NAIKUN OFFSHORE WIND ENERGY PROJECT

ASSESSMENT REPORT

With Respect to

the Application by NaiKun Wind Development Inc.

for an Environmental Assessment Certificate

pursuant to the *Environmental Assessment Act,* S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

November 16, 2009

BRITISH COLUMBIA
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Erratum

Pages 9 and 51 of the Report state that:

The proposed Project is estimated to generate a total of $42 million[1] in government revenue at the provincial and local levels of government, including direct, indirect and induced expenditures for items such as property tax, land transfer and tenure taxes and fees, permit fees, sales taxes, personal and corporate income taxes and other corporate taxes and levies. Of this amount, $38.3 million would go to the provincial government and $3.7 million to local governments.

This estimate is for the construction phase of the proposed Project only.

The operational phase of the proposed Project is expected to contribute $26.8 million annually to government revenue for the estimated 40 year life of the proposed Project. Provincial and local government revenue shares are $22.1 million and $4.7 million respectively.

This amounts to total estimated government revenue of approximately $1.1 billion for the proposed Project for construction and operation. Of this amount, approximately $922 million would go to the provincial government and $192 million to local governments.

Pages 8 and 51 of the Report state that:

The proposed Project construction phase investment in the BC economy is estimated to have a total impact on gross domestic product (GDP) of $261.7 million or an average of $87.2 million for every year of peak construction, including direct, indirect and induced effects. This represents 0.13% of the provincial GDP or 0.05% of GDP per annum.

This estimate is for the construction phase of the proposed Project only.

The operational phase of the proposed Project is estimated to contribute $40.3 million to GDP annually over the 40 year estimated proposed Project life. The total impact on GDP for construction and operation of the proposed Project is estimated at $2.2 billion.

Pages 8 and 51 of the Report state that:

The estimated direct impact of the proposed Project investment in the regional economy is 381 person years of employment, with 421 direct person years generated in the

[1] All financial estimates are in 2009 dollars.

province over the course of the construction phase. During the peak construction seasons the proposed Project could create up to 150 jobs.

Indirect employment[2] of the proposed Project is estimated at 2,350 person years primarily due to spending on construction and other services. The amount of induced employment[3] is estimated at 629 person years for the province.

These estimates are for the construction phase of the proposed Project only.

During the operations phase, the estimated direct impact of the proposed Project in the regional economy is estimated at 30-50 person years of employment, with 65 direct person years generated in the province. During operations the proposed Project is expected to require 60 permanent employees.

For the operations phase, indirect employment and induced employment in the province are estimated at 337 and 95 person years respectively.

The total estimated direct impact of the proposed Project in the regional economy is 411- 431 person years of employment, with 486 direct person years generated in the province. Total indirect employment and induced employment in the province are estimated at 2,687 and 724 person years respectively.

[2] Indirect employment is generated by the businesses that supply goods and services to the proposed Project.

[3] Induced employment is a result of the spending of directly and indirectly generated incomes from the proposed Project in the broader economy.

SUMMARY OF THE ASSESSMENT REPORT

Overview of Proposed Project

NaiKun Wind Development Inc. (Proponent) is proposing to develop an offshore wind energy project in the shallow waters of Hecate Strait, east of Haida Gwaii/ Queen Charlotte Island. The proposed NaiKun Offshore Wind Energy Project (proposed Project) consists of up to 110 wind turbines anchored to the seabed with a capacity to generate up to 396 megawatts of electricity. The proposed Project includes a submarine and overhead transmission cable connecting to BC Hydro's grid on Ridley Island near Prince Rupert and HaidaLink, a submarine cable and infrastructure supplying electricity to Graham Island near Tlell.

Overview of the Environmental Assessment

A cooperative environmental assessment (EA) of the proposed Project was undertaken by British Columbia and Canada.

The Environmental Assessment Office (EAO) assessed whether the proposed Project would result in any significant adverse environmental, social, economic, heritage and health effects. The EA focused on assessing specific potential effects on the following:

- Marine physical environment
- Marine aquatic ecology
- Marine mammals
- Marine birds
- Terrestrial ecology
- Employment and economy
- Communities and Services
- Land use and tenure
- Visual resources
- Radio communications
- Navigation
- Archaeological and heritage resources
- Public health and healthy living
- Accidents and malfunctions

The EAO assessed relevant issues raised by First Nations during the course of the EA and whether the Crown has fulfilled its obligations for consultation and accommodation. This Assessment Report has been provided to the Ministers for consideration in their decision of whether or not to issue an EA Certificate for the proposed Project.

Key EA Findings

The EAO has determined that the proposed Project would not result in any significant adverse effects. The federal EA process remains ongoing.

PREFACE

The EAO manages the assessment of proposed major projects in British Columbia, as required by the *Environmental Assessment Act*. The process includes:

- Opportunities for the involvement of all interested parties;
- Consultations with First Nations;
- Technical studies to identify and examine potential significant adverse effects;
- Strategies to prevent, or reduce, adverse effects; and
- Development of comprehensive reports summarizing input and findings.

At the conclusion of each EA, EAO provides a comprehensive assessment report (Assessment Report or Report), and makes recommendations to the Minister of Environment and to the Minister responsible for the project sector. The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Assessment Report considers the proposed Project's potential to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects, and sets out EAO's analysis and conclusions. It also documents the work undertaken by EAO to consult and accommodate First Nations, in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law.

Information and records relating to environmental assessments is available on EAO's website at www.eao.gov.bc.ca. Questions or comments can be directed to:

Environmental Assessment Office
PO Box 9426 Stn Prov Govt
Victoria BC V8W 9V1
Phone: 250 356-7441
Fax: 250 356-7440
Email: eaoinfo@gov.bc.ca

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Appendices

Acronyms Used in this Report

AC:	alternating current
AIA:	Archaeological Impact Assessment
AM:	Adaptive Management
AOA:	Archaeological Overview Assessment
Area A:	Area A crab fishery
BC:	British Columbia
BCTC:	British Columbia Transmission Corporation
BCTC:	British Columbia Treaty Commission
BMP:	best management practices
CCG:	Canadian Coast Guard
CEAA:	Canadian Environmental Assessment Act
CEA Agency:	Canadian Environmental Assessment Agency
CHN:	Council of the Haida Nation
CMT:	culturally modified tree
COSEWIC:	Committee of the Status of Endangered Wildlife in Canada
CPAEAR:	Canadian Port Authority Environmental Assessment Regulations
CWS:	Canadian Wildlife Service
DC:	direct current
DFO:	Fisheries and Oceans Canada
EA:	Environmental Assessment
EAO:	Environmental Assessment Office
EC:	Environment Canada
EMF:	electromagnetic field
EMS:	Environmental Management System
EMP:	Environmental Management Plan
ERP:	Emergency Response Plan
FUP:	Follow up Program
GDP:	Gross Domestic Product
HADD:	Harmful Alteration, Disruption or Destruction
HPA:	Haida Power Authority
ILMB:	Integrated Land Management Bureau
IUP:	Investigative Use Permit
km:	kilometre
LRMP:	Land and Resource Management Plan
m:	metre
m/s:	metre per second
MEMPR:	Ministry of Energy, Mines and Petroleum Resources

Acronyms Used in this Report (cont'd)

MoE:	Ministry of Environment
MW:	megawatt
NRCan:	Natural Resources Canada
NWPA:	Navigable Waters Protection Act
PNCIMA:	Pacific North Coast Integrated Management Area
PRPA:	Prince Rupert Port Authority
RA:	Responsible Authority
RoW:	Right of Way
SQCRD:	Skeena Queen Charlotte Regional District
TAC:	Technical Advisory Committee
TC:	Transport Canada
TUS:	Traditional Use Study
WTG:	wind turbine generator

PART A – INTRODUCTION AND BACKGROUND

1 Purpose of the Report

The purpose of this Report is to summarize the EA of the Application by the Proponent for an EA certificate for the proposed Project. The EAO is required to prepare this Report for provincial ministers who are responsible for making a decision on the proposed Project under section 17 of the BC *Environmental Assessment Act* (Act). For energy projects the deciding ministers are the ministers of the Environment and Energy, Mines and Petroleum Resources.

The Report:

- Describes the provincial and federal EA processes, the proposed Project and consultations undertaken during the EA;
- Identifies the potential environmental, heritage, health, social and economic effects of the proposed Project and how the Proponent proposes to mitigate effects;
- Identifies the commitments proposed by the Proponent; and
- Sets out conclusions based on the proposed Project's potential for significant adverse effects.

2 Proposed Project Overview

2.1 Proponent Description

The Proponent for the proposed Project is NaiKun Wind Development Inc. on behalf of NaiKun Wind Generating Inc., a BC-based wind power development company with its head office in Vancouver. NaiKun Wind Development Inc. is a wholly-owned subsidiary of NaiKun Wind Energy Group Inc. NaiKun Wind Generating Inc. is jointly owned by NaiKun Wind Energy Group Inc. and ENMAX Green Power Inc. NaiKun Wind Development Inc. is the subsidiary tasked with the proposed Project's design, permitting, and approvals, whereas NaiKun Wind Generating Inc. would contract to supply energy, and undertake the construction and operation of the proposed Project.

2.2 Proposed Project Description and Scope

The Proponent is proposing to build and operate an offshore wind energy project in the shallow waters of Hecate Strait along the northeast coast of Haida Gwaii. The following four communities would contain proposed Project components: Prince Rupert, Masset, Tlell and Skidegate (see Figure 1).

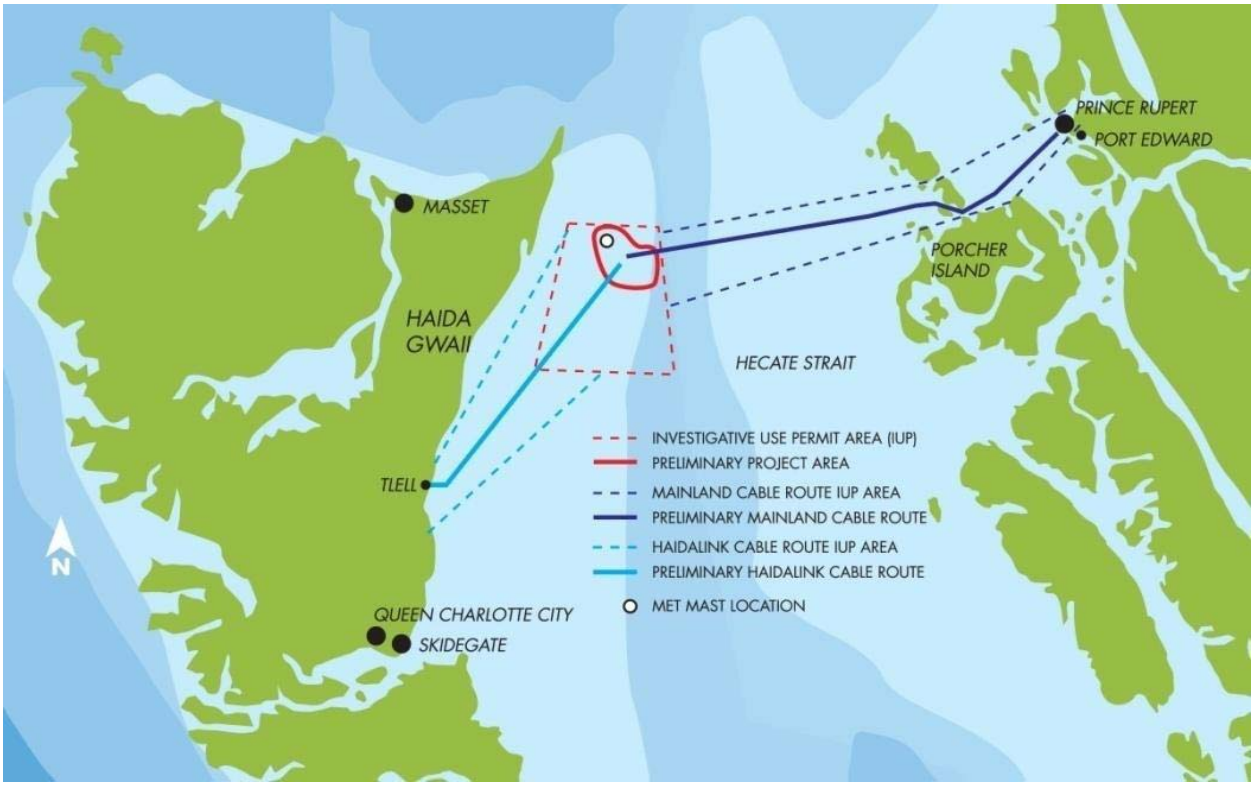

Figure 1. Location Map

The scope of the proposed Project consists of the following on-site and off-site components and activities:

- 67 – 110 wind turbines anchored on or into the seabed (including foundations, towers, blades and nacelles[4]);
- One offshore converter platform on pilings, and associated transmission cabling to connect turbines to the platform;
- A transmission line (sea cable and overhead) from the wind farm interconnecting with the British Columbia Transmission Corporation (BCTC) grid near Prince Rupert;
- A transmission line from the wind farm to Graham Island;
- Offshore construction including any dredging and disposal and pile driving;
- Fabrication/construction site and temporary facilities; and
- Offsite facilities or offsite activities related to the proposed Project.

Construction access to the wind farm would be primarily via Prince Rupert, while operations access would be via Masset and Skidegate on Haida Gwaii as well as Prince Rupert. Construction activities would be scheduled from April to October over a two

[4] Nacelles sit atop the towers and house the gear box, generator, controller and brake.

year period, from 2012 – 2014. The expected operational lifetime of the proposed Project is 40 years with turbine replacement after 20 – 25 years. Decommissioning would take place over a two-year period after completion of the operational life of the proposed Project.

On Graham Island, the power would be transmitted via a transmission line to a new substation that would be developed by BC Hydro within an existing right-of-way as part of the Haida Gwaii electric power supply and transmission system upgrade.

During construction and operations of the proposed Project, the Proponent would implement an environmental management system designed to monitor and report on activities and to mitigate and manage identified risks of impacts. Environmental management plans cover multiple aspects of proposed Project activities and the environment, as well as health and safety. The Proponent would employ an adaptive management approach and would revise plans periodically as required.

2.3 Proposed Project Benefits

The estimated direct impact of the proposed Project investment in the regional economy is 381 person years of employment, with 421 direct person years generated in the province over the course of the construction phase. During the peak construction seasons the proposed Project could create up to 150 jobs.

Indirect employment[5] of the proposed Project is estimated at 2,350 person years primarily due to spending on construction and other services. The amount of induced employment[6] is estimated at 629 person years for the province.

The Proponent has identified training and general hiring policies to hire local residents to the extent practical for construction activities and to recruit wind farm operations employees from northern BC and the regional communities in particular. The Proponent has also committed to providing appropriate and effective training resources to local First Nations in preparation for potential proposed Project-related employment opportunities.

The proposed Project construction phase investment in the BC economy is estimated to have a total impact on gross domestic product (GDP) of $261.7 million or an average of $87.2 million for every year of peak construction, including direct, indirect and induced effects. This represents 0.13% of the provincial GDP or 0.05% of GDP per annum.

[5] Indirect employment is generated by the businesses that supply goods and services to the proposed Project.

[6] Induced employment is a result of the spending of directly and indirectly generated incomes from the proposed Project in the broader economy.

The proposed Project is estimated to generate a total of $42 million in government revenue at the provincial and local levels of government, including direct, indirect and induced expenditures for items such as property tax, land transfer and tenure taxes and fees, permit fees, sales taxes, personal and corporate income taxes and other corporate taxes and levies. Of this amount, $38.3 million would go to the provincial government and $3.7 million to local governments.

2.4 Proposed Project Land Use

The proposed Project is situated within the Skeena Queen Charlotte Regional District (SQCRD) on the North Coast of BC. Naikoon Provincial Park is the closest point of land from the proposed Project, located along the eastern shore of Haida Gwaii. Naikoon Park is currently zoned and managed as a wilderness recreation tourism experience. The proposed Project area includes offshore oil and gas tenures granted by the federal government.

The wind farm would be located in a productive crab harvesting area on Dogfish Banks, which is fished by Area A crab fishers. There are also groundfish fisheries active in the region, including sablefish, halibut and rockfish.

In addition to forestry and commercial fishing, tourism is also prominent in the proposed Project area. The tourism sector on Haida Gwaii is comprised primarily of small businesses involved in lodging, fishing charters, food and beverage, and some retail. For mainland communities, tourism is driven to a large extent by the cruise ship industry.

The proposed Project is located within the North Coast Land and Resource Management Plan and falls within the area of the draft Haida Gwaii Strategic Land Use Agreement (2007) with the province. The Pacific North Coast Integrated Management Area (PNCIMA) is a federal marine use planning process also underway in the proposed Project area.

3 Assessment Process

3.1 Provincial Review

In September 2003, the Proponent submitted a Project Description to EAO. Based on a review of the proposed Project Description, EAO determined that the proposed Project was reviewable under the Act pursuant to Part 4 of the Reviewable Project Regulations (B.C. Reg. 370/02), because the proposed Project is a new wind power facility with a rated nameplate capacity of 50 MW or more of electricity. On November 27, 2003, EAO issued an order under section 10 of the Act indicating an EA certificate was required for the proposed Project and that it could not proceed without an assessment.

3.1.1 Pre-Application Stage

Before this Application was accepted, the following steps occurred:

1. Upon receipt of a project description in September 2003, EAO determined that the proposed Project required an assessment, and issued an order to this effect under section 10 of the Act.

2. The Proponent submitted a revised project description on December 20, 2006.

3. The EAO established a working group (Working Group) comprised of federal, provincial and local government agency representatives and First Nations representatives to participate in the EA of the proposed Project (see Appendix 1 for a list of Working Group members). The purpose of the Working Group is to provide technical and First Nations input throughout the review process, and to comment on documentation prepared by EAO and the proponent.

4. On June 20, 2007, EAO issued a procedural order pursuant to section 11 of the Act, defining the scope of the proposed Project, and the procedures and methods for conducting the review. This included directing the Proponent to prepare draft Terms of Reference which set out the information to be gathered and studies to be completed before the EA application would be submitted.

5. Copies of the draft Terms of Reference were posted on EAO's website and placed in local libraries. To seek input on the draft Terms of Reference, EAO held a public comment period between March 30, 2007 and April 28, 2007. Comments were received from ten individuals and organizations. The EAO also sought comments on the draft Terms of Reference from the Working Group and First Nations.

6. The proposed Project design was refined in May 2007, and the draft Terms of Reference were revised to include HaidaLink, a proposed transmission line that would connect Haida Gwaii to the wind farm in Hecate Strait, delivering energy to Haida Gwaii as well as connecting Haida Gwaii to the provincial electricity grid. Copies of the revised draft Terms of Reference were posted on EAO's website and placed in local libraries. To seek input on the revised draft Terms of Reference, EAO held a public comment period between June 21, 2007 and July 21, 2007. Comments were received from three individuals and organizations. The EAO also sought comments on the revised draft Terms of Reference from the Working Group and First Nations.

7. The EAO issued the approved final Terms of Reference to the Proponent on December 13, 2007.

8. The Proponent undertook the studies and information gathering required by the Terms of Reference and submitted an Application on March 17, 2009.

9. The EAO, with input from the Working Group and First Nations, evaluated the Application against the Terms of Reference and determined that the application contained the information required by the Terms of Reference on May 15, 2009. (The Application is posted on EAO's website.)

10. The EAO assessed the Proponent's First Nations and public consultation activities during the pre-application stage, and activities proposed during the Application review stage, and notified the Proponent on May 15, 2009, that they were adequate and allowed sufficient opportunities for the public and First Nations to review and comment on the proposed Project.

3.1.2 Application Review Stage

The formal review of the Application was initiated on May 20, 2009 and the Application was posted to EAO's electronic Project Information Centre on that day. The Application was also made available on the proponent's website and in local libraries and government offices.

A 45-day public comment period on the Application was held from May 28, 2009 to July 12, 2009. A total of 56 comments were received on the Application.

In addition, open houses were held in Prince Rupert on June 3, 2009, Masset on June 8, 2009 and Queen Charlotte City on June 9, 2009. The open houses provided information about the proposed Project and allowed people an opportunity to ask questions and express support for, or concerns about, the proposed Project. Representatives of EAO and the CEA Agency made presentations at the open houses and the Proponent and its consultants were in attendance to answer discipline-specific questions. Approximately 77 people attended the open houses.

The public comment period and open houses were advertised in two local newspapers and on EAO's website in June and July 2009.

The Proponent consulted with and gave presentations to local and regional government officials, stakeholder groups, and regional community representatives on a number of occasions. The Proponent also established community information offices, including the Haida Gwaii Energy Centre in Masset and a project office in Skidegate to share information and respond to inquiries.

A copy of the Proponent's public consultation report can be found on EAO's website.

3.2 Federal Review

A federal EA of a project is required under section 5(1) of CEAA before a federal authority exercises certain powers or performs certain duties or functions in respect of a project for the purposes of enabling the proposed Project to be carried out, in whole or in part, as follows:.

- If the federal government is the proponent;
- If the federal government makes or authorizes payment or any other form of financial assistance to the proponent;
- If the federal government sells, leases or otherwise disposes of lands; or
- If the federal government issues a permit, or license or other form of approval pursuant to a statutory or regulatory provision referred to in the CEAA Law List Regulations.

Under section 5 and section 9 of the CEAA, an EA is required in relation to the proposed Project because Transport Canada (TC) may issue an approval under paragraph 5(1)(a) of the *Navigable Waters Protection Act*; Fisheries and Oceans Canada (DFO) may issue an authorization under subsection 35(2) of the *Fisheries Act* and Indian and Northern Affairs Canada (INAC) may contribute funding for the purpose of enabling the proposed Project to be carried out. With reference to the scope of the assessment, the responsible authorities (RAs) are required to consider the factors specified in section 16(1) of the CEAA, taking into consideration the legislated definitions of "environment" and "environmental effect" prior to making a decision that would allow the proposed Project to proceed.

TC and DFO are each a RA in relation to the proposed Project, and have a responsibility to:

- Ensure that an EA of the proposed Project is carried out; and
- Make a decision on whether the proposed Project is likely to pose any significant adverse environmental effects.

Natural Resources Canada (NRCan)/Public Works Government Services Canada (PWGSC) and INAC are participating as they may also be required to conduct an EA of the proposed Project. The proposed Project has been subject to a screening level assessment under CEAA, and the CEA Agency was the federal environmental assessment coordinator for the screening. Health Canada (HC) and Environment Canada (EC) (including the Canadian Wildlife Service (CWS)) participated in the CEAA review as federal authorities providing specialist advice.

The proposed Project was considered a major resource project and brought under the purview of NRCan's Major Project Management Office process in March 2009.

The Prince Rupert Port Authority (PRPA) may make available federal lands to enable the proposed Project to proceed. Pursuant to section 9.1(1) of CEAA the PRPA is required to conduct an EA pursuant to the Canada Port Authority Environmental Assessment Regulations SOR/99-318 (CPAEAR). PRPA is not signatory to the Canada-British Columbia Agreement on Environmental Assessment Cooperation (2004), but is participating in the provincial review. PRPA has determined that it is able to accept the EA and screening report coordinated by CEAA and will therefore not be completing a separate EA or screening report under CPAEAR.

3.2.1 Scope of the Federal Screening

Under CEAA, the RAs have the discretion to determine how they will scope the proposed Project for the EA. The federal scope of the proposed Project will include all marine components of the proposed Project (wind turbines, offshore converter station, submarine transmission cables to mainland and Haida Gwaii, and submarine power lines between wind turbines), and those which are on federal (PRPA) lands (onshore converter station, onshore transmission line, staging, operations, and maintenance infrastructure).

CEAA requires that a federal screening include consideration of the following factors:

- The environmental effects of the proposed Project, including the environmental effects of malfunctions or accidents that may occur in connection with the proposed Project and any cumulative environmental effects that are likely to result from the proposed Project in combination with other projects or activities that have been or will be carried out;
- The significance of the environmental effects referred to above;
- Comments from the public that are received in accordance with CEAA and the regulations; and
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the proposed Project.

As defined under CEAA, “environmental effect” means, in respect of a project:

- Any change that the proposed Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*;

- Any effect of any change referred to in the bullet above on:
    - health and socio-economic conditions;
    - physical and cultural heritage;

- the current use of lands and resources for traditional purposes by Aboriginal persons;
- any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; or,
- any change to the proposed Project that may be caused by the environment.

3.2.2 Environmental Assessment Cooperation

The Canada/British Columbia Agreement for Environmental Assessment Cooperation (2004) provides for coordinated EA processes to avoid uncertainty and duplication where a project is subject to review under both the Act and the CEAA. Pursuant to this Agreement, a cooperative EA of the proposed Project was undertaken by British Columbia and Canada. Each government will make EA-related decisions within its own legislative authority.
Federal authorities participated in the EA of the proposed Project. As of the date of referral to the provincial ministers for a decision on whether to issue an EA certificate, the federal EA process remains ongoing.

Federal comments received during the cooperative review are reflected in this Report and have informed the analysis and conclusions, which will enable the federal agencies to use it as the basis of a federal EA report, along with any other information the federal authorities may require.

Before the proposed Project can proceed, the federal authorities must determine whether the proposed Project is likely to cause significant adverse environmental effects. If provincial and federal EA decisions are received that allow the proposed Project to proceed, the Proponent is also required to obtain the necessary provincial licences, leases and other approvals, as well as regulatory approvals from the federal responsible authorities.

3.3 First Nations Consultation

The proposed Project is situated within the asserted traditional territory of the Haida Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation who were all invited to participate in the EA as members of the technical Working Group. All four First Nations were kept fully informed of the progress of the EA and were provided with all the information that was sent to the Working Group. The EAO offered to consult with all four First Nations in a manner consistent with "deep consultation" in relation to the *Haida* spectrum of consultation by actively seeking meetings with and offering approaches to address any procedural or technical issues raised by First Nations. The EAO also shared information and views or positions on matters relating to

asserted aboriginal rights and the potential for impacts on those rights from the proposed Project and sought feedback from First Nations.

Part C of this Report provides a more detailed review of First Nations consultations and EAO conclusions with respect to the consultation process used, asserted aboriginal rights and the potential for impacts to those rights.

PART B – REVIEW OF THE APPLICATION

This part of the Report sets out EAO's substantive evaluation of the application.

4 General

4.1 Assessment Methodology

4.1.1 Assessing whether there are likely to be significant adverse effects

In undertaking this evaluation, EAO assesses whether the project as proposed would have significant adverse environmental, social, economic, heritage and health effects and potential effects on First Nations' asserted Aboriginal rights and interests, having regard to the mitigation measures proposed in the Application or otherwise developed through the EA process.

More specifically, for each issue under consideration in this part, this Report will:

- Set out a summary relevant of background information (which is complemented in considerably more detail in the application);
- Discuss the potential for residual adverse effects having regard to mitigation measures proposed in the application or developed subsequently as a result of public consultations, input from the working group and consultations with First Nations;
- Assess, with input from the Working Group and First Nations, whether any residual adverse effects would be significant.

In addressing what may constitute a "significant" adverse effect, EAO considers the following factors:

- **Magnitude:** This refers to the magnitude or severity of the effect. Low magnitude effects may have no impact, while high magnitude effects may have an impact.
- **Geographic Extent:** This refers to the extent of change over the geographic area of the proposed Project. The geographic extent of effects can be local or regional. Local effects may have a lower impact than regional effects.
- **Duration and Frequency:** This refers to the length of time the effect lasts and

how often the effect occurs. The duration of an effect can be short term or long term. The frequency of an effect can be frequent or infrequent. Short term and/or infrequent effects may have a lower impact than long term and/or frequent effects.

