible (C).
- Use non-residual herbicides<sup>19</sup> in all cases and mechanical methods, where practical, for vegetation control. Application by qualified, trained personnel (O&M).
- Apply buffer zones, for foliar treatment, to all water bodies, private land, wells and human habitation (temporary or permanent). At water bodies, buffers would be 30 m to 50 m depending on the slope, while buffers for wells, private land and human habitation would be 50 m.
- Use the cut and stump method of managing vegetation (cutting target species and applying herbicide to stumps to prevent re-sprouting) in sensitive areas.
- Do not apply herbicides in Protected Public Water Supply Areas, private or provincial parks, ecological reserves, or on private lands without permission of the owner.
- Examine, discuss with Newfoundland and Labrador and apply access control measures (e.g., signage, gates) to address off-highway vehicles use of access roads and trails (O&M).
- Ensure spill kits and trained personnel are present on-site at all times.

<sup>18</sup> O&M represents mitigation specific to the operations and maintenance phase of the Project.

<sup>19</sup> E.g., Tordon 101 with Sylgard 309 as a surfactant

### *Listed Plants or Regionally Uncommon Plants*

- Consult with Newfoundland and Labrador Department of Environment and Conservation (NLDEC) regarding siting, routing and/or mitigation strategies for Project infrastructure in the vicinity of known listed plants or species of concern.
- Follow corridor alternative A4 to avoid habitat for Long's Braya
- Adhere to federal and provincial guidelines and/or management plans relating to listed or regionally uncommon plants, unless otherwise approved by appropriate regulatory agencies.
- When known occurrences of listed plants and/or important habitat cannot be avoided, conduct pre-construction surveys. Develop, in consultation with federal and provincial regulators, species and site-specific mitigation for listed or regionally uncommon plants. The following measures could be used (C):
  - flag known locations of plants prior to construction and avoid to the extent practical;
  - clear vegetation by hand and minimize the area of disturbance (e.g., stripping of trenchline only through limestone barrens);
  - retain qualified botanist to assist in the development/implementation of appropriate mitigation strategy if a listed plant is located;
  - schedule construction outside of the normal growing season and during periods of increased snow cover; and
  - maximize the harvesting of seeds or transplant material collected for reclamation of specific listed plants.
- Do not use herbicides within 30 m of known locations of listed species and their habitat (O&M).

### *Wetlands*

- Apply setbacks and buffers for water bodies and wetlands for specific activities (e.g., refueling, vegetation clearing) (C).

- If construction is required in wetland areas, conduct the work in winter, fall, late summer, summer, spring (in order of preference), as technically and economically feasible (C).
- Only operate and transport construction equipment through wetlands necessary to install towers within wetlands; all other equipment will use an alternate route (C).
- Design construction site drainage features such that wetland hydrology is maintained, to the extent possible. Direct discharge of storm water, wastewater, or diversion of surface water during construction away from wetlands, unless it is intended to maintain pre-construction hydrology (C).
- Do not discharge silt-laden, contaminated or nutrient-enriched water (e.g., sewage) to wetlands (C).
- Salvage and store the upper organic layer of organic material for restoration purposes where construction is required within a wetland (C).
- Install silt fences on approaches to wetlands, as appropriate (e.g., unless it was determined that siltation would not be an issue or if the site location was not suitable (e.g., steep slope) for the installation of a silt fence) (C).
- Use swamp mats, rather than corduroy bridges, for crossing wetlands.

### *Terrestrial Wildlife and its Habitat*

- Restrict ground travel to existing and/or approved travel routes (O&M).
- In conjunction with NL, set and adhere to speed limits protective of wildlife.
- Conduct a visual reconnaissance three hours prior to any blasting to establish the presence of furbearers, avifauna or large mammals such as moose and caribou; delay blasting until wildlife have been allowed to leave the area on their own accord (note: where a delay could result in a critical delay for the Project schedule, in consultation with NLDEC, Nalcor may encourage wildlife to leave an area) (C).

