

**LOWER CHURCHILL
HYDROELECTRIC GENERATION PROJECT**

NALCOR ENERGY

FINAL WRITTEN SUBMISSIONS

A. INTRODUCTION

1. The hydroelectric potential of the Churchill River in Quebec and Labrador has been recognized for decades, and development of this potential began in 1954 with the construction of the 18 MW Menihek Power Plant to provide electric power to the iron ore mines in Shefferville, Quebec, near the Labrador border.¹ This was followed in 1960 with the construction of the Twin Falls Power Plant, which was then replaced by the Churchill Falls Power Station in 1974.²
2. While the Churchill Falls Power Station captured the hydroelectric potential of the upper Churchill River, studies began in 1974 to support the development of hydroelectric facilities on the lower Churchill River.³ In 1980, a full environmental assessment of this lower Churchill development was concluded that involved the collection and analysis of environmental baseline data, the preparation of an Environmental Impact Statement and the holding of public hearings.⁴ The Review Panel at the time found that the proposed project was acceptable, provided that certain environmental and socio-economic conditions were met.⁵

¹ Environmental Impact Statement (“EIS”) Vol. IA, pg. 1-16.

² EIS Vol. IA, pg. 1-16.

³ EIS Vol. IA, pg. 1-17.

⁴ EIS Vol. IA, pg. 1-17.

⁵ EIS Vol. IA, pg. 1-17.

3. Since 1980, extensive additional studies have been conducted both of the existing environment and of the potential environmental effects of hydroelectric development on the lower Churchill River.⁶ All of these studies were incorporated into the Environmental

⁶ EIS Vol. IA, pgs. 1-13, 1-14, 1-15, 1-17 and 1-18; these studies include the following: Moose (*Alces alces*) Interim Report, Minaskuat Inc. 2009a; Caribou (*Rangifer tarandus caribou*) Baseline Report, Minaskuat Inc. 2009b; Black Bear (*Ursus americanus*) Interim Report, Minaskuat Inc. 2009c; Wildlife Habitat Associations Environmental Baseline Report, Minaskuat Inc. 2008a, Moose and the Proposed Churchill River Power Project: A Literature Review, Conor Pacific Environmental Technologies Inc. and Westworth Associates Environmental Ltd. 2000; Churchill River Power Project 1999 Environmental Studies: Winter Moose Survey, Northland Associates and Jacques Whitford 2000; Inventory of Beaver Colonies in the Lower Churchill River Valley, Minaskuat Inc. 2008b; Furbearer Winter Habitat Use, Sikumiut Environmental Management Ltd. 2008a; Forest Songbird Survey, Minaskuat Inc. 2008c; Waterfowl in the Lower Churchill River Area, LGL Limited 2008; Inventory of Osprey, Bald Eagle & Golden Eagle Nest Sites in the Lower Churchill River Valley, Minaskuat Inc. 2008d; Osprey and Bald Eagle Study, Jacques Whitford 1999a; Churchill River Power Project Waterfowl, AGRA Earth and Environmental and Harlequin Enterprises 1999; Rare Plant Survey in the Lower Churchill River Valley, Minaskuat Inc. 2008e; Caribou (*Rangifer tarandus caribou*) Baseline Report, Minaskuat Inc. 2009b; Aquatic Vegetation Study, AMEC Earth and Environmental Ltd. 2008a; Lower Churchill River Fish Consumption and Angling Survey, Minaskuat Inc. 2009d; Seal Abundance and Distribution, Sikumiut Environmental Management Ltd. 2007; Habitat Quantification, AMEC Earth and Environmental Ltd. and Sikumiut Environmental Management Ltd. 2007; 2006 Fish and Fish Habitat Baseline Study: Catch-based Utilization Index Validation and Additional Habitat Surveys, AMEC Earth and Environmental Ltd. 2007; HADD Determination Methodology Churchill River, Labrador, AMEC Earth and Environmental Ltd. 2001; Biological Study of the Goose Bay Estuary, Jacques Whitford 2001a; Fish Migration and Habitat Use of the Churchill River, Jacques Whitford 2000; Fish and Fish Habitat, AGRA Earth and Environmental 2000; Primary Productivity and Plankton Biomass, Jacques Whitford 1999b; Benthic Invertebrate Study of the Churchill River, Jacques Whitford 1999c; Water and Sediment Modelling in the Lower Churchill River, Minaskuat Inc. 2008f; Water and Sediment Quality in the Lower Churchill River, Minaskuat Limited Partnership 2007; Sedimentation and Morphodynamics Study, Northwest Hydraulic Consultants 2008; Water Quality and Chlorophyll Study, Jacques Whitford 2001b; Water and Sediment Quality in the Churchill River, Jacques Whitford 1998a; Bank Stability Study, AMEC Earth and Environmental Ltd. 2008b; Salt Water Intrusion 3D Model Study, Hatch 2008a; Sediment Plume Analysis, Hatch 2008b; Hydraulic Modelling, Hatch 2008c; Ice Dynamics of the Lower Churchill River, Hatch 2007; Aquatic Environment in the Goose Bay Estuary, Agra Earth and Environmental and BAE-Newplan Group Limited SNC-Lavalin 2001; Assessment of the Potential for Increased Mercury Concentrations, Tetra Tech Inc. 2008; Calculation of Anticipated Consumption Advisory Levels of Fish in the Lower Churchill Area, Minaskuat Inc. 2008g; Existing Mercury Concentrations in Osprey and Ecological Risk Assessment, Minaskuat Limited Partnership 2008; Statistical Analysis of Mercury Data from Churchill Falls (Labrador) Corporation Reservoirs, Jacques Whitford 2006; Freshwater Fish Mercury Sampling Churchill River Labrador, AMEC Earth and Environmental Ltd. 2000; Historic Resources Overview and Impact Assessment of Muskrat Falls Generation Facility and Reservoir and Muskrat Falls to Gull Island Interconnecting Transmission Line Corridor, Minaskuat Inc. 2008h; Innu Environmental Knowledge of the Mishta-shipu (Churchill River) Area of Labrador in Relation to the Proposed Lower Churchill Project, Innu Nation 2007; Report on the Fieldtrip to Ushkan-shippis, Innu Nation 2008; Churchill River Power Project Historic Resources Overview Assessment 1998-2000 Volume 1 Interpretation Summary and Recommendations, Jacques Whitford and Innu Environmental Limited Partnership 2001a; Historic Resources (Labrador Study), Jacques Whitford and Innu Environmental Limited Partnership 2001b; Historic Resources Overview Assessment (Labrador Component), Jacques Whitford and Innu Environmental Limited Partnership 2000; Historic Resources Potential Mapping, Jacques Whitford and Innu Environmental Limited Partnership 2001c; Sea Level History and Geomorphology of the Churchill River and Strait of Belle Isle, Jacques Whitford 1998b; Forest Inventory, Sikumiut Environmental Management Ltd. 2009; Reservoir Preparation Report, Sikumiut Environmental Management Ltd. 2008b; Reservoir Preparation Workshop Report, Duerden & Keane Environmental Inc. 2007; Socio-economic Environmental Baseline Report, Minaskuat Inc. 2008i; Calculation of Anticipated Consumption Advisory Levels of Fish in the Lower Churchill Area, Minaskuat Inc. 2008g;

Impact Statement (“EIS”) that the Proponent, Nalcor Energy (“Nalcor”), filed in support of the current proposal for the Lower Churchill Hydroelectric Generation Project (the “Project”) in 2008. In essence, the Project has been the subject of intense analysis since the mid 1970s.

4. This Project represents the future for the people of Newfoundland and Labrador. The Project will provide the Province with a stable source of renewable energy and revenue for generations to come. The Government of Newfoundland and Labrador has labelled this Project the “centerpiece” of its Energy Plan.⁷ At the same time, the Project will provide real opportunities for new, sustainable, economic development in Labrador. This view was shared by the Central Labrador Development Board, among others.⁸
5. Sustainable development is a guiding principle of the *Canadian Environmental Assessment Act* (“CEAA”),⁹ of the *Newfoundland and Labrador Environmental Protection Act* (“NLEPA”)¹⁰ and of the EIS Guidelines that were prepared for this Project.¹¹ Sustainable development seeks to meet the needs of present generations

Lower Churchill River Fish Consumption and Angling Survey, Minaskuat Inc. 2009d; Forecasted Labour Resource Requirements by National Occupation Classification for Generation Projects, Nalcor Energy 2008; Community Health Study, Aura Environmental Research and Consulting Ltd 2008; Current Land and Resource Use in the Lower Churchill River Area, Minaskuat Inc. 2009e; Greenhouse Gas Emissions Study, Minaskuat Inc. 2008j; Greenhouse Gas Fluxes, Environnement Illimité & Environnement d’Hydro-Québec 2007; Wetland Assessment and Evaluation, Minaskuat Inc. 2008k; Regional Ecological Land Classification (ELC), Minaskuat Inc. 2008l; Project Area ELC, Minaskuat Inc. 2008m; Herpetile Surveys in the Lower Churchill River Valley, Minaskuat Inc. 2008n; and Interconnecting Transmission Line Constraint Mapping Atlas, AMEC Earth and Environmental Ltd. 2008c

⁷ Canadian Environmental Assessment Registry (“CEAR”) 515 at pg. 2.

⁸ Carol Best, CEAR 1164 at pgs. 101 and 115.

⁹ R.S.C. 1992, c. 37.

¹⁰ S.N.L. 2002, c. E-14.2, Section 2 (kk) and Department of Environment and Conservation, *Guide to the Environmental Protection Act* (2002) at pg. 2, on line: www.env.gov.nl.ca/env/env-assessment/guide_to_epa.pdf.

¹¹ CEAR 098.

without compromising the ability of future generations to meet their own needs. The three “pillars” or objectives of sustainable development are preserving environmental integrity, improving social equity and improving economic efficiency.

6. The Project is a truly sustainable project. It will result in environmental effects, but none of these effects will deny humans and wildlife the ability to use the environment in much the same way as they have historically done. The Project will provide training and jobs to local communities, and will greatly increase business activity in the area and throughout the Province of Newfoundland and Labrador. The Project will provide significant revenue to the Province that will accrue for generations to come, and will greatly increase the power available for economic development, more than doubling the amount of electricity currently available to the Province.¹² In addition, the biodiversity of wildlife in the river valley will be maintained as a result of adjacent habitat or as a result of new habitat that will be enhanced through a series of mitigation measures.

7. Unlike many resource development projects, where the permanent extraction of resources requires a balancing between the needs of present and future generations, the Project will continue to generate renewable energy from the Churchill River for decades and perhaps even centuries to come.¹³ The power that is produced from the Project is clean power – it will result in far fewer greenhouse gas (“GHG”) emissions per unit of electricity than any coal, gas, or oil-fired power plant.¹⁴ During the hearings, the Mayor of Holyrood stated that the Project was critical for the future of the Province, in part because it would make

¹² EIS Vol. IA, pg. 1-11.

¹³ Gilbert Bennett, CEAR 692 at pgs. 29 and 30.

¹⁴ This conclusion was supported by Environment Canada in CEAR 667 at pg. 8.

the Province's energy supply 98% GHG-free.¹⁵ In addition, the low-carbon advantage of the Project will result in the displacement of up to 11.5 mega tonnes of GHG emissions from existing generation facilities.¹⁶ This is the equivalent of taking 3.2 million cars off the road.¹⁷ The Project therefore represents one of the most important and realizable opportunities for Canada to meet its environmental commitments and curb greenhouse gas and other emissions in a meaningful way.¹⁸

8. The Joint Review Panel ("JRP" or the "Panel") for this Project was formed in January 2009 and since that time more than 1000 submissions have been made by the Proponent and by interveners. Forty-five days of public hearings have been held in nine different communities (through both live hearings and video conferencing hearings). Throughout this process, all interested parties have had ample opportunity to participate and inform the JRP of their views.

9. A significant amount of material was filed by interveners during the hearing, and much of this information Nalcor has not had a meaningful opportunity to respond to and question. However, much of this information was general information sourced from the internet and was not specific to the Project or the Project Area. Nalcor believes the Panel should be cautious in considering the applicability of these submissions as some of the material has actually served to increase misunderstandings and misperceptions about the Project. In addition, several interveners during the hearing stated their opposition to the Project but upon questioning they conceded that they had not read the majority of the supporting

¹⁵ Gary Goobie, CEAR 1208 at pg. 27.

¹⁶ Response to IR JRP 7, at pg. 115, table 2.

¹⁷ Gilbert Bennett, CEAR 1208 at pg. 19.

¹⁸ Response to IR JRP.146 at pg. 3.

documents for the Project.¹⁹ Again, views unsupported by facts, or without having reviewed the material, should be considered cautiously.

10. The evidence that is directly applicable to the Project or the Project Area, demonstrates that the potential environmental effects of the Project have been thoroughly considered and that with the appropriate mitigation and follow-up measures, there will be no likely significant adverse environmental effects caused by the Project. Further, Nalcor believes it is clear that the Project will result in considerable benefits to Labrador, the Province overall, and the entire country. Therefore, Nalcor asks the Panel to recommend that this Project be approved so that it may proceed to the next phase of detailed regulatory approvals.

B. APPLICATION AND LEGAL FRAMEWORK

I. The Proponent

11. Nalcor is a Crown corporation formed by the Government of Newfoundland and Labrador in 2008. Its mandate is to provide safe, reliable and dependable electricity to utility, industrial, residential and retail customers in the Province and it relies on its core business of generating and transmitting electrical power to do so.²⁰ Nalcor is the parent company of Newfoundland and Labrador Hydro, the Churchill Falls (Labrador) Corporation, and Nalcor Energy – Oil and Gas Inc. Nalcor has benefitted from decades of studies, policies and practices of its predecessor Newfoundland and Labrador Hydro.

¹⁹ For example, Dr. John Gibson, CEAR 1208 at pg. 72; Murray Rudd, CEAR 1163 at pg. 108; Dr. Dave Rosenberg, CEAR 1163 at pg. 244.

²⁰ EIS Vol. IA, pg. 1-1.

12. Nalcor's vision is to build a strong economic future for successive generations of Newfoundlanders and Labradoreans. Nalcor conducts its business according to the following core values:
- (a) *Open Communication*: Fostering an environment where information moves freely in a timely manner;
 - (b) *Accountability*: Holding themselves responsible for their actions and performance;
 - (c) *Safety*: Relentless commitment to protecting themselves, their colleagues, and their community;
 - (d) *Honesty and Trust*: Being sincere in everything they say and do;
 - (e) *Teamwork*: Sharing their ideas in an open and supportive manner to achieve excellence;
 - (f) *Respect and Dignity*: Appreciating the individuality of others by their words and actions; and
 - (g) *Leadership*: Empowering individuals to help guide and inspire others.²¹
13. Nalcor, through Newfoundland and Labrador Hydro, has considerable experience in hydroelectric power generation and transmission and with major project development.²² In constructing and operating its projects, Nalcor follows a company-wide Environmental Management System ("EMS") that ensures all potential environmental risks are identified, company-wide environmental principles are consistently applied and

²¹ EIS Vol. IA, pg. 1-1.

²² EIS Vol. IA, pg. 1-3.

communicated, and that Nalcor's environmental practices are constantly scrutinized and updated where necessary.²³ Nalcor draws from over 35 years of environmental management experience through its environmental services department that was formed under Nalcor's predecessor in 1975.²⁴ This department has overseen the environmental management of several large-scale construction projects in the Province, including Hinds Lake, Upper Salmon, Cat Arm and Granite Canal. Finally, Nalcor is ISO 14001-certified, meaning that its environmental management practices meet internationally accepted standards.²⁵ In fact, Nalcor's environmental assessment, monitoring, and habitat compensation efforts have received national and international recognition.²⁶

II. The Project

14. Nalcor's proposed Project consists of generation facilities at Gull Island and Muskrat Falls, as well as transmission lines between Gull Island and Churchill Falls and between Muskrat Falls and Gull Island. The generation capacity at the Gull Island facility will be 2,250 MW and at the Muskrat Falls facility 824 MW, totalling 3,074 MW of new renewable power generation.²⁷ In addition, the Project will involve constructing new access roads, temporary construction bridges, accommodation facilities, temporary borrow pits and quarry sites, and two reservoirs covering 126 km² of incremental inundated land.²⁸

²³ EIS Vol. IA, pg. 4-63 and 4-64.

²⁴ Marion Organ, CEAR 1113 at pg. 4.

²⁵ Marion Organ, CEAR 1113 at pg. 3.

²⁶ Marion Organ, CEAR 1113 at pg. 5.

²⁷ EIS, Vol. IA, pg. 1-8.

²⁸ EIS, Vol. IA, pgs. 1-8 to 1-10.

15. Several interveners, including the Helios Centre, have suggested that the assessment should focus on the Muskrat Falls component of the Project and should consider the possibility that the Gull Island component will never be built.²⁹ However, the scope of the Project was determined by the Federal and Provincial Governments to include both Gull Island and Muskrat Falls³⁰ and that is the Project that the Panel has been struck to consider. Nalcor has requested approval for both the Muskrat Falls and Gull Island facilities because it fully intends to develop both. In addition, both are required to meet the purpose of the Project, which is to develop the hydroelectric potential of the lower Churchill River³¹ (among others: see below) in fulfillment of the Province's Energy Plan. Accordingly, this hypothetical scenario is not an alternative to the project and is not the Project which the Panel is required to assess.

(i) Project Need and Purpose

16. When a hydroelectric project on the lower Churchill River was first proposed in the 1970's, the federal government conducted a full Environmental Assessment & Review Process ("EARP") Panel Review, which was completed in 1980. This Panel concluded that such a project was needed, and that the project would contribute to the national policy objective of energy self-reliance, through development of an indigenous, renewable energy resource.³²

²⁹ Helios submission CEAR 683 at pg. 5.

³⁰ CEAR 106 at pg. 8.

³¹ Response to IR JRP.26S(g) at pg. 8.

³² Lower Churchill Project - Report of the Environmental Assessment Panel (Executive Summary), December 1980.

17. Since 1980, the price of fossil fuels has increased significantly and residents of Newfoundland and Labrador have increasingly relied on thermal sources of energy to meet their domestic demands. In addition, individuals and governments around the world have begun to realize the significance of global warming, the contributions that GHG emissions make to global warming, and the need to seek out energy sources that are less GHG-intensive.³³

18. The Government of Newfoundland and Labrador's current Energy Plan incorporates these realities and promotes the development of renewable energy resources in the Province. The Energy Plan was the subject of extensive public consultation, and its six key goals include the responsible development of renewable sources of energy; ensuring a secure, reliable and competitively-priced supply of energy for current and future needs of the Province; maximizing long-term export value from all surplus electricity supplies; and, re-investing oil and gas revenues for the future well-being of the Province's residents.³⁴ The Project has been labelled the "centerpiece" of the Energy Plan, as it was determined to represent the most attractive undeveloped hydroelectric project in North America.³⁵ Nalcor, as a Crown Corporation, has an obligation to take the steps necessary to fulfill the Province's policy direction.³⁶

19. Nalcor analyzed the need for and purpose of the Project, as well as alternatives to and alternative means of carrying out the Project in accordance with the Canadian

³³ EIS, Vol. IA, pg. 2-2.

³⁴ Government of Newfoundland and Labrador, "Focusing our Energy: Newfoundland and Labrador Energy Plan" (2007) online: <<http://www.nr.gov.nl.ca/nr/energy/plan/index.html>> at 4.

³⁵ CEAR 515 at pg. 2; Government of Newfoundland and Labrador, "Focusing our Energy: Newfoundland and Labrador Energy Plan" (2007) online: <<http://www.nr.gov.nl.ca/nr/energy/plan/index.html>> at 32.