- **Reversibility:** This refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impact than irreversible or permanent effects.
- **Context:** This refers to the ability of the environment to accept change. For example, the effects of a project may have an impact if they occur in areas that are ecologically sensitive, with little resilience to imposed stresses.
- **Probability:** The likelihood that an adverse effect will occur in circumstances where it is not certain that the effect will materialize.

The development and refinement of mitigation measures is a key component of the EA process and one where EAO spends an extensive amount of time facilitating discussion and negotiation among the Proponent, interested parties and First Nations. In the case of this proposed Project, the Proponent has made 100 commitments which are set out in detail in Appendix 3. Key commitments will be discussed in the following sections of this Report.

4.1.2 Determining whether significant adverse effects (if any) are justified

As a result of the extensive commitments and mitigation measures that are typically made through the EA process, significant adverse effects are usually avoided. If, however, EAO concludes that a proposed Project is likely to cause significant adverse effects, EAO assesses whether the proposed Project should be considered justified. In assessing whether a proposed project that is likely to cause significant adverse effects may be justified, EAO will consider all relevant factors, including the following:

- The number, type and extent of significant adverse effects that are expected;
- The economic benefits that would be provided by the projects (including taxes, jobs and infrastructure development), and the degree to which those who would otherwise be adversely effected by the proposed Project would benefit;
- The degree to which the proposed Project would contribute to community development; and
- The allocation of costs and benefits of the proposed Project as between present and future generations.

Under CEAA if the RAs determine that the proposed Project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances, the RA shall not exercise any power or perform any duty or function conferred on it by or under any

Act of Parliament that would permit the proposed Project to be carried out in whole or in part. A project is referred to a mediator or a review panel when there is uncertainty whether a project is likely to cause significant adverse environmental effects; a project is likely to cause significant adverse environmental effects and there is uncertainty whether these effects are justified in the circumstances; or public concerns warrant it.

4.1.3 Ensuring the Crown's duties to consult and accommodate First Nations are met

The EAO is also required to ensure that the Honour of the Crown is discharged by ensuring appropriate consultation and accommodation of First Nation interests in respect of the decision by ministers as to whether to issue an EA certificate. There is often considerable overlap between the interests of First Nations and the assessment of environmental, social, economic, heritage and health effects. As a result, First Nations comments and interests are factored into the analysis in this Part. In addition, further and more specific consideration is given to the Crown's duty to consult and accommodate First Nation interests in Part C of this Report.

4.2 Spatial Boundaries

The local area boundaries for the proposed Project are generally defined as:

- The aerial and seabed footprint of the wind farm;
- The seabed bounded by the submarine cable corridors;
- The land around the land-based cables and converter station on Ridley Island;
- The above-ground transmission line right-of-way (RoW);
- The area of effects from local onshore facilities, including the construction phase marshalling area on Prince Rupert Port Authority (PRPA) lands, and helicopter and marine support facilities on Ridley Island and Haida Gwaii;
- The landfall site and transmission cable to the point of interconnection near Tlell on Graham Island; and
- All construction, operation, and maintenance access corridors including aerial access over Naikoon Park.

The definition of a regional study area varies by discipline and may take into consideration factors such as:

- Areas of direct and indirect socio-economic effects;
- Key habitat for sensitive life stages;
- Wildlife migration routes and ranges;

- Areas of potential effects from dispersed, intermittent proposed Project activities, such as air or marine transport; and
- Areas within which the proposed Project may measurably contribute to cumulative effects over time or in combination with other projects.

Regional areas for the effects assessment, primarily related to socio-economic issues, included all of Haida Gwaii, northern Hecate Strait, Prince Rupert, Kitkatla, and the adjacent mainland coast.

4.3 Temporal Boundaries

Temporal boundaries for the effects assessment were defined by the characteristics of the proposed Project and the valued components being assessed, and include the periods when the valued components will be affected by the proposed Project. Functionally, the construction, operations and closure/decommissioning stages will phase into each other and overlap throughout the life of the proposed Project.

Baseline – describes pre-existing ecological, physical and human-related characteristics of the environment as observed and documented by the Proponent in 2007/2008 (2002 for marine birds) before initiation of proposed Project development.

Construction – construction is estimated at six years by the Proponent including 3 years for the final design and siting work, marshalling area preparation, and onshore fabrication, and three years for offshore construction activities.

Operations – operation is planned by the Proponent at 40 years following construction. This is the estimated period of ongoing generator operation and power transmission with associated operation and maintenance activities. The expected physical life of the foundations, converter stations, and submarine cables is more than 40 years, while the first-generation wind turbine generators (WTGs) are expected to last 20–25 years and would have to be replaced within the proposed Project operation period.

Decommissioning and closure – would last approximately 2 years and would include all activities to dismantle and remove wind farm structures, cables and associated onshore facilities.

4.4 Cumulative Effects

Section 16(1)(a) of CEAA requires that the factors to be considered in every environmental screening include cumulative environmental effects that are likely to result from the proposed Project in combination with other projects or activities that have been or will be carried out. Cumulative environmental effects assessment is based on residual effects that are predicted to remain after implementation of the mitigation measures (i.e. post mitigation).

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions and include changes to the biophysical environment or socio-economic setting (indirectly from a biophysical change). Cumulative effects are to be considered for those reasonably foreseeable projects and activities, the effects of which have the potential for overlapping in time and space with the residual environmental effects of the proposed Project (construction, operation, decommissioning and post-closure phases) after mitigation measures are applied.

Cumulative effects were assessed when biophysical residual effects for the proposed Project had the potential to combine with the effects of other known projects or activities (existing or likely to occur in the foreseeable future) within the specified cumulative effects study area boundary and timeframe.

Cumulative effects assessments were completed by the Proponent following CEA Agency methods. Steps completed for each cumulative effects assessment included scoping, defining the context, describing the study boundaries, and determining the significance of the residual cumulative effects.

This cumulative effects assessment relies on the predicted residual effects of the proposed Project on valued components. The cumulative effects assessment was evaluated by CEA Agency and RAs against the following:

- If the proposed Project would result in a demonstrable or measurable residual effect on a component of the biophysical or human environment;
- If the residual effects would be likely to act cumulatively with components of existing and future projects and activities in the area; and
- If the cumulative impacts of the proposed Project would negatively impact the health, heritage, environmental, economic and social resource value of the valued component.

Section 13 of this Report summarizes the cumulative effects assessment as required by the CEA Agency.

4.5 Cumulative Impacts

The EAO completed a cumulative impacts assessment that is contained under each environmental, health, social, economic, or health effect with the potential for cumulative impacts. The EAO has considered the potential cumulative impacts through:

- Consideration of approved land use plans that designate the most appropriate activities on the land base;
- Comprehensive baseline studies which set out the current conditions and thereby factor in effects of prior development;

- Consideration of potential overlapping impacts that may be occurring due to other developments, even if not directly related to the proposed Project; and,
- Consideration of future developments that are reasonable foreseeable and sufficiently certain to proceed.

The EAO has characterized the residual cumulative impacts for the proposed Project by direction, magnitude, geographic extent, frequency, duration, reversibility, context, and probability, and, where practical, are described for three temporal cases: baseline, project (maximum project footprint), and future (includes all announced but incomplete projects, activities or actions that would occur with a high degree of certainty) cases.

The cumulative impacts of the proposed Project on valued components were evaluated by EAO in conjunction with existing tourism and fisheries activities, shipping lanes, ferries operations, as well as proposed liquid natural gas, oil and gravel shipping, onshore and offshore wind generation projects, container terminal infrastructure, potash terminal infrastructure, and potential offshore oil and gas development.

5 Environmental Effects

5.1 Marine Physical

5.1.1 Background Information

The Proponent's marine physical effects assessment focused on the potential effects of the proposed Project on the geomorphic form and process on Dogfish Banks and the shoreline of Graham Island from changes in the seabed and seabed sediments.

The study area comprises the area of the wind farm grid and northern portion of the overall investigative use permit (IUP) area for the wind farm, the north-western portion of the Hecate Strait including the related coastline of Haida Gwaii, and the IUPs for the transmission cable routes and related landfalls.

The Proponent completed a comprehensive literature review including available information from the Geological Survey of Canada and commissioned field studies including bathymetric[7] surveys in 2007 and 2008, to better understand the seabed surface, sediment types and subsurface geology. The studies identified the potential issues discussed below.

Scour at Foundations

Scour is the result of movement of marine waters past pile foundations used to support the WTGs that causes sediments to move. The amount of scour varies with the size of

[7] Bathymetric surveys were conducted to create charts showing seafloor relief or terrain as contour lines.

the pile foundations, type of sediment and currents at the site. Scour has the potential to change the physical processes within and beyond the proposed Project area via sediment transport.

The Proponent applied available literature from other offshore wind energy projects in conducting modelling to predict the potential range of changes in sediment transport and seabed morphology in the wind farm. Scour scenarios applied to two different sediment zones in the proposed wind farm area were modelled.

The results of these models indicated that the effects of scour are expected to be local, with thinly distributed volumes of scoured material. The Proponent states in its Application that the volumes of distributed sediment would be small in the large wind farm area. The Proponent expects that most scour would occur during the construction period, after the installation of the foundation piles. The Proponent reports in the Application that the magnitude of effects is considered to be low.

Far-field Littoral Sediment Environment

The proposed wind farm has the potential to affect sediment transport dynamics on Dogfish Banks and on the shoreline of Graham Island in Naikoon Provincial Park.

The Proponent conducted a literature review and field studies including sidescan, multibeam and sample data, which indicated that the longshore and sediment transport direction in and around the proposed Project area is northward. The Proponent indicates that the western half of the wind farm area has a less active seabed than the eastern half, in turn indicating that there may be limited transport of sediment across or through the western areas of the IUP, including those proximal to the coast of Graham Island. The Proponent concluded in its Application that this indicates that the shoreline of Graham Island is not being supplied by sediment from Dogfish Banks or influenced by sediment processes active within the wind farm, but rather is influenced by along-shore coastal transport.

The issues considered by the Proponent in the assessment of effects were the potential for changes in sediment transport/ movement due to long-term effects of changes in wind speed and wave height from the WTGs. Specifically, the Proponent considered whether the proposed Project would affect the physical basis of the marine habitat on Dogfish Banks, adjacent to the wind farm or affect the shoreline and geomorphic processes that maintain the shoreline of Naikoon Provincial Park.

The Proponent addressed these issues through the consideration of a similar offshore wind project, the Codling Bank Project, located in the Irish Sea with a similar marine physical setting. The conclusion of this study was that the proposed Project would have no significant impact on waves, littoral currents and sediment transport away from the

immediate area of the turbine foundations. Furthermore, the Proponent states in its Application that the proposed Project would have no impact on coastal erosion or deposition along the adjoining shorelines.

5.1.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Scour at Foundations

The Proponent reports in the Application that the effects of scour are considered to be insignificant. The Proponent has committed to conducting detailed engineering studies at each WTG location prior to final design and siting to determine the potential for scour at each WTG. To reduce scour volumes, the Proponent has committed to siting the foundation piles in troughs of sand waves where subsurface conditions allow. To mitigate longer term effects of scour, the Proponent has committed to two strategies for the installation of scour protection dependent on the seabed substrate:

- Monitoring sites where scour is expected and at sites where scour protection is used to confirm expectations and to enable adjustments to scour protection that may be required. Monitoring involves the use of multibeam bathymetric surveys; and
- Deploy scour rods to provide at-a-location measures of seabed change to confirm initial monitoring results and record changes in sediment forms and transport.

Far-field Littoral Sediment Environment

The Proponent did not propose any mitigation measures as no significant impacts were identified through its modelling and analysis. The Proponent committed to undertaking a multibeam bathymetric survey in conjunction with monitoring for scour effects, which would allow analysis of sediment transport processes over Dogfish Banks. The Proponent committed to considering mitigation measures based on this analysis in the detailed design stage of the proposed Project.

5.1.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Long-term Sediment Transport Modelling

During Application review, DFO and NRCan expressed concern that the Proponent's prediction of sediment transport effects was only substantiated by studies done in

Europe. Both DFO and NRCan identified the need for sediment transport modelling using local data in order to identify potential effects of the turbine foundations to the marine physical environment and any biological consequences of such effects. DFO initially requested that this modelling be undertaken during the EA, in order to determine the significance of sediment transport impacts and associated biological effects from the proposed Project. NRCan also requested that the modelling be undertaken to identify potential long-term and far field sediment transport effects. Subsequently, DFO and NRCan noted that appropriate worst case scenarios and mitigation measures could cover these aspects in the EA and required that a robust monitoring program be designed and implemented in the pre-construction phase following an EA decision to determine long-term and far field sediment transport effects from the proposed Project.

The Proponent met with experts at DFO and NRCan to gain a better understanding of the scope and timing of the requested modelling in September 2009. The Proponent revised technical Volume 3 of its Application based on comments received from DFO and NRCan and submitted Response Submission 24 committing to further marine physical work in the detailed design stage of the proposed Project including the requested long-term and far field sediment transport monitoring. A follow up meeting was held with DFO and NRCan experts on October 8, 2009 to review and discuss these documents.

To address comments made by NRCan and DFO during the meeting, the Proponent submitted Response Submission 25 providing additional information on far field effects including potential mitigation measures for a worst case scenario of such effects. On October 27, 2009 NRCan indicated they were generally satisfied with the information presented by the Proponent on far field effects and made suggestions for refinements to the monitoring and modelling work the Proponent committed to in Response Submission 24. At the time of writing, the Proponent is revising its commitments based on comments received by NRCan.

Scour and Scour Protection

During Application review, DFO, NRCan and TC requested additional information regarding the potential scour effects from the turbine foundations and for scour protection design details. The Proponent provided a supplemental information report relating to effects of scour on navigation with the requested details to the satisfaction of TC. At the time of writing, NRCan and DFO have expressed uncertainty as to the adequacy of the information presented on scour and proposed scour protection.

As described above, the process of identifying appropriate mitigation to address the worst case scenarios was ongoing between the Proponent, DFO and NRCan at the time of writing. Discussion of additional modelling and subsequent evaluation has taken

place, and the Proponent has provided a scope for pre-construction work to DFO and NRCan. DFO and NRCan have expressed the view that appropriate mitigation exists and could be employed in these circumstances. The Proponent has committed to working with DFO and NRCan to undertake additional study and develop appropriate mitigation measures as necessary.

Shoreline Erosion

MOE raised concerns regarding the potential for shoreline erosion along the east coast of Graham Island. The Proponent committed to discuss long term monitoring of the east coast of Graham Island with MOE and other interested parties[8] to determine long term information needs. MOE was satisfied with the Proponent's commitments to engage in discussions around long term monitoring.

Cumulative Impacts

The Proponent indicates that effects of the proposed Project on sediments are not expected to extend beyond the wind farm and no interactions with other project or activities, either developed or proposed, have been identified that would cause effects of the proposed Project to act in combination with other projects to affect marine sediments and seabed form. The Proponent has conducted worse case scenarios of far-field and near-field effects and developed mitigation measures for these effects. Given the Proponent's commitment to further marine physical work and the analysis done to date, with respect to potential effects on the marine physical environment from the proposed Project, EAO concludes that no significant cumulative impacts are expected on the marine physical environment from the proposed Project.

5.1.4 Conclusion

Based on the information provided in the Application and the responses by the Proponent to issues identified in the EA, EAO concludes that the proposed Project is not likely to have a significant adverse effect on the marine physical environment. In reaching this conclusion, EAO notes that the Proponent is engaged in ongoing discussions with DFO and may be required to undertake further mitigation or compensation measures if DFO determines that necessary as part of its regulatory process.

5.2 Marine Aquatic Ecology

5.2.1 Background Information

The proposed Project includes five main marine components: the offshore WTG grid; the offshore converter station; the submarine inter-array cables linking the WTGs to the

[8] Including University of Victoria's, Dr. I Walker

offshore converter station; the HaidaLink submarine cable to Graham Island; and the submarine cable to the mainland at Ridley Island. The study area includes the wind farm area, the mainland cable route and the HaidaLink cable route.

The Proponent conducted a review of available information of existing offshore wind farm projects of similar scale and nature to identify the potential for the proposed Project to interact with the marine environment.

According to the Proponent's Application, the review used appropriate data available from the directed marine ecological field studies conducted in May and September 2008, as well as marine geophysical data, acoustics and noise data and modelling and electromagnetic field (EMF) data acquired through literature reviews and/ or directed studies carried out in 2008. The Proponent collected sidescan sonar and multibeam sounder data for the mainland cable route and utilized pre existing geophysical survey data from the Pacific Geosciences Centre to assess the HaidaLink cable route. The Proponent has committed to undertake additional surveys to obtain information on the cable routes prior to final design.

The Proponent selected key indicator species based on their specific habits and habitats, associated sensitivity to proposed Project effects, their ecological function in the marine ecosystem, their importance to biodiversity and, in some cases, their cultural and human use values, such as fisheries. The key indicator species or communities are identified below:

- Epifaunal and infaunal species and communities – infaunal community composition in sand habitats, epibenthic community composition in cobble/boulder habitats;
- Mobile invertebrates – Dungeness crab, crangon shrimp;
- Benthic fish – sand lance, juvenile flatfish (wind farm area); halibut (mainland transmission corridor); and
- Pelagic fish – sand lance.

The Proponent's assessment considered the potential for temporary or permanent effects on existing marine aquatic conditions in terms of physical disturbance, noise, changes in benthic habitat, temperature and EMF and contamination. The principal issues identified in the assessment by the Proponent are identified and discussed below in section 5.2.2.

5.2.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Three general categories of potential effects were identified and are discussed below for each of the proposed Project issues and effects identified in the Application:

- Alteration of community assemblage (due to loss of habitat);
- Temporary or permanent displacement; and
- Injury/ mortality.

Physical Disturbance to Seabed and Benthic Habitats

The potential physical disturbance effects are mainly related to habitat loss from proposed Project component footprints, sediment suspension (turbidity) and redistribution/ sedimentation causing smothering.

Loss of habitat would occur from the placement of the foundation footprint (including piles and scour protection). The Proponent reports that impacts to benthic habitats would be confined to the foundation footprint, which constitutes a small percentage (0.1%) of the overall available habitats within the wind farm area. The area of disturbance would be small and the disruption short term and mobile benthic species would likely avoid or move away from the area of disturbance relatively quickly. The Proponent has committed to avoiding sensitive habitats such as cobble/ boulder habitat with longer lived epi-biota through micro-siting of the WTG foundations.

Overall disturbance from sediment suspension and redistribution during construction is considered temporary and localized by the Proponent and is associated with vessel activity, foundation installation and removal, and cable installation and removal. The results of the Proponent's literature review indicate that significant changes to benthic habitats were not observed in other offshore wind farm developments and reports indicate that impacts could be mitigated through the following best management practices and mitigation measures which the Proponent committed to:

- Use dynamically positioned vessels when possible and particularly over any documented sensitive areas to reduce anchor effect;
- Maintain a minimum clearance of 1.5 m between vessel propellers and the seabed to reduce propeller wash effects on the seabed; and
- Review existing mainland transmission cable route sidescan and multibeam imagery at a higher resolution as well as video imagery obtained from a cable route survey to identify the presence of and verify the absence of sponge reefs or areas of structure forming hard corals and avoid laying the transmission cable through any such areas.

DFO, the public, stakeholders and First Nations raised issues with respect to potential effects to pelagic fish including salmon and juvenile sablefish, through Edye Passage. The Proponent has committed to scheduling construction activities during non-sensitive time periods to mitigate effects on sensitive species life stages and to avoiding sensitive areas such as sponge reefs and hard coral aggregations through the detailed design

and siting stage. If timing windows are not available to avoid these, the Proponent would consider adjusting the route within the IUP for the cable corridor. The Proponent has also committed to employing best practices to minimize disturbance to the sea floor as listed above. The Proponent states in its Application that no significant adverse effects are expected from physical disturbances.

Noise and Vibration

Noise impacts in the marine environment are associated with fish and marine mammals due to the sensitivity of these species. Potential negative effects from the proposed Project include masking of important environmental sounds or social signals of fish from their habitat or interfering with sensory orientation and navigation. Within the proposed wind farm area, there are many species of concern with respect to noise impacts including flatfish (including halibut), sand lance, herring, salmon and Dungeness crab. In addition, grey and humpback whales are species of concern and these species are discussed in section 5.3 of this Report.

The Proponent conducted modelling to predict the noise levels generated by construction activities and WTG operations. The modelling results indicate that pile driving is the only construction or operation activity where source level noise could exceed the threshold criteria for fish injury. The Proponent estimates that fish in approximately 0.5% of the wind farm area, assuming uniform distribution of benthic fish, could be subject to injurious noise levels assuming a 40 m radius of effect around each WTG site.

The Proponent has committed to:

- Adhering to DFO and Pile Driving Contractors Association best practices guidelines to reduce fish kills and injury due to pile driving activity;
- Mitigation measures to reduce overall noise production and to reduce the zone of potential injury to fish;
- Construction monitoring to verify noise levels with the noise modelling results, implement protective protocols and identify any fish mortalities; and
- Avoiding pile driving during times of high fish activity.

The construction and operation of the wind farm would produce pressure waves that can propagate through the seabed as vibration. Due to the lack of available information regarding pressure effects from wind farm operations, the Proponent has collected baseline vibration levels within the wind farm area and in a reference area to the north of the wind farm area in order to compare with operational levels to assess the degree, extent and form of seabed vibrations under operating conditions. The Proponent has committed to an operational sand lance monitoring program to determine pressure and vibration effects. The Proponent has also committed to an operational noise monitoring

program to address the lack of information on the behavioural reaction of local species to wind farm noise. The Proponent states in its Application that no significant adverse effects are expected from noise impacts to the marine aquatic ecology.

EMF

According to the Proponent's Application, both alternating current (AC) and direct current (DC) submarine cables induce a magnetic field and a weak electric field. Magnetic fields diminish in strength with distance from the cable. The magnitude of the induced electric field is directly related to the speed of the organism movement through the fields and is typically very small and undetectable except by certain electro-sensitive species such as elasmobranchs (sharks and skates).

The Proponent modelled the magnetic field strength associated with the operation of the AC and DC cables and conducted a literature review of the potential effects of the magnetic fields from submarine cables on marine fauna in order to predict potential effects of EMF from the proposed Project.

Two potential effects were identified through this work:

- Exposure to magnetic fields could affect an organism by impacting its ability to migrate. Concerns about impacts to movement apply mostly to organisms where movements or migrations are important life history components such as movement to feeding, spawning or rearing areas; and
- Exposure to an induced electric field could impact the ability of an organism moving through the induced field to detect prey.

The results of the Proponent's modelling showed that the AC magnetic field from the HaidaLink interconnection would be quite weak, even directly over the cable, and its strength diminishes quickly with distance. The magnetic field produced by the WTG inter-array cables would be much lower than the HaidaLink cables due to the reduced power load.

The results of the Proponent's studies indicate that elasmobranchs on Dogfish Banks such as dogfish and big skates would be able to detect and respond to the magnetic field through avoidance as well as the associated induced electric fields of the mainland DC transmission cable.

The results of the Proponent's modelling for DC cables indicated that cable burial to a depth of one metre would reduce the magnetic field strength at the seabed surface to levels that are considered to avoid potential effects on the movement or migration of benthic invertebrates and fish including halibut and Pacific cod. The results of the Proponent's literature review also support this conclusion. The Proponent committed to burying cables to a minimum depth of one metre in all sediments across Hecate Strait

and to a minimum depth of two metres across the portion of Hecate Strait where active trawl fishing occurs. This would reduce the risk of fishing gear interaction as well as provide further reduction of the cable's magnetic field at the seabed surface in this section of the transmission cable route, which is considered to be the primary north/south movement corridor for groundfish, including halibut, in Hecate Strait. The Proponent also committed to conducting post-installation cable surveys to identify any unburied sections of cable and, if possible, rebury exposed sections particularly in more critical areas such as the groundfish trawl area. If any sections of cable cannot be buried due to seabed conditions, the Proponent committed to consulting with DFO and the fishing industry to identify if any of these areas are important movement corridors for benthic fish species. If so, the Proponent would assess the feasibility of protecting the cable with a minimum of 0.5 metres of suitable protective material effectively reducing the degree of associated magnetic fields to mobile invertebrates and benthic fish.

Changes in Benthic Habitats

The Proponent has committed to additional surveys as part of the final design phase to define the best possible location for the proposed Project facilities to minimize habitat disturbance or alteration.

According to the Proponent's Application, changes in benthic habitats would be in the vicinity of foundations within the wind farm area resulting from the following:

- The introduction of a hard substrate used for scour protection at foundations and the subsequent colonization of the hard substrate; and
- The resulting change to hydrological conditions which may alter the local seabed sediment composition and benthic habitats over time.

According to the Proponent, changes to benthic habitat resulting from the addition of hard substrate can be viewed as a positive impact or a negative impact by the creation of artificial reefs that would increase habitat diversity and complexity, provide the mechanism to change existing predator-prey relationships or to support the introduction of exotic or invasive species.

According to the Proponent, the placement of scour protection would potentially change a small percentage of a sand dominated habitat to a cobble/ boulder habitat within the proposed wind farm area. The introduction of rock scour protection may also attract reef fish, some of which may not currently be found in the proposed wind farm area and that may alter the existing predator-prey relationship between several species or fish or birds.

The total footprint of the foundations and scour area represents 0.1% of the total wind farm area and any change is expected by the Proponent to be minimal based on the

small level of change relative to the proposed wind farm area and transmission cable corridor. Due to concerns expressed about the introduction of predators of Dungeness crab and juvenile flatfish, the Proponent has committed to minimizing the degree of habitat change by designing scour protection to mimic existing boulder/ cobble habitat in the proposed wind farm area. This would minimize the potential for prey-predator relationships by avoiding the creation of new and different habitat. The Proponent estimates that the additional scour protection would increase the amount of boulder/ cobble habitat in the wind farm area by less than 2.5%. The Proponent has committed to monitoring of the scour protection relative to reference boulder/ cobble habitats for a minimum of three years post construction to address uncertainty associated with the prediction of impacts from scour protection.

Dungeness Crab

As Dungeness crab were a species of particular concern to the public, stakeholders and DFO, the Proponent identified the following pre- and post- construction monitoring programs in the Application:

- Monitoring broad scale Dungeness crab movement on Dogfish Banks;
- Monitoring fine scale crab movement relative to the inter-array cables; and
- Monitoring of catch per unit effort for the crab fishery.

Changes in Hydrological Conditions

According to the Proponent's Application, the presence of the WTGs and scour protection has the potential to affect the tidal current, wind and wave regime, which may impact sediment dynamics within and outside the proposed wind farm area. These changes have the potential to directly alter benthic species, communities and/or habitats over time by changing seabed characteristics and to indirectly affect predator- prey relationships. The Proponent reviewed modelling and monitoring results for European offshore wind farm to predict effects. The Proponent identified that the Pacific sand lance and their predators are the most likely to be affected. The Proponent states that the proposed large spacing (800 m by 1200 m) of the WTGs would reduce the degree of changes to hydrological regime and sediment dynamics. The Proponent has committed to pre-construction modelling and post construction physical surveys to provide more detailed information on sediment dynamics on Dogfish Banks.