- Make active work areas and access roads off limits to unescorted non-Project personnel (C).
- Develop, in discussion with NLDEC Wildlife Division, access control measures to manage public off- highway vehicle use of corridor roads and trails.
- Ensure that no harvesting of wildlife- and no feeding of wildlife take place during working hours.
- Limit haul distances for construction material (C).
- Keep work areas clean and organized at all times (e.g., collect and dispose of waste).

### *Caribou*

- Install signage to indicate crossing areas in known caribou crossing areas (C).
- Limit new access roads and decommissioning roads following construction.
- Based on the results of the follow-up program, implement access control measures to limit off-highway vehicle access along the right of way as appropriate and recommended by NLDEC.
- Work with NLDEC Wildlife Division to identify further mitigation to avoid impacts to caribou during sensitive calving/post-calving season.
- Develop a site-specific management plan relating to caribou, prior to and during project construction in consultation with NLDEC (C).
- Avoid conducting non-essential activity in Primary Core area in Newfoundland during the sensitive calving and post-calving season.

### *Caribou – Labrador Only*

- Realign part of the transmission line along the existing South Side Access Road to the Muskrat Falls site to eliminate the creation of new access in the range of the Red Wine Mountain Herd.
- Maximize the parallel placement of the transmission corridor in Labrador with the Trans Labrador Highway Phase 3 (approximately 200 km) rather than cutting through in-land territory.
- Based on the results of the follow-up program, mitigate the environmental effects of the Project on caribou, such as potential impacts on caribou movement, mortality or disturbance, in collaboration with NL wildlife.

### *Furbearers*

- Consult with the NLDEC Wildlife Division regarding final routing of the ROW and final project component siting in the vicinity of known marten habitat, particularly within the Northern Peninsula (C) using detailed imagery of terrain and vegetation cover.
- Minimize the amount of primary and secondary habitat traversed, and identify areas where other mitigation options (e.g., restricting the width of the ROW or leaving slash piles within the ROW to provide security areas for marten) would be implemented (C).
- Do not clear hardwood vegetation within 30 m of waterbodies occupied by beaver, unless clearing is required for electrical line clearance (C).
- Remove culverts from water crossings of access roads not required for operations and maintenance so as not to attract beaver (C).

### *Avifauna*

- Implement and design an avifauna management plan to address vegetation clearing and reduce the possibility of inadvertent destruction of the nests and eggs of migratory birds (C).
- Conduct nest searches prior to clearing if clearing activities are conducted during the breeding season of non-raptor migratory birds, and maintain a 30 m buffer around active nests during construction activities (C).
- Utilise data on the location of known high concentrations of waterfowl in the final ROW alignment and access routing (C).
- For the transmission line ROW, maintain a vegetated buffer extending 30 m from the water's edge to protect known waterfowl staging areas (C).
- Ensure that construction activities do not take place from May 1 to July 31 within the immediate vicinity of locations where breeding pairs of Harlequin ducks have been recorded (C).
- Adjacent to rivers that support breeding Harlequin duck, ensure that operations and maintenance activities do not take place in the vicinity (e.g., 500 m) of breeding pair locations during May 1 to July 31 (O&M).