³⁶ CEAR 1148 at pg. 2.

Environment Assessment Agency's ("CEA Agency's") Operational Policy Statement ("OPS") on Need, Purpose and Alternatives.³⁷ This OPS defines "need for" a project as "the problem or opportunity the project is intending to solve or satisfy". In contrast, the "purpose of" a project is "what is to be achieved by carrying out the project". The OPS states that the "need for" and "purpose of" a project should be established from the perspective of the project proponent and should provide the context for consideration of "alternatives to" the scoped project. Similarly, "alternatives to" a project are to be considered in relation to the project need and purpose and also from the Proponent's perspective.³⁸

20. This Project is needed to:
 - (a) address the future demand for electricity in Newfoundland and Labrador;
 - (b) develop the Province's hydroelectric resources for the benefit of Newfoundland and Labrador and its residents, in accordance with Provincial energy policy;
 - (c) secure a renewable future for the Province; and
 - (d) generate long-term revenues for the people of Newfoundland and Labrador.³⁹

21. The purpose of the Project is to develop the hydroelectric potential of the lower Churchill River. In achieving this purpose, the Project will generate long-term revenue for the Province, provide opportunities for future industrial activities that require large quantities

³⁷ CEAA Operational Policy Statement: Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act*.

³⁸ CEAR 1148 at pg. 2.

³⁹ Nalcor presentation on Need, Purpose and Alternatives, CEAR 669, at pg. 3.

of reliable and predictably priced power, reduce fossil fuel use and contribute to security of energy supply for the Province and for Canada.⁴⁰

22. The Project will also provide a competitive, long-term, clean, and reliable source of electricity to the Province, as well as a number of other regional markets within Eastern Canada and the north-eastern United States. Market demand is expected to be strong within the timeframe of the Project, and arises from the need to meet renewable requirements, to replace aging infrastructure and to meet load growth.⁴¹ For example, 14,000 MW of installed capacity in Newfoundland and Labrador, Nova Scotia, New Brunswick and Ontario is expected to be replaced by 2030.⁴²
23. The Province has forecasted that by 2015 existing energy capacity on the Island will not be sufficient to meet its reliability standards.⁴³ Into the future, demand for electric power in the province will increase further, even taking into consideration reasonable predictions for conservation and demand-side management. Nalcor evaluated various options for fulfilling this future need on the Island, and the Muskrat Falls component of the Project, together with the Transmission Link between Labrador and the Island, would cost the Province billions of dollars less than maintaining and expanding the existing isolated Island system.⁴⁴ This prediction assumed no cost for GHG emissions and no

⁴⁰ EIS, Vol. IA, pg. 2-1; Nalcor presentation on Need, Purpose and Alternatives, CEAR 669, at pg. 4.

⁴¹ Response to IR JRP.146 at pg. 3.

⁴² Nalcor presentation on General Session, CEAR 1168 at pg. 17.

⁴³ Gilbert Bennett, CEAR 793 at pg. 157.

⁴⁴ Gilbert Bennett, CEAR 776 at pg. 45.

restrictions on extending the life of the Holyrood Plant to the 2035 timeframe, both of which would enhance the economic competitiveness of the Project.⁴⁵

24. Furthermore, the Project is expected to enhance provincial income by a total of \$2.1 billion (\$2010) during the construction phase, with an additional \$20 million (\$2010) for each year of operations.⁴⁶ This reflects all incomes earned by workers and businesses living or operating anywhere in the Province that are employed directly or indirectly, or whose employment is induced by the Project.⁴⁷ Residents and businesses located in Labrador are expected to receive \$700 million (\$2010) of this \$2.1 billion (\$2010) in construction-related income.⁴⁸ In addition, Nalcor has estimated that the Project will result in approximately \$340 million (\$2010) in tax revenue to the Government of Newfoundland and Labrador during construction of the Project, with an additional \$1 billion in direct revenues each year after debt obligations have been satisfied.⁴⁹ Since the Project is likely to operate for generations, this government income represents considerable revenue that the Province will be able to spend on such areas as social services, health care, education, and infrastructure.⁵⁰

⁴⁵ CEAR 1148 at pg. 15.

⁴⁶ Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35.

⁴⁷ EIS Vol. III, pg. 3-10.

⁴⁸ CEAR 670 at pg. 5.

⁴⁹ Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35, CEAR 670 at pg. 13.

⁵⁰ Nalcor presentation on Need, Purpose and Alternatives, CEAR 669.

(ii) Alternatives to the Project

25. Several interveners in the hearing expressed concerns surrounding the lack of alternatives considered to the Project.⁵¹
26. Nalcor considered alternatives to the Project in accordance with the CEA Agency's OPS, which requires that any "alternative" must be capable of fulfilling the need and purpose identified for the Project. The OPS also confirms that the level of detail on alternatives should reflect the conceptual nature of the alternatives to the project at this stage of the process.⁵² In doing so, Nalcor considered environmental, technical and economic costs and benefits against the following general criteria: economic and technical feasibility, environmental considerations, social responsibility, government policy, and the mandate of Nalcor Energy to provide safe, reliable, least-cost power in an environmentally responsible manner.⁵³ Nalcor also based its consideration of alternatives on the requirement in subsection 3(b)(iii) of the *Electrical Power Control Act, 1994*⁵⁴ that power generation and transmission in the Province be developed in a manner that results in power being delivered to consumers at the lowest possible cost consistent with reliable service.
27. As required by the EIS Guidelines,⁵⁵ Nalcor considered the following alternatives to the Project:

⁵¹ For example, Sierra Club Atlantic submission CEAR 676; R. Goodfellow-Baikie submission CEAR 675.

⁵² CEAR 1148 at pg. 2.

⁵³ EIS Vol. IA, pg. 2-16.

⁵⁴ S.N.L. 1994, c. E-5.1.

⁵⁵ CEAR 98, s. 4.3.2.1.

- (a) management of electricity demand through utility-based energy efficiency and conservation initiatives;
- (b) alternative generation sources (e.g., hydrocarbons and wind);
- (c) run-of-river hydroelectric development;
- (d) combinations of alternative generation sources with hydroelectricity (e.g., hydro-wind);
- (e) the addition by the Proponent of more capacity at existing generation facilities;
- (f) utility-based energy efficiency; and
- (g) no Project.

28. After careful evaluation of each of these alternatives, Nalcor concluded that no technically and economically feasible alternative to the Project as proposed exists that can deliver over 3,000 MW of capacity and 16.7 TWh annually, could provide an attractive rate of return to the Province, and which fulfills the Energy Plan commitment to replace production from the Holyrood Thermal Generation Station (the “Holyrood Plant”).⁵⁶ Further, the Project represents the least cost alternative for meeting the energy demands of the Province, and is thus the only option available to Nalcor pursuant to subsection 3(b)(iii) of the *Electrical Power Control Act, 1994*.

29. Demand side management is already being pursued by Nalcor, in conjunction with Newfoundland Power, to provide incentives for residential and industrial energy

⁵⁶ EIS Vol. IA, pg. 2-22; CEAR 1148 at pg. 14. Note that nuclear energy is not a legal alternative pursuant to the *Electrical Power Control Act, 1994*, S.N.L. 1994, C. E-5.1, s. 3(f).

efficiency upgrades.⁵⁷ The Province has also created an agency that will specifically address the new policy direction from government with respect to demand side management, energy conservation and efficiency initiatives.⁵⁸

30. While conservation is and will remain an important part of Newfoundland and Labrador Hydro's planning and education efforts, Conservation Demand Management ("CDM") alone cannot result in savings that would negate the need for the Project. The Sierra Club Atlantic claimed during the hearings that CDM and smart grids could feasibly meet the need for the Project.⁵⁹ However, no evidence was presented to support these claims.⁶⁰
31. Nalcor commissioned an expert consultant to evaluate the merits of the Province's conservation and demand side management program.⁶¹ That report was provided to the Public Utilities Board ("PUB"), the regulator who is responsible for system planning activities in the Province. The report concluded that while energy demand in the Province is expected to increase by 29 percent from 2007 to 2027, CDM can achieve maximum savings of 12 percent over this same period.⁶²
32. It is difficult to predict with certainty how successful CDM will be in the Province in the future, since the experience of the customer base with CDM is limited and approaches to optimize customer response are still under development.⁶³ Based on the information

⁵⁷ Gilbert Bennett, CEAR 793 at pg. 135.

⁵⁸ Charles Bown, CEAR 776 at pg. 314.

⁵⁹ Bruno Marcocchio, CEAR 793 at pgs. 87, 89, 99, 101, 103 and 107.

⁶⁰ Bruno Marcocchio, CEAR 793 at pgs. 123 and 124.

⁶¹ CEAR 795.

⁶² EIS Vol. IA, pgs. 2-16 and 2-17.

⁶³ CEAR 1148 at pg. 21.

presently available, however, Nalcor believes that the potential for CDM to reduce energy demand in Newfoundland and Labrador is marginal, and certainly would be insufficient to offset production from the Holyrood Plant.⁶⁴ Therefore, CDM will not be able to meet the need for the Project.

33. Nevertheless, CDM will be pursued and the provincial CDM budget will continue to increase.⁶⁵ In the event that CDM programs are more successful than currently anticipated, Nalcor will be able to sell even more power from the Project to export markets than planned, thus further enhancing the economics of the Project.⁶⁶
34. Several alternate generation sources were considered as alternatives to the Project. In 2001, Nalcor's predecessor reviewed a number of potential renewable sources of energy: wind, solar, thermal, photovoltaic, biomass, fuel cells and micro turbines. However, none of these technologies were found to be technically or economically feasible nor capable of producing the quantity of power to be produced by the Project, nor were they capable of even meeting domestic energy demands.⁶⁷
35. Nalcor acknowledges that wind, in particular, is a resource that has potential in Newfoundland and Labrador and that energy source has attracted considerable attention during the hearings.⁶⁸ Nalcor and the Province have spent considerable time and effort studying the potential for wind in the Province and the extent to which wind can be

⁶⁴ CEAR 1148 at pg. 22.

⁶⁵ CEAR 1148 at pg. 22.

⁶⁶ Gilbert Bennett, CEAR 793 at pg. 182.

⁶⁷ EIS Vol. IA, pg. 2-19.

⁶⁸ For example, Philip Raphals, CEAR 776 at pg. 136.

integrated into the Province's energy supply mix.⁶⁹ However, wind is an intermittent resource that cannot be relied upon to provide power when it is needed. So long as there are firm sources of power for back up, such as imports through an interconnected system or hydroelectric facilities with sufficient storage capability, wind can make a contribution to energy supply. In Newfoundland and Labrador at present, however, there are not sufficient sources of firm power to allow any large-scale investments in wind. The Province has determined that it cannot take on any more wind power on the Island until such time as it is connected to a grid that will enable the full benefit of that wind power.⁷⁰

36. For that reason, the Project would actually enable a future expansion of wind capacity in the Province.⁷¹ Jean Francois Nolet, Atlantic and Quebec Policy Manager for the Canadian Wind Association, has stated that:

Wind power and hydro are the best couple; they go hand in hand. Wind is the perfect complement to hydro. Wind cannot replace hydro, however.⁷²

Nalcor has placed a high priority on plans to expand wind generation in the Province as a complement to more reliable and dispatchable sources of power.⁷³ However, these developments will not be pursued unless and until the Province has access to a larger load base that is more tolerable of the variability of wind generation. Therefore, while these wind developments do not constitute viable alternatives to the Project, their likelihood of

⁶⁹ Gilbert Bennett, CEAR 793 at pg. 64.

⁷⁰ Charles Bown, CEAR 776 at pg. 292.

⁷¹ Gilbert Bennett, CEAR 776 at pg. 20; Charles Bown, CEAR 776 at pg. 266.

⁷² Gilbert Bennett, CEAR 776 at pg. 21.

⁷³ EIS Vol. IA, pgs. 2-18 and 2-19.

being developed are greatly enhanced by the Project and wind capacity in the Province will be expanded in the future once the Project is commenced.⁷⁴

37. Alternative hydroelectric developments on the Island were raised as another potentially viable alternative to the Project.⁷⁵ The Newfoundland and Labrador Department of Natural Resources, however, explained that of all of the hydroelectric potential that has been identified on the Island, only two potential projects have progressed through basic screening processes and these projects amount to a total of approximately 40 to 45 megawatts of capacity.⁷⁶ This additional capacity will not allow the Province to meet its projected future demands, and will thus require continued dependence on the Holyrood Plant. In addition, these small-scale hydroelectric developments would not involve storage to enable them to respond to fluctuations in energy demand. Therefore, like wind, the successful integration of these developments into the provincial energy grid is conditional upon interconnection to a larger grid and/or additional storage capability, neither of which currently exists on the Island. Firm capacity must also be available to make up for shortfalls from these non-dispatchable sources.⁷⁷
38. Tidal power was another form of alternative generation that was raised during the hearing. The economic and technical feasibility of tidal power, however, are both unproven and the environmental effects of large-scale deployment are unknown.⁷⁸

⁷⁴ Charles Bown, CEAR 776 at pg. 266.

⁷⁵ Roberta Benefiel, CEAR 776 at pg. 321.

⁷⁶ For example, Roberta Benefiel, CEAR 776 at pg. 317.

⁷⁷ CEAR 1148 at pg. 23.

⁷⁸ CEAR 1148 at pg. 28.

Further, this energy source does not have the potential to generate the quantities of power associated with the Project.⁷⁹

39. The final type of alternative generation that was suggested during the hearing was natural gas from offshore developments. This alternative is purely hypothetical, as the current offshore operators have looked into the technical and economic feasibility of transporting and marketing their natural gas reserves and none have identified a viable business case.⁸⁰ The Newfoundland and Labrador Oil and Gas Industries Association similarly concluded that a natural gas industry on the Island will not exist for the foreseeable future and does not have the potential to meet the need for or the purpose of the Project.⁸¹
40. To summarize, Nalcor found that the cost of small-scale alternative generation would be more than double the cost of the Muskrat Falls component of the Project.⁸² In addition, large-scale integration of these sources is not technically feasible because of the limited storage and intertie available from Newfoundland to other markets. These factors, combined with the substantial cost of transmission upgrades that would become necessary and the operating complexity of knitting such a web of options together, preclude small-scale generation from being a viable alternative to the Project, or even to meeting the domestic energy demands of the Province.⁸³
41. The third suggested alternative to the Project, a run-of-river hydroelectric development on the lower Churchill River, is not technically or economically feasible. Run-of-river

⁷⁹ CEAR 1148 at pg. 28.

⁸⁰ Gilbert Bennett, CEAR 1178 at pg. 97.

⁸¹ Robert Cadigan, CEAR 1178 at pg. 131.

⁸² CEAR 1148 at pg. 34.

⁸³ CEAR 1148 at pg. 34.

development, without a large reservoir, would be unable to control frazil ice and is thus technically deficient. In addition, the lack of flow regulation would decrease the generation flexibility of the plant that is necessary to meet the demand patterns of consumers and ensure reliable service. This lack of flexibility would also reduce the ability of any run-of-river development to displace existing generation technologies that have such flexibility.⁸⁴

42. Nalcor has investigated the generation potential from combining generation sources, but at present combining alternative energy sources is not an attractive alternative to the Project. In fact, Newfoundland and Labrador Hydro recently assessed combined generation alternatives in the event that the Project is not approved.⁸⁵ In this process, Newfoundland and Labrador Hydro incorporated potential hydroelectric, wind and other developments on the Island, and combined them with refurbishment and expansion of the Holyrood Plant which would be required to meet future demands in the absence of the Project. The resulting scenario would cost \$2.2 billion more than the Project plus the Transmission Link, and would result in a less reliable and more GHG-intensive electricity system than with the Project.⁸⁶ Since Newfoundland and Labrador Hydro's mandate is to provide reliable power to all customers in the Province at the least cost with reliable services, this combination of generation sources was determined to be an inferior alternative to the Project.

43. Nalcor also considered all major existing power generation facilities in the province to determine whether capacity could be increased. All existing hydroelectric facilities were

⁸⁴ EIS Vol. IA, pg. 2-20.

⁸⁵ Newfoundland and Labrador Hydro, "Generation Planning Issues: 2010 July Update", CEAR 773.

⁸⁶ Gilbert Bennett, CEAR 793 at pg. 168; EIS Vol. IA, pg. 2-22.

determined to be optimized already. In addition, adding capacity through additional use of expensive and high carbon emission sources such as the heavy fuel oil used at the Holyrood Plant is contrary to the Province's Energy Policy. It is the intent of the Project to enable replacement of the thermal generation from the Holyrood Plant with hydroelectric power, thereby greatly reducing GHG emissions within the Province. As such, Nalcor found that adding generation capacity at existing generation facilities was either not economically or technically feasible, as in the case of existing hydroelectric facilities, or was contrary to government policy, as in the case of existing fossil fuel-based facilities such as the Holyrood Plant.⁸⁷

44. In addition, Nalcor considered opportunities to increase the efficiencies at existing generation facilities. For some existing hydroelectric facilities, Nalcor found that it could increase power output by one to two percent by replacing the turbines, stator rings and wicket gates with newer equipment. This increased efficiency would amount to additional production capacity of up to 30 MW. With the exception of these small gains, Nalcor found no remaining energy efficiencies that could be realized and that would offer feasible alternatives to the Project that are technically and economically feasible, even in combination with a variety of other options.⁸⁸

45. Finally, not proceeding with the Project would mean that the projected energy needs of the Province's residents, municipalities and industries would be met through more costly and GHG-intensive alternatives. As outlined above, Newfoundland and Labrador Hydro has developed a strategy to meet future domestic demands in the event that the Project is

⁸⁷ EIS Vol. IA, pgs. 2-20 and 2-21.

⁸⁸ EIS Vol. IA, pg. 2-21.

not approved. This scenario requires, with certainty, the continued use of the Holyrood Plant, which would require an investment of \$600 to \$800 million for scrubbers and precipitators. Even with these scrubbers and precipitators, there are considerable environmental effects associated with maintaining energy generation at the Holyrood Plant.⁸⁹ In addition, this “no Project” alternative would be billions of dollars more expensive over the long term, costs that would be borne by all Newfoundland and Labrador ratepayers, and more GHG-intensive than the Project. The No Project alternative would also mean the loss of an important economic opportunity for the Province, and the loss of an opportunity for the Province and the Atlantic Canada region to reduce GHG emissions from current sources of power with a new source of clean renewable power.⁹⁰ This alternative meets neither the purpose nor the need for the Project and leaves Newfoundland and Labrador in a much worse position in the future.

46. The Helios Centre suggested several possible alternatives to the Project, such as converting oil facilities to natural gas and integrating the existing Holyrood Plant with new wind generation.⁹¹ However, the Helios Centre’s representative, Mr. Raphals, conceded that he is largely unfamiliar with the electricity system in Newfoundland and Labrador.⁹² The Helios Centre also presented no evidence to suggest the feasibility of these options for meeting future energy demand in the Province. In addition to fully understanding how the electrical system in NL works, Nalcor has also spent considerable time and effort evaluating generation options in the Province and has fully assessed all

⁸⁹ Gary Goobie, CEAR 1208 at pg. 32; Tracy Walzthoni, CEAR 1208 at pg. 235.

⁹⁰ EIS Vol. IA, pg. 2-22.

⁹¹ Philip Raphals, CEAR 776 at pg. 136.