5.2.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's

responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Biological Consequences of Potential Marine Physical Effects

As discussed in section 5.1.3 of this Report, DFO has expressed the view that the Proponent should use a worst case scenario in order to identify the potential biological effects from the potential sediment transport effects of the proposed Project and verify these results when the modelling is completed and make appropriate refinements to mitigation and monitoring as necessary.

The Proponent submitted Response Submission 25 that includes potential mitigation measures for a worst case scenario to address DFO's concerns. At the time of writing, DFO has not indicated if they are satisfied with the Proponent's response.

EMF

The public, stakeholders and members of the Working Group (including DFO) raised concerns with respect to EMF during Application Review. Many of these concerns related to the effects of EMF on crabs and impacts to the crab fishery resource. In response, the Proponent prepared a Response Submission providing additional information and analysis regarding the potential effects of EMF. The Response Submission concluded that no significant adverse effects are expected from EMF to marine aquatic ecology.

DFO and Area A crab fishery (Area A) raised concerns with the potential for EMF effects on the disruption of movement and migration of crab. The Proponent has committed to assessing the feasibility of laboratory and field studies to validate the findings of the EA regarding the potential effects of EMF, with particular consideration of Dungeness crab. The Proponent has committed to develop and carry out the feasibility study and any subsequent research/ monitoring programs in consultation with DFO scientists. The results of the feasibility study would be reported to DFO, stakeholders and First Nations, as required and on a schedule to be determined in the study plan. The Proponent has committed to continue monitoring information from global research and monitoring activities for consideration in determining the focus and scope of potential monitoring programs for the proposed Project, such as in regard to EMF and report to DFO, stakeholders and First Nations, as required and on a schedule to be determined in the study plan.

Noise and Pressure Effects from Construction and Operation Activities

DFO has expressed the view that the Application does not provide a sufficient level of detail pertaining to the construction noise and pressure effects of the proposed Project

wind farm, as well as mitigation to reduce these effects, to determine the potential effects of the proposed Project on marine aquatic ecology. Specifically, DFO requested additional information to identify the pressure effects generated during construction and requested the use of bubble curtains to mitigate pressure effects generated during construction pile driving activities.

The Proponent met with DFO in September 2009, to discuss potential noise and pressure effects from construction activities and proposed mitigation. In response to concerns raised by DFO, the Proponent submitted a development framework for noise mitigation measures on October 13, 2009. DFO's response to the Proponent's Response Submission is presently outstanding.

Impacts to Fisheries

DFO raised the issue of the potential for impacts to the crab fishery, and is currently consulting with its fishery resource experts to better understand the potential impacts on the crab fishery. At this time, DFO has identified the potential for crabbing/ fishing gear to interact/ get tangled in the proposed transmission cables (including hook and line, trawl and crab fisheries). Area A also identified the potential for interactions between crabbing gear and the proposed cables. The Proponent considered the potential for fishing gear to interact with the proposed transmission cables in its Application. Given that the Proponent has committed to burying the proposed cable to a depth of 1 metre and conducting surveys to monitor cable burial, it is EAO's assessment that the potential for fishing gear to interact with the proposed transmission cables is low.

During Application review, Area A raised concerns about the potential for EMF effects on the crab resource and economic effects of the proposed Project construction and operation on the crab fishery. Area A also raised concerns regarding the feasibility of access to the wind farm grid by the commercial fishers. The potential effects of EMF are discussed above, the potential access effects are discussed in section 7.5 of this Report and the potential economic effects of the proposed Project on Area A are discussed in section 6 of this Report.

The Proponent has committed to undertake appropriate mitigation/compensation measures as necessary to minimize impacts to the crab fishery. DFO notes that further discussions are required between the Proponent, DFO and Area A.

Habitat Compensation

DFO required additional information on the footprint of the proposed Project wind farm and transmission cables to provide a basis for a harmful alteration, disruption or destruction of fish habitat (HADD) determination. DFO also required further information on final mitigation measures and conceptual compensation planning for HADDs

including design details of the wind turbine generator placement, choice of foundation, construction methods and cable laying, burial, routing and landing areas.

The Proponent and DFO met on September 16, 2009 and on September 24, 2009 to discuss the information required by DFO on fish habitat compensation planning. The Proponent submitted a revised conceptual habitat compensation plan for DFO's review on October 16, 2009. DFO notes that further discussions between the Proponent and DFO are required to determine the adequacy of the Proponent's conceptual habitat compensation plan.

Cumulative Impacts

Three potential residual effects on the key indicator resources were assessed by the Proponent in consideration of cumulative impacts and are discussed below.

1. Injury or Mortality and/ or Alteration of Community Assemblage from Chemical Means

   The Proponent reports that increased vessel activity, particularly vessels transporting hydrocarbons, resulting from projects in the area, (such as the proposed Kitimat liquid natural gas terminal) increase the likelihood of a major accident event. Given the Proponent's commitment to emergency spill response and contingency planning to reduce the potential risk associated with the proposed Project as detailed in section 12 of this Report, and the provincial and federal requirement for other projects to have emergency spill response and contingency planning in place, it is EAO's assessment that no significant cumulative impacts to marine aquatic ecology are expected.

2. Alteration of Community Assemblage

   The Proponent reports that the greatest source of habitat alteration associated with the proposed Project is the placement of scour protection on sand habitats that would result in a change in species assemblage. The Proponent has committed to post construction monitoring to determine whether these features are attracting predator reef fish to the area or contributing to the introduction of invasive species to Dogfish Banks which would be used to determine measurable cumulative impacts related to the addition of hard structures in Hecate Strait and Dogfish Banks from other projects. As there are no other projects at present or planned in the immediate area of the proposed Project, it is EAO's assessment that no significant cumulative impacts on the alteration of community assemblage are expected.

3. Displacement of Marine Resources

   The Proponent reports that the cumulative impacts on the displacement of marine resources is related to the potential effects of magnetic fields associated with additional submarine transmission cables within or near the proposed Project area. Given the Proponent's commitment to burying the cable to a depth of 1-2 m and monitoring cable burial, it is EAO's assessment that there is little potential for cumulative impacts of magnetic fields on the marine aquatic ecology.

5.2.4 Conclusion

Based on the information provided in the Application and the responses by the Proponent to issues identified in the EA, EAO concludes that the proposed Project is not likely to have a significant adverse effect on marine aquatic ecology. In reaching this conclusion, EAO notes that the Proponent is engaged in ongoing discussions with DFO and may be required to undertake further mitigation or compensation measures if DFO determines that necessary as part of its regulatory process.

5.3 Marine Mammals

5.3.1 Background Information

As existing baseline data on the distribution and abundance of marine mammals was generally unavailable for the proposed Project area, the Proponent conducted vessel, aerial and shore-based surveys within the following five areas to collect this information:

- IUP area;
- Turbine buffer area;
- Control areas north and south of the IUP;
- Transmission line corridors; and
- The broader regional area.

The studies indicated that Dogfish Banks is within the range of at least 35 species of marine mammals.

5.3.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Three general potential effects were identified in the Application and are described below:

- Displacement from foraging habitat from noise effects;
- Barrier to movements from tower, turbine and WTG layout and operation; and
- Direct injury and mortality.

Displacement from Foraging Habitat from Noise Effects

According to the Proponent, displacement from foraging habitat from noise effects is associated with:

- Vessel and helicopter traffic to transport maintenance crews, equipment and materials to site;
- Pile driving to install WTG foundations;
- Cable laying activities; and
- Placement of scour protection.

The noise generated by these activities would either displace marine mammals from the occupied area or prevent them from accessing it. The noise itself may also result in a disturbance effect, such as the masking of communication.

The proposed construction schedule overlaps with the occurrence of several species of marine mammals in the proposed Project area. The Proponent modelled construction noise to provide an estimate of the associated noise footprint and reviewed available studies to identify the associated disturbance zones.

According to the Proponent, pile driving is the construction activity with the greatest potential for adverse impacts to marine mammals. Marine mammals would be displaced by the noise of pile driving and injury is possible at high noise levels. The Proponent reported in its Application that during construction pile driving effects would be regional and temporary to behavioural disturbance.

The presence of the proposed wind farm and the WTG layout and operation would cause some marine mammals to avoid the immediate vicinity of the turbines and forego foraging opportunities causing a displacement from suitable habitat.

The Proponent conducted noise modelling for turbine operations and turbine maintenance to predict effects. The Proponent reports in its Application that as marine mammals are not reliant on the Dogfish Banks area as preferred habitat and the area affected is relatively small compared to available habitat, displacement from the wind farm area is not expected to be significant.

Barrier to Movement from Tower and WTG Layout and Operation

The presence of the proposed wind farm is expected to alter the movement of marine mammals that encounter it during local daily movements and seasonal migrations. Tower and WTG layout and operation are considered relevant to displacement from foraging habitat and movement due to the continuous nature of the sound produced during operations. The Proponent conducted a literature review, but found there were

limited relevant studies on effects of operational wind farms on marine mammals. The Proponent reports that the sound levels produced during operations are not capable of causing injury or mortality, and are not considered significant.

Direct Injury and Mortality

Direct injury and mortality is associated with underwater noise levels from pile driving, collisions with vessels, and entanglement with cable laying equipment. According to the Proponent, marine mammals will usually avoid vessels and high intensity sound, thus minimizing the risk of injury or death, and it is considered unlikely that a marine mammal could become entangled with cable-laying equipment.

The Proponent conducted modelling to determine the underwater noise levels that would be generated during pile driving activities and the effectiveness of proposed mitigation as committed to by the Proponent. Based on modelling results, the Proponent committed to check the implementation of safety radii around all significant noise-generating activities and to monitor marine mammal presence throughout the activity and the implementation. The Proponent committed to having dedicated marine mammal observers to enforce these mitigation measures. The Proponent also committed to implement acoustic or mechanical soft start procedures before bringing equipment up to full power to allow animals to disperse and avoid trauma.

The Proponent reviewed the number of vessels already using Hecate Strait and reported that they have not been documented as being of concern to marine mammals in the region. The Proponent committed to reduce vessel activity to the minimum necessary and impose speed limits to reduce the potential for collisions. The Proponent also committed to having dedicated marine mammal observers aboard lead vessels to advise the captain of opportunities to reduce adverse effects of disturbance on marine mammals by such actions as avoiding large congregations of marine mammals or those engaged in active feeding behaviours.

Proposed Mitigation

The Application identified monitoring of potential injury or mortality effects during construction, including aerial and vessel surveys. These surveys would also provide data specific to the behaviour of marine mammals in Hecate Strait, which would allow for adaptive management of proposed Project effects.

5.3.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's

responses and EAO's assessment of the adequacy of the responses are detailed in Appendix 2. Key issues and Proponent responses are set out below.

Survey Results

DFO identified inaccuracies in the results of the Proponent's surveys concerning the abundance and distribution of marine mammals in the proposed Project area. The Proponent has attempted to meet with DFO scientist to discuss this matter since August 2009, but has not been successful. In the absence of a meeting, the Proponent intends to address these concerns through additional surveys that would be conducted through monitoring and adaptive management programs. DFO notes that further discussion is required with the Proponent.

Noise and Pressure Effects from Construction and Operation Activities

The public, SQCRD and DFO raised concerns with respect to impacts from construction noise and the effectiveness of proposed mitigation. In addition, DFO had concerns with impacts from operational noise on marine mammals. In particular, DFO required additional information to address the uncertainty associated with noise from pile driving and to assess the potential impacts of pile driving on marine mammals in the proposed Project area. The Proponent committed to working with DFO to identify mitigation measures to reduce noise impacts to marine mammals and prepared a Response Submission outlining its framework for monitoring and mitigation of noise and pressure effects to marine mammals.

Cumulative Impacts

The public also raised concerns with respect to the cumulative impacts of the proposed Project on marine mammals. The Proponent conducted a cumulative impact analysis considering the potential impacts of displacement of foraging habitat, barriers to movement and injury and mortality. The Proponent's results indicate that there are no other existing or planned developments known to be displacing marine mammals from habitats or acting as barriers to movement, to which possible displacement or barrier effects due to the proposed Project would be cumulative. With respect to potential injury and mortality cumulative effects, the only identified cause would be any project with the potential for spills in the marine environment. Given the Proponent's commitments to spill prevention and contingency plans and the provincial and federal requirements for other projects to have spill prevention and contingency plans in place, no significant adverse cumulative injury or mortality impacts are expected on marine mammals. In conclusion, it is EAO's assessment that no cumulative impacts are expected from the proposed Project on marine mammals.

5.3.4 Conclusion

Based on the information provided in the Application and the responses by the Proponent to issues identified in the EA, EAO concludes that the proposed Project is not likely to have a significant adverse effect on marine mammals. In reaching this conclusion EAO notes that the Proponent is engaged in ongoing discussions with DFO and may be required to undertake further mitigation or compensation measures if DFO determines that necessary as part of its regulatory processes.

5.4 Marine Birds

5.4.1 Background Information

The study area for marine birds is located in the marine waters of Dogfish Banks and Hecate Strait between Graham Island and the BC mainland. The Proponent reports that the Dogfish Banks ecosystem provides marine birds with a vast area of highly suitable foraging habitat and is an important migration staging area as well as an important wintering area for many species. No other similar marine ecosystem exists on such a scale elsewhere on the BC coast.

As this would be the first offshore wind farm in North America, the Proponent utilized a number of sources in its assessment of effects including: historical information about the local avifaunal community; survey data collected for the purpose of assessing the proposed Project; published results of studies conducted at operating wind projects in European waters; and professional opinion.

The Proponent has worked with CWS since 2002 to determine the scope and methods of the assessment and conducted aerial and vessel marine bird surveys in 2002, 2003, 2007 and 2008. The assessment identified potential linkages between proposed Project activities and aspects of marine bird ecology such as behaviour and habitat use and potential effects to marine birds. The key potential effects and proposed mitigation are discussed below.

5.4.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The Proponent committed to monitoring and follow-up programs to confirm predicted effects and to improve predictive confidence for any future offshore wind farm developments.

Displacement from Foraging Habitat

The presence of wind farm infrastructure and operational vessels, machinery and people could displace birds from the occupied area (e.g., displaced by an oncoming vessel) or prevent them from accessing it (e.g., avoid the general vicinity of the wind

farm area). According to the Proponent, this displacement due to the wind farm's presence or operations would represent habitat loss. If alternate habitats are not available nearby, or if disturbances are long lasting, birds could be adversely affected and suffer reduced reproductive output or survivorship.

Pile Driving

Pile driving to install the foundations was a specific construction activity identified by the Proponent with the potential to cause displacement of marine birds. In order to mitigate the effects of pile driving, the Proponent has committed to concentrating construction and decommissioning pile driving activities during May through August, so that peak spring and autumn migration periods of sea ducks would be avoided. Additionally, the Proponent has committed to soft-start procedures for pile driving start-up whereby hammer energy would be gradually increased over a period of time that would be sufficient for diving birds to leave an area where they were disturbed by noise.

The Proponent has also committed to mitigation measures in the event that conservation-listed species of birds are attracted to the vicinity of piling operations:

- A qualified observer will scan the area in the vicinity of piling operations prior to start-up to ensure that no conservation-listed birds are present within 50 m of unmitigated piling and 25 m of mitigated piling (safety radius). If any such birds are present, piling operations will not commence until the birds have left the area. Birds that do not leave the area within 10 minutes will be hazed using non-injurious means; and
- In the event that conservation-listed species of birds are attracted to the vicinity (within 50 m of unmitigated piling and 25 m of mitigated piling) piling operations will be terminated until the environmental monitor declares the safety radius clear.

Noise and Visual Effects

Noise and visual effects of vessel and helicopter traffic during transport of equipment, materials and maintenance crews to the wind farm during construction and operation activities has the potential to displace marine birds. The Proponent has committed to having a dedicated, trained marine bird observer aboard a lead (or most active) vessel to advise the captain of opportunities to reduce adverse effects of disturbance on marine birds by such actions as avoiding large congregations of birds on the water or engaged in active feeding behaviours.

The Proponent stated in its Application that no significant displacement effects on marine birds have been identified.

Barriers to Movement

The presence of the proposed wind farm would represent a potential barrier to, and would alter the flight behaviours of, marine birds during daily flights or seasonal migrations. The Proponent states in its Application that if the wind farm blocks access to preferred seasonal or daily habitat-use areas, it could lead to reduced reproductive output or survivorship due to inadequate food intake unless birds were able to relocate to alternate, comparable habitats. Similarly, reproduction and survivorship could be reduced if barrier effects caused birds to expend a significant amount of energy flying over or around the wind farm and that the energy expenditure could not be made up through additional foraging.

The footprint of the proposed wind farm would occupy nearly 19% of Hecate Strait and could notably alter bird flight paths. However, the Proponent concluded in its Application that the proposed wind farm would not cause any significant adverse effects to the migratory movements of birds due to its offshore location and the small increase in flight time potentially caused by the proposed wind farm. The Proponent reports in its Application that the large spacing of the proposed Project's WTGs would diminish the barrier effect by allowing birds to safely fly between WTGs. The Proponent has committed to continuing aerial and vessel surveys pre- and post-construction to determine whether changes in the distribution or relative abundance of marine birds shifts as a result of the proposed Project, and the relevance of any such changes. In addition, the Proponent has committed to radar monitoring during operations to track daily flight paths and seasonal migratory flight paths to understand bird responses to the proposed wind farm.

Injury and Mortality

Collisions

The proposed WTGs, the offshore converter station and maintenance vessels could pose a collision hazard to flying birds. The Proponent reports in its Application that it was not possible, nor feasible with available data, to predict the number of birds that would be injured or killed by collisions with WTGs.

The Proponent has committed to minimize lighting on WTGs and the offshore converter station to that which is essential for navigational safety in order to reduce the potential of collisions. The Proponent has committed to using directionally focused (i.e., as necessary for vessel and/or air traffic) white LED or strobe lights with as brief a flash duration and as long a pause between flashes as possible. The Proponent has also committed to collision monitoring through the use of automated detection systems on the WTGs.

Pile Driving Noise

The construction and decommissioning phases of the proposed Project and associated pile driving noises for WTG foundation installation and removal could result in the mortality of marine birds. The Proponent states in its Application that pile driving could produce underwater noise impulses with sufficient energy to cause physical damage or death to submerged marine birds in close proximity to piling operations. Many birds are expected by the Proponent to avoid construction-related disturbances by distances much greater than those capable of resulting in noise injury or mortality. The Proponent has committed to employing a combination of observers and other possible mitigations such as soft-starts to ensure no birds are present within a 50 metre radius from the pile driving operation. If such birds are present, piling operations would not commence until the birds have left the area.

The Proponent states in its Application that until such time as future studies are conducted, adverse effects of injury and mortality were considered to be significant if the threshold values for pile driving and collision mortality were exceeded. The Proponent committed to mitigation measures as discussed above to ensure that threshold values for pile driving would not be exceeded. The Proponent committed to a number of follow-up and monitoring programs to collect data to confirm predictions and to verify the effectiveness of mitigation.

5.4.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of responses are detailed in Appendix 2. Key issues and Proponent responses are set out below.

<u>Lighting</u>

MOE, SQCRD and EC all raised concerns with respect to the lighting used on the WTGs to minimize potential impacts to marine birds. EC and TC recommended the use of aircraft detection systems that employ radar to activate lighting only when necessary when aircraft approach too closely. The Proponent committed to utilizing the most appropriate form of lighting to minimize the potential night time attraction for birds, as determined to be feasible and effective with regulatory agencies through the detailed design stage. MOE, EC and TC were satisfied with the Proponent's commitment to minimize lighting to reduce impacts to marine birds while still providing for safe navigation through the wind farm grid area.

Monitoring and Adaptive Management

EC stressed the importance of an adaptive management framework to ensure that interactions with bird populations are well understood, potential adverse effects are effectively mitigated and appropriate monitoring continues. In particular, EC recommended the Proponent to continue aerial and vessel survey through the construction period (three years) to at least three years post-construction, at the same survey frequency to allow for continuous monitoring from pre-construction to post-construction. Along with the above surveys, EC recommended radar monitoring to be initiated during construction and continue for to at least three years post-construction. EC recommended that data collected from monitoring programs should be used in the establishment of the post-construction monitoring program. EC requested a commitment from the Proponent for the development of a protocol in consultation with EC (Canadian Wildlife Service) to assess the proposed Project related impacts on bird abundance, distribution and movements. EC stated that a written agreement/MOU/approval conditions along with an oversight process would be important to ensuring all follow-up and monitoring work is undertaken in a satisfactory manner.

The Proponent committed to a monitoring and adaptive management program as recommended by EC in addition to a number of monitoring programs in the area in partnership with Simon Fraser University and EC beyond those required for the EA of the proposed Project. The Proponent is working with EC on a written agreement to ensure that all monitoring work is conducted in a satisfactory manner. EC is currently reviewing the Proponent's commitments to long-term monitoring and adaptive management. Given the Proponent's commitments to monitoring and adaptive management, and considering the assessment of environmental effects by EC, EAO concludes that no significant adverse residual effects are expected to marine birds.

Cumulative Impacts

As there are no other industrial developments in the proposed Project area or adjacent waters to act cumulatively with potential effects to marine birds from the proposed Project, it is EAO's assessment that no significant cumulative impacts are expected on marine birds.

5.4.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on marine birds.

5.5 Terrestrial Ecology

5.5.1 Background Information

There are two study areas for terrestrial ecology centered on Port Edward on the mainland and Tlell on Graham Island. The terrestrial ecology in the vicinity of the proposed onshore facilities in the Port Edward area reflects a range of conditions including undisturbed tracts of forest on Ridley Island, fragmented second-growth forest, small creeks and wetlands and highly disturbed developed areas. The Tlell study focused on two potential landing site areas, with the final location to be determined through preliminary feasibility studies and community consultations.

The terrestrial ecology effects assessment of the Port Edward and Tlell areas included freshwater fish habitat, vegetation and wildlife ecology. The Proponent conducted a desktop identification of focal elements of the terrestrial ecology in the study areas and field studies in 2007 and 2008. In the Port Edward study area, field studies included:

- Groundtruthing[9] of watercourses and ponds to describe freshwater fish habitat;
- Vegetation assessment and general terrain observations to identify ecotypes and sensitive plant communities, developing an ecosystem map and identifying general terrain stability characteristics; and
- Wildlife surveys focused on key species.

In the Tlell study area, field studies included:

- Vegetation assessment and general terrain observations to identify ecotypes and sensitive plant communities, developing an ecosystem map and identifying general terrain stability characteristics; and
- Wildlife surveys focused on key species.

5.5.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Freshwater fish habitat

Construction activities, including the detailed design of the RoW location and structures, the clearing of vegetation and the crossing of watercourses with heavy equipment, have the potential to alter riparian and freshwater fish habitat. The Proponent has committed to:

- Limiting disturbance to riparian management zones by placing structures outside of these areas and spanning watercourses and ponds with overhead lines;

[9] Groundtruthing is the process of verifying imagery data with data collected 'on location' or in the field.

- Groundtruthing of all streams and wetlands by qualified biologists and surveyors prior to the final layout of the transmission line;
- Land the cable on a rocky outcrop distant from any freshwater streams to eliminate much of the opportunity for disturbance to both freshwater and marine fish habitat; and
- Following procedures accepted by DFO to limit disturbance to fish habitat.

Vegetation

The proposed Port Edward onshore transmission route would create new or expand existing RoWs, some of which would require the removal of vegetation and ongoing vegetation maintenance. The Proponent states in its Application that this could cause the loss of rare plants and ecosystems or the loss of wetlands and old-growth forest. Similarly, the proposed transmission route at Tlell could cause the loss of rare plants and ecosystems, mature forest or backshore dune habitat.

The Proponent has committed to:

- Avoiding or minimizing the footprint in these sensitive areas through detailed design;
- Developing a sensitive areas management plan to preserve wetlands and old-growth forests and to manage activities through these areas; and
- Adhering to agency-approved best management plans for maintenance works.

Wildlife

The Application identified the following potential effects on wildlife from the proposed Project:

- Disturbance to Bald Eagle and other bird nests; and
- Loss of mature/old forest- dependent and wetland-dependent wildlife due to the removal of such habitat for the construction of the proposed Project.

The Proponent has committed to:

- Maintain natural buffers and to schedule all vegetation and shoreline disturbance outside the bird nesting window and periods of high shorebird use if possible, and where not possible, to develop a site-specific bird nest monitoring plan; and
- Implementing appropriate construction BMPs and mitigation measures to protect fish and riparian habitat and minimizing the proposed development footprint in mature/ old forest types.

5.5.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the application, additional issues were raised by the Working Group and First Nations. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses include the following:

Sensitive Areas

MOE raised concerns regarding the proposed best practices to minimize effects on sensitive areas and wildlife, in particular, shorebirds on Graham Island. The Proponent committed to conducting shoreline studies prior to construction and minimizing disturbance through construction scheduling and developing detailed BMPs through consultation with MOE. Additionally, the Proponent committed to re-vegetate any disturbed sites with a balanced native seed mix. MOE was satisfied with the Proponent's commitments to mitigate effects to sensitive areas and wildlife.

Cumulative Impacts

Given the existing altered state of the freshwater fish habitat, terrestrial vegetation and terrestrial wildlife in the proposed Project area and the prediction of no significant effects to terrestrial ecology from the proposed Project, the overall cumulative impact of the proposed Project with existing and known proposed future projects is not expected to be significant.

5.5.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects in respect of terrestrial ecology including freshwater fish habitat, vegetation and wildlife.

5.6 Environmental and Operational Management Plans

A number of the Proponent's commitments discussed above relate to the establishment of various environmental management plans (EMPs). As these would be an important part of the strategy for avoiding or mitigating adverse effects, it is worth providing some additional information and analysis respecting these plans.

The proposed Project includes four main development phases: pre- construction; construction; operations/ maintenance; and decommissioning. Each phase includes EMPs to guide proposed Project activities.

The Proponent developed a framework for its environmental management system (EMS) during Application review, and received comments from members of the Working Group about its content at the Follow Up and Adaptive Management subcommittee meeting in September 2009. The EMS would provide overarching guidance on reporting and decision making with respect to the proposed Project design, construction, operations/maintenance and decommissioning activities. The EMS would contain individual EMPs, which would be completed by the Proponent following EA.

The final design and siting EMP would address pre-construction activities that would lead to the final siting (location) of all structures and facilities and the final design of structures and facilities. The Proponent developed the framework for this EMP during Application review, and received comments from members of the Working Group on its content at the Follow Up and Adaptive Management subcommittee meeting in September 2009.

The Proponent foresees that agencies would have regular access and input to the design process with the right to access drawings and project descriptions throughout the process. The Proponent proposed the establishment of a formal working group with responsible agencies and regulators to continue working through the design phase and through the life of the proposed Project on adaptive management initiatives.