- Conduct a pre-construction survey to identify raptor nests (e.g., Bald eagle, Osprey and others if detected) (C).
- Do not clear within 800 m of an active raptor nest during the nesting period (May 15 to July 31) unless clearing is delayed until the nest is no longer occupied; and, do not conduct clearing within 200 m of an active raptor nest during the non-nesting season (C).
- Where nests must be cleared, implement mitigation involving placement of artificial nests, if appropriate, in consultation with the NLDEC Wildlife Division (C).
- Schedule annual maintenance activities that would be located within 200 m of a known active raptor nest to avoid the sensitive period for that species (O&M). Ensure that work within 200 m of an active raptor nest is preceded by discussion with provincial authorities.
- Do not establish permanent or temporary camps within 800 m of an active raptor nest (C).
- Conduct regular inspection and maintenance on permanent watercourse crossing structures (O&M).
- Place bridges entirely above the high water mark, do not locate bridges on meander bends, braided streams, alluvial fans, active flood plains, or any other inherently unstable area, and install bridges perpendicular to the watercourse (C).
- Stabilize approaches to fording sites (e.g., by use of swamp mats, corduroy), as appropriate, to avoid rutting (C).
- Implement a minimum of 20 m buffer zone around watercourses and waterbodies.
- Construction activities should be scheduled to avoid sensitive periods / habitat for fish.
- Cease construction in waterbodies or watercourses during heavy precipitation events.
- Do not deposit trees, logs, slash, brush or debris in (or on, if frozen) water bodies nor dispose of within 30 m of the high water mark (C).
- Install and maintain sediment traps / siltation control structures (i.e., silt curtains, sediment fences) and drainage collectors at appropriate locations.
- Install a temporary timber bridge as technically and economically feasible to minimize siltation.
- Inspect equipment to confirm it is in proper working order prior to each ford.
- When working in riparian the primary method of vegetation clearing shall be by hand (C).
- Machinery for removing riparian vegetation, shall be operated in a manner that minimizes disturbance to the banks of water bodies and restore banks to their original or stable condition (C).
- Conduct blasting operations near a watercourse in accordance with the *Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador* (C).
- Vegetate mineral soils exposed as a result of surface disturbance within riparian areas with native plants, and cover these with mulch to prevent soil erosion and encourage seed germination. If there is insufficient growing season remaining, stabilize the site and vegetate the following spring (C).

### ***Freshwater Fish and Fish Habitat***

- Conduct site evaluations (e.g., stream morphology, substrate, water velocity, depth, bank slope) of selected watercourse crossings during final route selection to determine optimal crossing locations (C).
- Maximize the use of bridges or culverts on larger and/or steeper-banked watercourses.
- Restrict crossings to a single location and cross at right angles to the waterbody, as technically and economically feasible.
- Choose crossing locations (including fording, culverts and bridges) where the banks and substrate are not sensitive to erosion. If a crossing must occur where the banks of the watercourse or waterbody are sensitive to erosion, modify the bank to minimize the potential for erosion.
- At watercourse crossings, reduce the width of the cleared ROW to 3 m for a minimum 20 m distance away from the shoreline. Apply the reduced ROW width to the entire buffer zone if greater than 20 m (C).
- Minimize the number of water crossings to avoid disturbance within waterbodies.



- Do not fuel or maintain equipment and machinery within 50 m of a watercourse or water body, wetland, or flood-prone area.
- Ensure spill kit and trained personnel are present on-site at all times.
- Ensure appropriate storage and handling of fuels and hazardous or controlled products including storing fuels and oils at least 100 m away from any surface water (C).
- Maximize the use of biodegradable lubricants and hydraulic fluids when working near waterbodies.
- Enforce a ‘no-harvesting’ policy during working hours for all Project personnel.

### ***Marine Fish and Fish Habitat (including Marine Mammals, Sea Turtles, Seabirds)***

- Mitigate lost habitat through appropriate fish habitat compensation measures approved by Fisheries and Oceans Canada (C).
- Do not sweep cable corridor prior to cable installation (C).
- Employ controlled rock placement with a fall pipe to minimize the amount of habitat coverage (C).
- Use chemically-benign rock for berm construction (C).
- Maximize the recovery of drill mud from the bore holes and conduit (C). Recycle drill mud and dispose of the cuttings on land (C).
- Maximize the use of silt curtains during construction at shore electrode sites (C).
- Confine the electric field to the inside of the cable using cable armouring and insulation (O&M).
- Use rock berm to serve as partial barrier to the electromagnetic field (EMF) generated by the cable (O&M).
- Ensure that the submarine cables are located in water greater than 60 m in depth.
- Use rock breakwater berm at each electrode site as a barrier for invertebrates and fishes (O&M).
- Design electrodes to minimize electric and magnetic fields (e.g., through design, materials, surface area, low resistivity surroundings) (O&M). Design the ground potential rise gradient on the seaside of the electrode breakwater to be less than 1.25 V/m.