⁹² Philip Raphals, CEAR 776 at pg. 128.

potential alternatives to the Project. Nalcor submits that no evidence has been submitted to suggest that it has overlooked any possible alternatives to this Project or that any of the alternatives to the Project that were suggested during the hearing are supported by an assessment of the Newfoundland and Labrador electrical system and how it operates.⁹³

47. In summary, the Project is the only option for Nalcor to meet the identified needs and purpose and also comply with the *Electrical Power Control Act, 1994*. It will satisfy forecasted growth in electricity demand on the Island at far less cost and with far more reliability than maintaining the existing isolated grid. It will allow the Province to invest revenues from non-renewable resources into long-term renewable resources. It will provide the Province with significant long-term revenues, in addition to other economy-wide benefits, it will develop this valuable asset for the benefit of the Province, and finally, it will accomplish all of this with a relatively small environmental footprint.⁹⁴

(iii) Alternative Means of Carrying out the Project

48. Nalcor also considered alternative means of carrying out the Project. Alternative means were considered for the following aspects of the Project:
- (a) the design and siting of typical components of a hydroelectric generation facility;
 - (b) approach to reservoir preparation;
 - (c) transmission line route selection;
 - (d) facility layout and siting;

⁹³ CEAR 1148 at pg. 26.

⁹⁴ Gilbert Bennett, CEAR 776 at pg. 11.

- (e) generation facility optimization;
- (f) construction sequence;
- (g) construction labour force accommodation; and
- (h) reservoir management during operation and maintenance.⁹⁵

49. Each of these alternative means were compared on the basis of environmental effects, safety, capital and operating cost, reliability, energy efficiency, constructability and schedule for construction.⁹⁶ Consultation with Aboriginal stakeholders also allowed alternative means to be considered that would reduce Project effects on sites with cultural and spiritual importance. For example, the spiritual importance of the knoll at Muskrat Falls led to a careful examination of alternatives that could minimize or reduce disturbance to the site, and led to a modification of Project design to avoid drilling tunnels through the rock knoll.⁹⁷ The Project as proposed incorporates all of the preferred alternative means of constructing and operating the Project.

III. The Legal Framework for the Review

(i) *Scope*

(a) Background of the Joint Review Panel Process

50. It is important to review the legal framework under which this Panel is operating, including its roles and responsibilities and the specific requirements of a CEAA review.

⁹⁵ EIS Vol. IA, pgs. 3-15 to 3-16.

⁹⁶ EIS Vol. IA, pg. 3-16.

⁹⁷ EIS Vol. IA, pg. 3-10.

51. Nalcor's Project is subject to both federal and provincial review. A federal environmental assessment is required pursuant to section 5 of the *Canadian Environmental Assessment Act*,⁹⁸ since the Project will require approvals from the Department of Fisheries and Oceans ("DFO") under the *Fisheries Act*,⁹⁹ as well as from Transport Canada under the *Navigable Waters Protection Act*.¹⁰⁰ A provincial environmental assessment is also required under Part X of the NLEPA and subsections 34(1)(a) and 34(1)(d) of the *Environmental Assessment Regulations*.¹⁰¹
52. The federal and provincial governments jointly issued Final Guidelines for the Preparation of the EIS ("EIS Guidelines") on July 15, 2008.¹⁰² These Guidelines provide a framework for the gathering of information necessary for both the provincial and federal environmental assessment processes.
53. On January 8, 2009, the Agreement for the Establishment of a Joint Review Panel for the Environmental Assessment of the Lower Churchill Hydroelectric Generation Project (the "JRP Agreement") was concluded between the federal and provincial governments.¹⁰³ This Agreement created a process for determining whether or not Nalcor has satisfied the EIS Guidelines to the satisfaction of both levels of government. The JRP process was explicitly intended to satisfy both the federal and the provincial environmental

⁹⁸ S.C. 1992, c.37.

⁹⁹ R.S.C. 1985, c. F-14, s. 35(2)

¹⁰⁰ R.S.C. 1985, c.N-22, s. 5.

¹⁰¹ Nfld. Reg. 54/03.

¹⁰² CEAR 98.

¹⁰³ CEAR 106.

assessment requirements through a single, effective and efficient environmental assessment process.¹⁰⁴

54. The JRP Agreement and the Terms of Reference appended to it set out the entire mandate and authority of the Panel, its composition and Project review guidelines. The Panel has no mandate outside of the JRP Agreement. It is important to note that the Panel has jurisdiction to consider the need for the Project, the environmental effects of the Project, mitigation that can be done to minimize environmental effects of the Project and monitoring programs that can be undertaken to verify Project effects predictions. While certain discussions during the hearings have been important in understanding the broader context for the Project, the Panel has neither the mandate or authority to evaluate the Province's energy policy, for example, or any other policy of an entity other than Nalcor as it relates to a review of the Project.
55. In preparing the EIS, Nalcor fulfilled the EIS Guidelines by preparing a document based on a robust set of data gathered and analyzed over more than 30 years, and employed the professional judgment and experience of numerous leading experts in their respective fields. All of this work resulted in an EIS in which there is a high degree of confidence and certainty in the EIS predictions, despite assertions to the contrary.
56. After the EIS was submitted in February 2009, Nalcor responded to five rounds of information requests ("IRs") in the 23 months that followed. On January 14, 2011, the Panel determined that the EIS and supporting documentation provided by Nalcor were sufficient to proceed to the public hearing phase and issued the notice of hearing.¹⁰⁵

¹⁰⁴ CEAR 106, pg. 1.

¹⁰⁵ CEAR 554.

57. Once the public hearings for the Project are concluded, the Panel must submit a report to the federal Minister of Environment and the provincial Minister of Environment and Conservation (the “Report”) setting out its rationale, conclusions and recommendations with respect to the significance of the environmental effects of the Project, as well as the mitigation of those effects and follow-up programs. Aboriginal groups will be provided with an opportunity to discuss any concerns about the Report with government, after which time the federal and provincial governments must decide whether or not the Project should be allowed to proceed.

(b) Purpose of Environmental Assessments

58. Environmental assessment is just the first formal step towards project approval and is to ensure appropriate environmental matters are considered early in the planning stage to both protect the environment and to avoid the waste of resources. Section 11 of the CEAA provides that where a federal authority requires an environmental assessment of a project, that federal authority “shall ensure that the environmental assessment is to be conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are made...” [Emphasis added.]

59. Therefore, the early conduct of an environmental assessment is statutorily mandated, which means that some detailed Project information may not be available in the EIS.

60. One of the reasons for conducting an environmental assessment early in the planning process is so that the environmental assessment can influence design decisions, execution plans, mitigation and monitoring. It is well accepted in Canadian jurisprudence that environmental assessment is a planning tool, used to help achieve the goal of sustainable development by providing an effective means of integrating environmental factors into

planning and decision-making processes early in the planning stages of projects.¹⁰⁶ An environmental assessment is intended to make reasonable predictions about what is *likely* to occur not what is speculative. It does not, and cannot, be expected to predict all effects with certainty or finality. This was confirmed by the Federal Court of Appeal in *Alberta Wilderness Association v. Express Pipelines Ltd.* when it held that, “[n]o information about the probable future effects of a project can ever be complete or exclude all possible future outcomes”.¹⁰⁷

(ii) *The Panel’s Role under the CEAA*

61. Under the CEAA and the JRP Agreement, this Panel must conduct an environmental assessment of the Project by collecting and considering the evidence it considers is necessary to make its recommendations and comply with the Terms of Reference attached to the JRP Agreement. The JRP Agreement governs this review.
62. Under the JRP Agreement, the Panel must consider the following:
 - (a) Purpose of the Project/Undertaking;
 - (b) Need for the Project/Undertaking;
 - (c) Rationale for the Project/Undertaking;
 - (d) Alternative means of carrying out the Project/Undertaking that are technically and economically feasible and the environmental effects of any such alternative means;

¹⁰⁶ *Bow Valley Naturalist Society v. Canada (Minister of Canadian Heritage)*, [2001] 2 F.C. 461 (C.A.) at para. 17.

¹⁰⁷ [1996] F.C.J. No. 1016 (Fed. C.A.) at para. 10.

- (e) Alternatives to the Project/Undertaking;
- (f) Extent to which biological diversity is affected by the Project/Undertaking;
- (g) Description of the present environment which may reasonably be expected to be affected, directly or indirectly, by the Project/Undertaking, including adequate baseline characterisation;
- (h) Description of the likely future condition of the environment within the expected life span of the Project/Undertaking if the Project/Undertaking was not approved;
- (i) Environmental Effects of the Project/Undertaking, including the Environmental Effects of malfunctions, accidents or unplanned events that may occur in connection with the Project/Undertaking;
- (j) Any cumulative Environmental Effects that are likely to result from the Project/Undertaking in combination with other projects or activities that have been or will be carried out;
- (k) The significance of the Environmental Effects as described in items (i) and (j);
- (l) Mitigation measures that are technically and economically feasible and that would mitigate any significant adverse Environmental Effects of the Project/Undertaking, including the interaction of these measures with existing management plans;
- (m) Proposals for environmental compliance monitoring;
- (n) Measures to enhance any beneficial Environmental Effects;

- (o) Need for and requirements of any follow-up program in respect of the Project/Undertaking;
- (p) Capacity of renewable resources that are likely to be significantly affected by the Project/Undertaking to meet the needs of the present and those of the future;
- (q) Extent of application of the precautionary principle to the Project/Undertaking;
- (r) Comments received from Aboriginal persons or groups, the public and interested parties by the Panel during the EA;
- (s) Factors related to climate change including greenhouse gas emissions; and
- (t) Proposed public information program.¹⁰⁸

63. The basic test that the Panel must consider under the CEAA is whether this Project is likely to cause significant adverse environmental effects after taking into consideration the mitigation measures proposed by Nalcor. However, significance is not defined in the CEAA and the Panel must rely on guidance from the CEA Agency and the courts in making such a determination.

64. Environmental effects are defined in the CEAA to include only those effects caused by the Project on the physical environment, as well as socio-economic effects that are a result of biophysical effects.¹⁰⁹ The same definition is used in the JRP Agreement.¹¹⁰ As a result, the Panel must ensure that in its review it differentiates between matters related to the Project and matters not related to the Project.

¹⁰⁸ CEAR 106, pg. 9.

¹⁰⁹ *Canadian Environmental Assessment Act*, S.C. 1992, c.37, s. 2(1).

¹¹⁰ CEAR 106, pg. 3.

65. The CEA Agency and the courts have developed a process to systematically determine whether there are likely to be any significant adverse environmental effects of a project:
- (a) First: The Panel must ask whether there is an effect (which is defined in the CEAA as a “change” in the environment) on the environment caused by the Project. Negligible residual environmental effects are those that are predicted to result in no measurable or detectable change in the environment. If there is no effect, the analysis stops there.
 - (b) Second: If there is an effect on the environment caused by the Project, the Panel must ask whether the effect would be adverse. If the effect is not adverse, the analysis stops there, but the Panel can consider potential beneficial effects in respect of an overall contribution to sustainability (for example the generation of data to better manage wildlife conservation).¹¹¹
 - (c) Third: If there is an adverse effect on the environment caused by the Project, the Panel must then ask whether that effect is significant after taking mitigation measures into consideration. The CEAA is clear that this mitigation includes not only that which is proposed by the Proponent but mitigation that will be undertaken by regulators and government agencies as well.¹¹² Significance is determined based on the magnitude of the effect, its geographic extent, its duration or frequency, the extent to which the effect is reversible or irreversible,

¹¹¹ CEA Agency Reference Guide: *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Section 4.1.

¹¹² CEAA, s. 37(2.1).

and the existing ecological context.¹¹³ If the adverse effect is not significant, then that effect is only considered in terms of cumulative effects.

- (d) Fourth: Finally, if the Panel has determined there is a significant, adverse, environmental effect after taking into consideration mitigation measures, the Panel must consider whether, based on the evidence before it, the significant adverse environmental effect is “likely” to occur. For example, a dam break might be significant but it is very unlikely. One must remember that mitigation and adaptive management measures are important here, because they may render a potentially significant adverse environmental effect “not likely” to occur.¹¹⁴ As the Federal Court of Appeal stated in *Alberta Wilderness Association v. Express Pipelines Ltd.*, there can be no purpose in considering purely hypothetical environmental effects when it is known and proposed that such effects can and will be mitigated by appropriate measures.¹¹⁵ The Panel, when considering the claims and assertions by the interveners of the risk of significant environmental effects, must look at whether those claims are founded on real and critically tested evidence and whether those effects are likely to occur.

66. In order for there to be a “likely significant adverse environmental effect” the answer to all four parts of this test must be “yes” – it is a conjunctive test.

¹¹³ CEA Agency Reference Guide: *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Section 4.2.

¹¹⁴ CEA Agency Reference Guide: *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Section 3; *Bow Valley Naturalists Society v. Canada (Minister of Canadian Heritage)*, [2001] 2 F.C. 461 (C.A.) at para. 49.

¹¹⁵ (1996), 137 D.L.R. (4th) 177 at para. 13.

67. This process for determining the significance of potential project effects was confirmed by Linden J. in *Bow Valley Naturalists Society v. Canada (Minister of Canadian Heritage)*:

The [CEA Agency's 1994 Reference] Guide suggests that the evaluation consists of three determinations. First, the responsible authority must determine whether or not the environmental effects are adverse. Second, it must decide whether or not they are significant. In deciding whether or not the effects are significant, the Agency's [1994 Reference Guide] suggests that the following factors be taken into consideration: magnitude of the adverse environmental effects; geographic extent of the adverse environmental effects; duration and frequency of the effects; degree to which the adverse environmental effects are reversible or irreversible; and ecological context. The Reference Guide also suggests that the adverse environmental effects may be significant if they occur in areas or regions which have already been adversely affected by human activities; and/or are ecologically fragile and have little resilience to imposed stresses. Third, it must be decided whether these significant effects are likely to occur.¹¹⁶

68. This guidance provides a framework for determining significance of a project's potential environmental effects.
69. When assessing the significance of a likely and adverse effect, based on the above criteria, the Panel must consider significance in the context of both the Project's potential benefits and the larger ecosystem and socio-economic perspective. In its Final Report, the Joint Review Panel for the Mackenzie Gas Project stated that:

There may well be impacts on regions or communities that would be significant to those regions or communities but which the Panel, in its collective judgment, has concluded are not significant in the context of its overall Mandate. There may well be impacts on individuals that, from an individual perspective, would be significant but which, again, the Panel might conclude would not be significant in the broader context.¹¹⁷

70. Therefore, in considering which Project adverse effects may be significant, the Panel must always weigh that decision in the terms of the larger Project and whether a local or

¹¹⁶ [2001] 2 F.C. 461 (C.A.) at paragraph 49.

¹¹⁷ Final Report of the Joint Review Panel for the Mackenzie Gas Project, at pg. 102.

limited effect is in fact significant in the broader context of the long term benefits of the Project.

71. The idea that there are degrees of importance which must be considered when determining significance under the CEAA has been acknowledged by Canadian courts. In *Alberta Wilderness Association v. Express Pipelines Ltd.*, the Federal Court of Appeal stated:

[T]he principal criterion set out by the [CEAA] is the “significance” of the environmental effects of the project: that is not a fixed or wholly objective standard and contains a large measure of opinion and judgment. Reasonable people can and do disagree about the adequacy and completeness of evidence which forecasts future results and about the significance of such results without thereby raising questions of law.¹¹⁸ [Emphasis added.]

72. Ultimately, the Panel must ask itself whether any likely adverse environmental effects are significant in relation to both the size and scope of the Project, and the size and scope of the environment in which the Project will be carried out.
73. In addition, the Panel must be aware that a significance determination under the CEAA does not require absolute certainty with respect to the potential effects of the Project. By their nature, environmental assessments will never achieve finality or certainty because they are performed early in project planning and are designed to be predictive. This was confirmed by the Federal Court of Appeal in *Alberta Wilderness Association v. Express Pipelines Ltd.* (also see the citation immediately above at Paragraph 71):

No information about the probable future effects of a project can ever be complete or exclude all possible future outcomes.¹¹⁹

74. In that case, the Court confirmed the Final Report of the Joint Review Panel for the Express Pipeline Project which had concluded the project in question was not likely to

¹¹⁸ (1996), 137 D.L.R. (4th) 177 at para. 10.

¹¹⁹ [1996] F.C.J. No. 1016 (Fed. C.A.) at para. 10.

result in significant adverse environmental effects, despite the fact that additional baseline studies were required,¹²⁰ several proposed mitigation strategies were unproven,¹²¹ several proposed mitigation and follow-up programs were not yet finalized and lacked detail,¹²² and that there was potential for unanticipated environmental effects of the project.¹²³

75. Similarly, the CEA Agency states in its OPS on adaptive management that:

Due to factors such as the complexities of ecosystems and difficulties predicting details of future development, all [environmental assessments] involve some level of uncertainty regarding the identification of environmental effects, the assessment of their significance and the effectiveness of mitigation measures. The [Canadian Environmental Assessment] Act implicitly recognizes uncertainty by requiring a follow-up program for all projects that undergo an assessment by comprehensive study or a review panel.¹²⁴

76. The same conclusion was reached in *Pembina Institute for Appropriate Development v. Canada (Attorney General)*, whereby Tremblay-Lamer J. clarified that a Joint Review Panel's recommendations will not necessarily be flawed simply because insufficient evidence is available to eliminate all uncertainty. Tremblay-Lamer J. held that it would be impossible to conduct an environmental assessment in the planning stages of a project if a Joint Review Panel were required to eliminate all uncertainty or if it were precluded from commenting on follow-up measures.¹²⁵ Similarly, the Joint Review Panel for the

¹²⁰ Final Report of the Joint Review Panel for the Express Pipelines Project (May 1996) online: <http://www.ceaa.gc.ca/DFBF51A8-EE56-4CE8-9F41-FB2E95B7E7AD/report_e.pdf> at 72.

¹²¹ Final Report of the Joint Review Panel for the Express Pipelines Project (May 1996) online: <http://www.ceaa.gc.ca/DFBF51A8-EE56-4CE8-9F41-FB2E95B7E7AD/report_e.pdf> at 43.

¹²² Final Report of the Joint Review Panel for the Express Pipelines Project (May 1996) online: <http://www.ceaa.gc.ca/DFBF51A8-EE56-4CE8-9F41-FB2E95B7E7AD/report_e.pdf> at 45 and 116.

¹²³ Final Report of the Joint Review Panel for the Express Pipelines Project (May 1996) online: <http://www.ceaa.gc.ca/DFBF51A8-EE56-4CE8-9F41-FB2E95B7E7AD/report_e.pdf> at 73.

¹²⁴ CEA Agency, *Operational Policy Statement: Adaptive Management Measures under the Canadian Environmental Assessment Act* (March 2009) online: <<http://www.ceaa.gc.ca/default.asp?lang=En&n=50139251-1>> at 2.

¹²⁵ *Pembina Institute for Appropriate Development v. Canada (Attorney General)*, 2008 FC 302 (T.D.) at para. 32.

Voisey's Bay Project recognized that in most cases, uncertainties about a project are not unreasonable at the environmental assessment stage of project planning and design, especially if they relate to future information that can only be obtained if the proponent were able to proceed with advanced project planning.¹²⁶

77. Therefore, uncertainty is expected in the environmental assessment phase of projects and this should not in and of itself prevent the Panel from determining that the Project is not likely to result in significant adverse environmental effects. Nalcor submits that its baseline studies for this Project are more than sufficient for the purposes of determining the potential significance of the Project's effects. In fact, the breadth of baseline studies for this Project are unprecedented for environmental assessment in the region, given the long history of planning for hydroelectric developments in the lower Churchill River.¹²⁷ When this Panel considers Nalcor's evidence in light of the framework outlined above, the evidence submitted by Nalcor supports the conclusion that the Project is not likely to cause any significant adverse environmental effects.