Below is a list of components under consideration by the Proponent for development within the EMS:

- Access Management Plan;
- Adaptive Management and Follow Up Program (AM & FUP) – Accidents and Malfunctions;
- AM & FUP - Monitoring for Marine Birds;
- AM & FUP – Scour Management;
- AM & FUP – Crab Movement Study;
- EMP All Phases - Access Management Plan;
- EMP Pre-Construction - Final design and siting. This EMP would be completed prior to completion of final design and siting and would reflect mitigation and siting guidance identified in the Application including the location of all proposed Project components, alignment of all transmission cables, scour design and protection for each WTG and all applicable construction windows. The Proponent has received feedback from the Working Group on the framework for this EMP.
- EMP Pre-Construction - Design and Siting for Graham Island Landfall and Substation;

- EMP Construction - The Proponent has committed to preparing a complete construction EMP prior to the start of any construction activities. The Proponent has identified the need for construction EMPs for the components listed below. The Proponent reports that contractors for the construction of the proposed Project would be required to demonstrate their compliance with the Proponent's EMS. The construction EMP would include:
    - Supervision protocols;
    - Structured reporting system;
    - Standard Operating procedures incorporating appropriate environmental safeguards (waste management, fuel and hazardous material storage and handling, surface erosion prevention and sediment control, fish and wildlife protection, air quality protection, noise management, archaeological site protection, worker and public health and safety);
    - Training plan to ensure environmental best practices;
    - Emergency response plans to ensure appropriate environmental protocols;
    - Internal review of monitoring data and procedures to ensure compliance with regulations and mitigation commitments;
    - Stakeholder feedback program;
    - Quality control and assurance; and
    - Monitoring and follow-up.
  - EMP Construction – HaidaLink;
  - EMP Construction – Inter-array cables;
  - EMP Construction – Landfall at Ridley Island;
  - EMP Construction – Mainland Submarine Cable;
  - EMP Construction – Marshalling Yard;
  - EMP Construction – Offshore Converter Station;
  - EMP Construction – Onshore Converter Station;
  - EMP Construction – Overhead Transmission Lines;
  - EMP Construction - Pile driving;
- EMP Scour Protection – Construction and Operations;
- EMP Operations - The operational EMP would ensure that the operations of the proposed Project are carried out in accordance with the environmental goals set out in the EMS and the requirements in the Application and developed in the EA. The Proponent has identified the need for operational EMPs for the various components listed below. The issues this EMP would address include:

        - Monitoring required to verify construction activities;
        - Long-Term Environmental Monitoring Program for adaptive management purposes;
        - Scour of seabed erosion and management;
        - Waste management;
        - Fuel, petroleum, oil and lubricant management;
        - Hazardous materials management;
        - Contingency plans and training for spill response;
        - Health and safety plans and training;
        - Emergency preparedness and response plan and training; and
        - Contractor orientation and auditing.
    - EMP Operations - HaidaLink Submarine Cable;
    - EMP Operations – Inter-array cables;
    - EMP Operations - Mainland Submarine Cable;
    - EMP Operations – Marine and air vessel procedures and maintenance;
    - EMP Operations – Offshore Converter Station;
    - EMP Operations – Shore bases;
    - EMP Operations – Turbines, Nacelles and Blades;
- Emergency Response Plan – Construction and Operations. The Proponent has indicated the importance of collaborating with the Regional Advisory Committee and local and regional resources in developing and implementing the Emergency Response Plan.
- Long- Term Environmental Monitoring Program - The Proponent has committed to environmental management practices and monitoring that foster the long-term viability of offshore wind development in BC. The Proponent has a commitment to the Haida Nation to undertake an eight year, long-term environmental monitoring program focusing on the following priorities:
        - Dungeness crab fishery;
        - Marine mammals;
        - Marine birds; and
        - Other areas identified by the outcomes of the EA or subsequently determined relevant by the Proponent or the Haida Nation.
- The Long- Term Environmental Monitoring Program would take an adaptive management approach including two years of pre-construction monitoring, three years of construction monitoring and three years of post-construction monitoring.
- EMP – Decommissioning.

5.6.1 EMP Content

The Proponent has committed to including the following seven areas in the EMPs.

Soil Erosion and Control Plans

The soil and erosion control plans would describe the mitigation measures and precautions to ensure that water quality protection for the proposed Project work on the mainland. The plans would describe measures to minimize sedimentation of watercourses and prevent the discharge of deleterious substances or debris into the receiving environment.

Emergency Spill Response and Contingency Procedures

A spill prevention, reporting, mitigation and clean-up program would be in place and enforced during all phases of the proposed Project. This plan would be designed to provide mitigation in the event of an accident of malfunction resulting in a spill of fuel, oils, lubricants or other harmful substances. This plan would describe measures to contain the spill and the appropriate notification and reporting procedures for each phase of the proposed Project.

Waste Management and Disposal Plan

This plan would identify any provincial requirements for waste disposal, removal and containment. The Proponent has committed to recycling scrap metal, glass, plastic and paper. This plan would also identify any waste management practices to minimize or eliminate potential effects to wildlife, aquatic species and the surrounding environs.

Health and Safety Plan

The Proponent has established and maintains an organizational culture of zero-injury and occupational illness. This plan would minimize the potential for accidents and risk to workers as well as the public. This plan would be part of the Safety Management System which would be integrated into all phases of the proposed Project.

Monitoring Plans

The Proponent has committed to a data collection program to provide quantitative data to aid in determining the effects of the proposed Project construction and operation on key resource indicators. Details of the monitoring plans have been discussed in each of the environmental effects sections of this Report. Monitoring would also be used in adaptive management in the design and operation of the proposed Project.

Qualitative Risk Assessment

The EMPs would also specifically address the following to ensure that all EMPs are responsive to changes to proposed Project design, schedules, risks and standards/ guidance affecting design:

- Design standards and related risks;
- Design and siting guidance; and
- Proposed Project schedule.

Environmental Auditing

The Proponent has committed to an auditing program of the environmental mitigation and monitoring proposed for all phases of the proposed Project. This would include reporting consistent with all permitting and regulatory requirements.

6 Economic Effects

6.1 Economic

6.1.1 Background Information

The spatial scope of the Proponent's effects assessment for the economic effects is Haida Gwaii, the SQCRD and the province. The Proponent analysed available information on these areas including labour and employment, expenditure, economic diversification and marine harvesting areas. The results indicated that the SQCRD has a higher than average unemployment rate partly due to the declining economic base and to the seasonal nature of many employment opportunities.

The construction phase of the proposed Project is expected by the Proponent to have the greatest impact on the economy and employment as it would be the most resource intensive phase. The HaidaLink component of the proposed Project would provide Haida Gwaii with a dependable electricity supply by providing a direct link to the main BC power grid and tying together both independent transmission systems on Haida Gwaii.

Area A crab fishery is the main fishery in the region. The Proponent reports in its Application that the BC seafood and shellfish sector had average landed values of $868 million between 2005 and 2007 and the BC crab industry is an important and relatively stable contributor to the sector with an average landed value of $30.5 million over the same period. Between 2000 and 2007, Area A licensees landed between 34% and 77% of the annual BC crab harvest. The Proponent conducted a detailed

assessment of the potential effect of local crab fishers' ability to continue to fish the area.

6.1.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The Proponent states in its Application that the proposed Project presents the opportunity to increase direct, indirect and induced employment in the SQCRD and the province. The Proponent estimates the direct impact of the proposed Project investment in the regional economy to be 381 person years of employment within 421 direct person years generated in the province over the course of the construction phase. According to the Proponent, during peak construction the proposed Project could create up to 150 jobs, equivalent to about 10% of the SQCRD unemployed workforce. The Proponent has also committed to promoting skilled trades, education and training programs in local communities in advance of the proposed Project and pursuing local hire policies to maximize the employment benefits of the proposed Project for the SQCRD.

The indirect employment effects are estimated by the Proponent at 2,350 person years and induced employment is estimated at 629 person years for the province. The Proponent has committed to hire local policies and local procurement policies to maximize benefits to the region and province.

The proposed Project is estimated by the Proponent to have a total impact on GDP of $261.7 million or an average of $87.2 million for every year of peak construction, including direct, indirect and induced effects.

The direct tax revenue impact includes personal, corporation, sales and other taxes generated as a result of the activities and industries that would supply the goods and services used by the proposed Project. The Proponent estimates that a total of $42 million of government revenue would be generated at the provincial and local levels of government, $38.3 million and $3.7 million respectively.

The results of the Proponent's assessment of the potential effect of local crab fishers' ability to continue to fish the area indicate that during offshore construction periods, there would be some areas of the harvestable area that would be off-limits to crab fishers and other vessels for safety reasons. The Proponent estimates that for a scenario of full exclusion from the wind farm grid all year round, the landings reduction impact is approximately 2.8%. The Proponent has committed to 500 m exclusion zones around construction vessels and offshore construction sites during temporary construction activities. The Proponent expects this to significantly reduce the impact to Area A. Area A has contended that the maintenance of such exclusion zones may not be achievable due to gear drift. The Proponent has committed to consulting with

agencies and stakeholders, including Area A, in developing an access management plan to set out the protocol for communicating construction phase activities, the route of the transmission line and appropriate interim operating procedures to the fishers. During operations, the Proponent is considering a 100 m exclusion zone around each WTG, excluding fishers from part of the proposed wind farm area. Considering the natural annual population shifts and based on available information, the Proponent reports in its Application that the potential for residual proposed Project effects on access and revenue to Area A fishers is not expected to be a significant impact.

6.1.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Renewable Energy

Many comments received during the public comment periods emphasized the need for the province and Haida Gwaii in particular to move to renewable energy sources, and expressed support for the benefits of alternative, renewable energy production this proposed Project would bring.

Crab Fishery

The public, stakeholders (particularly Area A) and DFO raised concerns regarding potential economic effects to the crab fishery due to access restrictions to the proposed wind farm area. The Proponent has committed to undertake appropriate mitigation or compensation measures as necessary to minimize these effects and ensure a viable crab fishery. DFO notes that further discussions are necessary between the Proponent, Area A and DFO on the potential effects to the crab fishery as a result of access restrictions.

Cumulative Impacts

The cumulative impacts of the proposed Project and other past, present and future planned projects on SQCRD employment and economy would be beneficial in all areas considered other than potentially to the Area A crab fishery. These projects provide jobs and training to regional, provincial and national residents. As well, revenue is generated from these projects for the region and province. It is EAO's assessment that the proposed Project's potential economic effects to Area A would not act cumulatively with other projects in the proposed Project area.

6.1.4 Conclusion

Based on the information provided in the Application and the responses by the Proponent to issues identified in the EA, EAO concludes that the proposed Project is not likely to have significant adverse economic effects. In reaching this conclusion, EAO notes that the Proponent is engaged in ongoing discussions with DFO and may be required to undertake further mitigation or compensation measures to ensure a viable crab fishery, if DFO determines that necessary as part of its regulatory process.

7 Social Effects

7.1 Communities and Services

7.1.1 Background Information

The spatial scope for the Proponent's effects assessment covers the SQCRD, including the following communities: Masset, Kitkatla, Old Masset, Lax Kw'alaams, Port Clements, Metlakatla, Queen Charlotte City, Port Edward, Skidegate, Prince Rupert, Electoral Area D and Electoral Area E.

The Proponent collected baseline information on population and demographics, education, employment and income, health, education, tourism, recreation and other services. The Proponent also consulted with local groups and users of the proposed Project area to gather information to assess the effects of the proposed Project on socio-community indicators. The Proponent completed qualitative and quantitative assessment of effects on socio-community indicators during construction, operation and decommissioning phases of the proposed Project.

The Proponent reports that over the last ten years, the SQCRD has experienced a decrease in population of 21%, and at the same its economy has been facing substantial restructuring due to a decreasing reliance on sectors such as forestry and fishing. The SQCRD currently has an unemployment rate of 15%, over double that of the province. In comparison to BC, the majority of the communities within the study area are characterized by declining populations and shrinking industrial sectors, having lower than average incomes as well as lower levels of educational attainment. The Proponent reports that the majority of communities tend to have a relatively young and willing labour force, reflected in high labour market participation rates, high levels of entrepreneurship, and owner-operated businesses. Tourism is playing an increasing role in the local economies of the study area.

7.1.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Communities and Services

As a result of labour being outsourced for the seasonal construction of the proposed Project, there is the potential for a temporary increase in population, primarily in the construction staging locations of Prince Rupert and Skidegate. The Proponent concludes in its Application that the extent of the overall increase in population would depend on the proportion of the workforce that is local and how much external labour is required. The Proponent committed to initiate local training and education programs and adopt employ-local policies to maximize the proportion of local labour employed in the proposed Project and minimize the effects to communities and services of any increase in population. The Proponent states in its Application that the proposed Project has the potential to produce a positive effect through the creation of up to 150 construction jobs within the SQCRD, representing almost 10% of the unemployed workforce. The Proponent estimates that the proposed Project would reduce the regional unemployment rate from 15% to 13.6%.

The Proponent has made numerous commitments to mitigate negative impacts of the proposed Project on communities and services. For example, the Proponent committed to a temporary housing strategy during construction to ensure appropriate and adequate accommodation would be available to workers relocating from outside the SQCRD. The Proponent has provided opportunities for the existing labour force to build the appropriate level of skills and training that would be required for the construction phase of the proposed Project by sponsoring an electricians' foundation course on Haida Gwaii and establishing a scholarships and bursaries program for students graduating high school who are interested in pursuing a career in the trades.

7.1.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, no additional issues were raised by government agencies, First Nations or members of the public.

Cumulative Impacts

When examining the cumulative impacts of the proposed Project on communities and services in relation to existing and predicted development in the proposed Project area, EAO has determined that the cumulative impact is not significant.

7.1.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of an EA certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects on communities and services.

7.2 Land Use and Tenure

7.2.1 Background Information

The spatial scope for the effects assessment of land use and tenures includes the three IUPs (proposed wind farm location and the two transmission cable routes) and the surrounding areas. The Proponent collected baseline information for onshore and offshore land and seabed use, land tenure, mineral tenures and oil and gas tenures. The results indicated that the wind farm IUP area overlaps with oil and gas tenures held by Shell Canada, Petro Canada and Canadian Forest Oil. There were no tenures within the submarine transmission cable IUP areas.

7.2.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The proposed Project has the potential to impact land use through the physical displacement of existing land uses due to construction, operation and maintenance and decommissioning activities.

The construction activities during the landfall installation near Tlell have the potential to interrupt existing land uses in some of the selected locations. At one location construction would cause temporary changes to recreational access to trails and beaches around the landfall site. The Proponent states in its Application that determination of residual effects would depend on the site selected and negotiations with landowners for access to, use, or ownership of the land at the landfall site. The Proponent has committed to ongoing consultation with stakeholders to determine the landfall site.

Similarly, the construction on the mainland could result in temporary interruptions of existing land uses. The Proponent reports that current land use in the area is identified as being primarily industrial with some mixed forest. The Proponent states in its Application that due to the industrial nature of existing land use in the area and plans for future expansion of other facilities on Ridley Island, it is expected that potential effects on land use would be negligible.

The presence of the proposed WTGs, offshore converter station and inter-array cables in the wind farm area has the potential to limit exploration activities for companies

holding oil and gas tenure in the area. Due to the federal and provincial moratorium on offshore oil and gas exploration and development in Canadian waters, the Proponent states in its Application that the proposed Project is not expected to pose a significant impact to the tenure holders. The EA also considered the future impact of the proposed Project on these rights should the moratorium be lifted (see further discussion below under Tenure).

7.2.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations and members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Land Use

The public raised concerns with respect to the HaidaLink portion of the proposed Project, BC Hydro's decision making process regarding the location of the landfall site for HaidaLink, and the potential effects on land use and adjacent property values due to the siting of the substation. The Proponent subsequently held a meeting with the Tlell Advisory Committee to provide information about the process for determining the substation location. The Proponent expects that the substation location would be determined in consultation with BC Hydro and the community of Tlell and be based on the results of the EA and detailed engineering studies. The Proponent committed to ensuring that community input related to the siting of the infrastructure required to connect HaidaLink would be carried forward to BC Hydro which ultimately would determine the process.

Tenure

NRCan raised issues with respect to the oil and gas tenures held by Shell Canada and Petro Canada in the proposed Project area during Application review. Specifically, NRCan commented that Shell's request (submitted during the public comment period) to conduct high quality seismic work prior to the proposed Project construction is not allowable under the current moratorium on offshore oil and gas exploration activities.

NRCan noted that any rights granted to the Proponent under the *Federal Real Property and Federal Immovables Act* would be subject to existing tenure rights. In this context NRCan agreed that it is appropriate for the Proponent to continue discussions with Shell Canada, Chevron and any other existing right holders to address concerns regarding potential impacts of the proposed Project on their rights.

The Proponent has committed to consult with ILMB, NRCan and tenures holders to resolve overlapping interests and jurisdictional issues during the design and siting phase (pre-construction). The Proponent has indicated that consultations with Shell and Chevron are ongoing to ensure that wind farm activities and any future oil and gas activities could co-exist in the future should the moratorium be lifted. The Proponent has committed to review engineering plans during the early detailed design of the proposed Project with Shell and Chevron in a workshop format to identify potential conflicts and if appropriate refine the proposed Project layout, where reasonably practical.

Cumulative Impacts

The cumulative impacts of the proposed Project in conjunction with existing and proposed projects in the proposed Project area on land use and tenure are very low, as the present and future projects are aligned with existing land use plans and reflect the existing moratorium on offshore oil and gas exploration activities. The Proponent has indicated that consultations with Shell and Chevron are ongoing to ensure that wind farm activities and any future oil and gas activities could co-exist in the future should the moratorium be lifted.

7.2.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects in respect of land use and tenure.

7.3 Visual Resources

7.3.1 Background Information

The spatial scope of the Proponent's visual resource effects assessment consisted of an area encompassed by an 80 km radius from the centre of the wind farm IUP area. The Proponent's visual assessment focused on land based locations in proximity to the wind farm IUP area and only considered those locations from which this area would be visible. The proposed Project is located about 8 km offshore at its closest point. According to the Proponent, the closest and most noticeable views would be from the shores of Naikoon Provincial Park on Graham Island. The Proponent conducted modelling under different scenarios to determine potential impacts to visual resources. The Proponent also collected data from park users on the nature of the potential impact to the viewscape.

7.3.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

In the absence of proposed mitigation, the presence of the proposed wind farm has the potential to diminish the enjoyment of the area by residents and tourists. The Proponent's modelling and data collection results from park users did not predict a diminished experience due to the presence of the proposed wind farm. The Proponent states in its Application that any loss of wilderness experience would generally be limited to the part of the shoreline of Naikoon Park closest to the WTGs, primarily during periods of good weather, and would not constitute a significant effect.

The Proponent committed to consider the alignment of the turbines during the detailed design stage and locate the turbines as far as possible from intensive recreation zones, and the natural environment zone of North Beach to minimize the effect on the viewscape from Graham Island.

7.3.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations or members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Naikoon Park

MOE expressed concerns with respect to the visual assessment and the potential impacts to Naikoon Park and the potential to change the wilderness experience offered at the park. The Proponent provided MOE with park survey data for its records and to enable post construction monitoring to determine impacts to park users. The Proponent also committed to carrying out a survey of park users during operations to gain an understanding of users' perceptions of the proposed wind farm and the impact on their enjoyment of Naikoon Park. MOE was satisfied with the Proponent's commitment to post construction monitoring to determine impacts to park users.

Cumulative Impacts

When examining the cumulative impacts of the proposed Project on visual resources in relation to existing and predicted development in the proposed Project area, EAO has determined that the cumulative impact is not significant. The potential cumulative impacts on visual resources would be from offshore developments visible from land and no information is currently available as to the timing of other offshore wind farms or developments in the region.

7.3.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on visual resources.

7.4 Radio Communications

7.4.1 Background Information

The Application identified the potential for direct effects of the operating WTGs and proposed Project-related radio communications on existing radio communication, radar and seismoacoustic systems operating in and around the proposed Project area as identified below.

The Proponent collected available information and conducted modelling to predict effects. The scope of the Proponent's assessment was north Hecate Strait. The results of the Proponent's assessment indicate that the proposed operation and maintenance activities and facilities would have the potential to disrupt the functioning of radio communication systems through interference.

The Proponent's analysis considered the potential for effects during operations on the following radio communications located within and around the wind farm IUP area:

- Interference of point-to-point systems;
- Interference of multichannel multipoint distribution (MMD) systems;
- Interference of radio and TV broadcasting; and
- Interference of maritime stations and radio-navigational aids.

Information collected by the Proponent indicated that no MMD systems were within the consultation zone, nor were there any radio and TV broadcasting buildings within the potential affected area. The potential effects on point-to-point systems and maritime stations and radio-navigational aids are described below.

7.4.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The Proponent concluded in its Application that no interference is anticipated with point-to-point systems, such as those used in TV broadcasting or cellular communications. To ensure there would be no effects, the Proponent has committed to consulting with systems owners to validate technical information regarding these systems to confirm the prediction of no significant impacts.

Most of the maritime radio systems in the proposed Project area are registered to the Canadian Coast Guard, (CCG) and provide services to the marine community and the

public. The Proponent identified four positional radar beacons, or racons, operated by CCG. Racons are a type of radar transponder used to mark maritime navigational aids. Based on available literature from other offshore wind farms, no effects are expected by the Proponent. CCG confirmed that no effects are anticipated from the WTGs on the racons.

7.4.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, no additional issues were raised by government agencies, First Nations or members of the public.

Cumulative Impacts

When examining the cumulative impacts of the proposed Project on radio communications in relation to existing and predicted development in the proposed Project area, EAO has determined that the cumulative impact is not significant. The potential cumulative impacts on radio communications would be from similar types of WTG structures in the consultation zone and no information is currently available as to the timing of other potential wind farms in the region.

7.4.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects on radio communications.

7.5 Navigation

7.5.1 Background Information

As there are no precedents in BC for assessing the effects of offshore wind projects on navigation, the Proponent used the experience from other jurisdictions and consultations with experts and stakeholders to identify the following activities that could impact navigation:

- Increased vessel movements between the wind farm and the mainland during all stages of the proposed Project;
- Increased vessel movements within the wind farm during all stages of the proposed Project;
- Submarine transmission cable laying activities for the inter-array cable, mainland cable and HaidaLink cable;

- Interaction with the inter-array submarine cables, the mainland cable and the HaidaLink cable during operation;
- Interaction with the towers and the offshore converter station during operation;
- Increased vessel movements due to decommissioning of the towers and offshore converter station and transportation to the shore for disposal; and
- Effect of the mainland submarine DC cable on compass bearings.

The Proponent's analysis focused on whether public safety would be affected and whether existing navigational routes and uses would need to be diverted or restricted.

The spatial scope of the Proponent's assessment is north Hecate Strait.

7.5.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

During construction and operations and maintenance activities there would be increased marine vessel traffic as equipment and materials are transported between the wind farm grid area and the mainland. The increased vessel movement could affect the collision risk of fishing vessels travelling to and from their fishing grounds on Dogfish Banks or the safety of commercial and passenger vessels. Given that vessel operators are required to have appropriate marine navigation training and adhere to applicable Canadian regulations, the Proponent reports in its Application that the effect of the proposed Project activity diminishing freedom of movement would be short term during construction and would not be significant. While vessel activity related to operation and maintenance activities would last for the duration of the proposed Project, the effects on navigation are still not considered to be significant by the Proponent. The Proponent has committed to the use of appropriate notifications and navigational aids to reduce the potential for effects to navigation.

Indirect effects to navigation, such as changes to water depth, are not anticipated so are not considered.

7.5.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations or members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Access Management Plan

TC required the Proponent to develop an Access Management Plan during Application review. Specifically, TC required additional details regarding the proposed lighting of the wind farm grid and exclusion zones within the access management plan. CCG provided guidance during Application review to ensure safe navigation during construction and operation of the wind farm. The Proponent prepared the Access Management Plan and revised the plan based on feedback received from the navigation subcommittee. The navigation subcommittee is reviewing the revised Access Management Plan. The Proponent committed to working with TC, CCG through the detailed design stage to further minimize impacts to navigation.

Cumulative Impacts

When examining the cumulative impacts of the proposed Project on navigation in relation to existing and predicted development in the proposed Project area, EAO has determined that the cumulative impact is not significant. The potential cumulative impacts on navigation would be from the development and operation of another offshore wind farm in the vicinity of the proposed Project or offshore oil and gas exploration or development in the vicinity of the proposed Project (if the moratorium were to be lifted), to which there is no information currently available, however the geographical extent of the potential cumulative impact would be local.

7.5.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects on navigation.

8 Heritage Effects

8.1 Archaeological and Heritage Resources

8.1.1 Background Information

The Proponent states in its Application that any pre-contact archaeological remains in the underwater study area would likely be highly significant due to the history of the area. While the great majority of the proposed Project area is underwater, much of it was dry land at the end of the Pleistocene era (14,000 to 9,000 radiocarbon years before present) precisely at the time when the first people to enter the American continents are believed to have made their way south along the Pacific coast.

The Proponent conducted underwater and terrestrial archaeological studies to assess the potential for impacts to archaeological resources. Underwater studies focused on

identifying archaeological potential for underwater (drowned) terrestrial sites, sunken cargo canoes from Haida or Tsimshian trade activities, lost fishing tackle and for shipwrecks and aircraft crash sites.

The spatial scope of the underwater portion of the archaeological assessment consisted of the area contained within the 550 km^2 area of the IUP. The Proponent conducted limited sampling in and around the location of the proposed wind farm and assessed the archaeological potential based on the percentage of submerged land area that was likely to have been occupied by humans and the number of artifacts and archaeological sites likely to be impacted by the footprint of the proposed Project. No artifacts or archaeological sites were identified by the Proponent during the field studies. The Proponent has committed to additional magnetometer surveys and targeted testing of the transmission corridors during pre construction monitoring.

The spatial scope of the Proponent's terrestrial archaeological impact assessment (AIA) consisted of three areas on the east coast of Graham Island, near Tlell and, on the mainland, the cable landing and converter station site and transmission line route. This assessment followed the *BC Archaeological Impact Assessment Guidelines*. Three areas for the cable landfall near Tlell were investigated by the Proponent and two were found to contain archaeological resources. The Proponent states in its Application that the archaeological impacts would depend on which landing site is chosen. On the mainland, the Proponent's archaeological studies found the following resources: culturally modified trees (CMTs), shell midden sites, stone tools and remains of a World War II fort. The Proponent has committed to additional field studies on the portion of the transmission line RoW on Watson Island and the portion of the proposed transmission line that follows the existing CN RoW prior to the start of construction in order to confirm the low archaeological potential ratings identified in the AIA for these two areas.

8.1.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

Marine Archaeology

Submarine cable laying activities and associated subsurface trenching has the potential to destroy archaeological resources along the submarine cable routes. The Proponent committed to additional sampling at selected sites to determine archaeological potential prior to construction and avoiding identified sites through the selection of alternative routes or sites through the detailed design stage.

The effect of pile driving activities would create a disturbance footprint of the pile and bottom disturbance from support legs or spuds of construction barges and anchoring of support vessels which has the potential to destroy archaeological resources. The

Proponent committed to additional sampling at selected sites to determine archaeological potential prior to construction and avoiding identified sites through the selection of alternative routes or sites through the detailed design stage.

The Proponent committed to a contingency plan to stop work that could threaten remains and record wreckage or artifacts and notify the Archaeology Branch and to provide Archaeological Awareness Training for construction crews.

Terrestrial Archaeology

The Proponent states in its Application that the principal land based issue near Tlell is the potential for construction and operations to impact archaeological and heritage resources.

The principal effect considered in the Application is the potential for ground disturbance associated with the construction of towers and/or power poles along the transmission line RoW, which could affect any CMTs and/or other types of archaeological features that might be present. The Proponent committed to a number of mitigation measures to address this potential effect including:

- Avoiding as many CMTs as feasible through final design; and
- A qualified professional archaeologist and representatives of the Gitxaala, Lax Kw'alaams, and Metlakatla Nations to monitor all construction activities. Should significant cultural deposits be encountered during monitoring activities, construction activities would cease and a systematic data recovery program would be implemented by a qualified professional archaeologist. The Proponent has committed to work cooperatively with the above listed First Nations to obtain the appropriate approvals from the First Nations for such recovery programs.