- Minimize contact area between the shoreline saltwater pond and the breakwater to create a safe voltage gradient on the sea side of the breakwater (O&M).
- Design electrodes to result in low levels of electric current under normal conditions (bipolar) (O&M).
- Design electrode system to require less than 40 hours per year of monopolar operations (100-percent).
- Utilize a Marine Mammal Observer during marine cable installation (C).
- Ensure that Project vessels maintain constant course and speed whenever possible and detour around Marine Mammals and Sea Turtles, as technically and economically feasible.
- Maintain equipment to ensure that noise control devices such as engine mufflers are working to specification (C).
- Minimize construction time to decrease exposure to vessel noise (C).

### ***Marine Birds***

- Conduct daily monitoring for stranded seabirds through searches of decks, and recovering and releasing stranded birds to the sea (C).
- Note incidents related to effects on seabirds (e.g., stranding) or other marine wildlife species and address issues appropriately through an adaptive management process.
- Ensure spill kits and trained personnel are present on-site at all times, and develop spill prevention and response plans (C).
- Outfit, operate and maintain vessels to limit the potential for inadvertent releases of contaminants (e.g., oil) including implementation of proper protocols to avoid accidental introduction of potentially deleterious substances to the marine environment (C).

### ***Current Use of Land and Resources for Traditional Purposes/Land Uses***

- Continue to use information collected during past and ongoing discussions with potentially affected Aboriginal groups and communities to

avoid conflicts with contemporary land use for traditional purposes.

- Consider and incorporate traditional land use information from on-going land and resource use studies under current community engagement agreements (i.e., with NunatuKavut Community Council, Pakuashipi and Unamen Shipu).
- Assess any new relevant information, as it becomes available, regarding contemporary traditional land use activities of the Quebec Innu of Uashat mak Mani-Utenam, Matimekush-Lac John, Nutashkuan, Ekuanitshit and the Naskapi Nation of Kawawachikamach.
- Advise communities of locations of the ROW scheduled for vegetation management via signage in the right of way and notification of municipal governments whose boundaries encompass treatment and storage areas.
- Place the electrode line on the HVdc transmission towers from the Muskrat Falls converter station to the Straits area, rather than constructing a wood pole line in Southeastern Labrador.

Note: Measures proposed to mitigate project impacts on other components of the environment, would also mitigate potential impacts on the current use of land and resources for traditional purposes by Aboriginal persons (e.g., measures to limit disturbance and habitat alteration or loss).

### *Land Uses*

- During detailed design and planning, work with any commercial outfitter with an existing, active hunting and / or fishing camp located within the proposed transmission corridor, or within 5 km of it or of the planned location of any other permanent Project component (C);
- Use other standard effects management measures, such as (C):
  - use only essential vehicles along the transmission line to limit noise (C) and
  - limit access to only approved routes and specific vehicles (C).
- During detailed planning and design, use the following measures to limit the effects of the Project on the visual landscape (C):

- avoid visually sensitive areas (e.g., Gros Morne National Park); (C)
- construct in remote, uninhabited areas; and (C)
- retain a vegetative buffer zone at watercourses and major highway crossings as technically and economically feasible (C).
- Maximize the use of existing access roads and trails (C).
- Use existing industrial sites and other developed areas for key Project components.
- Extract borrow material from existing operational quarries and from within the ROW wherever practical (C).
- Route and design the Project to avoid direct physical interaction with existing protected areas. Work with the Newfoundland and Labrador Natural Heritage Branch, Parks and Natural Areas Division, and other organizations during detailed engineering design and planning in order to avoid or reduce any potential interactions with protected areas that will occur within 1 km of the transmission line, and in order to incorporate any available information regarding proposed protected areas (C).
- Consult with the International Appalachian Trail – Newfoundland and Labrador (IATNL) to discuss the specific routing and tower placement for the Project as engineering progresses, to reduce visual issues in key areas where technical and cost considerations facilitate this.
- Minimize interference with traplines or associated equipment (O&M).