(iii) Panel's Role (provincial)

78. In addition to the requirements under the CEAA, the Panel is required to satisfy the requirements of the NLEPA and the *Environmental Assessment Regulations*. Sections 64 to 66 of the NLEPA require the Panel to submit a report to the provincial Minister of the Environment and Conservation summarizing the issues raised during the environmental assessment process and containing the Panel's recommendations relating to the Project, including any mitigation measures and follow-up programs.

¹²⁶ CEAA-NEEA Joint Review Panel, *Voisey's Bay Mine and Mill Environmental Panel Report*, (1999) at s.17.2

¹²⁷ Perry Trimper, CEAR 923 at pg. 10; Colleen Leeder, CEAR 1086 at pg. 8.

79. In making such recommendations, the Panel is guided by section 46 of the NLEPA, which sets out the purpose of the provincial environmental assessment requirements, namely to:
- (a) Protect the environment and quality of life of the people of the province; and
 - (b) Facilitate the wise management of the natural resources of the province.
80. This Project is rare for resource development projects in that it will protect part of the environment by displacing GHG's from other carbon based generating facilities.¹²⁸ Furthermore, the potential environmental effects of the Project have been thoroughly assessed and the evidence supports the view that those effects can be managed to protect the environment.
81. The quality of life of the people of the Province will not only be protected but will be improved by the Project, both through direct income and through increased government services that will be funded by revenues from the Project and the services it will fund. This Project represents a significant long-term economic opportunity for Newfoundland and Labrador that will provide benefits for many generations to come.
82. Finally, this Project epitomizes wise management of the Province's natural resources. The Province's 2007 Energy Plan formulated the need to develop renewable resources in the Province and specifically the hydroelectric potential of the lower Churchill River. This Project will involve re-investing revenues from non-renewable energy sources in the Province such as offshore oil and gas into long-term renewable energy generation. Developing the Project will not only allow the province to replace existing non-

¹²⁸ Response to IR JRP.85(d) at pg. 5.

renewable power generation facilities with renewables, but will also provide the provincial government with substantial income that it can use to further improve the wellbeing of all residents of Newfoundland and Labrador.

83. Without the Project, the projected energy needs of the Province's residents, municipalities and industries would be met through more costly and GHG-intensive alternatives. Labrador in particular would not be able to attract as much future development, and this would prevent a diversification of the region's economy. In addition, the Province would lose a tremendous opportunity to generate prosperity for present and future generations and to create long-term revenue with which to fund social programs across the Province. The development of this long term renewable source of energy – and revenue – is consistent with the “wise management of the Provinces resources”.
84. Nalcor submits the evidence supports a conclusion that the Project is not likely to result in any significant adverse environmental effects, based on the test under the CEAA, and a recommendation by the Panel that this Project should be allowed to proceed under the NLEPA.

C. CONSULTATION

85. Seeking public and stakeholder input is a core principle of Nalcor's management approach and is a requisite component of both the CEAA and NLEPA environmental assessment processes under the EIS Guidelines.
86. Nalcor's predecessor initiated a public consultation program for this Project more than five years ago in November 2005 in a meeting in Happy Valley-Goose Bay between the

Premier of Newfoundland and Labrador, government and Nalcor officials, and members of the public.¹²⁹ In that meeting, Nalcor's predecessor made clear that public consultation was to be an important component of the Project planning process and committed to ongoing, continuous, and meaningful consultation with the people of Labrador regarding this Project.¹³⁰

87. Since then, Nalcor has ensured that all stakeholders, including members of the public, have received up-to-date information on the Project and have had opportunities to respond and provide input into Project planning.
88. Nalcor has responded to issues and concerns through a collaborative and consultative process.¹³¹

(i) Public

89. Consultation with the general public has been done through open houses in several communities, numerous technical workshops, direct meetings with specific stakeholder groups, and meetings with educators and educational agencies, as well as through maintaining a public website, sending out electronic news notifications and project newsletters, establishing a community information centre in Happy Valley-Goose Bay, distributing posters and information sheets on major Project issues, and making public advertisements and speeches about the Project.¹³² There has been no lack of consultation.

¹²⁹ EIS, Vol. IA, pg. 7-5.

¹³⁰ EIS, Vol. IA, pg. 7-5.

¹³¹ EIS Vol. IA, pg. 7-8.

¹³² EIS Vol. IA, pgs. 7-2 to 7-8.

90. Issues that were raised by the public during the public consultation process were diligently recorded and were presented in the EIS.¹³³ These issues directed Nalcor's Project-planning efforts and wherever possible, these issues were resolved.
91. Nalcor's consultation efforts to inform the public about the Project and gather public feedback is ongoing and will continue throughout the life of the Project.

(ii) *Aboriginal Groups, Communities and Organizations*

92. Several Aboriginal groups made submissions during the hearings in relation to their Aboriginal rights and title.¹³⁴ It is important to clarify the purpose of the environmental assessment and the JRP process in relation to Aboriginal rights and title, as well as where this process fits into the broader Crown duty to consult with Aboriginal groups.
93. In *Haida Nation v. British Columbia (Minister of Forests)*, the Supreme Court of Canada found that the honour of the Crown may require it to consult, and where appropriate, accommodate Aboriginal rights in the context of an unresolved land claim.¹³⁵ This duty may be triggered where the Crown is being asked to issue regulatory and environmental approvals for a resource project, in which case the Crown may be required to consult with Aboriginal peoples prior to making its decision.
94. Aboriginal rights fall along a spectrum with respect to their degree of connection with their land. At one end of the spectrum are practices, customs and traditions that are integral to the distinctive Aboriginal culture of the group claiming the right, such as

¹³³ EIS Vol. IA, table 7-4, pg. 7-8 to 7-9.

¹³⁴ For example, Innu Nation, CEAR 706 at pg. 98; NunatuKavut, CEAR 707 at pg. 3; Nunatsiavut Government, CEAR 730 at pg. 147.

¹³⁵ 2004 SCC 73 at para. 25.

religious ceremonies, language and dialect. “Site specific” rights that are dependent on the use of the land, such as harvesting, fishing and trapping, are somewhere in the middle. Aboriginal title, being an indefeasible-like interest in land, is at the other end of the spectrum. The scope of the Crown’s consultation obligation is proportionate to the strength of the asserted right or title, and the seriousness of the impact of the proposed decision on the exercise of traditional rights.¹³⁶

95. As a result, the scope of the duty to consult will differ with the circumstances under consideration. Where a proposed project will have minimal impact on the exercise of traditional rights, a multi-lateral public consultation process may be sufficient. For example, the Chief of Matimekush-Lac John indicated during the hearing that the mere fact of being invited to the panel hearings constituted adequate consultation in the circumstances for his community.¹³⁷ Conversely, where the potential impact is greater, more substantive consultation may be required by the Crown.
96. The duty to consult does not require a project proponent to offer any particular form of accommodation to Aboriginal groups, nor does it provide any Aboriginal group with an effective veto over a proposed project.¹³⁸ Some communities have asserted that consent is required for the Project to go ahead,¹³⁹ relying notably on the Supreme Court of Canada decision in *Delgamuukw v British Columbia*.¹⁴⁰ Nalcor submits that such an

¹³⁶ 2004 SCC 73 at para. 39.

¹³⁷ Chief Réal Mackenzie, CEAR 1221 at pgs. 159-160.

¹³⁸ 2004 SCC 73 at para’s 47 to 49.

¹³⁹ For example, Patricia Utman, CEAR 1220 at pgs. 27-28, 32 and 35; Armand Mackenzie, CEAR 1220 at pgs. 39 and 40; Elizabeth Ashini, CEAR 1220 at pg. 63; Chief François Bellefleur, CEAR 1220 at pg. 150; Chief Jean-Charles Piétacho, CEAR 1220 at pg. 320; Submission from the Conseil Innu Takuaitkan Uashat mak Mani-utenam, CEAR 1228 at pgs. 2 and 8.

¹⁴⁰ [1997] 3 SCR 1010; Chief François Bellefleur, CEAR 1220 at pg. 150.

assertion is incorrect in law. The *Delgamuukw* decision is inapplicable in the present circumstances as it only applies to questions where Aboriginal title exists. Further, it would be inappropriate to require Nalcor to enter into Impact Benefit Agreements (“IBA’s”) with every Aboriginal group with asserted or established rights in the region (unless that obligation is within a settled Land Claim Agreement and required pursuant to the terms of that Agreement), as was suggested by Todd Russell during the hearings.¹⁴¹ The Nunatsiavut Government, in CEAR 1300 has recommended that the Panel require Nalcor to enter into an “Accord” with it. Nalcor disagrees with such a recommendation. First there is no basis in law for such a recommendation and would provide a *de facto* veto to the Nunatsiavut Government. More importantly, Nalcor’s obligation is to consider the impact of the proposed project on the current use of land and resources for traditional purposes. Nalcor has done that work and no significant impacts have been predicted. Further, Nalcor has committed to mitigation and monitoring plans to verify those predictions – in consultation with the Nunatsiavut Government. That is the appropriate action for Nalcor to take. Finally, such an accord constitutes “accommodation” and as such is the obligation of the Crown – but only in the event the impacts of the Project are determined to be of such a serious nature as to require accommodation. Also, such a recommendation is beyond the authority of the Panel to make under the terms of the JRP and no such obligation exists under the terms of any executed Land Claim Agreement.

97. The Innu, in CEAR 1320, have suggested that an “over lap agreement” with the Nunatsiavut Government exists in relation to 12-E lands wherein the Nunatsiavut Government’s consent to development within those lands cannot be unreasonably

¹⁴¹ Todd Russell, CEAR 1163 at pgs. 279 and 280.

withheld. First, the Project is not within the 12-E lands. Second, if such an overlap agreement exists, it is a bi-lateral agreement entered into between the Innu and the Nunatsiavut Government and it has not been approved by either the Federal or Provincial Crown therefore it does not form part of any existing or settled Land Claim Agreement. As a result, no consent is required.

98. Pursuant to the JRP Terms of Reference, which were appended to the JRP Agreement and which define the parameters of the Panel's authority in relation to the Project, the Panel has the mandate to invite information from Aboriginal persons or groups, including information related to the nature and scope of potential Aboriginal rights or title in the area of the Project, and to prepare a report to be delivered to the Provincial and Federal governments for their consideration. However, the JRP does not have the authority to make any determination in relation to:
- (a) the validity or the strength of any Aboriginal group's claim to aboriginal rights and title or treaty rights;
 - (b) the scope or nature of the Crown's duty to consult Aboriginal persons or groups;
 - (c) whether Canada or Newfoundland and Labrador has met its respective duty to consult and accommodate in respect of potential rights recognized and affirmed by s. 35 of the *Constitution Act, 1982*; or
 - (d) the scope, nature or meaning of the Labrador Inuit Land Claims Agreement.¹⁴²
99. Therefore, the Panel's authority relates to assessment of potential environmental effects of the Project on the current uses of land by Aboriginal persons for traditional purposes.

¹⁴² CEAR 106 at pg. 10.

While the JRP process may be a component of the Crown's consultation framework, the JRP does not have jurisdiction to make determinations on the strength of a particular Aboriginal claim, nor does it have any authority relative to how the Crown's duty to consult may be satisfied – such as requiring any particular form of accommodation with any specific Aboriginal group including the imposition of an IBA.

100. Nalcor's consultation obligations are set out in section 4.8 of the EIS Guidelines, which requires Nalcor to consult specifically with several named Aboriginal groups, those being the Innu Nation, NunatuKavut (formerly known as Labrador Métis Nation), the Nunatsiavut Government, and the Quebec Innu communities of Pakua Shipi, Unamen Shipu, Nutashkuan, Ekuanitshit, Uashat mak Mani-Utenam, and Matimekush-Lac John. Nalcor consulted with each of these groups, as well as the Naskapi Nation of Kawawachikamach. The specific details of Nalcor's consultation efforts are comprehensively described in its responses to IR JRP. 1/1S, IR JRP. 2/2S, IR JRP. 151, the Consultation Assessment Report ("CAR"), the response to CAR comments and the monthly consultation updates.
101. Section 4.8 of the EIS Guidelines also specifies the extent of Nalcor's role in the consultation process, which is to:
 - (a) Familiarize each group with the Project and its potential environmental effects;
 - (b) Identify any issues of concern regarding potential environmental effects of the Project; and

- (c) Identify what actions Nalcor is proposing to take to address each issue identified, as appropriate.¹⁴³
102. Nalcor's duty to consult is thus grounded in the requirement for it to assess all potential environmental effects of the Project, including potential impacts on the exercise of Aboriginal rights and title. The EIS Guidelines do not affect the Crown's duty to consult, which must be satisfied by the Crown prior to making a final decision on this Project.
103. Nalcor adopted a three-step approach to consulting with each of these Aboriginal communities, in order to meet its obligations at law and under the EIS Guidelines:
- (a) First, Nalcor attempted to familiarize each community with the Project and with the Project's potential environmental effects;
 - (b) Second, Nalcor provided opportunities for each community to inform Nalcor of any issues of concern to them surrounding the Project or of any traditional or contemporary land or resource uses that could be affected by the Project; and
 - (c) Finally, Nalcor proposed actions to address those issues of concern, wherever such actions were appropriate.¹⁴⁴
104. Nalcor undertook a variety of efforts to develop a clear understanding of Aboriginal interests, values, concerns, contemporary and historic activities, Aboriginal traditional knowledge and important issues facing each Aboriginal group pursuant to Section 4.8 of the EIS Guidelines. These efforts included:
- (a) Providing information and ongoing updates regarding the Project;

¹⁴³ CEAR 098 at pg. 41.

¹⁴⁴ Consultation Assessment Report, Supplement to Nalcor's Response to IR JRP.151, at pg. 1-1.

- (b) Meeting or offering to meet with each Aboriginal group, community or organization to discuss any potential issues of concern relating to the potential environmental effects of the Project;
- (c) Offering to come to each of the communities or meet with the group or organization to present a Plain Language Summary on the Project, including a description of the Project, the predicted Project effects and their significance, and proposed mitigation of Project effects;
- (d) Providing fact sheets on topics such as: aquatic studies, historic resources, reservoir formation, methylmercury, greenhouse gas emissions and construction workforce;
- (e) Hosting open house information sessions on the Project;
- (f) Offering technical workshops on various aspects of the Project (e.g., methylmercury, energy alternatives and fish habitat compensation);
- (g) Providing or offering to provide information in relation to training and employment opportunities;
- (h) Where appropriate, entering or offering to enter into formal consultative arrangements (including providing capacity funding) to facilitate the collection of land and resource use data in the Project Area and to identify issues of concern; and,
- (i) Offering to undertake a Summer Consultation Program, including the employment of local community consultation officers, to collect land and

resource use data in order to augment Nalcor's understanding of the community's interests, values, concerns, contemporary and historic activities, Aboriginal traditional knowledge and issues in relation to the Project.¹⁴⁵

105. Any issues of concern regarding potential environmental effects of the Project as well as mitigative actions Nalcor proposes to take to address each issue identified, as appropriate, are primarily contained in the CAR and the response to CAR comments. Many of the Quebec Innu groups raised issues related to rights and title which are beyond the scope of Nalcor to resolve.
106. Ekaunitshit raised the issue of Project splitting in consultation and in its most recent submission to the Panel (CEAR 1325). As the panel is aware that matter was dealt with by the CEAA Agency in CEAR 598. The Panel's obligation is to conduct an assessment of the Project as scoped, if Ekaunitshit is unhappy with the scoping of the Project there are venues for them to pursue that concern.
107. In respect of its obligations under the Guidelines, Nalcor gathered Aboriginal Traditional Knowledge about the existing environment in the Project Area, past and current use of the environment, and values about how things should be and what is the proper thing to do in relation to the environment.¹⁴⁶ Nalcor incorporated this Traditional Knowledge into its understanding of the current environment, how potential environmental effects of the Project were measured, including cumulative effects, and alternative means of carrying out the Project. For example, the spiritual importance of the knoll at Muskrat Falls

¹⁴⁵ CEAR 589, pg. 3

¹⁴⁶ EIS Vol. IA, pg. 9-2.

contributed to a careful examination of alternatives that could minimize or reduce disturbance to the site.¹⁴⁷

108. Although not a requirement of the EIS Guidelines, in addition to the ongoing provision of Project-related information, Nalcor also offered to enter into formal consultative arrangements with several Aboriginal communities. This offer was intended to provide funds to assist these communities in providing Nalcor with information about their traditional and current uses of land and resources, concerns and interests as required by the EIS Guidelines.
109. The provision of funding and formal consultative agreements are not required by law or the EIS Guidelines, nor are they necessary for Nalcor to meet its consultation obligations. For each community that was unwilling to accept capacity funding agreements or avail itself of the opportunity to enter into a formal consultation agreement with Nalcor, Nalcor still provided them with Project-related information, gave them opportunities to provide information regarding any potentially adverse effects of the Project on their land and resource use in the Project Area, and consistently reiterated Nalcor's commitment to engage in discussions regarding mitigation measures should that community provide such information. Nalcor has reiterated that ongoing commitment throughout the hearing process to the various groups.
110. The CAR contains a detailed analysis of each community and relies on an exhaustive literature review, including studies completed by the *Conseil des Atikamekws et des*

¹⁴⁷ EIS Vol. IA, pg. 3-10.

Montagnais (CAM). During the hearings, many communities in fact referred to these same studies in their presentations, including the CAM study.¹⁴⁸

111. Nalcor gathered all available information on each community's land and resource use in order to assess potential impacts of the Project on the exercise of Aboriginal rights of that community.¹⁴⁹
112. Based on all of the information available to it, Nalcor concluded that, with the proposed mitigation measures, the Project is not likely to result in significant adverse effects on the current use of land and resources by Aboriginal persons for traditional purposes. For example, in respect of the concerns related to potential impacts on caribou raised by many of the Quebec Innu groups, that is addressed in the projects potential impacts on caribou below.
113. Nalcor has made every reasonable effort to comply with sections 4.8 and 4.4.4.4 and associated sections of the EIS Guidelines to familiarize the named Aboriginal groups, communities and organizations with the Project and its potential environmental effects, and to identify issues of concern and appropriate mitigative actions, if any, in response to such concerns. Nalcor has submitted detailed summaries of its Aboriginal consultation efforts in its EIS, in several responses to IRs,¹⁵⁰ and in its monthly consultation reports to the Panel.¹⁵¹ Handrigan J. for the Supreme Court of Newfoundland and Labrador recently assessed Nalcor's consultation efforts for the Project in relation to the NunatuKavut

¹⁴⁸ François Lévesque, CEAR 1209 at pgs. 59 and 94; Chief George Bacon, CEAR 1209 at pg. 106; Chief Réal Mackenzie, CEAR 1221 at pgs. 107-108.

¹⁴⁹ Consultation Assessment Report, CEAR 501, which was a supplemental report to IR JRP.151.

¹⁵⁰ Nalcor responses to IR JRP.1/1S, IR JRP.2/25, IR JRP.151, and in the Consultation Assessment Report, CEAR 501, which was a supplemental report to IR JRP.151.

¹⁵¹ CEAR Doc. Nos. 366, 405, 424, 473, 524, 530 and 551.

Community Council and found them to be “fulsome and generous”.¹⁵² He further concluded that while “[p]erhaps more could have been done to hear and address [the NunatuKavut’s] concerns but I cannot say what it would have been”.¹⁵³ Nalcor agrees and submits that its consultation efforts with all Aboriginal groups and communities have met and exceeded those required by the EIS Guidelines and by law. In addition, Nalcor will continue to provide opportunities for Aboriginal groups, communities or organizations to provide information and discuss their concerns with Nalcor throughout the life of the Project.