8.1.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, no additional issues were raised by government agencies, First Nations or members of the public.

Cumulative Impacts

When examining the cumulative impacts of the proposed Project on heritage in relation to existing and predicted development in the proposed Project area, EAO has determined that the cumulative impact is very low. The Proponent has committed to avoiding as many CMTs and archaeological sites as possible in the final design of the proposed Project and other projects would be required to conduct archaeological assessments which would further reduce the potential for cumulative impacts.

8.1.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on archaeological and heritage resources including underwater and terrestrial archaeology.

9 Health Effects

9.1 Healthy Living

9.1.1 Background Information

The Government of British Columbia has a goal of leading the way in North America in healthy living and fitness. There are many factors affecting healthy living and fitness, however three key factors that are considered with respect to the proposed Project are environmental health, health education and sports/physical activity. Environmental health issues are addressed in section 5 and 9.2 of this Report, therefore this section focuses on how the proposed Project contributes to: 1) enabling or enhancing physical activities and fitness, and 2) health education of people that would be employed at the proposed Project.

Of particular concern in connection with the proposed Project are the likely implications, if any, for the continuation and expansion of opportunities for physical activity and various recreational pursuits in the vicinity of the proposed Project. Such opportunities would apply to anyone using or visiting the area in general, as well as workers employed at the proposed Project. Encouraging healthy living lifestyles through education can include provision of information or programs to assist employees to quit smoking, address substance abuse or maintain physical fitness.

9.1.2 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application describes public use of the lands near to the site of the proposed Project as including recreational activities such as hiking, boating, wilderness experiences, and wildlife viewing. The Proponent considered the potential for impacts on these activities and found that due to the relatively small terrestrial footprint of the proposed Project, hiking, wilderness experiences and wildlife viewing would not be impacted. Boating in the proposed wind farm area and shoreline recreational activities at the proposed cable landing site near Tlell could be impacted. The Proponent committed to minimizing the proposed footprint through final design and siting and to developing an access management plan to reduce the impact of the wind farm and submarine transmission cable installation and operations on recreational boaters. In

addition, the Proponent is currently working with the Village of Masset to determine the feasibility of upgrading or reopening the community recreation centre which was closed in late 2008 as a result of lack of funding. The Proponent has also committed to consulting with local communities to develop viewpoints to promote the viewing of the wind farm as a recreational and eco-tourism activity.

As the shoreline disturbance would only occur during construction activities and the disturbance to boaters would be relatively small considering the extent of the area available, the Proponent concludes in its Application that no adverse impacts are expected to physical activities and fitness from proposed Project activities or operations.

The Proponent's assessment revealed that the impact on public use of the land for recreational activities would be slight and EAO does not consider that continuation of those activities would be impeded in the future.

The Proponent intends to provide information and/or institute education programs that encourage healthy living lifestyles for workers employed at the proposed Project. For example:

- The Proponent has committed to implement a Health and Safety Plan for its employees;
- As part of employee training, the Proponent will look to include personal health modules to promote healthier living and will support employees and their families in practicing healthy and safe activities; and
- The Proponent will give consideration to promoting the use of local/ country foods (resources gathered for food purposes) as part of the construction and operations stages. For example, using local suppliers of country foods for meals for construction and/ or operation staff.

9.1.3 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations or members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

<u>Impacts to Naikoon Park</u>

MOE raised concerns with respect to the potential impacts to Naikoon Park users from visual impacts of the proposed wind farm and noise impacts during construction and operations including helicopter flight paths. As discussed in section 7 of this Report, the Proponent committed to post construction monitoring to determine impacts to park users and their perceptions of the wind farm and the impact on their enjoyment. MOE

also raised concerns with respect to the potential impacts to beaches in Naikoon Park and food resources from accidents and malfunctions that would affect the enjoyment of these areas. The Proponent committed to developing an EMP to include Naikoon Park beaches and monitoring of contaminants to country foods. To address MOE's concerns regarding potential noise impacts to intensive recreation and natural environment zones in Naikoon Park, the Proponent committed to conducting in air noise modelling to confirm operational noise levels and consulting with MOE to confirm helicopter flight paths for regular maintenance and access to and from the wind farm, to avoid sensitive use areas of Naikoon Park. MOE was satisfied with the Proponent's commitments to mitigate effects to park users.

Impacts to Beach Access

Tlell community residents raised concerns with respect to the potential impacts to beach access from the cable landing on Graham Island. The Proponent committed to further community consultation to identify the final location of the cable landfall in order to minimize temporary disturbance effects from the construction of the cable landfall.

Cumulative Impacts

Considering that the proposed Project is primarily located offshore and the Proponent's commitments to encourage healthy living through employee training programs, its Health and Safety Plan and enhancing community resources for healthy living activities, EAO has determined that the cumulative impact is not significant.

9.1.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects on healthy living.

9.2 Public Health

The proposed Project has the potential to impact some aspects of public health including those listed below:

- Air quality;
- Noise;
- Water quality;
- Country foods;
- EMF;
- Worker safety; and
- Public safety.

The Proponent collected baseline information on the public health aspects listed above. The spatial scope is the communities in the SQCRD. The construction phase of the proposed Project is considered by the Proponent to have the greatest potential for impact as it would be the most intensive phase.

9.2.1 Proposed Project Issues and Effects and Proposed Mitigation Identified in the Application

The following describes the key issues identified in the Application and the proposed mitigation for potential effects.

Air Quality

Construction activities such as emissions generated during marine and air transportation, pile driving and cable trenching could have the potential to affect air quality in the study area. The Proponent committed to mitigation measures to reduce dust and emissions including limiting vehicle speeds and minimizing vehicle trips and idling and ensuring that all vehicles including marine vessels and construction equipment are in good working order and follow regular routine maintenance. The Proponent reports in its Application that effects on air quality are considered to be temporary and negligible.

According to the Proponent, there is the potential for a positive effect on air quality during the operational phase of the proposed Project due to the diesel generators on Haida Gwaii being replaced by energy produced by the proposed Project.

Country Foods

The Proponent considered country foods gathered from the land, collected from the shoreline and from the ocean. Country foods in the proposed Project area include: wild strawberries, crab apples, salmon, dogfish, halibut, razor clams, Dungeness crabs, octopus and scallops.

All phases of the proposed Project have the potential for accidental spills of fuel and lubricants on the ground and in the water that could impact the quality of country foods. The Proponent has committed to mitigation measures and response protocols as listed in the Environmental Management Plan to minimize the potential for contamination of country foods and monitor beaches along Naikoon Park to check for contamination in areas of country food harvesting.

Workplace Health and Safety

To address the potential for workplace accidents, the Proponent committed to health and safety procedures similar to those of offshore oil and gas installations. The

Proponent committed to providing appropriate health and safety training for WTG maintenance, confined places and marine activities.

9.2.2 Proposed Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Working Group, First Nations or members of the public. These issues, the Proponent's responses and EAO's assessment of the adequacy of the Proponent's responses are detailed in Appendix 2. Key issues and responses are set out below.

Noise

MOE raised concerns with respect to noise impacts within Naikoon Park and the potential to impact the wilderness experience sought by park users. The public also raised concerns relating to noise effects primarily from construction. MOE required a night time construction noise mitigation plan. The Proponent committed to developing a construction EMP and implementing noise mitigation measures to reduce exposure of local receptors to noise by construction ships, vessels and helicopters. In addition, the Proponent committed to conducting in air noise monitoring to confirm operational noise levels during a low/ calm wind and moderate wind as determined by MOE. MOE was satisfied that the Proponent's commitment would reduce the potential for noise impacts.

Country Foods

Health Canada requested additional information regarding the potential for sediment disturbances from cable laying activities or WTG installation to introduce contaminants into aquatic species and to what extent this water body is used as a source of country foods. Advice of Working Group members including PRPA, TC and EC indicated that cable laying activities would not be in proximity to existing contaminated seabed areas. The Proponent committed to additional surveys during the detailed design stage to confirm that contaminated sediments would not be disturbed through cable laying activities. The Proponent committed to adaptive management and long term monitoring programs with the involvement of stakeholders. Health Canada was satisfied with the information provided and the Proponent's commitments to reduce the potential for impacts to country foods.

MOE raised concerns regarding the potential for impacts from contaminants to country foods on Graham Island. The Proponent committed to a monitoring and follow-up plan for beaches along Naikoon Provincial Park to check for contamination in areas of country food harvesting. This plan would require the collection of pre-construction data. MOE was satisfied with the Proponent's commitment for monitoring to confirm

predictions of no significant effects to country foods on Graham Island from the proposed Project.

Cumulative Impacts

Considering the limited existing and predicted development in the area of the proposed Project and the Proponent's commitments to mitigation and monitoring programs and health and safety procedures, EAO has determined that the cumulative impact on public health is not significant.

9.2.3 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate) EAO is satisfied that the proposed Project is not likely to have significant adverse effects on health.

PART C – FIRST NATIONS CONSULTATION

10 First Nations Consultation

10.1 Introduction

This section represents a summary review and assessment of the following matters:

1. The First Nations setting;
2. Key proposed Project-related issues and concerns identified by First Nations that have asserted Aboriginal rights that may be affected by the proposed Project;
3. The specific identification of asserted aboriginal rights that may potentially be impacted by the proposed Project, EAO's conclusions as to the degree to which the proposed Project might impact those asserted rights, and EAO's assessment as to where on the *Haida* spectrum the proper consultative procedure should be located;
4. The process of consultation engaged in by the Proponent under the direction of EAO, and by EAO itself, on behalf of the Province, both preceding and during the EA review of the proposed Project, and the accommodation measures that have been utilized or that are contemplated; and
5. Having regard to the overall consultation and accommodation process, EAO's conclusion as to the reasonableness of the process in the circumstances and EAO's conclusion as to whether the Crown duties have been discharged.

10.2 First Nations Setting

10.2.1 Asserted Traditional Territories

Section 3.3 of this Report identifies those First Nations who were invited to participate in the Working Group based on potential impacts to their identified traditional territories. These First Nations are:

- Haida Nation;
- Lax Kw'alaams First Nation;
- Metlakatla First Nation; and
- Gitxaala Nation.

Figure 2 shows the proposed Project area in relation to the Haida and Tsimshian traditional territories. The boundary of the Tsimshian traditional territory represents the western extent of the claimed territories of Lax Kw'alaams First Nation and Metlakatla First Nation. The western boundary of the claimed territory of Gitxaala Nation extends west beyond the Tsimshian traditional territory, but not into the proposed Project wind farm area.

Proposed Project components that would be located within the asserted traditional territories of the Lax Kw'alaams and Metlakatla First Nations and the Gitxaala Nation include the submarine transmission cable that connects the wind farm to the mainland electricity transmission grid in the Prince Rupert area, an onshore converter station and a marshalling facility.

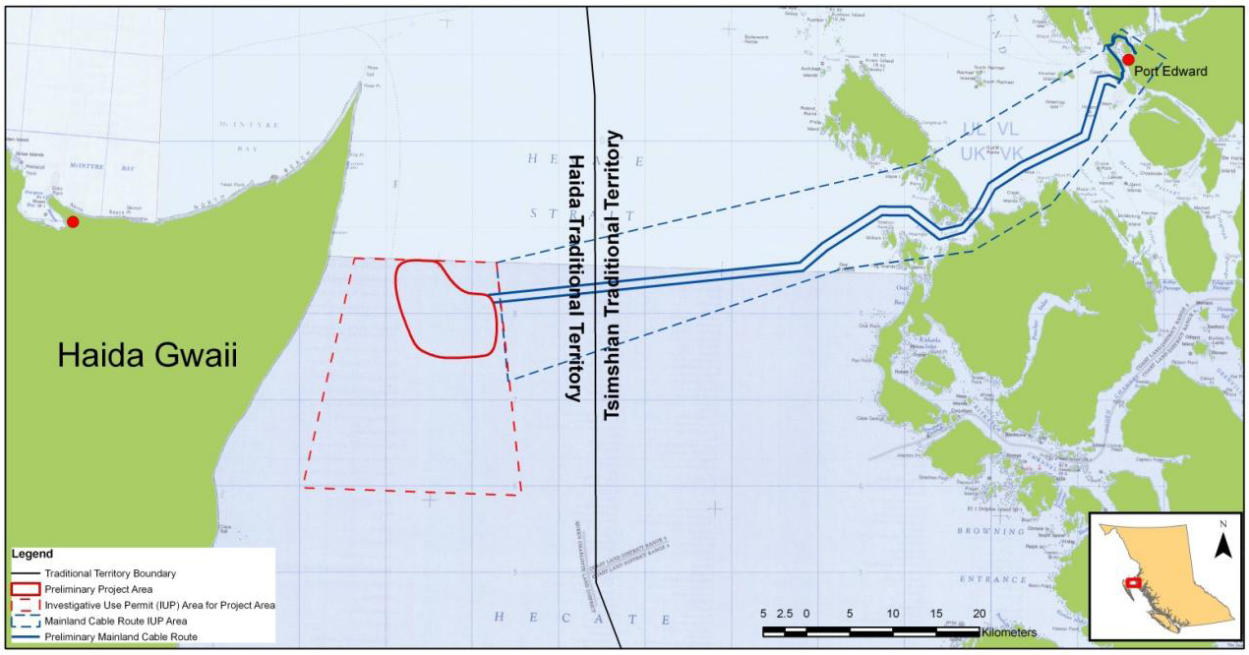

Figure 2. Haida and Tsimshian Traditional Territories in Relation to the Proposed Project Area

Haida traditional territory extends from Haida Gwaii (the Queen Charlotte Islands) east to the middle of Hecate Strait. The following proposed Project components would be located within Haida traditional territory:

- The wind farm (110 turbines and associated inter-array submarine cables and converter platform);
- Proposed operations and maintenance bases on Haida Gwaii;
- HaidaLink, the submarine transmission cable from the wind farm to Haida Gwaii, near Tlell; and
- One-third of the submarine transmission cable that stretches across Hecate Strait to the mainland.

The Proponent's proposal for First Nations consultation during the Application review period, as required in the section 11 Order issued by EAO on June 20, 2007, was accepted by EAO on May 15, 2009. The Application was distributed to First Nations on or before May 20, 2009. The Proponent made offers to meet and review First Nations interests and concerns on a number of occasions through the EA review, including an offer to host community open houses. Consultation activities completed after EAO acceptance of the Application for review are summarized in the Proponent's August 2009 First Nation Consultation Report.

10.2.2 Information Sources

The Proponent worked with the First Nations to obtain information on their traditional uses, knowledge, interests and asserted rights in the areas affected by the proposed Project, and non-confidential information gathered by the Proponent was compiled in section 12 of Volume 1, in the Application.

Additional information sources for this section of the Report included:

- Indian and Northern Affairs Canada website, 2008; and
- Council of the Haida Nation website, 2009.

In addition to the publicly available sources listed above, the following reports were also used to inform this Report:

- Gitxaala First Nation: Review of Anthropological and Historical Sources Relating to the Use and Occupation of Land, Ministry of Attorney General, January 2009; and

- Strength of Claim Analysis for the Areas Claimed by the Lax Kw'alaams and Metlakatla, Ministry of Attorney General, August 2007.

During the pre-Application phase of the assessment process, traditional use studies (TUS) were undertaken by the Haida, Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation. However, due to the confidential nature of some of the material covered in these reports, they have not been made public or formally submitted as part of the EA process at the request of each of the First Nations. Subsequently, the Proponent completed "desktop TUS reports" encompassing publicly available TUS information, which was submitted to EAO during the Application Review period. The Gitxaala Nation completed their TUS during Application review, and it was submitted to the Proponent and EAO on October 26, 2009.

All of the above records, plus information obtained during Working Group meetings and meetings directly with First Nations, were used in compiling this Report.

10.2.3 Background First Nations Information

10.2.3.1 Haida Nation

The Haida Nation currently has 38 reserves totalling some 1,812 hectares (Indian and Northern Affairs Canada 2008). Haida members reside throughout the islands but are concentrated in two main centres on Graham Island: Old Massett and Skidegate. The Haida make up half of the islands' total population of 5,000, with some 2,000 more Haida living outside of Haida Gwaii in urban centers such as Prince Rupert and Vancouver (Haida Nation, 2008). As of December 2008, the Haida Nation had a total registered population of 4,126.

In 1993, the Haida Nation entered the BC Treaty Commission (BCTC) process, and in April 2005, completed Stage 2 of the BCTC process.

The Council of the Haida Nation (CHN) is the governing authority of the Haida Nation with a mandate to perpetuate Haida heritage and culture, strive for independence, and protect Haida interests (CHN, 2009). The CHN represents the Old Massett Village Council and Skidegate Band Council.

The Haida Power Authority (HPA) was established by the CHN in 2006 to manage local energy resources and look at alternative options for power generation on Haida Gwaii. The HPA is mandated to protect the environment of Haida Gwaii and ensure that the maximum benefit from all power development on the islands flows to the Haida people (CHN, 2009).

In 2006, the Proponent created a Technical Advisory Committee (TAC), chaired by the Proponent, to provide capacity to the HPA in its role as regulator of power development in Haida traditional territory. Technical experts, energy advisors, and business leaders are available to the HPA through the TAC. The Proponent has given multiple presentations to the TAC to keep them informed about the status of the proposed Project.

In December 2007, CHN signed a Strategic Land Use Agreement with the Province. As of February 2009, CHN were engaged in a total of five marine planning processes.

10.2.3.2 Lax Kw'alaams First Nation

Lax Kw'alaams First Nation is comprised of 78 reserve lands totalling close to 12,000 hectares. Lax Kw'alaams has a total population of 3,172 with an estimated 760 living on reserve. The community of Lax Kw'alaams, also known as Port Simpson, is located on the main reserve (IR No.1), on the Tsimshian Peninsula, approximately 40 km northwest of Prince Rupert.

Lax Kw'alaams withdrew from the Tsimshian Tribal Council Society to negotiate a treaty independently. They are currently negotiating a comprehensive treaty settlement with Canada and BC and have entered Stage 2 of the BCTC process.

In 2008, Lax Kw'alaams signed a Strategic Land Use Planning Agreement with the Province.

10.2.3.3 Metlakatla First Nation

The Metlakatla First Nation has a membership of nearly 800. The main village is located 7 km west of the City of Prince Rupert on the Tsimshian Peninsula.

Metlakatla is a member of the Tsimshian Tribal Council Society, which is comprised of five Tsimshian First Nations endeavouring to negotiate a treaty agreement(s). The Tsimshian First Nations are collectively at Stage 4 of the BCTC process.

10.2.3.4 Gitxaala Nation

Gitxaala is comprised of 18 reserves totalling 1,885 hectares (Indian and Northern Affairs Canada 2008). The main community, Kitkatla, is located on Dolphin Island.

In 2004, Gitxaala withdrew from the Tsimshian Tribal Council Society and are no longer participating in the BCTC process.

In 2006, Gitxaala signed a Sustainable Land Use Planning Agreement (SLUPA) with the Province. Further to the SLUPA, Gitxaala has signed a Protected Area Collaborative Management Agreement with the Province.

10.3 Traditional Occupation and Use of the proposed Project Area Haida Nation

Prior to 1846, Haida Gwaii was and continues to be occupied by the Haida Nation. The Application noted the following evidence of Haida occupation of the terrestrial portion of the proposed Project area:

- 30 Archaeological sites along East Beach from Richardson Ranch at Tlell to Rose Point including villages, settlements and shell middens;
- Historic Haida house at Tlell documented by Fladmark (1972), known as Richardson Ranch village with at least three houses;
- Settlements around Rose Spit/ Tow Hill; and
- Four habitation sites at Cape Ball and Tlell River.

The Proponent's Application notes the following documented traditional use of the proposed Project area as evidenced by archaeological investigations and elder interviews:

- Harvest of the following bird species: loons, ducks, Canada and other geese and scoters;
- Sea mammal hunting including: sea otter, whale, porpoise, harbour seals, fur seals and sea lions;
- Terrestrial mammal hunting including black bears and caribou;
- Fishing including: salmon, sculpin, halibut, dog fish, black cod, octopus and crab;
- Extensive marine harvesting including: clams, mussels, scallops, crab, sea urchins and chiton; and
- Terrestrial plant harvesting including: strawberries, crab apple and tree bark.

Lax Kw'alaams and Metlakatla First Nations

Lax Kw'alaams and Metlakatla First Nations are descendants of the Coast Tsimshian, a village based people, with winter villages primarily clustered on the Tsimshian Peninsula and summer resource gathering at specific locations along the Nass and Skeena Rivers. Coast Tsimshian villages formed a regional political and defensive alliance originally occupying winter villages on the Skeena River (below Kitselas Canyon) and later moving to re-establish villages on either side of Metlakatla Pass (Venn Passage). The Coast Tsimshian villages maintained a seasonal summer migration to their Nass and Skeena camps and territories at least until the mid 1860s. After that period many of

the Coast Tsimshian were employed by the fish canneries along the Skeena River. Salmon remained an important food source and many villages maintained a strong connection with their fishing stations on the Skeena well into the 1900s.

Salmon was and remains an important food source for the Coast Tsimshian. Much of their diet was and continues to be from the ocean and rivers in the area, supplemented with hunting and berry/ plant gathering. Tsimshian groups followed a seasonal round of activities within their traditional territories that included the following harvesting activities:

- Harvesting marine species including: eulachon, seaweed, halibut, salmon, inner bark, roe upon kelp, sea gull eggs and abalone; and
- Hunting of marine mammals including seals, sea lions and sea otter and terrestrial animals and waterfowl including deer, elk, mountain goat, bear, porcupine, marten, mink, lynx, ducks, swan and geese.

The proposed Project area contains several fishing grounds, marine mammal hunting areas, intertidal and coastal harvesting areas, plant use areas, hunting areas and tree harvest areas. Specific areas identified in the Application and in other reports include:

- Prime marine mammal hunting areas identified at Island Point on northern Porcher Island and several locales in the island groups at the north end of Stephens Islands;
- Camps in Eddy Pass, inside Catella Island and the south end of Dundas, Hunts Inlet for herring roe collection;
- Seaweed gathering areas including northern Stephens Island;
- Shellfish gathering in the area of Stephens Island generally;
- Abalone gathering near Arthur Island, Prescott Passage, northern and western Stephens Island;
- Digby, Ridley, southern Kaien and Porcher Islands have medicinal plant use areas and culturally modified trees (CMTs); and
- Hunting areas including Digby and Kaien Islands, Hunts Inlet on northern Porcher Island, Port Edward area, Stephens Island and Prescott Island.

The Application identified the following archaeological sites, providing evidence of the long tradition of camps and villages in the proposed Project area:

- Seven named villages in Ksgazi Cultural and Natural Area (CAN) and five named villages at the northern tip of Porcher Island in the Kwil-mas CAN;
- Camps and villages including Porpoise Harbour camp, Watson Island village, Kloiya Bay camp, and Gispaxloats village on Stephens Island; and

- Ten shell midden sites in the area and vicinity of the subsea cable route, including one house depression on Stephens Island.

Gitxaala Nation

Gitxaala followed the seasonal rounds of salmon, herring and eulachon which comprised the bulk of their economic activities. Gitxaala stayed in their permanent villages such as Kitkatla over the winter months and travelled to seasonal camps at traditional fishing sites during the summer months in the vicinity of Dolphin and Porcher Islands, Pitt Island, Bonilla Island, Banks Island and the Estevan Group of islands. In addition to fishing and seafood collection, berries including salmonberries, wild crab apples and high bush cranberries were also collected and preserved for winter months.

Salmon was the most important food source to Gitxaala. Other important traditional foods included: seaweed, kelp, halibut, seals, sea lions, herring spawn, cedar bark, cambium collected from hemlock, spruce and pine, seagull and oyster catcher eggs and abalone. Sporadic hunting did occur during the winter months as well as shellfish gathering including cockles and varieties of clam and mussels.

Kitkatla was and continues to be the main traditional winter village for Gitxaala while many of the surrounding islands and bays were used for forts, hunting, fishing and gathering:

- McCawley Island was the location of a fort and was used for safety;
- Alpha Bay, Curtis Island and Bonilla Island were areas for hunting seals and sea otters; and
- Wolf Point was a location for halibut processing.

Gitxaala stated in a subcommittee meeting in September 2009 that several habitation sites are within or adjacent to the proposed Project area and there is early 20th century evidence of occupation of these sites.

10.4 Current Occupation and Uses of the Proposed Project Area for Traditional Purposes

The following are current occupation and uses of the proposed Project area for each of the First Nations.

Haida Nation

- The proposed Project will not bisect or encroach on any Haida Nation reserves;
- Resource extraction activities such as forestry and fisheries for food, social and ceremonial purposes;

- CHN own and operate a 57-ft seiner to fish communal and commercial licences for halibut, salmon, and spawn-on kelp. It also serves as a platform for monitoring, surveying, and studying marine habitats around Haida Gwaii. The Proponent utilized this vessel for environmental and engineering studies for the proposed Project;
- Skidegate Band Council owns a tour company, Haida Expeditions Ltd. that provides ecotourism adventures;
- The Haida Heritage Centre in Skidegate opened in 2008, showcasing traditional Haida art and culture; and
- Gwaii Haanas National Park and Heritage Site offer tourism and wilderness experiences and is managed in partnership with the Haida.

Lax Kw'alaams First Nation

- The proposed Project will not bisect or encroach on any Lax Kw'alaams First Nation reserves;
- Fishing and marine harvesting activities for food, social and ceremonial purposes;
- Own Coast Tsimshian Resources, which helps to employ members in the forest industry as well as provide a potential revenue stream for the Nation;
- Own and operate a fish plant into which they commit significant financial resources to create local employment; and
- Pursuing other opportunities including an aquaculture program and ecotourism.

Metlakatla First Nation

- The proposed Project will not bisect or encroach on any Metlakatla First Nation reserves; and
- Fishing and marine harvesting activities for food, social and ceremonial purposes.

The Metlakatla Development Corporation (MDC) was federally incorporated in 1988 and provincially registered as an extra-provincial society under the *Society Act* in October 1989 to address the economic needs of the Metlakatla First Nation. Today, MDC functions as an independent business arm for the Metlakatla First Nation. Activities of MDC include business development, business operations, and capacity building. Including all subsidiary companies, MDC has 33 employees (5 non-aboriginal).

The MDC owns and operates:

- Metlakatla Ferry Services Ltd.;
- North-Co-Corp Ferry Services Ltd.;

- First Nations Training and Development Centre;
- Grassy Bay Services Ltd.;
- Metlakatla Forestry Corp.;
- Seashore Charters Ltd.; and
- Northland Marine Sales and Service Ltd.

Lax Kw'alaams and Metlakatla First Nations

- The proposed Project area is situated near or within four areas defined by the Metlakatla and Lax Kw'alaams First Nations as Cultural and Natural Protection Areas or Special Management Areas (Metlakatla and Province, 2003, 2006; Allied Tsimshian Tribes of Lax Kw'alaams 2002, 2003). These include the Ksgaxl Cultural and Natural Area; Kwil-mas Cultural and Protection Areas; the Rachael, Kinahan and Lawyer Management Area and the Kxeen Special Management Area. These designations mark general or broad areas of concerns for the continuation of traditional use practices.

Gitxaala Nation

- The proposed Project will not bisect or encroach on any Gitxaala Nation reserves;
- Fishing and marine harvesting activities for food, social and ceremonial purposes;
- Use and recognition of culturally and spiritually significant areas; and
- Planned multi- use areas.