### *Historic and Heritage Resources*

- Map and use information on known Historic and Heritage Resources during the planning and design phase of the Project. Consult with the Provincial Archaeology Office (PAO) during detailed Project design (C).
- Conduct an historic resources field survey of those sections of the selected ROW that cross through identified high potential areas. Plan the specific nature and locations of such surveys in consultation with the PAO (C).

- In the event that unregistered Historic and Heritage Resources are discovered, implement the Historic and Heritage Resources contingency and response measures included in the EPP. Halt work immediately at that location, notify the PAO and, if requested, initiate a Stage 1 Historic Resources Overview Assessment (C).
- If Historic and Heritage Resources cannot be avoided through Project design, undertake mitigation in the form of Systematic Data Recovery in full consultation with the PAO and in accordance with provincial guidelines<sup>20</sup> (i.e., appropriate excavation, documentation, salvage and retrieval and conservation of materials, followed by analysis and report preparation) (C).
- Identify any known Historic and Heritage Resources within 100 m of planned Project activities, and make these sites known to supervisory personnel. Maintain a 50 m “no work” buffer around all known Historic and Heritage Resources sites (C).
- Include briefings related to Historic and Heritage Resources in the orientation and training programs provided to construction personnel, including information on the avoidance of known sites, site and artefact recognition, the importance and value of such resources and their preservation, and the protection and contingency measures to be implemented in the event of an accidental resource discovery (C).
- Where Project components are constructed in an area known to have high potential to contain palaeontological resources, undertake periodic inspections of disturbed areas by qualified palaeontologists to limit the potential for disturbance of fossils and the loss of any information they may provide (C).
- Continue to consult with relevant Aboriginal communities and organizations, to further understand any sites of cultural-historical importance or other Historic and Heritage

Resources that may be located within or near planned Project activities. Consider information made available through such consultation during ongoing Project design and eventual implementation, and keep Aboriginal groups informed as Project work progresses.

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<sup>20</sup> Government of Newfoundland and Labrador. 1992 – *Historic Resources Impact Assessment Guidelines*. Culture and Heritage Division, Department of Tourism, Culture and Recreation. St. John's.

## Appendix E

### Accidents and Malfunctions

The following list includes measures that the Canadian Environmental Assessment Agency considers necessary to mitigate the environmental effects associated with accidents and malfunctions.

Type of Potential Incident	Potential Environmental Interactions	Mitigation Measures
Transmission Tower Failure	<ul style="list-style-type: none"> <li>• collision with wildlife</li> <li>• ignition of a brush or forest fire</li> <li>• electrocution of fish and / or wildlife</li> <li>• disturbance of wildlife along the access trails, roads and right-of-way during repairs</li> <li>• risk to public safety</li> </ul>	<ul style="list-style-type: none"> <li>• design towers in accordance with Canadian Standards Association standards and guidelines</li> <li>• install anti-cascade towers at 15 to 20 tower intervals</li> <li>• design towers to withstand loadings associated with a 50-year return period meteorological event</li> </ul>
Electrocution	<ul style="list-style-type: none"> <li>• human injury or death</li> <li>• wildlife (e.g., bird) injury or death</li> </ul>	<ul style="list-style-type: none"> <li>• design towers to Canadian Standards Association standards</li> <li>• high voltage signage for Project components</li> <li>• restrict public access to electrodes/converter stations</li> <li>• avian-safe separation of energized and/or grounded parts of the power line</li> <li>• protect submarine cable using horizontal directional drilling and cover with rock berm</li> </ul>
Spills and Leaks of Hazardous Material	<ul style="list-style-type: none"> <li>• surface water contamination interactions with fish and aquatic habitats</li> <li>• groundwater contamination interactions with human health if material reaches an aquifer used for human consumption</li> <li>• wildlife mortality, wildlife habitat/vegetation alteration, loss or fragmentation</li> <li>• soil contamination</li> </ul>	<ul style="list-style-type: none"> <li>• fuel handling and storage to comply with all relevant legislation and regulations</li> <li>• Environmental Protection Plan (EPP) to include spill response procedures</li> <li>• spill response kits at all work sites</li> <li>• engage response team in “mock responses”</li> <li>• store waste oil in drums inside dyked area and ship regularly for disposal</li> <li>• prior to fording streams, inspect equipment to confirm that it is mechanically sound</li> <li>• report all in-water spills or leaks to the Canadian Coast Guard for referral to the proper authority</li> <li>• report on-land spills or leaks to NL Government Services Centre</li> </ul>
Frac-Out (release of drilling mud into the surrounding environment) during Horizontal Directional Drilling	<ul style="list-style-type: none"> <li>• terrestrial frac-outs – may result in localized alteration or loss of listed plants</li> <li>• marine frac-out – fine bentonite particle interaction with fish eggs, benthic invertebrates and marine plants</li> </ul>	<ul style="list-style-type: none"> <li>• selection of drill sites considered locations of sensitive plants and habitat</li> <li>• drill sites selected through 2011 pre-drilling geotechnical assessment</li> <li>• drill path location and depth designed to minimize potential for frac-out</li> <li>• have readily accessible clean-up material and equipment</li> <li>• prepare frac-out response plan</li> <li>• marine frac-out : monitor to determine if drilling mud congeals (and seals the frac-out); if not, mud may be contained with underwater boom/curtain</li> <li>• terrestrial frac-out: contain drilling mud with hay bales, sand bags or silt fencing, then pump into the return pit; if vegetated area is affected, reclamation would include measures to promote natural revegetation of area</li> </ul>