D. SPECIFIC ISSUES RAISED IN HEARING

114. The key issues raised during the course of these proceedings can generally be put into seven categories:

- (a) Economic Issues;
- (b) Methodological Issues;
- (c) Technical Issues;
- (d) Environmental Issues;
- (e) Socio-economic and Cultural Issues;
- (f) Cumulative Effects; and

¹⁵² *NunatuKavut Community Council Inc. v. Newfoundland and Labrador Hydro-electric Corporation (Nalcor Energy)*, 2011 NLTD (G) 44 at para 42.

¹⁵³ *NunatuKavut Community Council Inc. v. Newfoundland and Labrador Hydro-electric Corporation (Nalcor Energy)*, 2011 NLTD (G) 44 at para 41.

(g) Adaptive Management, Monitoring and Follow-Up.

115. Although some of these issues were raised and discussed at the hearing, the discussion of these issues did not, in any meaningful way, challenge the quality, credibility or certainty of the Project, or the conclusions reached in Nalcor's EIS, the supporting material filed in response to the Panel's IRs, and during the course of the hearing.

I. Economic Issues

116. The economic details of the Project were called into question on several occasions during the hearings, most notably through the Panel's March 21, 2011 information request of Nalcor. Nalcor stresses that in accordance with the CEA Agency's OPS on need, purpose and alternatives, the Panel's consideration of these issues should not be an audit of the economics of the Project; that obligation is the responsibility of the Province as the sole shareholder of Nalcor and in consideration of the Province's objectives as set out in its energy policy. The Panel's mandate is to consider the need, purpose and rationale so it can better understand the objectives the Proponent is trying to achieve with the development of the Project, and whether the Proponent has considered alternatives to the proposed Project that achieve those objectives.¹⁵⁴

117. Nonetheless, assertions were made in the hearing that the Project is not financially viable and that Nalcor has overestimated future electricity prices in export markets.¹⁵⁵ These assertions are absolutely incorrect. Given the long lifespan of the Project, anticipated long-term growth in energy demand in the North American markets available to the Project (especially for green and dispatchable power, such as that offered by the Project),

¹⁵⁴ CEAR 1148 at pg. 2.

¹⁵⁵ For example, Helios submission CEAR 683 at pg. 12; Sierra Club Atlantic submission, CEAR 676 at pg. 2.

the Project's low operating costs relative to other sources of generation, and its low GHG emissions, power from this Project will be desirable and competitive for generations to come.

118. Nalcor, under the terms of its agreement with Emera, has access to firm transmission capacity through and into the Nova Scotia, New Brunswick, and New England markets.¹⁵⁶ These markets exist and are accessible for the power from the Project. The New England electricity market is both structured and liquid which simply means that the market exists and power can be bought and sold in that market without impediment. Market supply bids are matched to load in order of increasing cost until the supply is sufficient to meet the total load in the market. At that point, all supply bids receive the "market clearing price" for their supply. Given the very low marginal cost of hydroelectric generation, Nalcor will be able to access this market with a very high degree of certainty.¹⁵⁷
119. The economic justification for the Project is evidenced by the Muskrat Falls component alone. As previously stated, the Island of Newfoundland is expected to face a capacity deficit beginning in 2015. Nalcor evaluated various options for fulfilling this future need on the Island, and Muskrat Falls together with the Transmission Link between Labrador and the Island would cost the Province \$2.2 billion less than maintaining and expanding the existing isolated Island system.¹⁵⁸ This conclusion factors in the addition of new renewable energy sources on the Island, as well as conservation and demand side management. It also holds true regardless of whether Nalcor is able to sell a single

¹⁵⁶ CEAR 1148 at pg. 4.

¹⁵⁷ CEAR 1148 at pg. 4.

¹⁵⁸ Gilbert Bennett, CEAR 776 at pg. 23.

megawatt of power from Muskrat Falls into export markets.¹⁵⁹ For every unit of power that Nalcor sells in other jurisdictions, either from Muskrat Falls or Gull Island, this economic justification for the Project is only strengthened.

120. Further concerns were raised that Nalcor had insufficient transmission options available to it in order to fully develop the Project.¹⁶⁰ That is incorrect and unsupported by the facts. Nalcor submits that it has multiple transmission options available to it for the Project. These options include transmission through Quebec in accordance with Hydro-Quebec's Open Access Transmission Tariff ("OATT") and the Transmission Link proposed by Nalcor and that is now under environmental assessment and further transmission connections to Atlantic Canadian markets.
121. Hydro-Quebec, as a participant in the US wholesale electricity markets, has an obligation to provide open, non-discriminatory access on its transmission facilities. Hydro-Quebec's OATT, the rules and procedures for obtaining and providing transmission service, is modelled on U.S. Federal Energy Regulatory Commission ("FERC") order 888 which requires transmission service providers such as Hydro-Quebec to provide service that at least meets minimum terms and conditions of non-discriminatory service comparable to those that it receives itself from other transmission providers. Pursuant to Hydro-Quebec's OATT and US market participation rules, Hydro-Quebec cannot refuse access on its transmission facilities to Nalcor or any other eligible transmission customer. Nalcor's subsidiary, Newfoundland and Labrador Hydro currently has a transmission service agreement with Hydro-Quebec for 265 MW on Hydro-Quebec's transmission

¹⁵⁹ Gilbert Bennett, CEAR 776 at pg. 62.

¹⁶⁰ For example, Helios submission 683 at pg. 15.

system.¹⁶¹ Transmission service applications for the Project have also been made. Newfoundland and Labrador Hydro has filed complaints to the Régie de L'énergie (the Régie), Quebec's energy regulatory agency, in relation to Hydro-Quebec's treatment of one of these requests. The Régie did not rule in Newfoundland and Labrador Hydro's favour in these complaints proceedings; however, the rules of non-discriminatory transmission service apply in Quebec and Nalcor will pursue all actions necessary to obtain transmission service for the Project in accordance with these rules and US market participation requirements.¹⁶²

122. Finally, questions were asked in the hearing about the profitability or economic viability of the Project.¹⁶³ It is important to note that the environmental assessment is part of the planning for the Project; the ultimate decision to proceed with the Project will be made by Nalcor and its shareholder, the Province, when it has the then current information, including the extent and nature of any conditions that attach to the Project's approval, as well as the terms upon which it is able to obtain financing for the Project. Regardless of the outcome of the environmental assessment process, the Project will not be constructed unless Nalcor and its shareholder, the Province, conclude that the Project is economic and required to fulfill the Province's long term goals.¹⁶⁴ That decision can only be based, as it is in respect of every project, on the prevailing economic conditions at the time of

¹⁶¹ Gilbert Bennett, CEAR 776 at pg. 101.

¹⁶² Gilbert Bennett, CEAR 692 at pg. 45.

¹⁶³ For example, from Chairperson Clarke, CEAR 692 at pg. 60; Murray Rudd, CEAR 1163 at pg. 87.

¹⁶⁴ Gilbert Bennett, CEAR 692 at pg. 61.

sanction by the shareholder. This sanction process is consistent with all major projects.¹⁶⁵

123. Mr. Raphals, in particular, on behalf of the Grand River Keepers, was critical of the information provided by Nalcor. With respect, the information Mr. Raphals was requesting and interested in may be appropriate for a Public Utilities Board rate-setting exercise but is not useful to an environmental assessment in relation to whether a project is in the public interest. Further, the information that was provided by the proponent, as pointed out by Mr. Hull, may put Nalcor at a disadvantage when it seeks financing in the capital markets (Wednesday April 13th session, no transcript reference available at time of submission). Any suggestion that additional information was required or relevant to a consideration of the need for the project is without merit. Further detail at this point would simply put Nalcor at a significant disadvantage in obtaining competitive commercial arrangements.
124. Mr. Raphals also seemed to suggest that once the capital costs of the project were recovered, the province might require that power rates be reduced to reflect actual operating costs. The inference being that the Project's benefits would thus also be reduced. His analysis is incorrect. The issue of whether the *pure economic* benefit from the Project should flow to the ratepayers or the taxpayers is a matter for the Government of the Province of Newfoundland and Labrador to determine. The fact is, however, that the economic benefit of the Project exists in either case and is clear in the evidence (see CEAR 1148 among others for example). It will be up to the Province to determine whether that benefit is shared with the people of the Province through rate protection or whether the benefit accrues to the taxpayers as a whole and is spent on sustaining and

¹⁶⁵ CEAR 1148 at pg. 11.

enhancing provincial services. In either case, there is no doubt that the benefit exists, only how that benefit is allocated. Mr. Bennett pointed that out in his comments to the panel, saying that decision (of how the benefits from the project are allocated) is ultimately up to the Province, not Nalcor. (Gilbert Bennett, Wednesday April 13th session, Transcript reference not available at time of submission).

125. Based on market conditions that exist today, the Muskrat Falls component of the Project is required to meet demands in the Province and will provide Nalcor's shareholder with standard rates of return even if none of the surplus power from Muskrat Falls is sold into export markets.¹⁶⁶ The projected rates of return for the Gull Island component are even greater, and the market for this power exists as well.¹⁶⁷ At the request of the Panel, Nalcor confirmed that both components of the Project will achieve reasonable rates of return even if the capital cost is greater than expected and export sales are lower than predicted.¹⁶⁸ Therefore, Nalcor is certain that both components of the Project will be economic. This economic viability of the Project will be enhanced by any direct funding from the provincial government, which it has indicated it is willing to provide,¹⁶⁹ or any federal loan guarantee, which both the Conservative and Liberal federal political parties have indicated they would support.¹⁷⁰

¹⁶⁶ Gilbert Bennett, CEAR 776 at pg. 62.

¹⁶⁷ CEAR 1148 at pg. 11.

¹⁶⁸ CEAR 1148 at pgs. 11, 12 and 13.

¹⁶⁹ Terry Paddon, CEAR 817 at pg. 94.

¹⁷⁰ "Ignatieff: Lower Churchill hydro megaproject 'in the national interest'" *The Chronicle Herald*. (April 4, 2011) online: <<http://thechronicleherald.ca/Front/9020454.html>>.

II. Methodological Issues

(i) *Completeness of EIS*

126. Some interveners, including regulators, have submitted that Nalcor's effects conclusions remain uncertain and that additional baseline studies are required.¹⁷¹ To the extent that a degree of uncertainty is inherent in environmental assessments and that more detailed baseline studies are required in order to develop the specifics of monitoring and mitigation programs, Nalcor agrees. However, Nalcor disagrees that there is any additional information that is required in order to make robust predictions as to whether or not the Project will likely result in significant adverse environmental effects. As discussed above, the purpose of an environmental assessment is to identify potential effects of a project before final decisions are made. The level of information required to support such an assessment should correspond to the level of planning expected at this stage of a project's development.
127. The information and data relied upon for this environmental assessment is extensive and comprehensive. Nalcor has been able to rely on over 35 years of studies for this Project, which is unprecedented for environmental assessments in Labrador,¹⁷² and has conducted thorough surveys and fieldwork over many years to supplement and reinforce earlier findings. Nalcor prepared its EIS in accordance with the Guidelines for the EIS issued by the Panel. It has also worked closely with all relevant regulators to ensure that its methodologies and effects predictions are acceptable.¹⁷³

¹⁷¹ For example, Fisheries and Oceans Canada, CEAR 639.

¹⁷² Perry Trimper, CEAR 923 at pg. 10.

¹⁷³ Gilbert Bennett, CEAR 940 at pg. 317.

128. Nalcor has reviewed the recommendations and concerns of interested parties, and has addressed them accordingly through thousands of pages of submissions, responses to five rounds of IRs, through direct correspondence, and through submissions in this hearing. In all, Nalcor has submitted over 15,000 pages of studies and assessment for this Project.¹⁷⁴ The EIS meets the purpose set out in the EIS Guidelines through its thorough examination of potential environmental effects, including cumulative effects, of the construction and operation of the Project and evaluating their significance. Potential interactions of each Project activity on each Key Indicator (“KI”) were considered and properly assessed.¹⁷⁵ Nalcor’s effects predictions incorporated the precautionary approach and relied on proven technologies and approaches to modeling.¹⁷⁶
129. Nalcor is confident in its effects predictions as a result of: the level of detail available for the Project; the extensive sampling and baseline data that was collected for the Project over a period of several decades; knowledge of the nature and extent of potential interactions between the Project and the environment; experience with similar projects in the region and across the country; conservative modeling inputs that were used throughout the assessment; Nalcor’s proposed mitigation measures; the availability of adjacent habitat for ecological KIs; and the input of many stakeholders, including Aboriginal groups and regulators.¹⁷⁷
130. Additional information is still required prior to construction. This information is required to inform the details of mitigation and follow-up programs if the Project is approved.

¹⁷⁴ Gilbert Bennett, CEAR 1208 at pg 312.

¹⁷⁵ Gilbert Bennett, CEAR 940 at pg. 318.

¹⁷⁶ Gilbert Bennett, CEAR 692 at pg. 34.

¹⁷⁷ Jeff Barnes, CEAR 1136 at pg. 15.

This information is not required in order for the Panel to make significance determinations or to assess the effectiveness of proposed mitigation and follow-up programs.¹⁷⁸

131. To the extent that uncertainties remain in Nalcor's effects conclusions, these uncertainties will be addressed through detailed monitoring, follow-up programs, and adaptive management. Nalcor has proposed comprehensive monitoring and follow-up programs to verify the predictions made in this environmental assessment. These monitoring programs will focus on the biophysical environment (physical, atmospheric, aquatic and terrestrial), the socioeconomic environment (economy, employment, business, communities, land and resource use and cultural heritage resources) and Project infrastructure.¹⁷⁹ Many of these monitoring and follow-up programs will require further regulatory approval following the conclusion of the environmental assessment process, and will require ongoing stakeholder consultation. These monitoring and follow-up programs will identify any unexpected effects of the Project, and Nalcor has committed to implement adaptive management strategies if need be to mitigate any such effects.¹⁸⁰
132. As discussed above, the presence of some uncertainty in environmental assessments is well accepted and should not prevent the Panel from concluding that the Project is not likely to result in significant adverse environmental effects. Nalcor has thoroughly assessed the types of interactions that may occur as a result of the Project and these interactions are not predicted to be significant.

¹⁷⁸ Gilbert Bennett, CEAR 940 at pg. 320.

¹⁷⁹ CEAR 1189.

¹⁸⁰ Gilbert Bennett, CEAR 692 at pgs. 39 and 40.

(ii) VEC and KI Selection

133. Concerns were raised during the hearing in relation to the specific Valued Environmental Components (“VECs”) and KIs that Nalcor chose for the environmental assessment and the appropriateness of those selections.
134. Nalcor’s methodology for the environmental assessment reflects accepted practice for environmental assessments.¹⁸¹ The assessment focused on VECs, which are biophysical and socio-economic components of the environment that are valued by society and can be indicators of environmental change. Since it is impractical to fully assess every aspect of each VEC, KIs are chosen as representative indicators for certain potential Project effects, and these KIs are fully assessed in the environmental assessment.
135. VECs and KIs were selected for the Project through a comprehensive issues-scoping process, which included stakeholder and public consultation, including consultation with Aboriginal groups.¹⁸² KIs were selected for several reasons, including if that KI was:
- (a) sensitive to Project environmental effects, based in part on existing knowledge;
 - (b) important to local communities and resource users;
 - (c) important regionally, provincially, nationally or internationally (e.g., it has been designated for specific management or protection measures by regional, provincial, national or international authorities);
 - (d) associated with environmental effects on related resources and broader systems (e.g., ecological, economic, social or cultural);

¹⁸¹ EIS Vol. IA, pg. 9-13.

¹⁸² EIS Vol. IA, pg. 9-15.

- (e) a key linkage in a pathway between the Project and environmental effects on VECs; and
- (f) identified as an aspect of concern during regulatory, public and stakeholder consultation.¹⁸³

136. As a result of this issues-scoping process, VECs and KIs were chosen that allowed Nalcor to fully assess potential effects of the Project on the environment. No evidence has been led during this hearing that shows any gap in Nalcor's environmental assessment as a result of the VECs and KIs that were chosen.

(iii) Study Area Selection

137. Nalcor delineated the study area for the Project based on Section 4.4.2 of the EIS Guidelines and CEAA guidance, which requires the study area to include all of the landscape necessary to predict the environmental effects of the Project on each VEC, and a rationale for delineating the boundaries of that study area. In developing a study area, it is important to encompass enough area to fully assess the potential environmental effects of a project, but not so much area that the potential environmental effects of a project are masked.

138. Nalcor developed "Assessment Areas" for each VEC or KI, as appropriate. The boundaries of these areas were determined by the spatial and temporal characteristics and distributions of the VECs or KIs and their potential interactions with the Project. Spatial ecological boundaries were determined by the distribution and movement patterns of biophysical components, like migratory patterns, or physical elements, like watersheds.

¹⁸³ EIS Vol. IA, pg. 9-13.

Temporal ecological boundaries were based on the relevant characteristics of the VECs, including the natural or seasonal variation of the population for each species, or any sensitive or critical periods such as spawning or migration.¹⁸⁴ In addition to Assessment Areas being either similar or smaller in size than study areas, they were also conservative in that they usually encompassed only a portion of the population.

139. While several interveners during the hearings challenged the exclusion of specific areas downstream of the Project from these Assessment Areas, especially Lake Melville, Nalcor has undertaken extensive studies to determine the extent of any environmental effects downstream of Muskrat Falls that may be caused by the Project, if any. Some of these studies used the mouth of the river at Goose Bay as the boundary of the survey area,¹⁸⁵ some used the Goose Bay Estuary as the downstream boundary,¹⁸⁶ and some included Lake Melville and beyond.¹⁸⁷
140. The findings of these studies all suggest that while some minor changes may occur downstream of Muskrat Falls, the minimal changes in flow regime of the river, combined with the diluting influence of several other tributaries into Goose Bay, will likely result in “no measurable effects” of the Project on selected KIs downstream of Muskrat Falls beyond Goose Bay.¹⁸⁸ This conclusion was made separately for total suspended solids,¹⁸⁹ total phosphorous,¹⁹⁰ fish productivity,¹⁹¹ salinity,¹⁹² velocity,¹⁹³ temperature,¹⁹⁴ ice

¹⁸⁴ EIS Vol. IA, pg. 9-17.

¹⁸⁵ For example, JWEL 2000; AMEC and Sikumiut 2007.

¹⁸⁶ For example, AMEC – BAE 2001; JWEL 2001.

¹⁸⁷ For example, JWEL 2001; Sikumiut 2007.

¹⁸⁸ IR JRP.166, at pg. 3.

¹⁸⁹ IR JRP.166, at pg. 8.

¹⁹⁰ IR JRP.166, at pg. 8.

dynamics,¹⁹⁵ seal distribution,¹⁹⁶ bank stability,¹⁹⁷ and fish habitat utilization.¹⁹⁸ This means that any effects or changes to the KIs downstream of the Project Area, if they occur, are within the range of natural variability.¹⁹⁹

141. The same conclusion was reached with respect to changes in sediment deposits downstream, in response to DFO's suggestion that downstream sections of the River may change from several shallow meandering channels to a single deep channel.²⁰⁰ Nalcor has predicted that immediately downstream of Muskrat Falls, there will be a deepening of the channel and towards Happy Valley-Goose Bay and Mud Lake, there will be an increase in sediment.²⁰¹ The effect of this increase in sediment is expected to be negligible, since climate change modelling forecasts an increase in water depth in those sections of the River that will offset any increase in sediment depth.²⁰²
142. Finally, methylmercury levels will increase in plankton and in the water itself downstream of Muskrat Falls to the mouth of the River and to the Goose Bay narrows,

¹⁹¹ IR JRP.166, at pg. 9.

¹⁹² IR JRP.166, at pg. 9.

¹⁹³ IR JRP.166, at pg. 11.

¹⁹⁴ IR JRP.166, at pg. 11.

¹⁹⁵ IR JRP.166, at pg. 11.