10.5 Issues and Concerns Raised by First Nations

The key issues and concerns identified by the First Nations about the proposed Project are listed below by First Nation.

Haida Nation

- Potential impacts to the food chain;
- Effects of noise (primarily from construction on marine mammals);
- Opportunities for employment and training;
- Effects of accidents and malfunctions on the marine environment and ecology;
- Potential impacts to sediment transport and subsequent marine biological impacts;
- Potential impacts to marine birds;

- Potential impacts of electro-magnetic fields (EMF) and of the submarine cable on crab movement, marine mammals and fish migration; and
- Potential impacts to Haida fishers.

Lax Kw'alaams First Nation

- Potential impacts of EMF to marine mammals and fish migration;
- Potential for effects to marine mammals, fish, and traditional food fish (salmon, roe on kelp, crab);
- Opportunities for training and employment;
- Potential impacts on crab fishing;
- Potential obstructions to navigation during proposed Project construction and operation phases;
- Impacts of potential accidents and malfunctions (mainly vessel collisions with turbine towers) and the desire to be involved in the development of accident and response plans; and
- Submarine cable installation effects on seabed and marine species.

Metlakatla First Nation

Metlakatla First Nation has not raised any issues/ concerns to date.

Gitxaala Nation

Gitxaala have expressed the following concerns with respect to the proposed Project:

- Impacts of the marine cable (EMF) on marine mammals, crab movement and fish migration;
- Impacts to local marine resources for food, social and ceremonial purposes (including ceremonial hunts of marine mammals);
- Impacts of accidents and malfunctions on marine resources for food, social and ceremonial purposes;
- Impacts of the marine cable through Edye Passage and potential effects to marine resources;
- Identified additional opportunities to incorporate and use traditional ecological knowledge in the environmental assessment and supporting studies;
- Impacts to marine birds;
- Stressed the importance of long term monitoring and adaptive management and the desire to be involved in the development of these plans;
- Terrestrial impacts on Ridley Island;

- Impacts to the traditional economy (hunters, fishers and traditional food harvesters);
- Impacts to archaeological resources; and
- Impacts to culturally and spiritually significant areas.

The Gitxaala Nation proposed the following mitigation and monitoring during a subcommittee meeting on September 14, 2009.

- Cable laying activities should be conducted from November 1 to February 1 to avoid potential disturbance to seagull egg laying season and avoids herring spawn, oolichan and salmon migration as well as major fishing times;
- Cable laying activities should avoid seal haul outs and cable laying vessels should maintain a distance of 1 km from seal haul outs;
- Cable laying activities should avoid seagull nesting areas and cable laying vessels should maintain a distance of 1 km from seagull nesting areas;
- Herring spawn monitoring should be conducted pre and post construction to determine effects; and
- Avoid spiritually and culturally significant areas.

The Proponent has committed to discussing these further with Gitxaala to determine which mitigation measures would be feasible and the Proponent could commit to. Gitxaala indicated their satisfaction with this approach at the September 14, 2009 meeting. Discussions between the Proponent and Gitxaala Nation are ongoing at the time of writing as the draft Table of Commitments is being revised based on comments received.

10.5.1 Impacts from Accidents and Malfunctions

A common issue and concern among the First Nations was the potential impacts from accidents and malfunctions. The impacts from accidents and malfunctions including contaminant spills were discussed in detail in the Working Group and subcommittee meetings and the risk of these impacts were evaluated and mitigation and monitoring developed to avoid, minimize or mitigate the risks to the satisfaction of the Working Group. Through the Working Group, the Haida Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation were all provided the opportunity to be involved in these discussions.

The Proponent has committed to having a comprehensive environmental management system in place including a spill response plan. The Proponent states in its Application that the likelihood of a serious contamination incident is low. However, if such an incident were to occur it has the potential to impact the assumed rights of the above listed First Nations.

While EAO agrees that a possibility of a spill remains, the potential for a spill has been reduced as much as possible through the development of best practices, appropriate safeguards and mitigation measures and containment in the event that a spill occurs. Section 12 of this Report provides a detailed assessment of the probability of accidents and malfunctions and the Proponent's commitments to minimize the consequences should there be an occurrence.

The results of the Proponent's probability assessment indicated that the probability of occurrence of any accident or malfunction associated with the proposed Project is low. To reduce the potential for accidents and malfunction and minimize the consequences should there be an occurrence the Proponent has committed to the following mitigation measures and plans:

- Emergency preparedness, contingency and response plans;
- Preventative maintenance;
- Operations Directives that will set out operating protocols and safety measures for proposed Project vessels;
- Long term environmental monitoring; and
- Safety plan.

Both the mainland and Haida Gwaii terrestrial areas of the proposed Project are modified from their natural state and represent a small portion of available lands to First Nations for harvesting activities. The marine portions of the proposed Project also represent a small portion of available area to First Nations for marine resource harvesting. The available area is comparable habitat to the areas that could be impacted by accidents and malfunctions associated with the proposed Project.

Given the Proponent's commitments to best practices, mitigation measures including contingency and response plans and the availability of other lands and marine areas for use by First Nations, it is EAO's assessment that the potential effects to resources harvested by First Nations would be minimized so that no significant effects are expected from accidents and malfunctions associated with the proposed Project on First Nations resource harvesting activities.

Gitxaala disputes this conclusion claiming that EAO has made an assumption as to the availability of resources, lands and marine areas for use by First Nations. Gitxaala expressed the view that EAO's assessment does not take into account the ecologically sensitive nature of the proposed Project area such as Edye Passage or its significance to First Nations in the region. Furthermore, Gitxaala states that if an accident or malfunction were to occur, it would have the potential to significantly affect First Nation harvesting activity through denying access to a culturally and ecologically significant

region within Gitxaala territory. Additionally, Gitxaala states that in the case of a severe accident or malfunction, there is potential for long term impacts to resources and Gtixaala's ability to access these resources.

The EAO recognizes the importance of Edye Passage to First Nations for marine harvesting. However, based upon the Proponent's commitments to mitigation measures including contingency and response plans and commitment to involve First Nations in the development of monitoring programs, EAO concludes that a severe accident or malfunction is not likely and therefore no significant effects are expected from accidents and malfunctions associated with the proposed Project on First Nations resource harvesting activities.

10.6 First Nations and Rights

As discussed in section 10.2.1 of this Report, portions of the proposed Project are located within the traditional territories of each of the First Nations.

The proposed wind farm, HaidaLink transmission cable and one third of the submarine transmission cable from the wind farm to the mainland is located within the traditional territory of the Haida Nation while two thirds of the submarine transmission cable from the wind farm to the mainland and overhead transmission cable from landfall on Ridley Island to Port Edward is located within the overlapping traditional territories of Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation (see Figure 1).

In view of its preliminary understanding as to the nature of the proposed Project, EAO determined early in the review process that the proposed Project could potentially have an adverse impact on the asserted rights of the Haida Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation. While the potential impact did not appear to be substantial, and notwithstanding EAO's assessments below as to the requisite scope of the Province's legal duties in terms of the *Haida* spectrum, EAO determined out of an abundance of caution that it would engage in a process of deep consultation (with respect to the *Haida* spectrum of consultation) with the above listed First Nations in order to develop and implement measures to avoid, mitigate or minimize impacts of the proposed Project. The EAO made this determination based on the potential for impacts on aboriginal rights, in particular fishing and marine harvesting, and in light of the strong *prima facie* case for fishing and other rights of the above listed First Nations.

The EAO is of the view that the consultation and accommodation that takes place during the environmental assessment, when coupled with opportunities for government-to-government engagement on issues of aboriginal rights, represents "deep consultation". At the deep end of the spectrum, the consultation required may entail the opportunity to make submissions for consideration, formal participation in the decision

making process and provision of written reasons to show that aboriginal concerns were considered and to reveal the impact they had on the decision. It is EAO's view that the EA process for the proposed Project manifests all of these elements with respect to demonstrating "deep consultation".

The opportunities EAO provided to each of the First Nations are discussed in detail in the section 10.7 of this Report below.

10.6.1 Haida Nation

The Haida Nation has traditionally used the proposed wind farm and submarine cable areas within their traditional territory for fishing, marine mammal hunting and marine resource harvesting, terrestrial hunting and terrestrial plant harvesting including timber. These activities continue today in the portions of proposed Project areas identified above.

The EAO has made the following assessments regarding the assumed rights of the Haida Nation and the impacts of the proposed Project on the assumed rights.

Fishing, Hunting Marine Mammals and Marine Resource Harvesting

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that the Haida Nation has a strong *prima facie* case in support of an aboriginal right to fish, hunt marine mammals and harvest marine resources for food, social and ceremonial purposes within the wind farm, Haida Gwaii undersea cable and one third of the mainland undersea cable portions of the proposed Project area;
- The EAO has assumed that the Haida Nation has an incidental aboriginal right to fish during travel for the purposes of trading on the mainland in the area of the mainland undersea cable of the proposed Project area;
- The wind farm and submarine cable construction, installation and operation could potentially impact fishing and marine mammal hunting grounds used by Haida; and
- Given the Proponent's commitments to mitigation during construction and long term monitoring and adaptive management to minimize impacts to aquatic species, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Hunting, Trapping and Gathering

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that the Haida Nation has a strong *prima facie* case in support of an aboriginal right to hunt, trap and gather for food, social and ceremonial purposes within the Haida Gwaii terrestrial portion of the proposed Project area; and

- Given the relatively small area that could be impacted by the cable landfall and the amount of available adjacent habitat, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Harvesting Timber

- The EAO acknowledges that in the Supreme Court of Canada's *Haida* decision of 2004 the court endorsed lower court findings that the Haida have a strong *prima facie* case for the aboriginal right to harvest red cedar from both coastal and inland areas of Block 6 of T.F.L. 39;
- The EAO also acknowledges the strong *prima facie* case in support of an aboriginal right to harvest old growth cedar for cultural and domestic purposes within the Haida Gwaii terrestrial area and that the right could be impacted by the proposed Project; and
- Given the relatively small size of the area that could be impacted by the cable landfall and the amount of comparable adjacent areas, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Aboriginal Title

- For purposes of the Crown's duty in relation to the proposed Project, EAO acknowledges that the Haida Nation asserts aboriginal title over much of the area encompassing the proposed Project;
- The EAO acknowledges that in the Supreme Court of Canada's *Haida* decision of 2004 the court endorsed lower court findings that the Haida have a *prima facie* case in support of aboriginal title to at least some parts of the coastal and inland areas of Haida Gwaii;
- For the purposes of the duties associated with the proposed Project, EAO acknowledges that a *prima facie* case exists in support of an aboriginal title claim to the Haida Gwaii terrestrial portion of the proposed Project, the area of the proposed Project wind farm, the area of the submarine transmission cable to Haida Gwaii and one third of the submarine transmission cable from the wind farm to the mainland, but also notes that there are significant questions in relation to any claim to aboriginal title over open sea;
- The Haida Nation did not specify potential impacts of the proposed Project on their aboriginal title claim during the environmental assessment; and
- Given the relatively small terrestrial footprint of the proposed Project and the existing modified state of these lands from their natural state, and given the ability of the Haida Nation to continue to be able to access the lands impacted by the proposed Project and the Proponent's commitment to mitigation and long term monitoring and adaptive management, it is EAO's assessment that it is unlikely that the proposed Project would have any significant adverse impact on

the asserted aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were proven in the future.

10.6.2 Lax Kw'alaams First Nation

The Lax Kw'alaams First Nation has traditionally used the portion of the submarine cable area from the wind farm to the mainland and overhead transmission cable from Ridley Island to Port Edward within their traditional territory for fishing, marine mammal hunting and marine resource harvesting, terrestrial hunting and terrestrial plant harvesting including timber. These activities continue today in the portions of proposed Project areas identified above.

The EAO has made the following assessments regarding the assumed rights of the Lax Kw'alaams First Nation and the impacts of the proposed Project on the assumed rights.

Fishing, Hunting Marine Mammals and Marine Resource Harvesting

- The EAO acknowledges that in the BC Supreme Court's *Lax Kw'alaams* decision the court held that Lax Kw'alaams established generally that their predecessors fished and lived in the Prince Rupert Harbour area, on the coastal islands known as the Dundas Island Group, and along the mouth and some of the tributaries of the lower Skeena River;
- Consequently, EAO acknowledges the strong *prima facie* case in support of an aboriginal right to fish, hunt marine mammals and harvest marine resources for food, social and ceremonial purposes in some of the Project area, specifically, those areas encompassed by the point immediately above;
- A portion of the submarine cable from the wind farm to the mainland and the cable landfall on Ridley Island could potentially impact the aboriginal right to fish, hunt marine mammals or harvest marine resources in the proposed Project area; and
- Given the Proponent's commitments to mitigation during construction and operating including burying the submarine cable to a depth of at least 1m where possible and long term monitoring and adaptive management, it is EAO's assessment that the proposed Project would not have an adverse impact on the asserted right.

Hunting, Trapping and Gathering

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Lax Kw'alaams has a good *prima facie* case in support of an aboriginal right to hunt, trap and gather within the mainland terrestrial portion of the proposed Project area including the cable landfall and transmission line; and
- Given the relatively minimal disturbance in the area of the cable landfall, the existing modified state of these lands from their natural state, and given the

amount of available adjacent habitat, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Harvesting Timber

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Lax Kw'alaams has a strong *prima facie* case in support of an aboriginal right to harvest timber for domestic purposes in the within the mainland terrestrial portion of the proposed Project area and that the right could be impacted by the proposed Project;
- The EAO understands that the Proponent has been in discussion with Lax Kw'alaams in regards to the potential for significant adverse impacts from the removal of timber as part of the construction of the transmission line; and
- Given that the Proponent has committed to undertaking an acceptable method to deal with the potential impact that was proposed by Lax Kw'alaams, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Aboriginal Title

- As noted above, EAO acknowledges that in the BC Supreme Court's *Lax Kw'alaams* decision the court held that Lax Kw'alaams established generally that their predecessors fished and lived in the Prince Rupert Harbour area, on the coastal islands known as the Dundas Island Group, and along the mouth and some of the tributaries of the lower Skeena River;
- For the purposes of the duties associated with the proposed Project, EAO has assumed that a *prima facie* case exists in support of an aboriginal title claim to some of the terrestrial portion of the area encompassing the proposed Project including cable landfall and overhead transmission line in the Prince Rupert area;
- The Lax Kw'alaams First Nation did not specify potential impacts of the proposed Project on their aboriginal title claim during the EA; and
- Given the relatively small terrestrial footprint of the proposed Project and the existing modified state of these lands from their natural state, and given the ability of the Lax Kw'alaams First Nation to continue to be able to access the lands impacted by the proposed Project and the and the Proponent's commitments to mitigation, monitoring and adaptive management, it is EAO's assessment that it is unlikely that the proposed Project would have any significant adverse impact on the asserted aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were proven in the future.

10.6.3 Metlakatla First Nation

The Metlakatla First Nation has traditionally used the portion of the submarine cable area from the wind farm to the mainland and overhead transmission cable from Ridley Island to Port Edward within their traditional territory for fishing, marine mammal hunting

and marine resource harvesting, terrestrial hunting and terrestrial plant harvesting including timber. These activities continue today in the portions of proposed Project areas identified above.

The EAO has made the following assessments regarding the assumed rights of the Metlakatla First Nation and the impacts of the proposed Project on the assumed rights.

Fishing, Hunting Marine Mammals and Harvesting Marine Resources

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Metlakatla has a strong *prima facie* case in support of an aboriginal right to fish, hunt marine mammals and harvest marine resources for food, social and ceremonial purposes within the mainland submarine cable corridor and cable landfall location of the proposed Project area;
- A portion of the submarine cable from the wind farm to the mainland and cable landfall on Ridley Island could potentially impact the aboriginal right to fish, hunt marine mammals or harvest marine resources in the proposed Project area; and
- Given the Proponent's commitments to mitigation during construction and operating including burying the submarine cable to a depth of at least 1m where possible and long term monitoring and adaptive management, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Hunting, Trapping and Gathering

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Metlakatla has a good *prima facie* case in support of an aboriginal right to hunt, trap and gather within the mainland terrestrial portion of the proposed Project area including the cable landfall and transmission line; and
- Given the relative disturbance in the area of the cable landfall, the existing modified state of these lands from their natural state, and given the amount of available adjacent habitat, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Harvesting Timber

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Metlakatla has a strong *prima facie* case in support of an aboriginal right to harvest timber in the area for domestic purposes, and that the right could be impacted by the proposed Project;
- The EAO understand that the Proponent has been in discussion with Metlakatla in regards to the potential for significant adverse impacts from the removal of timber as part of the construction of the transmission line; and
- Given that the Proponent has committed to undertaking an acceptable method to deal with the potential impact, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Aboriginal Title

- Given the *prima facie* case of Lax Kw'alaams to a portion of the proposed Project terrestrial area and the overlapping case by Metlakatla First Nation and Gitxaala Nation, for the purposes of the duties associated with the proposed Project, it is EAO's assessment that Metlakatla Nation has a *prima facie* case in support of an aboriginal title claim to the terrestrial area of the proposed Project including the mainland cable landfall and transmission line;
- The Metlakatla First Nation did not specify potential impacts of the proposed Project on their aboriginal title claim during the environmental assessment; and
- Given the relatively small terrestrial footprint of the proposed Project and the existing modified state of these lands from their natural state, and given the ability of the Metlakatla First Nation to continue to be able to access the lands impacted by the proposed Project and EAO's assessment of the strength of Metlakatla's title case and the Proponent's commitments to mitigation, monitoring and adaptive management, it is EAO's assessment that it is unlikely that the proposed Project would have any significant adverse impact on the asserted aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were proven in the future.

10.6.4 Gitxaala Nation

The Gitxaala Nation has traditionally used a portion of the submarine cable area from the wind farm to the mainland, particularly in the vicinity of Porcher Island and Edye Passage, within their traditional territory for fishing, marine mammal hunting and marine resource harvesting. These activities continue today in the portion of the proposed Project areas identified above.

The EAO has made the following assessments regarding the assumed rights of the Gitxaala Nation and the impacts of the proposed Project on the assumed rights.

Fishing, Hunting Sea Mammals and Harvesting Marine Resources

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Gitxaala Nation has a strong *prima facie* case in support of an aboriginal right to fish, hunt marine mammals and harvest marine resources for food, social and ceremonial purposes within a portion of the submarine mainland transmission line route of the proposed Project;
- A portion of the submarine cable from the wind farm to the mainland could potentially impact the aboriginal right to fish, hunt marine mammals or harvest marine resources in the proposed Project area; and
- Given the Proponent's commitments to mitigation during construction and operating including burying the submarine cable to a depth of at least 1m where possible and long term monitoring and adaptive management, it is EAO's

assessment that the proposed Project would not have an adverse impact on the assumed right.

Hunting, Trapping and Gathering

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Gitxaala Nation has a *prima facie* case in support of an aboriginal right to hunt, trap and gather within the mainland terrestrial portion of the proposed Project area including the cable landfall and transmission line; and
- Given the relative disturbance in the area of the cable landfall, the existing modified state of these lands from their natural state, and given the amount of available adjacent habitat, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Harvesting Timber

- For purposes of the Crown's duty in relation to the proposed Project, EAO has assumed that Gitxaala Nation has a *prima facie* case in support of an aboriginal right to harvest timber for domestic purposes within the mainland terrestrial portion of the proposed Project area including the cable landfall and transmission line and that the right could be impacted by the proposed Project;
- The EAO understands that the Proponent has been in discussion with Gitxaala in regards to the potential for significant adverse impacts from the removal of timber as part of the construction of the transmission line; and
- Given that the Proponent has committed to undertaking an acceptable method to deal with the potential impact, it is EAO's assessment that the proposed Project would not have an adverse impact on the assumed right.

Aboriginal Title

- Given the strength of the prima facie case in support of Lax Kw'alaams assertion of title to a portion of the proposed Project terrestrial area and the overlapping claim by Metlakatla First Nation and Gitxaala Nation, for the purposes of the duties associated with the proposed Project, it is EAO's assessment that Gitxaala Nation has a *prima facie* case in support of an aboriginal title claim to the portion of the proposed Project area of the cable landfall on Ridley Island and transmission cable to Port Edward;
- For the purposes of the duties associated with the Project, EAO has assumed that a *prima facie* case exists in support of an aboriginal title claim to a portion of the proposed Project including a portion of the submarine cable from the wind farm to the mainland in the vicinity of Porcher Island and Edye Passage;
- The Gitxaala Nation did not specify potential impacts of the proposed Project on their aboriginal title claim during the EA; and
- Given EAO's assessment as to the strength of Gitxaala Nation's case in support of an aboriginal title claim to the terrestrial potion of the proposed Project and the Proponent's commitments to mitigation, monitoring and adaptive management, it

is EAO's assessment that it is unlikely that the proposed Project would have any significant adverse impact on the asserted aboriginal title to the area of the proposed Project or on the use of the area if aboriginal title were proven in the future.

10.7 Consultation with First Nations

10.7.1 First Nations Involvement with the Proponent

The Proponent's involvement with the First Nations is detailed in section 12 of the Application and in the Proponent's First Nations Consultation Summary Report, submitted in September 2009.

The Proponent began discussions with the Haida Nation in 2002 regarding the proposed Project. As of 2007, the Proponent had met with all four of the identified First Nations to discuss and provide information about the proposed Project, the EA process, the proposed Project timelines and a variety of other related matters.

The Proponent developed a comprehensive information sharing, engagement and consultation program with the First Nations, provided opportunities and financial support to encourage involvement in the proposed Project and build related capacity among First Nations and engage with First Nations as potential partners in the proposed Project. A summary of the Proponent's engagement and information sharing with the Haida Nation is presented in section 12.2.2.1 of the Application, with the Lax Kw'alaams First Nation in section 12.2.3.1, with the Metlakatla First Nation in section 12.2.4.1 and with the Gitxaala Nation in section 12.2.5.1.

All four First Nations have participated, to varying degrees, in environmental field investigations related to archaeology, terrestrial ecology studies, terrestrial and marine archaeology, and other aspects of the environmental study program. All of the participating First Nations have also completed traditional use studies in relation to the proposed Project.

The Proponent has engaged in information sharing and consultation activities within each of the First Nations communities. During Application review the Proponent held open house type meetings in each of the Haida Nation, Lax Kw'alaams First Nation and Gitxaala First Nation communities. The Proponent was unable to hold a community meeting with Metlakatla due to weather and scheduling issues.

The Proponent negotiated capacity funding agreements with the Haida Nation, Lax Kw'alaams First Nation and Metlakatla First Nation to provide capacity to participate in the EA review and commercial agreements for access to land required for proposed

Project facilities. The Proponent also provided funding for TUS for the three identified First Nations above.

The Proponent announced its limited partnership agreement with the Council of the Haida Nation on January 29, 2009 to operate and maintain the proposed Project after construction. On August 13, 2009 the Proponent and the Haida Nation announced an agreement for the Haida Nation to acquire up to 40 percent of the proposed Project.

10.7.2 First Nations Involvement with EAO

All four First Nations have representation on the EAO Working Group and have been kept informed by EAO on an ongoing basis in relation to the EA review schedule and opportunities to engage in the EA process, including technical subcommittee meetings during Application review. First Nations have had the opportunity to review and provide comment on the section 11 Order, draft Terms of Reference and the Application and supplemental information.

To assist First Nations in participating in the EA review and in providing input to EAO, EAO provided capacity funding to each of the four First Nations. The EAO provided the Haida Nation with additional capacity funding for community engagement.

The EAO held meetings with each of the First Nations during pre-Application, and offered to meet with each of the First Nations during Application review. The EAO sought information from each of the First Nations on the potential for impacts to their asserted rights and title from the proposed Project through various means including direct communications and meetings.

The following table summarizes the meetings EAO held with the First Nations and the subject of the meetings.

Table 1. EAO Meetings with First Nations

Date	First Nation	Meeting Purpose/ Subject
March 8, 2007	Haida	Review section 11 Order, capacity funding
April 2, 2007	Haida	Review section 11 Order, capacity funding
April 25, 2007	Gitxaala	Review section 11 Order, capacity funding, involvement of Gitxaala Environmental Monitoring (GEM) in EA review
April 25, 2007	Lax Kw'alaams and Metlakatla	Meeting with Chiefs to review capacity funding and capacity funding
June 4, 2007	Lax Kw'alaams and Metlakatla	Review of section 11 Order
June 4, 2008	Gitxaala	Meeting with Chief and Council
August 12, 2008	Metlakatla	Meeting with Chief
September 23, 2008	Haida Marine Working Group	EAO provided general EA process information to WG
September 24, 2008	Haida	Government-to –Government meeting with Haida, discuss EA review, data collection and reporting
June 4, 2009	Lax Kw'alaams	Met with Band Council to discuss Application review and any identified impacts to rights and title
June 8, 2009	Gitxaala	Meeting with Chief and Council to discuss Application review and any identified impacts to rights and title

The following table summarizes all of the Working Group and technical subcommittee meetings that EAO held and First Nations participation.

Table 2. Working Group Meetings and First Nations Participation

Date	First Nation	Meeting
January 23, 2007	Haida	Working Group
March 9, 2007	Haida	Working Group
June 27, 2007	Haida and Gitxaala	Working Group
November 3, 2008	Haida	Working Group
February 19, 2009	Haida, Gitxaala and Lax Kw'alaams	Working Group
June 4, 2009	Haida, Gitxaala and Lax Kw'alaams	Working Group
July 28, 29	Haida, Gitxaala and Lax Kw'alaams	Working Group
September 3	Haida and Gitxaala	Marine Bird Subcommittee
September 14	Haida and Gitxaala	Follow Up and Adaptive Management Subcommittee

In July 2009, Lax Kw'alaams First Nation and Gitxaala Nation provided written comments in response to an EAO request for their views on the potential for impacts of the proposed Project which the Proponent responded to in the issues tracking tables (Appendix 2). These comments are addressed in the following sections.

On October 6, 2009 EAO provided Haida Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and Gitxaala Nation with a draft of this Report and asked that any comments they wish to submit be sent to EAO by October 27, 2009. Gitxaala Nation was the only First Nation that submitted comments and EAO has addressed these comments within the Report.

The Haida Nation submitted a letter to EAO on November 10, 2009 providing an update of their review of the Application undertaken on their behalf by Rescan Consultants. The letter indicated that the Haida Nation is generally satisfied with the Proponent's commitments, particularly relating to specific issues raised by the Haida Nation. The Haida Nation stated that their process is anticipated to conclude before the end of the year.

The EAO received a letter from Lax Kw'alaams First Nation on October 6, 2009 indicating that Lax Kw'alaams was generally comfortable with the findings of the EA and the Proponent's commitments to mitigation and that Lax Kw'alaams did not have any unresolved issues or concerns with respect to the proposed Project.

10.8 Measures Being Implemented to Mitigate or Otherwise Accommodate Potential for Impacts to First Nations

Baseline information collection that was directly related to understanding the potential for impacts to First Nation's interests and asserted aboriginal rights included studies on a variety of valued ecosystem and social components, particularly for marine resources including crab, fish, birds and mammals. The Proponent noted species of importance to the First Nations, such as crab, halibut, clams, and various marine mammals and sea birds in its Application. The Proponent also conducted archaeological and cultural heritage studies which focused on each First Nation's interests.