**Appendix E: Accidents and Malfunctions table continued**

Type of Potential Incident	Potential Environmental Interactions	Mitigation Measures
Slope Failure	<ul style="list-style-type: none"> <li>• wildlife habitat alteration or loss</li> <li>• wildlife disturbance or mortality</li> <li>• alteration or loss of vegetation cover</li> <li>• change in surface water runoff patterns could affect water quality and fish habitat</li> <li>• siltation of marine or freshwater habitat</li> <li>• loss of infrastructure and / or land use</li> <li>• risk to public safety</li> </ul>	<ul style="list-style-type: none"> <li>• site Project away from unstable terrain</li> <li>• employ slope stabilization measures</li> <li>• EPP describes slope stabilization and erosion control procedures</li> <li>• conduct geotechnical investigations to prevent slope failure</li> <li>• design foundations and guy anchors in consideration of potential for slope instability</li> <li>• design drainage measures with consideration of seasonal and post- construction requirements</li> <li>• slopes flattened and include revetment with riprap stone at electrode sites</li> </ul>
Fires (including Forest Fires)	<ul style="list-style-type: none"> <li>• reduced air quality (from particulate matter and other contaminants)</li> <li>• wildlife habitat alteration or loss</li> <li>• vegetation alteration or loss</li> <li>• loss of infrastructure and / or land use</li> <li>• risk to public safety</li> <li>• change in surface water run-off patterns could water quality and fish habitat</li> <li>• change in landscape visual aesthetics</li> <li>• disruption to recreational use</li> </ul>	<ul style="list-style-type: none"> <li>• handle flammable materials in accordance with applicable legislation and regulation</li> <li>• no burning of slash or debris</li> <li>• store fire-fighting equipment on site (and train field personnel to use it)</li> <li>• have a fire alarm and suppression system at converter stations</li> <li>• designate smoking areas</li> <li>• fire-fighting equipment and describe procedures in Safety, Health and Environmental Emergency Response Plan (SHERP) and the EPP</li> <li>• field personnel trained in use of fire-fighting equipment and available for immediate response</li> </ul>
Waste Management Incidents	<ul style="list-style-type: none"> <li>• surface water contamination interactions with fish and aquatic habitats</li> <li>• interactions with human health if the material reaches an aquifer used for human consumption</li> <li>• wildlife habitat/vegetation alteration or loss</li> <li>• soil contamination</li> </ul>	<ul style="list-style-type: none"> <li>• EPP will describe procedures for waste management</li> <li>• disposal will comply with legislation</li> <li>• comply with applicable regulations under the federal <i>Transportation of Dangerous Goods Act</i></li> <li>• waste management on marine vessels to comply with the requirements of the <i>Canada Shipping Act, 2001</i></li> </ul>
Motor Vehicle Collisions	<ul style="list-style-type: none"> <li>• human injury or mortality</li> <li>• wildlife injury or mortality</li> <li>• wildlife disturbance</li> <li>• destruction of nests or dens</li> </ul>	<ul style="list-style-type: none"> <li>• prepare SHERP with safety measures for vehicles, including collision prevention</li> <li>• driver/operator awareness programs including awareness of high potential collision circumstances</li> <li>• speed restrictions on Project roads</li> </ul>
Marine Vessel Collisions	<ul style="list-style-type: none"> <li>• human injury or mortality</li> <li>• wildlife injury or mortality</li> <li>• wildlife disturbance</li> <li>• loss of habitat</li> <li>• effects on marine water quality</li> </ul>	<ul style="list-style-type: none"> <li>• prepare SHERP with safety measures for vessels (e.g., prevention of wildlife collisions)</li> <li>• vessel operator awareness programs</li> <li>• define safety zones</li> <li>• simultaneous operations procedures and processes</li> <li>• adhere to Vessel Traffic Management Plan</li> <li>• comply with applicable regulations under the <i>Canada Shipping Act</i> (i.e., Collision regulations)</li> </ul>
Aviation Accidents	<ul style="list-style-type: none"> <li>• human injury or mortality</li> <li>• wildlife injury or mortality</li> <li>• loss of wildlife habitat</li> <li>• loss of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• comply with Canadian Aviation Regulations</li> <li>• consult with the Department of National Defence (e.g., briefings)</li> </ul>