¹⁹⁶ IR JRP.166, at pg. 14.

¹⁹⁷ IR JRP.166, at pg. 14.

¹⁹⁸ IR JRP.166, at pg. 14.

¹⁹⁹ Jim McCarthy, CEAR 884 at pgs. 34, 35 and 36.

²⁰⁰ Fisheries and Oceans Canada, CEAR 639 at pg. 26.

²⁰¹ Jim McCarthy, CEAR 1164 at pg. 93.

²⁰² Jim McCarthy, CEAR 1164 at pgs. 93 and 94.

respectively.²⁰³ Methylmercury levels are also predicted to increase in fish as far downstream of Muskrat Falls as Goose Bay.²⁰⁴ This conclusion was supported by Robin Anderson's report that was submitted by DFO.²⁰⁵ However, the predicted increases in methylmercury levels in fish, both within the reservoirs and downstream, are not expected to affect fish health or behaviour at a population level.²⁰⁶ In addition, these peak methylmercury levels will return to baseline levels within 35 years.²⁰⁷

143. The Nunatsiavut Government expressed concerns about effects on seals downstream of Muskrat Falls.²⁰⁸ However, the research conducted by Nalcor does not indicate that seals will be affected in any meaningful way by the Project.²⁰⁹ A seal abundance and distribution survey was conducted in 2006²¹⁰ concurrently with an ice dynamics study²¹¹ such that potential interaction with seals could be determined. Results of the seal study indicated that seal use of ice in the Goose Bay and Lake Melville area for whelping and molting is concentrated on the east end of Lake Melville. This, along with no predicted change to ice conditions in either Goose Bay or Lake Melville, led Nalcor to conclude that there was no interaction with the Project. To the extent that seals will be exposed to increased mercury from the Project, the ecological risk assessments that were conducted for river otter and Osprey inform what may apply to seals as well, who are suggested to

²⁰³ Jim McCarthy, CEAR 884 at pg. 41.

²⁰⁴ Jim McCarthy, CEAR 884 at pgs. 42 and 43.

²⁰⁵ Fisheries and Oceans Canada, CEAR 639 at pg. 31.

²⁰⁶ Jim McCarthy, CEAR 884 at pg. 43.

²⁰⁷ Jim McCarthy, CEAR 884 at pg. 43.

²⁰⁸ Tom Sheldon, CEAR 908 at pg. 268.

²⁰⁹ Jim McCarthy, CEAR 884 at pg. 52.

²¹⁰ Sikumiat (2008), Seal Abundance and Distribution Component Study.

²¹¹ Hatch (2008), Ice Dynamics Component Study.

consume far less fish from the Project Area than will either river otter or Osprey.²¹² Regardless, Nalcor has committed to conducting baseline and post-construction monitoring of mercury levels in seals to ensure both that the mercury exposure does not reach levels at which the seals themselves would suffer health effects, and also to inform communities that consume seal meat of the mercury levels in that food to ensure human health is protected.²¹³

144. For the purposes of the environmental assessment, Nalcor focussed on the areas where there was the most potential for adverse effects.²¹⁴ For the aquatic environment, this assessment focussed on the reservoirs. However, it should be stressed that the delineation of Assessment Areas for the Project will *not* restrict monitoring and follow-up programs for those areas outside the Assessment Area boundaries. For example, Nalcor has proposed a monitoring program for several locations downstream of the Assessment Area for the purposes of monitoring ice formation, mercury concentrations, and several other inputs to ensure that its effect predictions in the EIS are accurate, including areas where it has predicted no effects will occur.²¹⁵

²¹² Jim McCarthy, CEAR 884 at pg. 52.

²¹³ CEAR 916 and CEAR 1086 at pg. 25.

²¹⁴ Marion Organ, CEAR 961 at pg. 16.

²¹⁵ CEAR 1189 at pg. 3. For example, a seal tissue sampling program has been initiated and is currently underway in Lake Melville.

(iv) Significance Determination

145. Several comments were made during the hearing to suggest that Nalcor's significance determinations were subjective and that the Project would result in significant adverse effects from the perspective of those individuals or organizations.²¹⁶
146. In determining the significance of potential Project effects, Nalcor followed established environmental assessment practice and guidance from the CEA Agency, as outlined above under the Panel's role under the CEAA.
147. First, Nalcor identified whether or not the Project would have any interaction with each VEC or KI. For biophysical KIs, examples of potential environmental effects included changes in habitat, changes in health or mortality. For socio-economic VECs, potential environmental effects included changes in the quantity and quality of specific parameter values such as employment, income levels and health and well-being, or demands on infrastructure (e.g., port or airport traffic) and for services (e.g., education, policing).²¹⁷
148. Nalcor identified possible environmental interactions of the Project based on documented experience with previous projects and activities, decades of environmental studies for the Project, consideration of Aboriginal traditional and community knowledge, the professional experience and judgment of the study team, and concerns raised through the issues scoping process.²¹⁸
149. For each possible environmental effect on a VEC or KI, an environmental effects analysis was conducted. If the possible environmental effect could not be mitigated, and was

²¹⁶ For example, Rick Hendricks, CEAR 706 at pg. 121; Bruno Marcocchio, CEAR 707 at pg. 72; Herb Brown, CEAR 707 at pg. 94; Annette Lutterman, CEAR 1136 at pg. 295.

²¹⁷ EIS Vol IA, pg. 9-24.

²¹⁸ EIS Vol IA, pg. 9-24.

found to be likely, Nalcor then assessed whether or not the Project's effect on each KI or VEC it was "significant". Based on CEA Agency guidance, this determination was based upon that effect's magnitude, its geographic extent, its duration or frequency, the extent to which the effect was reversible or irreversible, and the existing ecological context. In addition and pursuant to Section 4.5.1 of the EIS Guidelines, this determination was also presented, to the extent appropriate for each KI or VEC, in terms of timing, level and degree of uncertainty of knowledge, the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of present and future generations, the extent to which biological diversity is affected, and environmental protection goals and objectives as set out in applicable legislation.²¹⁹

150. Separate definitions of "significant adverse environmental effect" were created for each VEC or KI, as appropriate.²²⁰ The definition for each represented a threshold beyond which any changes or environmental effects resulting from the Project were considered unacceptable. The thresholds developed for this assessment were based on guidance from the CEA Agency,²²¹ applicable regulatory standards and requirements, previous environmental assessments, and the professional experience of the study team.
151. While Nalcor does not dispute that certain Project effects may be perceived as significant to some individual interveners, Nalcor determined significance on a broader ecosystem or socio-economic level. In this context, Nalcor concluded that the Project is not likely to

²¹⁹ CEA Agency Reference Guide: *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Section 4.2, and CEAR 976.

²²⁰ EIS Vol IA, pg. 9-20, and response to IR JRP 116.

²²¹ Canadian Environmental Assessment Agency, "Reference Guide: Determining Whether A Project is Likely to Cause Significant Adverse Environmental Effects".

result in any significant adverse environmental effects, taking into consideration Nalcor's proposed mitigation strategies.

152. The definitions used by Nalcor to determine significance for each VEC or KI, as well as Nalcor's significance determinations, are discussed below under Environmental and Socio-economic Issues.

(v) *Precautionary Principle/Precautionary Approach*

153. The precautionary principle was identified by the Panel as another "cross-cutting" issue for the hearings that attracted concerns from interveners.
154. Section 2.5 of the EIS Guidelines, as well as subsection 4(2) of the CEAA, requires that Nalcor incorporate the precautionary principle into planning for this Project. Despite the alternate interpretations of this concept put forward by some interveners during the hearing,²²² the EIS Guidelines define the precautionary principle to mean that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.²²³
155. Nalcor has adopted the precautionary principle throughout its planning for the Project. An example of this was the inclusion of tributary deltas in the application of fish habitat compensation. These areas were not identified as distinct fish habitat types by the study team based on modelling and scientific study; however, these areas were identified as important habitat by members of the Innu Traditional Knowledge Committee.²²⁴

²²² Bruno Marcocchio, CEAR 1136 at pgs. 301 and 302.

²²³ CEAR 98 at pg. 9.

²²⁴ Jeff Barnes, CEAR 1136 at pg. 10.

Therefore, although there is uncertainty about whether this habitat contributes disproportionately to the river's fish production, Nalcor has proposed the re-establishment of several large tributary confluences in its Fish Habitat Compensation Strategy²²⁵ (REF) so that this habitat type can be quickly stabilized and used by fish.²²⁶

156. Nalcor has also incorporated a precautionary *approach* in its planning for this Project, as required by section 2.5 of the EIS Guidelines. The use of a precautionary approach means that:

- (a) Environmental effects predictions are based on conservative values or modeling inputs and assumptions and are used to address uncertainty and propose mitigation that will prevent and reduce adverse effects;
- (b) The lack of scientific certainty regarding the probability of an environmental effect occurring has not been used as a reason to postpone mitigation (i.e., the precautionary principle);
- (c) Mitigation has been proposed for Project effects, including those that are not likely to be significant and adverse; and
- (d) Follow-up and monitoring have been proposed.²²⁷

157. For example, in some component studies there were limitations in the individual numbers of certain aquatic and terrestrial species that were captured and analyzed (e.g., black bear and burbot).²²⁸ Wherever these limitations existed, the study team applied conservative

²²⁵ Response to IR JRP. 153.

²²⁶ EIS Vol. IIA, section 4.10.2.4.

²²⁷ Response to IR JRP.19, at pg. 3.

²²⁸ Component Study 8 of 11 for Fish and Fish Habitat at pg. 143, and Telemetry Report on Black Bear, supplemental response to IR JRP.9 at pg. 7-7.

assumptions and estimates of baseline conditions or continued to collect information to complete the dataset.²²⁹ Similarly, when predicting saltwater intrusion downstream of Muskrat Falls, the study team assessed the effects associated with no compensation flow during impoundment, when in fact there will be a 30 percent compensation flow.²³⁰ This approach resulted in a high level of certainty regarding the prediction of environmental effects.

158. Some interveners in the hearing argued that the precautionary principle requires that Nalcor be prohibited from proceeding with the Project absent certainty regarding the Project's environmental effects.²³¹ This interpretation of the precautionary principle was considered and rejected by the Federal Court of Appeal in *Canadian Parks and Wilderness Society v. Canada (Minister of Canadian Heritage)*.²³² In that decision, Evans J.A., for the Court, discussed both the concepts of adaptive management and the precautionary principle at paragraphs 23-24, as follows:

On the basis of these reports, the Minister's approval of the winter road was announced on May 25, 2001. The decision stated that any adverse environmental impact of the road would be insignificant, both because of its design and limited use, and because of the measures that would be taken to monitor and mitigate any unforeseen problems through "adaptive management" techniques.

The concept of "adaptive management" responds to the difficulty, or impossibility, of predicting all the environmental consequences of a project on the basis of existing knowledge. It counters the potentially paralysing effects of the precautionary principle on otherwise socially and economically useful projects. The precautionary principle states that a project should not be undertaken if it may have serious adverse environmental consequences, even if it is not possible to prove with any degree of certainty that these consequences will in fact materialise. Adaptive management techniques and the precautionary principle are important tools for maintaining ecological integrity [emphasis added].

²²⁹ Response to IR JRP.19, at pg. 8.

²³⁰ Response to IR JRP.43 at pg. 14.

²³¹ For example, Tom Sheldon, CEAR 1113 at pg. 294, Bruno Marcocchio, CEAR 1136 at pg. 309.

²³² 88 [2003] FCA 197 ("*CPAWS v. Canada*").

159. Therefore, the precautionary principle should be used to strengthen the conclusions in an environmental assessment, but should not be interpreted to mean that the Project should not proceed without absolute certainty. The whole point of an environmental assessment is to predict environmental effects at an early stage of project planning. A degree of uncertainty is to be expected in this approach. That is why monitoring, mitigation, and adaptive management are all important tools to ensure that the effects predictions made in the EIS are accurate into the future. With this context in mind, Nalcor submits that it properly applied the precautionary principle and the precautionary approach in its EIS and in the design of the Project. DFO concurred that the precautionary principle was incorporated into Nalcor's assessment for the Project.²³³

(vi) Sustainability

160. "Sustainability" is another concept that was flagged by the Panel as a "cross-cutting" issue for the hearing and that has attracted varying interpretations. Sierra Club Atlantic, for example, has asserted that Nalcor has not incorporated sustainable development principles into its environmental assessment, but has rather incorporated the concept of sustainable economic development – thus placing economic benefits of the Project above any environmental or social effects associated with the Project.²³⁴

161. Sustainable development means "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".²³⁵ The Government of Newfoundland and Labrador has recognized that development of the

²³³ Tilman Bieger, CEAR 1136 at pg. 97.

²³⁴ Sierra Club Atlantic submission CEAR 676 at pg. 1.

²³⁵ World Commission on Environment and Development, 1987. Available online and referenced in the EIS Vol. IA at pg. 1-10.

hydroelectric potential of the lower Churchill River is a natural resource project that can provide an important, long term, reliable source of renewable energy. However, the Government also stressed that it is essential that the Project be planned and implemented for long-term sustainability, integrating economic, environmental and social factors effectively so that the benefits of each factor are realized for present and future generations.²³⁶

162. Hydroelectric development is by its nature far more sustainable than many alternative energy developments. No resource is extracted through hydroelectric development and the energy source or revenue stream may last for centuries in a reliable and low operational cost environment.²³⁷ In addition, the Project will have a smaller environmental footprint than most hydroelectric projects since it will be developed on an already regulated river with developed upstream storage.²³⁸ Nevertheless, Nalcor planned and designed the Project to ensure that the following three key objectives to sustainable development were met:

- (a) preservation of ecosystem integrity, including the capability of natural systems to maintain their structures and functions and to support biological diversity;
- (b) respect for the right of future generations to the sustainable use of renewable and non-renewable resources; and

²³⁶ EIS Vol. IA, pg. 1-10.

²³⁷ Gilbert Bennett, CEAR 776 at pg. 16.

²³⁸ Gilbert Bennett, CEAR 776 at pg. 16.

(c) attainment of desirable and equitable social and economic benefits.²³⁹

163. The biophysical assessment for the Project examined the ability of the Project Area to retain biodiversity, in terms of whether the species assessed will continue to remain viable within the lower Churchill watershed. While the Project will directly affect 16 percent of the lower Churchill River valley, with mitigation, the ecological integrity of the atmospheric, aquatic and terrestrial environments will be maintained and will continue to support biological diversity.²⁴⁰ DFO agreed that the Project is not likely to threaten the long-term sustainability of the aquatic environment or the human activities that depend on it.²⁴¹ Environment Canada made similar conclusions regarding the terrestrial environment (30 March 2011).²⁴²
164. To protect the right of future generations to have continued access to renewable and non-renewable resources, the Project approach to planning has been to respect existing uses of the lower Churchill River and to provide for continued access, as demonstrated in the socio-economic assessment.²⁴³ This socio-economic assessment concluded that the Project will not restrict or degrade current land and resource use in the Assessment Area to the extent that those activities will not be able to continue at the same levels over the long term.²⁴⁴ In other words, while the patterns of land and resource use may shift, those activities will be able to continue to the same extent in the Assessment Area as at present.

²³⁹ EIS Vol. IA, pg. 9-34.

²⁴⁰ EIS Vol. IA, pg. 1-11.

²⁴¹ Tilman Bieger, CEAR 1136 at pg. 99.

²⁴² Scott Gilliland, CEAR 923 at pg. 159.

²⁴³ EIS Vol. IA, pg. 1-11. EIS Vol. III, Section 5.6, responses to IR JRP 34, IR JRP 35, IR JRP 36 and IR JRP 72.

²⁴⁴ EIS Vol. III, pg. 5-36 and response to IR JRP 116, pg. 33.

Further, various mitigation methods that have been proposed by Nalcor, such as re-establishing certain plant species and replacing boat launches, portage routes and snowmobile trails that are lost through inundation, in order to ensure future generations have continued access to renewable and non-renewable resources in the Assessment Area.²⁴⁵

165. Finally, the Project will provide long-term economic benefits to the region, the Province, and the country. These benefits will continue to accrue for generations, given the long life of the Project. Residents of the local communities and the entire Province will benefit through job creation, business activity, and improved investor confidence. Socio-economic benefits from the Project will accrue through training initiatives for individuals and through supplier development programs for businesses. Nalcor has worked, and will continue to work, closely with governments, Aboriginal groups, women's organizations, training institutions and labour organizations to maximize these benefits in the local communities.²⁴⁶ In addition, Nalcor's Gender Equity program and Diversity Plan will each enhance the equitable distribution of Project benefits.²⁴⁷
166. The Project will also provide significant revenue to the Province to support social benefits. Overall Project construction is expected to enhance provincial income by a total of \$2.1 billion, with an additional \$20 million for each year of operations.²⁴⁸ Labrador alone will receive over \$700 million of this construction-related income.²⁴⁹ In terms of

²⁴⁵ EIS Vol. III, pg. 5-32 and 5-33.

²⁴⁶ EIS Vol. III, pg. 3-25; Paul Dimm, CEAR 817 at pg. 206.

²⁴⁷ CEAR 1121; Response to IR JRP.115(c) at pg. 9.

²⁴⁸ Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35.

²⁴⁹ CEAR 670 at pg. 5.

revenues from taxes, Nalcor has estimated that the Project will result in approximately \$340 million in revenue to the Government of Newfoundland and Labrador during construction of the Project, with an additional \$1 billion in direct reserves each year after debt obligations have been satisfied.²⁵⁰ The cost savings to ratepayers in the Province as a result of the Project amounts to \$41 billion over the next fifty years.²⁵¹ Finally, the Project will greatly increase the power available for economic development in the Province, more than doubling the amount of electricity currently available.²⁵² This will provide for further long-term economic development that will benefit present and future generations.

167. Therefore, the entire environmental assessment for the Project has been modelled on sustainability to ensure that the Project will not compromise the ability of future generations of people, wildlife and vegetation, to use this river valley as they have historically done. The Project will result in a minimal incremental effect on the current aquatic, terrestrial and atmospheric environment and will provide positive economic benefits that will affect present and future generations.²⁵³ In short, the Project is a model of sustainable resource development and sustainable project planning.

(viii) Alternative Methodologies

168. The Grand Riverkeeper submitted that Nalcor should have incorporated alternative methodologies into its environmental assessment, such as a cost-benefit analysis or an

²⁵⁰ Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35.

²⁵¹ Gilbert Bennett, CEAR 776 at pg. 23.

²⁵² EIS Vol. IA, pg. 1-11.

²⁵³ Gilbert Bennett, CEAR 776 at pgs. 17 and 18.

ecosystem service analysis.²⁵⁴ However, the Grand Riverkeeper's representatives, Mr. Rudd and Dr. Raheem, both conceded that Nalcor followed the EIS Guidelines that were formulated for this Project and the EIS Guidelines did not require or support either of these approaches.²⁵⁵ Nalcor submits that while these alternative approaches are interesting from an academic perspective, it followed standard environmental assessment practices in Canada and that these practices do in fact consider the relative costs and benefits of projects as well as the socio-economic impacts associated with environmental effects.²⁵⁶ While every possible effect of a proposed project is not assigned a monetary value, Nalcor submits that the standard Canadian environmental assessment practices that were used for this Project ensure that environmental effects are fully considered.²⁵⁷ Accordingly, Nalcor submits that the methodologies it used in its environmental assessment were appropriate in these circumstances.

169. Furthermore, Nalcor submits that if the regulators or other stakeholders desired the type of assessment that Grand Riverkeeper has recommended, this requirement would have been included in the EIS Guidelines. It would be procedurally unfair to require this type of assessment at this point in the process, after EIS Guidelines have been issued, extensive work has been done on the basis of those EIS Guidelines, and after the Panel has made a determination on the sufficiency of information with which to proceed to public hearings.