The EAO sought input from the First Nations as to how their asserted rights might be impacted by the proposed Project during meetings and correspondence in the pre-Application stage with each of the First Nations. The EAO did not receive any specific response with respect to the identification of impacts to asserted rights by the proposed Project from any of the First Nations.

The valued ecosystem components associated with the issues and concerns raised by First Nations are reviewed in greater detail in section 5 of the Application. The following provides examples of the impact mitigation measures and commitments developed in response to issues raised by First Nations. A more complete assessment of the potential for impacts to valued ecosystem components can be found in Part B of this Report along with specific mitigation measures for potential impacts.

The Proponent committed to involving the First Nations in the development and implementation of the following measures to address concerns raised by First Nations. These mitigation measures were discussed at Working Group meetings and include:

- Mitigation strategy/ process to address any impacts to culturally modified trees (CMTs);
- Environmental Management System including individual Environmental Management Plans;
- Long-term environmental monitoring studies;
- Adaptive management program for specific aspects of the proposed Project including marine aquatic ecology, marine mammals and marine birds;
- Emergency spill response plan;
- Training and employment programs;
- Hire-locals-first policy; and
- Engagement of the First Nations in the final siting and construction components of the proposed Project in order to protect the marine resources.

Below is a summary of the key areas of interest identified by First Nations and the Proponent's responses and commitments to address the issues raised (Table 3). A more detailed table appears in section 12.4 of the Application. For a complete list of the Proponent's commitments refer to Appendix 3 of this Report.

Table 3. Summary of Proponent's Responses and Commitments to First Nations

First Nations Interest	Proponent's Response or General Commitment
Employment Opportunities	• The Proponent will ensure that opportunities and benefits that arise from the proposed Project development, construction and operation are available to First Nations; and • The Proponent has made specific commitments to First Nations within the context of formalized commercial agreements.
Training Opportunities	• The Proponent will develop and provide appropriate and effective training resources to First Nations to prepare for potential proposed Project-related employment opportunities based on input received through consultation with First Nations; and • The Proponent has provided information in the Haida Gwaii Energy Centre and in local newspapers on the type of jobs available in the offshore wind industry and has provided scholarships to local high schools for students who are focused on a career in related trades.

High-yield fishing Areas	• The Proponent committed to designing and operating the proposed Project in such a way that avoids or minimizes any potentially adverse effects to high-yield fishing areas.
Fishing industry employment	• The Proponent will ensure that First Nations benefit from increased employment as a result of the proposed Project and to design and implement appropriate measures to mitigate or otherwise resolve any potentially adverse effects to First Nations participation, including employment, in contemporary fishing activities.
Viewscapes from traditional food gathering areas	• The Proponent committed to design and implement appropriate measures to mitigate or otherwise resolve any potential adverse effects to viewscapes from important traditional food gathering areas.
Birds and bats coming into contact with WTGs	• The Proponent committed to designing and operating the proposed Project in such a way that minimizes risks of birds and bats coming into contact with WTGs and mitigates any potential adverse effects to birds and bats; and • The Proponent committed to developing a long-term monitoring program to meet or exceed regulatory requirements.
Migration routes of marine mammals, birds and crabs	• The Proponent committed to designing and operating the proposed Project in such a way that minimizes risks to marine wildlife to the greatest extent practical and to implement appropriate mitigation measures to mitigate any potential adverse effects to the migration routes of marine wildlife
EMF emitted from the transmission cable	• The Proponent enhanced environmental studies in relation to potential EMF emitted from the submarine transmission cable; and • The Proponent committed to design and implement appropriate additional measures to mitigate adverse effects from EMF.

10.8.1 Haida Nation

The Proponent has entered into a commercial agreement with the Haida Nation which will provide employment opportunities to the Haida Nation through the operating company for the proposed Project. In addition, the Proponent has undergone the Haida Nation's assessment of the proposed Project. The Haida Nation will decide whether to approve or reject the proposed Project at their House of Assembly in October 2009. At

the time of writing, results from the Haida Nation's House of Assembly have not been provided to EAO.

On August 13, the Haida Nation announced that it signed a memorandum of understanding with the Proponent entitling the Haida Nation to acquire 40% of the proposed Project. Currently the Haida Nation is seeking support from the federal government for this proposal.

The Proponent is in the process of negotiating an agreement for long term monitoring and adaptive management to fulfill the requests of the Haida Nation.

10.8.2 Lax Kw'alaams and Metlakatla First Nations

The following list outlines the proposed mitigation measures for each of the potential impacts identified on the Lax Kw'alaams and Metlakatla First Nations interests.

- Potential impacts on terrestrial plant use areas (cedar bark harvesting) will be mitigated through an agreed upon process, put forward by Lax Kw'alaams to handle these impacts;
- Potential impacts to traditional marine fishing grounds and intertidal and coastal resource gathering areas will be mitigated through the Proponent's commitments discussed in detail in section 5.2 of this Report;
- The removal of vegetation with material, food or medicinal values will be minimized through the use of previously disturbed areas;
- Disturbance of traditional fishing grounds by the laying of the marine cable will be minimized by installation during seasons that avoid peak seasons of fishing activity; and
- Potential impacts from oil spillage or other toxic spills will be mitigated through the Proponent's commitment to discuss appropriate compensation with Metlakatla and Lax Kw'alaams for any loss of the ability to conduct traditional activities within their marine fishing grounds.

10.8.3 Gitxaala Nation

- The Proponent has committed to including the Gitxaala Nation in discussions regarding the development and finalization of long term monitoring to address Gitxaala's concerns with respect to marine resources including herring, fish, seagull eggs, marine mammals, marine birds;
- The Proponent has committed to discussions with the Gitxaala Nation to address their concerns with respect to cable laying activities and the potential impacts to seals and seagulls; and

- The Proponent committed to discussions with the Gitxaala Nation prior to the final design and siting phase to avoid or reduce impacts to culturally and spiritually significant areas.

10.9 Conclusions

Having regard to all of the above, EAO concludes that:

- The process of consultation has been carried out in good faith and that it was appropriate and reasonable in the circumstances;
- The EAO, on behalf of the Crown, has made reasonable efforts to inform itself of the impacts the proposed Project may have on the identified First Nations, and by way of both draft and final copies of this Report, it is communicating its findings to the First Nations; and
- The potential for effects on assumed aboriginal rights has been mitigated or otherwise accommodated such that there they will not significantly impact the First Nations rights.

In reaching these conclusions, EAO recognizes that if the proposed Project receives an EA Certificate, subsequent evaluations will be undertaken, notably prior to any permits being granted from provincial and federal regulators and on an ongoing basis as monitoring programs to ensure the proposed Project is constructed, operated and decommissioned as proposed.

PART D – FEDERAL REQUIREMENTS

This section provides an overview of the additional information that will be required as part of the federal environmental assessment under the CEAA for the proposed Project as scoped by the federal RAs. A basic outline of the type of information that will be addressed in the federal environmental assessment report is provided in this Part. The federal assessment will also include the following:

- The environmental effects of the proposed Project, including the environmental effects of malfunctions or accidents that may occur in connection with the proposed Project and any cumulative environmental effects that are likely to result from the proposed Project in combination with other projects or activities that have been or will be carried out;
- The significance of the environmental effects referred to above;
- Comments from the public that are received in accordance with CEAA and its regulations;
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the proposed Project; and

- Any other matter relevant to the screening, such as the need for the project and alternatives to the project that the RAs may require to be considered.

As defined under CEAA, “environmental effect” means, in respect of a project:

a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the Species at Risk Act

b) any effect of any change referred to in paragraph (a) on

   i) health and socio-economic conditions

   ii) physical and cultural heritage

   iii) the current use of lands and resources for traditional purposes by aboriginal persons, or

   iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or

c) any change to the project that may be caused by the environment, whether any such change or effect occurs within or outside Canada;

The federal assessment will include an evaluation of the nature and extent of the residual adverse environmental effects after applying mitigation and whether the adverse environmental effects are significant. The prediction of significance will be based on such factors as: magnitude, geographic extent, duration, permanence/reversibility, and ecological context. Clearly supported and traceable conclusions will be provided (based on descriptions of the existing environment, the proposed Project and their interaction) and a description of the predicted effectiveness of the mitigation measures to be applied.

Under section 79 of the *Species at Risk Act*, SC 2002, c.29, the RAs must identify adverse effects of the proposed Project on listed species and their critical habitat or residences. The RAs must also ensure that measures are taken to avoid or lessen adverse effects and that effects are monitored. Mitigation measures must be consistent with recovery strategies and action plans for the species.

11 Effects of the Environment on the Proposed Project

In addition to evaluating the effects of the proposed Project on the environment, changes to the proposed Project that may arise as a result of the environment will also be considered. The assessment of the effects of the environment on the proposed Project included identifying the environmental factors deemed to have possible consequences on the proposed Project, the likelihood and severity of their occurrence

and mitigation measures planned to minimize their impact. The environmental conditions or events discussed in regard to their potential to affect the proposed Project include but may not be limited to consideration of natural hazards such as: extreme weather events (lightning, heavy precipitation, extreme temperatures, flooding, and wind); natural seismic events; fire; slope stability and mass wasting events (e.g., debris flows/torrents; rock fall; snow avalanche); winter; and, climate change. Proposed mitigation, including design strategies, will be considered in the evaluation of the effects of the environment on the project and the determination of their significance.

The Proponent considered the following effects of the environment on the proposed Project:

- Atmospheric effects;
- Marine Conditions;
- Geophysical conditions; and
- Other environmental conditions.

Atmospheric Effects

Extreme winds

The Proponent reports in its Application that the preferred WTG technology has a fail-safe pitching mechanism that shuts down the unit by feathering the blades into the wind and in that configuration, the WTG can withstand two-second wind gusts of up to 60 to 80 m/s, well above the limit anticipated in the area. The Proponent considered the potential environmental effect of a failed pitching mechanism of the WTG that could result in a broken or detached blade from the WTG. The Proponent reports that there may be temporary and localized disturbance of the seabed to recover the detached blades, and as such no significant effect is expected.

The Proponent also considered the possibility that extreme winds could disrupt a portion of the overhead transmission cable on the mainland. The Proponent states in its Application that the overhead lines would be repaired in a timely fashion according to standard industry practices. The Proponent reports that the environmental effects are expected to be localized, short term and not significant.

Extreme temperatures

The WTG and offshore converter station would be equipped with climate control systems in the event that the temperature drops below the minimum operational level. In the event that climate control systems fail, the WTGs and offshore converter stations are expected to continue operating, but WTG internal structures could be damaged and

require repair. The Proponent states that no structural failure is expected that could significantly affect the environment.

Frost, ice and extreme precipitation

The WTGs would be equipped with a sensor system that monitors changes in the aerodynamics of the blades due to drag. If this drag becomes sufficient to jeopardize the blades' stability, the sensors will trigger a shutdown of the WTG. Similar to other mechanical failure events described above, the WTG blades may break or detach. The Proponent reports that there may be temporary and localized disturbance of the seabed to recover the detached blades, and as such no significant effect is expected.

Lightning

The Proponent reports that both the WTGs and the offshore converter station would be equipped with lightning protection mechanisms, including lightning rods and appropriate grounding and would be designed to operate safely in severe electrical storms. In the event that an electrical surge should occur, the Proponent reports that the expected consequence is that the circuits in the WTG receiving the strike would fail and require repairs. No structural failure is expected that could affect the environment and thus no significant effect is expected.

Fog and low clouds

The Proponent states in its Application that all outer WTGs within the proposed wind farm would be fitted with appropriate warning lights, as required by TC, to clearly delineate the wind farm to seagoing vessels and aircraft. Proposed project facilities would be displayed on the marine and aviation charts for the area. The Proponent reports that in the event that warning lights fail or vessels or aircraft fail to heed warning lights, it is possible that a single WTG tower could be struck or blades could be broken or destroyed and a tower may be either vertically re-aligned or suffer structural damage. In these events, the blades would have to be recovered or a tower may have to be removed. The Proponent reports that a localized physical disturbance to the seabed and marine ecology could occur in the short term. As the potential for a collision is unlikely due to TC requirements for vessel navigational equipment and the location of the proposed wind farm is not within large vessel shipping lanes and the potential effects are localized and temporary, no significant effect is expected.

<u>Marine Conditions</u>

Waves

Intensive wave activity has the potential to add stress to the foundations and transition piece of the WTGs and offshore converter station. In addition, the wind farm area would

be inaccessible by vessel for maintenance during intense wave activity. The Proponent conducted meteorological studies to determine site-specific wave speeds and frequency distributions for use in the design of these structures during the detailed design phase. The Proponent states that planned maintenance for WTGs would be undertaken in the summer months when the significant wave height is more likely to be below 2 m. Above this wave height, when essential maintenance is required, technicians would be winched down from a helicopter onto a deck at the top of the WTG, provided winds are below 20 m/s.

The Proponent considered the possibility of a combination of marine conditions such as a wave height at or close to the design wave height plus freeboard and a rogue wave[10] occurring that would cause damage to WTG blades, or possibly structurally damage the WTG tower or foundations and indicated that repairs and recovery of damaged structures would occur and a new tower or foundation may be required.

The Proponent states in its Application that the recovery of damaged structures could cause a localized and temporary disturbance of the seabed and a short-term disturbance of marine ecology. Replacing a tower would have a short-term negligible effect on marine ecology due to vessel activity during installation. Replacing a foundation would involve cutting the old tower off at the seabed and installing a new foundation. The effects of foundation installation would be the same as those identified for the initial construction of a turbine foundation. Considering the application of the proposed mitigation for construction of the turbines and foundations and the predicted localized, temporary and short term effect on marine ecology, no significant effects are expected.

Tides

The Proponent states in its Application that no extreme tidal currents are expected that would cause a structural failure of a foundation for a WTG or for the offshore converter station. Therefore, no significant environmental effects are anticipated.

Salinity

The Proponent states in its Application that no structural failure of towers, foundations, cables, or the offshore converter station is anticipated due to salinity. Therefore, no significant environmental effects are anticipated.

Geophysical Conditions

Seabed stability

[10] An unpredictable, abnormally large wave that occurs on a seemingly random basis.

The Proponent considered the potential event that sub-seabed conditions change, or are not able to support forces exerted on the towers and blades. This would cause foundations could fail or cause change in the vertical alignment of a tower and possible blade failure. The Proponent reports that the recovery of broken structures or replacement of a tower could cause a localized and temporary disturbance of the seabed and a short-term disturbance of marine ecology. Replacing a foundation would involve cutting the old tower off at the seabed and installing a new foundation. The effects of foundation installation would be the same as those identified for the initial construction of a turbine foundation. Considering the application of the proposed mitigation for construction of the turbines and foundations and localized, temporary and short term effect on marine ecology, no significant effects are expected.

With respect to the offshore converter station, the Proponent states in its Application that the structure is not expected to fail, resulting in the platform sinking to the seabed, unless most of the foundations fail. Recovery of failed structures above the seabed and foundation replacement would have effects similar to those described above. The Proponent reports that the containment design and shutoff valves are expected to avoid spills of these materials to the environment, even in extreme events. Therefore no significant effects are expected.

Sediment transport

The Proponent states in its Application that effects of scour on foundations are expected to be localized to specific WTG sites. Consequently, the number of WTGs that may be affected by extreme scour conditions is expected to be limited to one to five WTG sites during the life of the proposed Project. The effects would be the same as those described above for seabed stability, and no significant effects are expected.

Earthquakes

The Proponent states in its Application that the offshore structures would be designed to meet the seismic design standards for the area and all structures will be designed based on National Building Code of Canada seismic guidelines for the area. Effects of earthquakes on the proposed Project would be similar to the effects of sediment transport as described above. However, the Proponent assumed that high magnitude earthquakes could affect multiple foundations and structures, including the offshore converter station. The Proponent states that the environmental effects associated with earthquakes are considered to be similar to those described above for seabed stability. Considering the analysis for effects from seabed stability and applicable mitigation measures, no significant effects are expected.

Tsunamis

A tsunami would have the potential to damage to WTG blades, or possibly structurally damage the WTG tower or foundations. Considering the application of the proposed mitigation for construction of the turbines and foundations and the predicted localized, temporary and short term effect on marine ecology, no significant effects are expected.

Terrain stability

The Proponent states in its Application that the only area potentially subject to stability is the shoreline near Tlell, where coastal erosion is already evident. The occurrence of extreme wind and waves, earthquakes, or tsunamis could cause the transmission cable to be disrupted and require repair or replacement or coastal protection works could be destroyed in the vicinity of the landing. The Proponent states that under such circumstances, environmental effects would be associated with the repair works are expected to negligible, and repair work would be subject to permitting and approvals from regulators. As such, no significant effects are expected.

Other Environmental Conditions

Fire

The environmental effect associated with the effect of fire on the proposed Project is at the WTG nacelles or onshore converter station, because of the presence of some hazardous materials. The Proponent reports that environmental effects are expected to be minor and limited to an area immediately adjacent to the WTG or converter station. No significant effects are expected.

Floods

The principal flood effect on the proposed Project is expected to be associated with a tsunami at the Ridley Island landing and converter station and as such the principal environmental effects are associated with any hazardous materials at the converter station. The Proponent reports that environmental effects are expected to be minor and limited to an area immediately adjacent to the converter station. No significant effects are expected.

Climate change

Climate change is generally expected to raise sea levels. The Proponent reports that deeper waters on Dogfish Banks would reduce the effects of waves on seabed forms and sediment transport and thus no negative effects are expected.

The effect of climate change on winds and precipitation is uncertain. The Proponent reports that the proposed Project has freeboard for design wave heights and the

changes in wind are thought to be within the design standards. Consequently, climate change is not expected to have measureable effects on the proposed Project, and hence no environmental effects are anticipated.

12 Environmental Effects of Accidents and Malfunctions

Pursuant to CEAA, consideration of the environmental effects of any proposed Project-related accidents or malfunctions is required. The assessment will include consideration of the potential accidents, malfunctions and unplanned events that could occur in any phase of the proposed Project, the likelihood and circumstances under which these events could occur, and the environmental effects that may result from such events, assuming contingency plans are not fully effective.

Potential effects identified by the Proponent that were assessed include but are not necessarily limited to:

- Spills of hydrocarbons, lubricants or other toxic substances either directly or through a collision with a proposed Project structure;
- Interaction of underwater gear with the submarine transmission cables associated with the proposed Project;
- Accidental fire and associated fire fighting activities; and
- Downing of onshore transmission lines or transmission towers.

The Proponent conducted a probability assessment of each of the potential accidents and malfunctions identified for the proposed Project and developed mitigation plans for each potential accident and malfunction. The Proponent's commitment to avoidance and mitigation of accidents and malfunctions is embodied in the EMS and Safety Management System including the Emergency Response Plan (ERP). The ERP is designed to provide mitigation in the event of an accident or malfunction. The primary goal of the plan is to ensure the safety of employees at the site, other users of the area and residents of nearby communities. Specifically, the ERP would address:

- Spills of toxic materials;
- Accidents involving vessels;
- Accidents involving aircraft;
- Structure failure;
- Fire;
- Evacuation;
- Earthquake;

- Rescue from water;
- Rescue from structure;
- Cable breakage or repair;
- Power failure; and
- Other incidents contemplated in section 11 of this Report, Effects of the Environment on the Proposed Project.

The Proponent has committed to developing the ERP to the satisfaction of the CCG and other emergency response services in the region. EC expects to receive the draft ERP for review post EA, prior to the construction of the proposed Project. The Proponent states in its Application that it would have a significant response capability given its vessel and helicopter assets. A response would require coordination with the CCG, Burrard Clean, PRPA, BC Ambulance Service, RCMP, and fire and rescue services in Prince Rupert, Masset, Skidegate/ Queen Charlotte City and Tlell.

Generally, the Proponent has committed to the following plans and programs to address accidents and malfunctions:

- EMP – Final Design and Facility Siting;
- EMP- Construction, Operation and Decommissioning;
- Long term environmental monitoring;
- Preventative maintenance;
- Operations directives;
- Safety Plan; and
- ERP.

The following is a discussion of a selected number of potential accidents and malfunctions, the Proponent's probability assessment and the Proponent's commitments to address each potential accident or malfunction.

<u>Spills</u>

The potential for spills is from the following:

- Nacelle leak of hydraulic fluid, lubricants and metals;
- Drilling waste disposal;
- Concrete works run-off;
- Hydrocarbon spills from vessels; and
- Hazardous materials from vessels.

The results of the Proponent's probability assessment indicated that the probability for the above listed spills was low. The Proponent reports that the following spills have a medium effect consequence:

- Drilling waste spills;
- Concrete works run-off; and
- Hazardous material spills outside the wind farm.

The Proponent reports that a hydrocarbon spill could have a high effect consequence especially if there is a delayed response due to inclement weather, from the following two scenarios due to the potential for a spill to affect habitats, marine life, marine birds and the shoreline of Graham Island:

- A ship/ vessel malfunction or accident outside the wind farm affecting the marine and coastal areas of Hecate Strait or the land areas of Ridley Island or Tlell; and
- Offshore converter station containment failure affecting Dogfish Banks and shoreline of Naikoon Provincial Park.

The Proponent has committed to the following mitigation measures to minimize the potential for spills and the consequences in the event of an occurrence:

- Conduct an accident and spill risk assessment prior to construction;
- Emergency preparedness and contingency plans will be prepared to minimize the consequences should there be an occurrence; and
- Proposed Project vessels will be governed by the Operations Directives that will set out operating protocols and safety measures.

Collisions

The potential for collisions includes collisions between a commercial vessel, a fishing vessel or a recreational vessel and a WTG tower. The results of the Proponent's probability assessment indicated that the probability for the above listed vessel collisions with a WTG tower was low. The Proponent has committed to:

- Marking the WTGs and spacing the structures on a grid of 1,200 m by 800 m;
- Developing and Implementing Operations directives; and
- Developing and Implementing an Emergency Response Plan.

Worker Accidents

The Proponent conducted a review of all reported wind farm-related accidents, globally. To address the potential for worker accidents the Proponent has committed to:

- Incorporate WorkSafe BC guidelines for operation in the marine environment in the Project Safety Plan; and
- Identify any proposed Project activities that could endanger workers, using WorkSafe BC average rates for worker activities, in developing emergency preparedness and contingency planning.

Structure Failure

The Proponent reports that the probability of structure failure for the proposed Project is considered low as all components would be engineered with the benefit of years of experience with offshore wind projects in Europe, constructed to the highest possible standard and regularly maintained. The Proponent reports that the consequences would be low, limited to some disruption to the immediate area during repair.

Fire

The potential for fire is due to RoW clearing of vegetation on land for the construction of the transmission line. The Proponent has committed to following the BCTC guidelines for managing riparian vegetation and the BC Hydro guidelines for power line timber risk reduction to ensure that the probability of an occurrence is low.

Cable Break or Repair

The Proponent reports that the probability of a cable break is low. The potential causes would be an anchor catching a submarine cable or from seismic activity. In order for an anchor to cause a break in the proposed submarine cable, it would have to be an emergency anchor over an exposed cable as the proposed Project area is not generally used for anchoring and the Proponent has committed to burying the submarine cable to a depth of 1 m. The Proponent has committed to regular cable inspections to confirm proper burial of the cable.

The Proponent conducted a literature review to determine the potential for fishing gear to catch the proposed submarine cable. The results indicated that the probability is low considering that the proposed Project cable would be buried to a depth of 1 m and there is no evidence of public sources of damage to submarine power transmission cables in available literature or anecdotal evidence.

12.1 Conclusion

The EAO is satisfied that the Proponent's commitments to mitigation measures and EMPs and other programs including operations directives, preventative maintenance and long term monitoring would reduce the potential for accidents and malfunctions and the minimize the consequences in the event of an occurrence so that no significant

impacts are expected. The RAs have not expressed a view as to their conclusions regarding accidents and malfunctions.

13 Cumulative Environmental Effects Assessment

Cumulative environmental effects are changes to the environment that are caused by an action in combination with other past, present and future human actions, and include changes to the biophysical environment or socio-economic setting (indirectly from a biophysical change in the environment). Cumulative effects are to be considered for past, existing, and reasonably foreseeable projects and activities, the effects of which have the potential for overlapping in time and space with the residual environmental effects of the proposed Project (construction, operation, decommissioning, and post-closure phases), after mitigation measures are applied.

Cumulative environmental effects occur when:

- Impacts on the natural and social environments take place so frequently or densely that the combined individual effects cannot be assimilated into the environment; or when
- The impacts of one activity combine with those of another in a synergistic manner creating a cumulative effect that is equal or greater in intensity than the total of the individual effects.

Section 16(1) of the CEAA requires any screening or comprehensive study to include consideration of “any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out”. Cumulative effects assessments are done to ensure that the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant.

The Proponent’s Application, accepted on May 15, 2009, included a chapter on cumulative effects assessment that was initially reviewed by agencies and the public. During Application review, the Proponent was required by the RAs to revise its cumulative effects assessment to include the Canpotex project. The Proponent submitted this assessment on October 15, 2009 (Response Submission 18). Materials presented below summarize the cumulative effects assessment chapter that was made available for agency, First Nations and public comment in May 2009 as well as Response Submission 18.

13.1 Project Components and Contingencies Considered in Cumulative Effects Assessment

Marine components:

- Offshore wind farm on Dogfish Banks in Hecate Strait;
- The high voltage direct current (DC) submarine transmission cable from the wind farm to Ridley Island; and
- The alternating current (AC) submarine transmission cable from the wind farm to Tlell (HaidaLink).

Terrestrial and shoreline components:

- The submarine transmission cable landfall onshore converter station on Ridley Island;
- The HaidaLink cable landfall and buried transmission cable at Tlell on Graham Island;
- The above-ground transmission line from the Ridley Island converter station to the point of interconnection with the BC Transmission Corporation (BCTC);
- The marshalling area and marine vessel berth on Ridley Island; and
- The marine and helicopter support facilities at Masset and Skidegate.

Potential accidents and malfunctions:

- In the marine environment, these relate primarily to:
    - Potential for navigational hazards;
    - Effects of potential hydrocarbon spills from the converter station platform (diesel fuel storage for standby generator);
    - Potential fuel or oil spills from construction and maintenance support vessels (fuelling spills, fuel tank leaks or spills, bilge disposal); and
    - Potential spills of other toxins (paint, hydraulic fluid) during operations and maintenance.
- In the terrestrial environment, accidents and malfunctions potentially associated with the proposed Project include hydrocarbon or toxic spills or fire.

Table 4. Environmental and Socio-economic Components Assessed

Atmospheric effects:	Wind Waves
Marine physical environment:	Sediment transport/movement and seabed forms
Marine aquatic ecology:	Epifaunal and infaunal benthic communities Mobile macroinvertebrates Benthic fish Pelagic fish Sponge reefs Coral species
Marine birds:	All species present
Marine mammals:	All species present
Terrestrial ecosystems:	Freshwater fish habitat (Port Edward), Fish species (Port Edward and Tlell), Vegetation (Port Edward and Tlell) Wildlife (Port Edward and Tlell)
Archaeology:	Terrestrial archaeology sites (Ridley Island and Port Edward) Underwater archaeological site potential, shipwrecks and plane crashes Terrestrial archaeological sites (Tlell)
Socio-economic effects:	Communities and services Land use and tenure Economic considerations Visual assessment Public health and safety Radio communications Navigation

13.2 Other Projects and Activities

Other approved or reasonably foreseeable projects that could interact with key indicator resources and/or ecosystems affected by the proposed Project are as follows:

- Kitimat Liquified Natural Gas (LNG) Facility Tanker Traffic;
- Enbridge Northern Gateway Pipeline Project;
- Banks Island Wind Energy Project;
- North Coast Wind Power Project;
- English Bay Energy Projects;

- Bear River Gravel Project;
- Offshore Oil and Gas Development;
- Fairview Terminal Phase II Expansion Project;
- ICEC Terminals Company Ltd – Sulphur Forming, Handling, and Storage Facility;
- Canpotex Potash Project;
- Future Wind Energy Development in the NaiKun IUP; and
- BCTC Facilities for Power Distribution from HaidaLink.