## Appendix F

### Follow-Up Program Requirements

The following requirements have been identified by the Canadian Environmental Assessment Agency for the Labrador-Island Transmission Link Project (Project) follow-up program (Table 1). Responsible authorities would be responsible for ensuring the design and implementation of the follow-up program under the former *Canadian Environmental Assessment Act*. Additional requirements for follow-up may be articulated in authorizations that may be issued by the federal or provincial governments.

**Table 1: Follow-Up Program**

VEC or Key Indicator	Description	Timing/Duration	Location	Reporting to
Atmospheric Environment (noise-levels)	<p>Assess noise during horizontal directional drilling to determine whether Health Canada's acceptable criteria are being exceeded.</p> <p>Adaptive Management: If required, implement mitigation (e.g., sound barriers, berms) within a reasonable amount of time to ensure noise levels remain below Health Canada's acceptable criteria. Complaint logs are to be kept which will include the time/date of any complaints and the time/date of their resolution, including any additional mitigation implemented as a result of complaints.</p>	Construction	Fortreau Point (Labrador) and Shoal Cove (Newfoundland) where acceptable criteria could be exceeded.	Health Canada
Caribou	<p>Develop a follow-up program that is acceptable to the NL Department of Environment and Conservation (Wildlife Division) to monitor potential impacts of the Project to caribou in Labrador. At a minimum, this program should include monitoring of:</p> <ul style="list-style-type: none"> <li>• off-highway vehicle use within the ranges of the Red Wine Mountains Herd and Mealy Mountains Herd in Labrador</li> <li>• caribou use of the Project area within the ranges of the Red Wine Mountains Herd and Mealy Mountains Herd in Labrador</li> <li>• caribou crossing of the Project right of way in Labrador</li> </ul> <p>Adaptive Management: Based on the outcomes of the follow-up program, Nalcor should implement adaptive management measures, as appropriate and recommended by the NL Department of Environment and Conservation (Wildlife Division) (e.g., access control measures to limit off-highway vehicle access).</p>	Construction and operations	Labrador	NL Department of Environment and Conservation (Wildlife Division)
Caribou	Continue to participate on the Labrador Woodland Caribou Recovery Team and support related research, such as the telemetry monitoring program.	Construction and operations	Labrador	NL Department of Environment and Conservation (Wildlife Division)