²⁵⁴ For example, Murray Rudd, CEAR 1163 at pg. 102; Dr. Nejem Raheem, CEAR 1208 at pg. 136.

²⁵⁵ Murray Rudd, CEAR 1163 at pg. 102; Dr. Nejem Raheem, CEAR 1208 at pg. 129.

²⁵⁶ Gilbert Bennett, CEAR 1163 at pg. 344; Gilbert Bennett, CEAR 1208 at pg. 310.

²⁵⁷ Gilbert Bennett, CEAR 1208 at pg. 310.

III. Technical Issues

(i) *Construction, Operation and Decommissioning*

(a) Construction

170. Several issues were raised in relation to construction of the Project. These concerns included those in relation to access roads, reservoir clearing, reservoir impoundment, and the sequence of construction.
171. In terms of reservoir access, Nalcor will use existing transportation infrastructure to the maximum extent possible, in particular, existing roads and bridges.²⁵⁸ The location of any new access roads required for the Project will take into consideration environmental constraints such as streams, rivers and water bodies, wetlands and areas sensitive for wildlife and vegetation. To the extent that this is possible, temporary roads will be located within the flood zone of the reservoirs.²⁵⁹ When no longer required, access roads will be decommissioned.
172. Stream crossings and fording sites for all watercourses and water bodies will consider habitat type and species present at each stream crossing including those both upstream and downstream. Erosion stabilization and effective sedimentation control practices will be employed. Furthermore, stream crossings will comply with permits issued by the Newfoundland and Labrador Department of Environment and Conservation and federal guidelines, including a letter of advice from DFO.²⁶⁰

²⁵⁸ EIS Vol. IA, pg. 3-34.

²⁵⁹ EIS Vol. IA, pg. 3-44.

²⁶⁰ EIS Vol. IA, pg. 3-43.

173. Environment Canada has submitted that Nalcor should avoid any vegetation clearing or initial grading between May 1 and July 31 of any year to minimize effects on terrestrial wildlife.²⁶¹ However, Nalcor's environmental assessment considered the effects of construction activities on terrestrial wildlife throughout the year and found that if Nalcor implemented the mitigation strategies (e.g., follow best management practices and demonstrate due diligence in terms of incidental take) proposed in the EIS, the Project would not likely result in any significant adverse environmental effects on terrestrial wildlife. Furthermore, restricting Nalcor's ability to carry out activities for three full months of the year unreasonably restricts its flexibility to responsibly and efficiently construct and operate the Project. Environment Canada's recommendation is based on the prohibition on incidental take under the *Migratory Birds Convention Act*.²⁶² Nalcor had clearly stated that it will not violate this Act.²⁶³ Avifauna management plans have been developed in the past and will be developed for this Project that will ensure that Nalcor does not violate this Act.²⁶⁴ Nalcor will work closely with Environment Canada in formulating the details of this plan.²⁶⁵ Therefore, Nalcor submits that this recommendation should not be adopted.

174. With respect to reservoir clearing, several interveners have asserted that alternative strategies to reservoir preparation that could reduce mercury uptake were not adequately considered by Nalcor.²⁶⁶ However, Nalcor determined removing vegetation has been

²⁶¹ Environment Canada, CEAR 658 at pg. 36.

²⁶² S.C. 1994, c. 22, s. 5.1.

²⁶³ Gilbert Bennett, CEAR 923 at pg. 140.

²⁶⁴ Perry Trimper, CEAR 835 at pg. 79; Perry Trimper, CEAR 923 at pg. 131.

²⁶⁵ Perry Trimper, CEAR 923 at pg. 137.

²⁶⁶ For example, Natural Resources Canada, CEAR 674 at pg. 19.

found to result in essentially no difference in terms of project mercury levels.²⁶⁷ Stripping soils from the future reservoirs is not technically or economically feasible, and would have considerable environmental effects in and of themselves.²⁶⁸ Other technologies to reduce mercury concentration increases, such as adding selenium to the soil, were either unproven or created environmental risks of their own, or both, as discussed in the response to IR JRP. 33(c).²⁶⁹

175. As such, the only options that Nalcor considered for reservoir clearing were no clearing, “full” clearing and “partial” clearing of vegetation. “No” clearing involves clearing only the trees and vegetation necessary to construct the generating facilities. “Full” clearing refers to the removal of all timber in the area to be flooded by the Project where it is safe to do so. The Innu Development Limited Partnership (“IDL”) referred to this as “proper” clearing during the hearing.²⁷⁰ “Partial” clearing would involve clearing all timber from 3 metres below the low supply level (“LSL”) of the future reservoirs to 3 metres above the full supply level (“FSL”), except where it would be unsafe to do so.²⁷¹
176. These three alternatives were assessed with regards to technical feasibility, economic feasibility and environmental effects. The partial clearing option was selected as the preferred option since it met the operational needs of the generating facility, the needs for accessibility and navigation and the environmental need of accelerating the formation of a riparian zone. It was stated by some interveners that full clearing would have an

²⁶⁷ Response to IR JRP 148(a) at pg. 15.

²⁶⁸ Gilbert Bennett, CEAR 846 at pg. 31.

²⁶⁹ Response to IR 33(c) at pgs. 6 and 7.

²⁷⁰ Rick Hendriks, CEAR 835 at pg. 126.

²⁷¹ Response to IR JRP 148(a) at pg. 5.

environmental benefit in that there would be a reduction in peak methylmercury levels.²⁷² Nalcor's predictions indicate that full and partial clearing would result in the same model reduction in methylmercury level over the "no" clearing option.²⁷³ It was also stated by some interveners that full clearing would also reduce GHG emissions from the reservoir.²⁷⁴ Again Nalcor's predictions indicate that full and partial clearing would result in the same levels of GHG emissions from the reservoir.²⁷⁵ The methodology used to predict peak mercury level concentrations and GHG emissions have been accepted by the regulatory authorities for these respective areas.²⁷⁶

177. Safety considerations were made in accordance with standard forestry practices in the area.²⁷⁷ While the Sierra Club Atlantic advocated for alternative clearing technologies that could clear steeper slopes than the equipment proposed by Nalcor,²⁷⁸ they failed to provide any evidence to suggest that this could be feasible for the Project in the Project area. In addition, the Forestry Division of the Department of Natural Resources has expressed its support for the clearing methods Nalcor has proposed.²⁷⁹
178. Based on the value of the timber and the cost of clearing, neither full clearing nor partial clearing is economically feasible.²⁸⁰ In addition, while full clearing would remove more

²⁷² Roberta Benefiel, CEAR 835 p 195.

²⁷³ Response to IR JRP 148 (a) at pg. 15.

²⁷⁴ Bruno Marcocchio, CEAR 846 at pg. 5.

²⁷⁵ Response to IR JRP. 148 (a) at pg. 11.

²⁷⁶ Michael Parent, CEAR 908 at pg. 87, Keith Clarke, CEAR 908 at pg. 93, Neil Burgess, CEAR 908 at pg. 97., Environment Canada, CEAR 835, p. 169.

²⁷⁷ Colin Carroll, CEAR 846 at pg. 68.

²⁷⁸ Bruno Marcocchio, CEAR 846 at pg. 16.

²⁷⁹ Colin Carroll, CEAR 846 at pg. 79.

²⁸⁰ Response to IR JRP.6(b) at pg. 5.

vegetation from the flood zone, this clearing method would result in negligible reductions in mercury concentrations in the reservoirs and in GHG emissions.²⁸¹ Full clearing would also result in several adverse environmental effects, such as removing existing riparian habitat and generating additional air emissions.²⁸² Not only would full clearing remove riparian vegetation that protects habitat from temperature increases during reservoir preparation, but it would also create increased potential for erosion and sedimentation along the river banks.²⁸³ Finally, while full clearing would result in additional employment, the cost of accessing the additional trees would far exceed typical harvesting costs and in Nalcor's opinion would outweigh the associated employment benefits.²⁸⁴ Therefore, partial clearing was chosen as the least cost option that meets operational, environmental, and safety requirements.²⁸⁵

179. For partial clearing, Nalcor has proposed maintaining a 15 metre buffer around existing tributaries and along the main stem of the reservoir clearing zone. This buffer will maintain riparian habitat for fish and wildlife and will prevent additional environmental effects, such as erosion and depositing sediment into the river. The width of the buffer chosen by Nalcor is less than what DFO recommends for forestry activities in its *Forestry Guidelines for the Protection of Fish Habitat in Newfoundland and Labrador*,²⁸⁶ but represents a compromise between protecting riparian habitat for the interim period

²⁸¹ Bob Barnes, CEAR 835 at pg. 10; Michael Hingston, CEAR 835 at pg. 169; Michael Parent, CEAR 908 at pg. 122.

²⁸² Response to IR JRP.6(c) at pg. 7.

²⁸³ Response to IR JRP.6(c) at pg. 7.

²⁸⁴ Gilbert Bennett, CEAR 835 at pg. 148.

²⁸⁵ Response to IR JRP.6(b) at pg. 5.

²⁸⁶ DFO, CEAR 369 at pg. 8; DFO, "*Forestry Guidelines for the Protection of Fish Habitat in Newfoundland and Labrador*" (1997) online: <<http://waves-vagues.dfo-mpo.gc.ca/waves-vagues/search-recherche/display-afficher/225525>>.

between clearing and impoundment and clearing the maximum amount of vegetation possible to minimize trash and debris generation in the reservoirs and to maximum safe navigation and access to the reservoirs. As a result, Nalcor submits that a 15 metre buffer is the appropriate size of buffer to be used for reservoir clearing.

180. The IDLP and several other interveners submitted that a wood processing facility must be constructed in Labrador to process the wood that will be cleared from the reservoirs.²⁸⁷ Nalcor supports such efforts; however, as stated by the Forestry Division of the Department of Natural Resources, reservoir clearing is not a harvesting exercise.²⁸⁸ The Department of Natural Resources has asserted that it is their mandate to ensure the full utilization of the timber resource in the region.²⁸⁹ To that end, the Forestry Division has initiated an Expression of Interest process for secondary wood processing in Labrador.²⁹⁰ Nalcor will continue to work with the Forestry Division and secondary wood processors to identify opportunities to utilize timber cleared from the reservoirs to meet the objectives of the Project. Nalcor has also committed to making the wood that is cleared from the reservoirs available to interested parties for their use.²⁹¹
181. The IDLP also submitted that Nalcor should be required to remove all the timber within the reservoirs, beyond that which is required to meet the needs of the Project, where it is safe to do so and with appropriate environmental constraints.²⁹² Nalcor will work with the Department of Forestry to identify what areas of the future reservoirs will not be cleared

²⁸⁷ For example, Rick Hendriks, CEAR 835 at pg. 136.

²⁸⁸ Colin Carroll, CEAR 846 at pg. 67.

²⁸⁹ Colin Carroll, CEAR 846 at pg. 65.

²⁹⁰ Colin Carroll, CEAR 846 at pg. 66.

²⁹¹ Gilbert Bennett, CEAR 835 at pg. 145.

²⁹² Rick Hendriks, CEAR 835 at pgs. 126 and 135.

by Nalcor through the partial clearing program. This will allow secondary wood processors to clear additional timber from the Project Area. Nalcor will provide reasonable access to these areas and harvesting activities within these areas would be regulated by the Forestry Division. However, requiring Nalcor to remove additional timber beyond the partial clearing option would result in additional cost and schedule delays for the Project. In addition, there is no evidence to suggest that the half million cubic metres of harvested wood associated with partial clearing will even be fully utilized by any wood processing operation, let alone any additional wood from a full clearing operation.²⁹³ Finally, any economic benefits associated with full clearing as opposed to partial clearing from a wood processing perspective would be more than offset by the additional costs incurred by Nalcor in adopting the full clearing option.²⁹⁴ In these circumstances, it would be inappropriate to require Nalcor to adopt the full clearing option.

182. In terms of reservoir filling, impoundment of the reservoirs is date restricted, due to the timing of sensitive life stages (e.g., reproduction, rearing, denning) in a variety of aquatic and terrestrial species. While mitigation strategies are available to minimize the effects of inundation throughout the year,²⁹⁵ and thus no period of impoundment would be likely to result in significant adverse environmental effects, the period between August and October represents the least sensitive period for most species and, accordingly, this was the preferred option for impoundment by Nalcor.²⁹⁶ DFO submitted that the ideal period

²⁹³ Gilbert Bennett, CEAR 835 at pg. 146.

²⁹⁴ Gilbert Bennett, CEAR 835 at pg. 148.

²⁹⁵ CEAR 1039.

²⁹⁶ EIS Vol. IA, pg. 3-49.

of impoundment for the purposes of fish and fish habitat is mid-July to mid-September.²⁹⁷ However, flooding during this period would result in greater effects on certain terrestrial wildlife, such as Wetland Sparrows.²⁹⁸ Similarly, the Department of Environment and Conservation's Wildlife Division suggested changing the preferred period of impoundment so that no impoundment occurs after October 1st.²⁹⁹ Again, however, this was only based on effects on one species (black bears) and in fact was based on behavioural data from other areas that was found to be non-representative of the Project Area, where black bears were found to not enter dens until November.³⁰⁰ Therefore, Nalcor submits that flexibility in impoundment must be maintained. However, the preferred impoundment period should remain between August and October.

183. While Nalcor plans to fill the reservoirs during the preferred impoundment period, and Nalcor's detailed construction schedules provide a high degree of certainty that this will occur, it is possible that impoundment will occur outside of this period. The Project will experience considerable financial losses if the construction is completed and Nalcor is not able to commence filling at that time.³⁰¹ If in the future it appears to Nalcor that reservoir filling will occur outside of the preferred impoundment period, Nalcor will consult with all appropriate regulators several months in advance to minimize any adverse effects.³⁰²

²⁹⁷ Fisheries and Oceans Canada, CEAR 639 at pg. 11.

²⁹⁸ EIS, Vol. IIB at pg. 5-33.

²⁹⁹ Kirsten Miller, CEAR 1113 at pg. 359.

³⁰⁰ Perry Trimper, CEAR 1113 at pg. 372.

³⁰¹ Marion Organ, CEAR 835 at pg. 60.

³⁰² Bob Barnes, CEAR 835 at pg. 12.

Furthermore, reservoir filling will not occur outside of the preferred impoundment period without all of the appropriate regulators accepting an alternate impoundment strategy.³⁰³

184. A further issue that was raised with respect to reservoir impoundment was reservoir-triggered seismicity (“RTS”).³⁰⁴ During the hearing, Natural Resources Canada (“NRCan”) supported Nalcor’s conclusion that any RTS experienced in the Project reservoirs should be at frequencies well above the natural frequency of the dams and would be of short duration.³⁰⁵ Therefore, they agreed with Nalcor that the dams will not be affected by any RTS caused by the reservoirs.

185. With respect to Project sequencing, construction for the Project will be staged so that either the Gull Island facility or the Muskrat Falls facility will be constructed first, and then the second facility will be constructed at a later date.³⁰⁶ Nalcor has undertaken a full assessment of the environmental effects associated with each dam separately and has concluded that the differences in environmental effects between the order of construction sequencing are negligible.³⁰⁷

(b) Operations

186. Concerns in relation to the operation of the Project focussed on the location of operations staff, as well as reservoir levels and drawdowns.

³⁰³ Gilbert Bennett, CEAR 846 at pg. 144.

³⁰⁴ For example, Roberta Benefiel, CEAR 835 at pg. 203.

³⁰⁵ Response to IR JRP.62(a) at pg. 2; Dr. Maurice Lamontagne, CEAR 836 at pg. 69.

³⁰⁶ EIS Vol. IA, pg. 3-51.

³⁰⁷ Response to IR JRP.165 at pg. 3.

187. The Gull Island and Muskrat Falls generation facilities will be operated remotely using the Hydro Energy Management System in St. John's. This system operates the network for efficient delivery of electricity. Remote monitoring programs, such as for ice conditions and reservoir levels, will be incorporated into the operations system.³⁰⁸
188. During operations, a maintenance crew will be based in Happy Valley-Goose Bay. These personnel will respond to any issues that become identified in the monitoring results, and will also conduct routine weekly monitoring of each dam to check for erosion, rainfall damage and sloughing. Each week, maintenance personnel will also conduct a reconciliation of fuel tanks as well as tests on fire pumps and emergency diesels. On a monthly basis, maintenance personnel will inspect the domestic water system.³⁰⁹ Semi-annually, maintenance personnel will check for any movements in the dams or changes to elevation, as well as inspecting the operations of the spillway gates.³¹⁰
189. Each year, maintenance personnel will also conduct a vegetation management program to remove vegetation from each dam. Annual inspections of the spillways, access roads, fire protection systems, generators, transformers, switchgear and powerhouses will also occur using approved methods.³¹¹
190. These frequent inspections will be part of Nalcor's ongoing monitoring program to ensure that the effect predictions in this environmental assessment are accurate. If any equipment at one of the facilities is not working as intended, or begins to show signs of

³⁰⁸ EIS Vol. IA, pg. 4-58.

³⁰⁹ EIS Vol. IA, pg. 4-59.

³¹⁰ EIS Vol. IA, pg. 4-60.

³¹¹ EIS Vol. IA, pg. 4-60.

failure, the maintenance personnel will be able to detect these issues promptly and address them to ensure they do not result in any larger problems. This strategy for operating the facilities will also create 50 full-time jobs in Happy Valley-Goose Bay.³¹²

191. In terms of operation of the reservoirs, several interveners expressed concerns about the environmental effects associated with frequent drawdowns.
192. Both the Gull Island and Muskrat Falls reservoirs will be operated as close to FSL as possible in order to maximize power and energy output.³¹³ This will minimize adverse environmental effects associated with frequent drawdowns. Reservoir levels will be drawn down to the LSL immediately prior to spring melt to accommodate the substantial inflows that occur during this period. Levels will then increase back to FSL.³¹⁴ These operating regimes are considered the minimum range over which it would be technically feasible to operate a hydroelectric facility, and the environmental effects of these drawdowns have been fully assessed in the EIS³¹⁵ and incorporated into the Fish Habitat Compensation Strategy.³¹⁶
193. Some interveners have also expressed concerns about the loss of seasonal flow dynamics as a result of the Project.³¹⁷ It is important to note that the Churchill River is already a regulated river; the flows downstream of Muskrat Falls post-inundation are expected to remain essentially the same as at present. Post-inundation, there will continue to be

³¹² Gilbert Bennett, CEAR 1164 at pg. 25.

³¹³ EIS Vol. IA, pg. 3-52.

³¹⁴ EIS Vol. IA, pg. 4-59.

³¹⁵ Response to IR JRP. 28(e) at pg. 31.

³¹⁶ Response to IR JRP. 153.

³¹⁷ For example, Nunatsiavut Government presentation, CEAR 645.

increased flows during the spring as the reservoirs have limited storage capacity. In addition, flow variation that occurs as a result of uncontrolled inflows to the downstream portion of the watershed will continue in the future, and is therefore consistent with the World Commission on Dams report,³¹⁸ the Rosenbert *et. al.* paper *Large-scale impacts of hydroelectric development*³¹⁹ and DFO's 2008 paper on *Effects of Altered Flow on Fish Habitat and Fishes Downstream from a Hydropower Dam*³²⁰ in terms of minimizing downstream effects.³²¹ Nalcor assessed the environmental effects associated with any change in seasonal flow dynamics and concluded that the Project will have no measurable effect on the current fish productivity and flow patterns observed within the main stem lower Churchill River below Muskrat Falls, in the Goose Bay Estuary or Lake Melville.³²²

(c) Decommissioning

194. The Sierra Club Atlantic, among others, has asserted that Nalcor's exclusion of decommissioning from Nalcor's environmental assessment is unacceptable.³²³ However, there are no plans to decommission the Project as it is expected to be operated for at least fifty years and potentially much longer.³²⁴ Past hydroelectric developments, such as the

³¹⁸ World Commission on Dams, 2000. *Dams and Development; A New Framework for Decision-Making*. Earthscan Publications Ltd. 365 pp.