Past and Ongoing Projects and Activities:

- Tourism/Recreation Development along the East Coast of Graham Island;
- Land Use and Development in the Tlell Area;
- Fisheries Harvest in Hecate Strait;
- Port of Prince Rupert and Shipping Lane;
- Economic Development of Port Edwards Area;
- BC Ferries Operations;
- Mineral Development in Hecate Strait;
- Economic Development of Tsimshian Territory; and
- Economic Development of Haida Territory.

13.3 Spatial Scope of the Cumulative Effects Assessment

Spatial boundaries used for cumulative effects assessment are normally based on the "zone of influence" beyond which the effects of the action have diminished to an acceptable or negligible state. This approach is taken for each effect on each environmental component examined; therefore multiple boundaries are required rather than a single study area. Spatial bounds therefore expand and contract according to the unique ecological relationships encountered. The spatial boundaries used for environmental components examined as part of the cumulative effects assessment are as follows:

Marine Physical Environment

The spatial boundary for the marine physical study area is the wind farm investigative use permit (IUP) area as well as areas outside of the wind farm in order to determine far-field effects (see Figure 1 – outlined by a red dotted line).

Marine Aquatic Ecology

The geographic area comprising Hecate Strait and adjacent marine areas south of Dixon Entrance and north of Queen Charlotte Sound.

Marine Birds

The geographic area comprising Hecate Strait and adjacent marine areas south of Dixon Entrance and north of Queen Charlotte Sound.

Marine Mammals

The wind farm and northern Hecate Strait.

Terrestrial Ecology

The larger area surrounding the proposed Project terrestrial study area, including Ridley Island and the southern end of Kaien Island and the backshore area along the shoreline near Tlell on Haida Gwaii.

Land Use and Tenure

The spatial scope includes the three investigative use permit areas (see Figure 1). With respect to the cumulative developments, discussions around land use and tenure focus on those projects that may overlap or interact with potential cable landfall areas around Tlell on Graham Island, and Ridley Island and Port Edward on the mainland. Any potential for overlap with offshore mineral, and oil and gas tenure and development were also considered by the Proponent.

Navigation

The spatial scope for cumulative effects on navigation is north Hecate Strait.

13.4 Temporal Scope of the Cumulative Effects Assessment

The cumulative effects assessment included consideration of past and present effects of human activity within the study areas noted above, and potential future activities during the life of the proposed Project.

For each of the residual proposed Project effects, the cumulative effects assessment identifies whether there is:

- No anticipated interaction with other projects and activities that would result in cumulative effects;
- Interaction with other projects and activities, which could result in a cumulative effect, and available information permits consideration of measurable effects;

- Interaction with other projects and activities, which could result in a cumulative effect, and available information does not permit consideration of measurable effects;
- Interaction with accidents and malfunctions from other projects and activities, which could result in a cumulative effect, but which could not be assessed. Potential effects are dependent on project/activity specific practices for prevention and response to accidents and malfunctions; and
- Interaction with other projects and activities, which could result in a cumulative effect, but which could not be assessed due to lack of information on the status or trends in the condition of the ecosystem component over time. Potential effects are dependent on implementation of adaptive management practices.

13.5 Analysis of Effects

In the cumulative effects assessment the contribution of, and the interactions between, specific historical and current development activities, were explored to gauge the extent to which they have contributed to the existing environmental conditions. This assessment was undertaken for those ecosystem components where residual effects were expected to occur as a result of the proposed Project. Any ongoing trend in environmental change or effects was explored in the analysis of effects. This is important for effects that have yet to reach equilibrium in the environment, and or when the effect is continuous.

Other activities where effects occur on the ecosystem components within the temporal and spatial boundaries were outlined and their effects noted. The cumulative effects were then discussed and their magnitude evaluated. The interactions of potential effects of the proposed Project with each of the other activities that were considered were compared with ecosystem receptors. These interactions defined the separate effects analyses that were conducted for each ecosystem receptor associated with the ecosystem component.

An assessment of the proposed Project related effects, and the effects of all projects and activities, on the ecosystem receptors was conducted and presented in the Application and Response Submission 18. The discussion below summarizes these sections as well as the federal conclusions from review of these sections.

Marine Physical Environment

The Proponent expects proposed Project effects on wind, waves, tidal currents, and sediment transport to be confined to the wind farm area. The Proponent has also committed to implementation of mitigation measures should unanticipated far-field effects occur such that an unacceptable accumulation of sediment occurs and is affecting marine biological resources or shoreline structures or navigational waterways.

The potential for interaction with a subsequent wind farm development on Dogfish Banks would be informed by the results of sediment modeling and monitoring of the proposed Project. Cumulative effects could arise from the routing of cableways and the proximity of the new wind farm to the proposed Project and would need to be considered once the details of any future project are known.

Marine Aquatic Ecology

Injury or Mortality and/or Alteration of Community Assemblage from Chemical Means

Increased vessel traffic associated with a number of the proposed developments in combination with existing vessel activity will increase the risk of potential accidental spills and equipment malfunction that may result in the release of oil, gas, diesel, or other hydrocarbons into the marine water in areas that overlap with the proposed Project activities. Of particular concern would be a large oil spill or vessel collision that results in significant impacts to shallow subtidal and intertidal habitats (e.g., forage fish spawning beaches along the east coast of Graham Island) and community assemblages primarily infauna (e.g., clam beds) and epifauna but potentially mobile macroinvertebrates and benthic and pelagic fish species (e.g., eggs from demersal spawners; contaminated food source) of Haida Gwaii, the mainland coast and offshore islands (e.g., Porcher, Stephens, Prescott, Smith, Banks). Such an event is not strictly a cumulative effect in that the effect of one project is added to the effect of another project or activity. Rather increased vessel activity, particularly vessels transporting hydrocarbons, resulting from existing and future projects increases the likelihood of a major accident event. Proper emergency spill response and contingency planning associated with each project should reduce these potential risks.

Injury or Mortality from Physical Disturbance

Within northern Hecate Strait, physical disturbance to the seabed by human activities is restricted to commercial and recreational fishing which occurs on both Dogfish Banks (such as the Area A commercial crab harvest) and in Hecate Strait (such as commercial trawl, trolling and bottom fishing) as well as Chatham Sound/Prince Rupert areas (e.g., geoducks in the nearshore around Porcher, Stephens, and Prescott Island and northern Banks Island; shrimp trawl in Chatham Sound). There have been no physical developments in northern Hecate Strait (wind turbines, oil and gas infrastructure) with the exception of the meteorological mast installation on Dogfish Banks and port developments in Prince Rupert and Kitimat and on Haida Gwaii. Depending on the location of the footprints associated with expansion of the proposed Project (wind turbines and associated cables), Banks Island and English Bay energy projects (submarine cable footprint only), and offshore oil and gas infrastructure, cumulative effects to be considered are injury or direct mortality of infauna and epifauna, mobile

invertebrates and benthic fish in the footprints of submarine cables and infrastructure. Currently, there is not enough information available on the potential projects to provide measureable cumulative effects assessment.

Given that the extent of impacts by physical disturbance to the ecosystem components from the proposed Project is expected to be low, particularly for the mobile invertebrates and fish, based on the comparatively short duration of the construction activity and the limited geographic extent of habitats impacted, results from post-construction cable route surveys for the proposed Project would provide valuable information on benthic habitat disturbance and recovery that can be used for a future assessment of cumulative effects of the proposed developments. The greatest concern for cumulative effects resulting from cable and infrastructure installations are impacts to sensitive features such as sponge reefs and aggregations of hard coral and spawning areas for demersal fish (e.g., Pacific cod).

Alteration of Community Assemblages

As described above, there are currently no human made structures in Hecate Strait (with the exception of the meteorological mast on Dogfish Banks). The greatest source of habitat alteration associated with the proposed Project is the placement of scour protection (i.e., hard substrate) on sand habitats that will result in a change of species assemblage (e.g., to primarily sessile epibenthic biota and potentially reef fish).

Post-construction monitoring of the scour protection for the proposed Project would provide valuable information on whether these features are attracting predator reef fish to the area or contributing to the introduction of invasive species to Dogfish Banks, the two primary concerns related to alteration of benthic habitat. Until such information is available, it is not possible to determine measureable cumulative effects related to the addition of hard structures in Hecate Strait and Dogfish Banks from oil and gas development or an expansion of the proposed Project.

Displacement of Marine Resources

Concerns with respect to cumulative effects on the displacement of mobile or migratory fish and invertebrates rests primarily with the potential effects of magnetic fields associated with additional submarine transmission cables within or near the proposed Project area. Currently two land-based wind generation projects (Banks Island Wind Energy and English Bay Wind Energy) may involve the placement of transmission cables across Principe Channel and Chatham Sound. There are no known plans for additional cable placement across Hecate Strait. The Proponent has committed to assessing the feasibility of laboratory and field studies to validate the findings of the EA regarding the potential effect electric and magnetic fields, with particular reference to

Dungeness crab. The feasibility study and any subsequent research/monitoring program would be developed and carried out in consultation with DFO scientists.

The Proponent committed to continue to monitor information from global research and monitoring activities for consideration in determining the focus and scope of potential monitoring programs for the Project, such as in regard to EMF. The results of the feasibility study would be reported to DFO, stakeholders, Haida Nation, Gitxaala Nation, Metlakatla First Nation and Lax Kw'alaams First Nation, as required and on a schedule to be determined in the study plan.

Marine Birds

Displacement from Foraging Habitat

Other than port developments on Haida Gwaii and the nearby BC mainland, there are presently no human-built structures (e.g., offshore wind farm, offshore oil and gas platform) occupying a notable footprint in Hecate Strait or adjacent waters (or the entire BC coast). Vessel traffic (commercial, transportation, recreational) is expected to cause short-term displacement of marine birds throughout the proposed Project area, in the vicinity of ports on Haida Gwaii and the BC mainland. Such displacement might be chronic, but, according to the Proponent, there is currently no reason to believe that the level of disturbance is unsustainable or that birds are precluded from accessing important foraging areas. There are no other existing or planned industrial developments known to be displacing marine birds from habitats in Hecate Strait to which possible displacement due to the proposed Project would be cumulative. Depending on location, the footprint(s) of future offshore wind farm or oil and gas developments could be located in areas that, when combined with the proposed Project, would lead to an increased risk of displacement of marine birds from foraging habitats. Post-construction monitoring by the Proponent (e.g., aerial and vessel bird surveys) would provide important information on bird distribution and abundance in that portion of Hecate Strait affected by the proposed Project. That information would provide insights into how birds respond to the proposed Project as well as serve as a basis for predicting how further offshore wind energy developments might interact to cumulatively affect bird movements.

Barriers to Movement

At present, there are no other industrial developments known or suspected to be acting as barriers to seasonal migration or daily movements of marine birds in Hecate Strait. Depending on location, the footprint(s) of future offshore wind farm developments could be located in areas that, when combined with the proposed Project, would lead to an increased risk of barrier effects. Post-construction monitoring (e.g., radar studies as part of an adaptive management plan) would provide important information on bird flight

and avoidance behaviors over a portion of Hecate Strait. That information would provide insights into how birds respond to the proposed Project as well as serve as a basis for predicting how further offshore developments might interact to cumulatively affect bird movements.

Injury and Mortality

There are presently no physical developments (i.e., vertical structures), other than the meteorological mast installed as part of the present proposed Project, that pose notable collision risks to birds in Hecate Strait. Depending on location, the footprint(s) of future offshore wind farm developments could be located in areas that, when combined with the proposed Project, would lead to an increased risk of collisions. Post-construction monitoring (e.g., radar studies and collision monitoring as part of an adaptive management plan) will provide important information on bird flight and avoidance behaviors over a portion of Hecate Strait.

Any expansion of commercial gillnet fishing operations in Hecate Strait could lead to increased bycatch of marine birds unless adequate mitigation measures were in place. As such, it is possible that increased bycatch, together with wind turbine collision mortalities, could lead to cumulative effects on the mortality of alcids such as Common Murre, Rhinoceros Auklet, and Marbled Murrelet. Other sources of human-caused mortality of marine birds in Hecate Strait and nearby waters include oiling due to spills such as that associated with the Queen of the North, and possibly low levels of chronic oiling due to smaller spills and the pumping of vessel bilges contaminated with hydrocarbons. Ongoing losses of marine birds to these sources of mortality are expected to be very low. The greatest concern involves the effects of a large oil spill. The likelihood of such an event is extremely low. It is possible that oil-spill mortalities due to activities not associated with the proposed Project would be cumulative with those that occurred as a result of wind turbine collisions and/or with accidental spills associated with the proposed Project. The possibility of future wind farm and/or offshore oil and gas developments in Hecate Strait presents serious uncertainties with regard to cumulative adverse effects on marine birds. The Proponent's commitment to an adaptive management framework is considered to be a vital tool in reducing this uncertainty to an acceptable level.

Marine Mammals

Displacement from Foraging Habitat

Other than port developments on Haida Gwaii and the nearby BC mainland, there are presently no human-built structures (e.g., offshore wind farm, offshore oil and gas platform) occupying a notable footprint in Hecate Strait or adjacent waters (or the entire BC coast for that matter). Vessel traffic (commercial, transportation, recreational) is

expected to cause short-term displacement of marine mammals throughout the proposed Project area; in the vicinity of ports on Haida Gwaii and the BC mainland, such displacement might be chronic, but there is presently no reason to believe that the level of disturbance is unsustainable or that marine mammals are precluded from accessing foraging areas. There are no other existing or planned industrial developments known to be displacing marine mammals from habitats in Hecate Strait to which possible displacement due to the proposed Project would be cumulative. Depending on location, the footprint(s) of future offshore wind farm or oil and gas developments could be located in areas that, when combined with the proposed Project, would lead to an increased risk of displacement of marine mammals from foraging habitats; however, the location of such habitats remains poorly understood. Post-construction monitoring by the Proponent (e.g., vessel marine mammal surveys) would provide important information on marine mammal distribution and abundance in that portion of Hecate Strait potentially influenced by the proposed Project. That information would provide insights into how marine mammals respond to the proposed Project as well as serve as a basis for predicting how further offshore developments might interact to cumulatively affect marine mammal movements and use of habitat.

There may be temporary displacement of marine mammals during the construction phase of the proposed Project as a result of marine traffic and installation of the bases of the turbines due to the noise produced by the vibrohammers.

Barriers to Movement

At present, there are no other industrial developments known or suspected to be acting as barriers to seasonal migration or daily movements of marine mammals in Hecate Strait. Depending on location, the footprint(s) of future offshore wind farm developments could be located in areas that, when combined with the proposed Project, would lead to an increased likelihood of barrier effects. Post-construction monitoring (e.g., vessel surveys as part of an adaptive management plan) would provide important information on marine mammal avoidance behaviors over a portion of Hecate Strait. That information would provide insights into how marine mammals respond to the proposed Project as well as serve as a basis for predicting how further offshore developments might interact to cumulatively affect marine mammal movements and habitat use.

There may be temporary barriers to movement of marine mammals during the construction phase of the project as a result of marine traffic and installation of the bases of the turbine due to the noise produced by the vibrohammers.

Injury and Mortality

There is potential injury/mortality cumulative effects related to vessel traffic and commercial fisheries in Hecate Strait. Commercial fishing (primarily long-lining and gillnetting) on the BC coast are the probably the single largest source human-caused mortality for marine mammals. Other sources of human-caused mortality of marine mammals in Hecate Strait and nearby waters potentially include oiling due to spills, and the pumping of bilges contaminated with hydrocarbons. Future shipping activities associated with the LNG and Enbridge crude oil projects carry the possibility of spills and effects that could range from not significant to significant, depending on circumstances of a spill event (volume, material spilled, location, weather, proximity to marine mammal foraging habitat, or seasonal aggregations). Any such proposed projects would have rigorous requirements for spill prevention and contingencies; therefore, the likelihood would be extremely low.

The extent of collision injury or mortality caused by vessel traffic is not expected to be significant, but may involve several species of marine mammal and would be dependent on the type, scale, and routing of vessel traffic involved with each project. Vessel-whale collisions are not reported frequently. Injuries and mortalities associated with high-intensity noise production would be expected to be limited to construction (or exploration) activities and projects would be expected to adopt appropriate mitigation measures to minimize impacts. The extent to which any mortalities are cumulative with other human-caused mortalities of marine mammals in Hecate Strait is unknown and likely to vary with species. Presently, no significant adverse cumulative effects are anticipated with regard to marine mammals and existing infrastructure or human activities.

The possibility of future wind farm and/or offshore oil and gas developments in Hecate Strait presents uncertainties with regard to cumulative adverse effects on marine mammals. Until such time as a reasonable understanding exists regarding (i) the nature and extent of any adverse effects of the first wind farm development in Hecate Strait and (ii) the ecological capacity of the area to tolerate such effects, caution must be exercised in considering future offshore developments in Hecate Strait. The adaptive management framework described in this report is considered to be a vital tool in this regard. The Proponent has committed to marine mammal monitoring programs (such as vessel, aerial, and shore-based surveys and acoustic monitoring) to assess marine mammal distribution and responses to the wind farm. Findings from those monitoring programs would contribute to enhanced understanding of the scope and severity of marine mammal interactions and guide the scope and design of future development activities.

Freshwater Fish Habitat (Port Edward)

The only historically significant salmon habitat in the area is Wolf Creek, which the proposed Project is not expected to effect. Other projects in the planning stages are expected to contribute to alteration of small streams on Ridley Island and along the southern end of Kaien Island. The future projects identified are the Fairview Terminal Phase II Expansion Project (includes CN rail development at southern end of Kaien Island), and the two developments on Ridley Island: ICEC and Canpotex. Since only a coarse level of information is available for these projects, it is not possible to conduct a measurable cumulative effects assessment. While the direct effects of the proposed Project are not anticipated to be significant, the proposed Project will combine with effects of other projects and activities to affect habitat. It is expected that each project will minimize direct effects through appropriate mitigation. Cumulative effects are not expected to be significant effects on freshwater fish habitat.

Terrestrial Vegetation (Port Edward)

The upland wetlands and scrubby bog forest of Ridley Island are part of the bog and fen ecosystems that are representative of the outer coast of the Hecate Lowlands. Some of them (particularly the fens) are identified as rare ecosystems in BC. Other rare ecosystems in the proposed Project area are associated with sloughs. Development of the outer coast has a cumulative effect through the additive loss of these habitats. While it is anticipated that the Proponent would avoid significant disturbance to these areas through mitigation measures, unavoidable loss of portions of these areas will add to the cumulative development effects in the region. The other projects considered to potentially contribute to this cumulative effect include the Fairview Terminal Phase II Expansion Project, the Canpotex project and the various land-based wind energy projects proposed for the outer coast. It is noted that the other land-based wind projects would affect habitats at much higher elevations than those affected by the proposed Project. On October 12, 2009, the Proponent provided Response Submission 18 to complete the cumulative effects assessment in consideration of information available in the updated Canpotex Project Description. In that submission the Proponent stated that the revised Canpotex design does not result in a change to cumulative effects presented in the Application wherein Canpotex was acknowledged as posing a potential cumulative effect on components of the terrestrial ecology. As a result, the Proponent recommended that a concerted effort between various project proponents, regulators, and stakeholders be undertaken to manage, and minimize, cumulative loss of rare ecosystems in the Hecate Lowlands.

Terrestrial Wildlife (Port Edward)

Past and future development along the North Coast of BC will have a cumulative effect on the loss of important wildlife habitats. The proposed Project is not expected to have direct significant effects on valued wildlife habitat such as old-growth forest and wetlands, but unavoidable removal of forest and riparian area would contribute to the overall reduction of these habitats along the North Coast. Future projects that may also contribute to this effect include the Fairview Terminal Phase II Expansion Project, the Canpotex project, and the various land-based wind energy projects proposed for the outer coast. The combinations of these effects is expected to be a very small portion of similar habitats in the north coastal region of BC that remain undisturbed, indicating that no significant cumulative effects are anticipated.

Terrestrial Vegetation (Tlell)

Past land development in the areas contemplated for the HaidaLink cable landing has had a cumulative effect on the loss of important plant species and ecosystems in the Tlell area. The landfall and cable to the landfall is expected to be located in disturbed lands in one of the three properties. Therefore, the proposed Project is expected to avoid or minimize effects on key components of plant ecology. The small additional effect of the proposed Project in combination with past and current effects on vegetation is expected to be negligible and would not contribute to a significant cumulative effect. Although information concerning interconnection facilities required to connect Haida Gwaii to the mainland electrical grid via HaidaLink is not available at this time, the land use and vegetation information available indicates opportunities for transmission routes and substation location to be sited to avoid and minimize effects on native vegetation areas in the vicinity of Tlell.

Terrestrial Wildlife (Tlell)

Past land development in the areas contemplated for the HaidaLink cable landing has had a cumulative effect on the loss of important wildlife habitats and ecosystems in the Tlell area. The landfall and cable to the landfall is expected to be located in disturbed lands in one of the three properties. Therefore, the Proponent is expected to avoid or minimize effects on key wildlife habitats. No incremental effect on wildlife is expected due to the cable and landfall. Although information concerning BCTC facilities to connect Haida Gwaii to the grid by HaidaLink is not available at this time, the land use, vegetation, and wildlife information available indicates opportunities for transmission routes and substation location to be sited to avoid and minimize effects on native vegetation areas in the vicinity of Tlell. It is expected that cumulative effects on wildlife would be negligible.

13.6 Analysis

The RAs considered the information provided by the Proponent, including the Proponent's conclusions on potential effects and the method used to reach those conclusions as outlined in this chapter. The RAs then conducted their own analysis of the potential effects and proposed mitigation measures before independently reaching conclusions on the residual effects.

Potential Effects

The Proponent's application chapter on cumulative effects analysis and Response Submission 18 took into consideration the comments of the harmonized EA working group, so potential environmental effects that were not addressed in the original chapter were included in the submission. Thus, there are no additional potential environmental effects other than those that have been previously described in this chapter.

Potential cumulative environmental effects associated with the proposed Project in relation to existing and future projects and activities identified during the cumulative environmental effects are discussed above. There is either no significant cumulative environmental effects or not enough information available on potential ecological effects of proposed Project components (e.g., scour protection), or between the proposed Project and other potential projects to provide measureable cumulative effects assessment. The proposed Environmental Management System for the proposed Project (including follow up and adaptive management plans) is meant to reduce the uncertainties associated with prediction of potential effects to an acceptable level. It would provide valuable information to be considered in any future project being developed within the study area and contribute to ensuring that cumulative effects are not significant.

As documented in the Table of Commitments and Assurances, the Proponent has committed to post-construction monitoring and the development and implementation of adaptive management plans to address uncertainties regarding environmental effects (including cumulative environmental effects) and the development of any required mitigation. Specific mitigation measures for environmental effects are summarized in chapter 5 of this Report.

Outstanding issues under discussion between federal departments and the Proponent include:

- Marine aquatic environment and impacts to fisheries. DFO requires further information on final mitigation measures and conceptual fish habitat compensation planning for HADDs including design details of the wind turbine generator placement, choice of foundation, construction methods and cable

laying, burial, routing and landing areas. The Proponent submitted a revised conceptual habitat compensation plan for DFO's review on October 16, 2009; DFO responded on November 12, 2009. Further discussions are required between the Proponent and DFO to refine the Proponent's conceptual habitat compensation plan.

- Follow up Plan: Further work is required to refine the Follow up and Adaptive Management Plans for the proposed Project, which are contained in several components of the proposed Environmental Management System (EMS).

Further analysis on cumulative effects will be included in the federal screening report.

14 Follow-up Program

14.1 CEAA Provisions for Effects Monitoring and Follow-up Program

Under CEAA, where a RA takes a course of action that would permit the proposed Project to be carried out in whole or in part, it is required to consider whether a follow-up program is appropriate for the project in the circumstances, and if so, shall design a follow-up program and ensure its implementation. The purpose of a follow-up program is to verify the accuracy of the EA and determine the effectiveness of measures taken to mitigate the potential adverse environmental effects of the proposed Project. The federal screening report will provide the basis for determining the nature of the follow-up program, its associated requirements and who will be responsible for implementing and reporting on its various components.

The RAs required the Proponent to establish follow-up monitoring, adaptive management and an environmental management system to address uncertainty with predicted project effects during Application review. The Proponent submitted a draft framework for discussion and a technical subcommittee was established to review and provide details and comments on the framework.

14.2 Proponent Commitments and Obligations

The Proponent committed to developing environmental monitoring, adaptive management and follow up plans for the proposed Project. These follow-up and monitoring plans would be developed in consultation with regulatory agencies two years prior to the start of construction. The Proponent would carry out either three years of post-construction monitoring, or in the case of specific resources/studies, for a timeframe determined by the resource, study or adaptive management plan.

The following is a list of follow up plans the Proponent has committed to develop:

- Marine physical;
- Marine ecology;

- Marine ecology (EMF);
- Marine ecology (crab tagging);
- Marine ecology (habitat compensation);
- Marine birds;
- Marine mammals;
- Naikoon Provincial Park; and
- Long term monitoring program.

At the October 20 and 21 Working Group meeting, the federal agencies indicated they would provide the Proponent with further information regarding their requirements for the development of the follow up plans during the EA.

PART E – CONCLUSIONS

Based on:

- Information contained in the Application;
- The Proponent's efforts at consultation with First Nations, government agencies, including local governments, and the public, and its commitment to ongoing consultation;
- Comments on the proposed Project made by participating First Nations and government agencies, including local governments, as members of EAO's Working Group, and the Proponent's responses to these comments;
- Comments on the proposed Project received during the public comment period, and the Proponent's responses to these comments;
- Issues raised by participating First Nations regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues; and
- Commitments and mitigation measures identified in Appendix 3 to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project,

The EAO is satisfied that:

- The EA process has provided adequate opportunities for the identification and assessment of the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- Consultation with First Nations, government agencies, and the public, and the distribution of information about the proposed Project have been adequately

carried out by the Proponent and that efforts to consult with First Nations will continue on an ongoing basis;

- Issues identified by First Nations, provincial government agencies and the public, which were within the scope of the environmental assessment, were adequately and reasonably addressed by the Proponent during the review of the Application. At the time of writing, the Proponent still needs to finalize a number of review documents to enable the federal government to complete its EA;
- Practical means have been identified to prevent or reduce any potential negative environmental, economic, social, heritage or health impacts of the proposed Project such that no direct or indirect significant adverse effect is predicted or expected;
- The potential for adverse effects on the rights of the Haida Nation, Lax Kw'alaams Indian Band, Metlakatla Nation and Gitxaala Nation have been avoided, mitigated or otherwise accommodated to an appropriate level such that implementation of the proposed Project should not prevent these First Nations from exercising their rights;
- The provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an EA Certificate for the proposed Project.

In reaching this conclusion, EAO notes that the Proponent is engaged in ongoing discussions with DFO and may be required to undertake further mitigation or compensation measures if DFO or NRCan determine that necessary as part of their regulatory processes.

The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an environmental assessment certificate to the Proponent under the Act.