VEC or Key Indicator	Description	Timing/ Duration	Location	Reporting to
Marten	<p>Investigate effects of right-of-way (ROW) construction and operation on marten habitat use utilizing a before-after control-impact experimental design including:</p> <ul style="list-style-type: none"> <li>• collection of baseline data on marten movement through the area</li> <li>• recording of marten movement patterns during and after ROW construction to determine how these activities affect marten habitat use, particularly whether or not the cleared ROW acts as a barrier to marten movement</li> <li>• determining the efficacy of watercourse buffer zones and brush piles and windrows as travel routes for marten; and</li> <li>• investigate the efficacy of modified vegetation management techniques, should these be adopted to help facilitate marten movement across the ROW.</li> </ul> <p>Work with NL Department of Environment and Conservation (Wildlife Division) to design an appropriate study which could include winter track counts.</p>	Pre-construction, construction, and operations	Main River Marten Core Area (Newfoundland)	NL Department of Environment and Conservation (Wildlife Division)
Furbearers Land and Resource Use	<p>Assess the degree of public access afforded by the ROW and access roads by means of aerial survey. The presence and abundance of snowmobiles and snowmobile tracks would serve as an indicator of the degree of increased trapping pressure and disturbance that may be associated with increased public access.</p> <p>The results of the program would be used to determine:</p> <ul style="list-style-type: none"> <li>• the effectiveness of access control measures should they be implemented during construction;</li> <li>• the areas of the ROW being accessed;</li> <li>• whether sensitive areas (i.e., marten core areas) are being accessed via the ROW; and</li> <li>• access points for snowmobiles.</li> </ul> <p>Resulting information would be used in an adaptive management framework to adjust access control measures, thereby helping to minimize potentially effects on furbearers.</p>	First winter following construction	Main River Marten Core Area (Newfoundland)	NL Department of Environment and Conservation (Wildlife Division)
Avifauna	<p>Conduct Harlequin Duck surveys along rivers crossed by the Project known to support breeding populations to determine Project effects on breeding pairs.</p> <p>Pre-construction surveys will determine the extent of breeding activities.</p>	Pre-construction, two years following construction	Newfoundland and Labrador	Environment Canada
Avifauna	Note observations of Red Knot or other species of conservation status (e.g., species at risk).	Construction and season following construction	Along ROW (Newfoundland and Labrador)	Environment Canada

VEC or Key Indicator	Description	Timing/ Duration	Location	Reporting to
Marine Fish	Confirm effects predictions regarding electromagnetic fields generated by the submarine cables and electrodes. Apply an adaptive management approach by refining and optimizing mitigation measures, if required.	Operations (one time follow-up to confirm predicted EMFs)	Strait of Belle Isle and Conception Bay	Fisheries and Oceans Canada
Marine Mammals	Establish a marine mammal observer program for the construction of the Strait of the Belle Isle marine cable crossing.	Construction	Strait of Belle Isle	Fisheries and Oceans Canada
Marine Environment	Evaluate the level of production of electrolysis products at electrode sites.	Operations (one time follow-up to confirm predicted emissions)	Strait of Belle Isle and Conception Bay	Fisheries and Oceans Canada Environment Canada
Vegetation	Revisit known locations of <i>Species at Risk Act</i> - and <i>Endangered Species Act</i> - listed plant species identified within, or adjacent to the Project components to evaluate population health and extent. This will include evaluating the success of mitigation efforts undertaken to protect Listed Plants during construction. The information collected will be used to develop mitigation, in consultation with vegetation experts, as appropriate, through Nalcor's adaptive management program.	Growing season following construction	Shoal Cove (Newfoundland)	NL Department of Environment and Conservation
Vegetation	Review off-highway vehicle use to evaluate the overlap with <i>Species at Risk Act</i> - and <i>Endangered Species Act</i> - listed plant species identified within, or adjacent to the Project components	Post-construction	Shoal Cove (Newfoundland)	NL Department of Environment and Conservation (Wildlife Division)