³¹⁹ Rosenberg, D.M., F. Berkes, R.A. Bodaly, R.E. Hecky, C.A. Kelly and J.W.M. Rudd. 1997 *Large-scale impacts of hydroelectric development*. *Environ. Rev.* 5:27-54.

³²⁰ Clarke, K.D., T.C. Pratt, R.G. Randall, D.A. Scruton, K.E. Smokorowski. 2008. *Validation of the Flow Management Pathway: Effects of Altered Flow on Fish Habitat and Fishes Downstream from a Hydropower Dam*. *Can. Tech. Rep. Fish. Aquat. Sci.* 2784:vi + 111p.

³²¹ Gilbert Bennett, CEAR 923 at pg. 71; Jim McCarthy, CEAR 884 at pg. 34.

³²² Response to IR JRP.43(a) at pg. 3.

³²³ Sierra Club Atlantic, CEAR 676 at pg. 4.

³²⁴ Gilbert Bennett, CEAR 793 at pg. 118.

Petty Harbour hydroelectric facility, demonstrate that these projects can continue to operate for over a century without any need for decommissioning.³²⁵ The amount of investment that will be required to refurbish and allow the Project to operate for the indefinite future will be much smaller than the original capital cost of the Project.³²⁶ Therefore, it is impossible to predict if and when decommissioning will be required for the Project and what the costs associated with decommissioning will be at that time. Nevertheless, the net present value of such costs would likely be a very small number.³²⁷ That was confirmed by Professor Rudd who accepted that the net present value of decommissioning is functionally close to \$0.³²⁸

195. In addition, any future decommissioning or abandonment activities will be subject to future examination under the NLEPA and the CEAA (or other legislation applicable) at the time of decommissioning.³²⁹ Decommissioning plans would also have to be approved by DFO, Transport Canada, as well as the Department of Environment and Conservation.³³⁰ This approach to decommissioning for large-scale hydroelectric projects was approved by the Joint Review Panel in the Romaine River Hydroelectric Complex Development Project³³¹ and Nalcor submits that it is appropriate for the Project as well.

³²⁵ Gilbert Bennett, CEAR 793 at pg. 118.

³²⁶ Gilbert Bennett, CEAR 793 at pg. 119.

³²⁷ Gilbert Bennett, CEAR 793 at pg. 119.

³²⁸ Murray Rudd, CEAR 1163 at pg. 122.

³²⁹ EIS Vol. IA, pg. 4-62.

³³⁰ Response to IR JRP.40(a) at pg. 2.

³³¹ Response to IR JRP.40(a) at pg. 2.

(ii) Ice Formation

196. Ice dynamics have been raised as a concern primarily in relation to ice formation downstream of Muskrat Falls. Residents of Mud Lake in particular are concerned about their ability to travel on the ice after this Project is commenced.³³²
197. Nalcor conducted two different types of studies to determine the effects of the Project on ice formation. First, baseline data was collected to determine the existing physical characteristics and processes of ice on the lower Churchill River. This study included field work to document the extent of ice cover and break-up processes. Secondly, Nalcor conducted thorough thermal and dynamic ice modelling to enable prediction of changes that might occur as a result of the Project.³³³
198. These studies produced several conclusions. First, the timing of freeze-up and break-up in any given year currently fluctuates considerably.³³⁴ Therefore, at present no one is able to predict with absolute certainty what week of the year the main stem below Muskrat Falls will freeze or what week it will break-up. Secondly, the studies predicted that the timing of freeze-up post-inundation would occur up to two weeks later than it does at present, and the timing of break-up would be delayed by approximately one week.³³⁵ However, the total “transition” time between open water and ice and vice versa – i.e. the amount of time that Mud Lake residents would be unable to travel across the river – would not change, nor would the stability or thickness of the ice.³³⁶ The Water Resources

³³² For example, Craig Chaulk, CEAR 952 at pg. 35; Vyann Kerby, CEAR 952 at pg. 43.

³³³ EIS Vol. IA, pg. 9-9.

³³⁴ Response to IR JRP.71(d).

³³⁵ EIS Vol. III, at pg. 5-19.

³³⁶ EIS Vol. III, at pg. 5-19, Ice Dynamics Component Study at pg. 7-2.

Management Division of the Department of Environment and Conservation concurred with Nalcor's predictions for ice formation, especially in the vicinity of Happy Valley-Goose Bay and Mud Lake.³³⁷

199. Therefore, while the timing of river crossings will likely shift for Mud Lake residents, the effects of the Project on navigation are not predicted to be significant.³³⁸ Transport Canada has reached the same conclusion.³³⁹ In addition, Nalcor has committed to monitoring ice formation in select locations downstream of Muskrat Falls to verify that its predictions of ice formation are accurate and to communicate ice stability information to local residents.³⁴⁰ While unlikely, if Nalcor's predictions are wrong and the Project is found to result in residents of Mud Lake being unable to travel to Happy Valley-Goose Bay for a longer period than they are currently experiencing, Nalcor will provide alternative travel arrangements for those additional periods.³⁴¹
200. At the request of the Panel, Nalcor incorporated climate change parameters into its ice dynamics modelling.³⁴² The results of this modified modelling are very similar to the original results. While climate change will likely shorten the total period of ice-cover, the processes of ice formation and break up (i.e. the "transition" period) are predicted to be unaltered by climate change.³⁴³ It should be noted that climate change is also predicted to result in an increase in the intensity and frequency of extreme temperature events. This

³³⁷ Michael Colbert, CEAR 884 at pg. 207.

³³⁸ Response to IR JRP.71(e).

³³⁹ Transport Canada, CEAR 635 at pg. 12.

³⁴⁰ Response to IR JRP.164 at pg. 4.

³⁴¹ Gilbert Bennett, CEAR 952 at pg. 198.

³⁴² CEAR 1037.

³⁴³ CEAR 1037, at pg. 1.

means that regardless of the Project, climate change will likely result in an increased variability of the occurrence and duration of impassable river conditions for the residents of Mud Lake.³⁴⁴

(iii) Bank Stability

201. NRCan has requested that Nalcor conduct further studies to determine the stability of the banks of the River, both pre- and post-impoundment.³⁴⁵ Further, NRCan has recommended that Nalcor be required to establish a procedure for drawing down the reservoirs following a spring flood or for maintenance purposes.³⁴⁶
202. Nalcor has conducted extensive studies of the existing bank stability along the lower Churchill River and the susceptibility of this region to large-scale mass movements. These studies found that slope failures along the River are not uncommon at present, and that slope failures were expected post-inundation as well.³⁴⁷ The effects associated with these slope failures were fully assessed in the EIS.³⁴⁸ As such, Nalcor submits that further studies of bank stability are unnecessary for the purposes of assessing the environmental effects associated with the Project. NRCan's recommendations relate to the detailed engineering and design that will be done for the Project, following a favourable outcome in this environmental assessment.³⁴⁹ As per industry best practice, Nalcor will develop formal drawdown procedures as part of the detailed design phase for various operating

³⁴⁴ CEAR 1037, at pg. 2.

³⁴⁵ Natural Resources Canada, CEAR 674 at pg. 9.

³⁴⁶ Natural Resources Canada, CEAR 674 at pg. 9.

³⁴⁷ Response to IR JRP.55(a) at pg. 2.

³⁴⁸ EIS Vol. IIA, pgs. 4-9 and 4-10.

³⁴⁹ Gilbert Bennett, CEAR 836 at pg. 122.

conditions, as recommended by NRCan, to ensure the safe operation of the reservoirs and the generating facility.

203. Further concerns were raised during the hearing that the soil surrounding the proposed Muskrat Falls dam site is inherently unstable and that this could result in dam failure.³⁵⁰ Nalcor acknowledged that there was instability in this area in the EIS and has proposed several strategies to increase stability prior to impoundment.³⁵¹ NRCan considered this issue as well and concluded that Nalcor has an adequate and fundamental understanding of the geotechnical and groundwater conditions that contribute to the existing instabilities at the Muskrat Falls dam site and that Nalcor's proposed stabilization approaches are reasonable.³⁵² As a result, Nalcor submits that any inherent bank instability in the vicinity of the dam sites will be managed and is not be likely to result in dam failure.

(iv) Compensation Flow/Water Management

204. Several concerns were raised surrounding compensation flows and the water management agreement with the existing Churchill Falls hydroelectric facility.³⁵³ Specifically, some stakeholders are concerned that minimum flows will not be released into the River downstream of Muskrat Falls, perhaps as a result of limited water supply from the Churchill Falls Power Station. If minimum flows are not released, these stakeholders are concerned about the downstream effects on fish and fish habitat.

³⁵⁰ For example, Bruno Marcocchio, CEAR 1163 at pg. 338.

³⁵¹ EIS Vol IA, pg. 4-51.

³⁵² CEAR 1082 at pg. 5.

³⁵³ For example, Carly Thomson, CEAR 952 at pg. 104; Watson Rumble, CEAR 952 at pg. 165.

205. During impoundment of each reservoir, Nalcor has committed to ensuring that 30% of the mean annual flow of the river is released downstream of each dam to maintain downstream fish habitat for fish.³⁵⁴ This minimum flow, referred to as “compensation flow”, will amount to between 500 and 560 m³/second. By comparison, historical data shows that flows in the lower Churchill River have dropped to 250 m³/second in the past.³⁵⁵ So the proposed compensation flows are well above what the River has experienced previously and are well within natural variation.
206. DFO expressed concerns surrounding fish stranding and dewatering of spawning habitat downstream of Muskrat Falls during impoundment.³⁵⁶ These effects may occur as a result of impoundment, and they have occurred historically during periods of low flow.³⁵⁷ There are several mitigation options that are available to Nalcor in the event that fish are stranded downstream of Muskrat Falls during the limited periods of reservoir impoundment. For example, Nalcor could release additional water through the spillways during impoundment.³⁵⁸ Alternatively, stranded fish could be relocated.³⁵⁹ DFO has submitted that its concerns with fish stranding will be covered in any authorization it grants for the Project.³⁶⁰ In terms of dewatering spawning grounds, the worst-case scenario would involve the loss of a full year’s cohort of new fish as a result of desiccating eggs downstream of Muskrat Falls during impoundment. As shown in

³⁵⁴ Response to IR JRP.148(e).

³⁵⁵ Jim McCarthy, CEAR 884 at pg. 9.

³⁵⁶ Tilman Bieger, CEAR 835 at pg. 269.

³⁵⁷ Jim McCarthy, CEAR 884 at pg. 9.

³⁵⁸ Gilbert Bennett, CEAR 385 at pg. 315.

³⁵⁹ Jim McCarthy, CEAR 884 at pg. 13.

³⁶⁰ Tilman Bieger, CEAR 1113 at pg. 243.

Nalcor's presentation of the existing and pre-Churchill flow regimes,³⁶¹ the compensation flow is approximately twice that of historical low flow periods for the lower Churchill River, and therefore is well within the range that species have adapted to and experienced previously. The calculation of the minimum flow release is a mitigation for loss of habitat and fish during impoundment based on DFO's paper *A Common Approach to Understanding and Addressing Instream Flow Needs in Newfoundland and Labrador*.³⁶² The habitat downstream of Muskrat Falls has been described and quantified in terms of substrates and species present. The majority of the substrate is uniform sand and not conducive to spawning by salmonids and equally suitable throughout for other species residing there, such as suckers. Therefore, a complete loss of a cohort of fish as a result of reduced flows is not likely.

207. As stated above, the DFO approach of instream flow was used to determine the appropriate level of flow mitigation needed. In fact, the described approach to determining the level of flow needs is typically for more permanent alterations of flow and is therefore considered conservative for flows incurred during the relatively brief impoundment time periods. DFO has suggested that using Tennant's Method to determine flow release is less accurate than more detailed modeling such as PHABSIM; however, the method used was based on the DFO approach outlined in their paper: *A Common Approach to Understanding Instream Flow Needs in Newfoundland and Labrador*.³⁶³ This additional modeling is inconsistent with DFO's approach outlined in

³⁶¹ CEAR 867.

³⁶² CEAR 639, Gosse, M.M., B. Brown, D. Scruton and A. Beersing. No date. *A Common Approach to Understanding and Addressing Instream Flow Needs in Newfoundland and Labrador*. Sciences, Oceans and Environment Branch, Department of Fisheries and Oceans, St. John's, NL.

³⁶³ CEAR 639, pg. 10.

its paper for determination of the flow release under the impoundment scenario. Nalcor also believes that with the flow control they have over downstream water release at Muskrat Falls during impoundment, a stepped approach to downstream water reduction could be implemented. For example, flows could be reduced slowly, and if it is determined that the 30 percent flow release may be too low, the flows may be held at a higher level.

208. During operations, Nalcor has also committed to minimum flows that will be released from each generating facility (either through power generation or via the spillway) that ensure the flows in the River do not fall below historic levels.³⁶⁴ The Water Management Agreement that was concluded between Nalcor and the operator of the Churchill Falls Power Station, CF(L)Co., on March 9, 2010 will ensure that enough water is released into the lower Churchill River from the Churchill Falls Power Station to at least provide the minimum flow levels that Nalcor has committed to.³⁶⁵ In addition, with the exception of drawdown in the spring of each year, the reservoirs for the Project will be operated as close as possible to the FSL's.³⁶⁶ This means that the amount of water that is released from the Churchill Falls Power Station must also be released at both the Gull Island and Muskrat Falls facilities. In turn, this ensures that flows downstream of Muskrat Falls during operation of the Project remain consistent with the existing flow regime, which is also dependent on releases from the Churchill Falls Power Station.

³⁶⁴ Response to IR JRP.149(b) at pg. 7.

³⁶⁵ Response to IR JRP.149(a) at pg. 3.

³⁶⁶ Response to IR JRP.84(a).

(v) *Accidents and Malfunctions*

209. Finally, concerns have been raised regarding the effects associated with any accidents or malfunctions in relation to the Project, and in particular the effects associated with dam failure.³⁶⁷
210. Nalcor was required to assess the potential environmental effects of malfunctions or accidents that may occur as a result of the Project pursuant to both the EIS Guidelines and the CEAA.³⁶⁸ In constructing and operating the Project, Nalcor will use only those technologies that have a proven record of performance.³⁶⁹ Nalcor has also committed to incorporate fail-safe design into planning of the Project, meaning that any failure of equipment, processes or systems, will produce minimum propagation beyond the immediate environment of the failing entity, that the failure will be economically acceptable, and that devices in the system will perform their intended function and eliminate danger upon the loss of actuating power.³⁷⁰
211. Given the complex nature of activities associated with the construction, operation and maintenance of the Project, an accidental release or other unplanned event is possible. To address that reality, Nalcor will develop a series of comprehensive Safety, Health and Environmental Emergency Response Plans (“SHERPs”).³⁷¹ The purpose of each SHERP will be to identify responsibilities in the event of an unplanned incident, and to provide

³⁶⁷ For example, Debbie Michelin CEAR 648 at pg. 3.

³⁶⁸ Section 4.5.2 of the EIS Guidelines; *Canadian Environmental Assessment Act* at s. 16(1)(a).

³⁶⁹ EIS Vol. IA, pg. 3-5.

³⁷⁰ EIS Vol. IA, pg. 3-6.

³⁷¹ EIS Vol. IA, pg. 3-9.

the information required for effective response and incident reporting. These Plans will establish procedures to:

- (a) Protect and maintain human health and safety;
- (b) Identify the potential for accidents and emergency situations;
- (c) Plan responses to accidents and emergency situations; and
- (d) Prevent and mitigate potential environmental effects associated with accidents and emergency situations.³⁷²

212. Environment Canada has submitted that this approach to emergency preparedness is satisfactory.³⁷³ The Department of Fire and Emergency Services also submitted that it concurred with Nalcor's effects predictions and mitigation strategies for emergencies.³⁷⁴

213. In the EIS and in IR responses, Nalcor considered the environmental effects associated with accidental releases of garbage and waste, spills of hazardous materials, dam failure, and forest fires, including worst-case scenarios for both dam failure and forest fires.³⁷⁵ Nalcor also commissioned a comprehensive Dam Break Study that was published in August 2010.³⁷⁶ This study complemented the previous Churchill Falls Dam Break study that assessed potential effects that would result from a failure upstream of the Project at the Churchill Falls Power Generation facility.³⁷⁷

³⁷² EIS Vol. IA, pg. 3-9.

³⁷³ Environment Canada presentation, CEAR 659.

³⁷⁴ Derek Simmons, CEAR 1113 at pg. 334.

³⁷⁵ EIS Vol. IA, pgs. 4-81 to 4-89; Responses to IR JRP.96, IR JRP.145, and IR JRP.162.

³⁷⁶ Response to IR JRP 162, Appendix F.

³⁷⁷ CEAR 504.

214. For each potential accident or malfunction, Nalcor has identified mitigation methods to prevent them from occurring, and to reduce the effects associated with them should they occur.³⁷⁸ With these prevention measures in place, Nalcor concluded that the likelihood of any accidental releases of garbage and waste or spills of hazardous materials were minimal and could be contained and remedied in a short period of time.³⁷⁹ Forest fires are also unlikely to be caused by the Project; however, Nalcor has committed to develop a plan to prevent and combat forest fires that will assist in minimizing the occurrence and limiting the area burned by a forest fire.³⁸⁰
215. In terms of dam failure, both dams will comply with the Canadian Dam Association Dam Safety Guidelines (2007), which reflect international dam design standards and guidelines.³⁸¹ While some interveners are concerned with the safety of these dams,³⁸² Nalcor submits that these dams will be constructed according to best industry standards and therefore any dam failure will be very unlikely.³⁸³ This was confirmed by Hatch in its 2010 Supplemental Dam Break Analysis.³⁸⁴ In addition, the Province requires Dam Safety Reviews (DSRs) as per the guidelines stipulated in the Canadian Dam Association Safety Guidelines by independent engineering firms every five years to further protect against the risk of any unanticipated dam failure.³⁸⁵ The Department of Environment and

³⁷⁸ EIS Vol. IA, pgs. 4-81 to 4-89.

³⁷⁹ EIS Vol. IA, pgs. 4-83 and 4-84.

³⁸⁰ EIS Vol. IA, pg. 4-87.

³⁸¹ EIS Vol. IA, pg. 3-29; Bob Barnes, CEAR 1208 at pg. 240.

³⁸² For example, Debbie Michelin, CEAR 648; Rebecca Benefiel, CEAR 835 at pgs. 204 and 205.

³⁸³ Marion Organ, CEAR 952 at pg. 29.

³⁸⁴ Response to IR JRP.162, Appendix F at pg. 2.

³⁸⁵ Clyde McLean, CEAR 835 at pg. 231.

Conservation's Water Management Division concluded that the risk of dam failure for the Project is "very low".³⁸⁶

216. Nevertheless, Nalcor assessed the effects associated with a worst-case dam breach scenario, referred to as the Probable Maximum Flood ("PMF") scenario for the Churchill basin.³⁸⁷ The results of this dam breach modelling will be incorporated into Nalcor's Emergency Preparedness Plan for the Project, which will identify the hazards posed by the dam, the roles and responsibilities of all parties, and the notifications to be made in the event of an emergency at the dam.³⁸⁸ This Plan will be in place prior to any reservoir impoundment.³⁸⁹
217. In addition, the results of the dam breach modelling were used to prepare inundation mapping that may be used by downstream communities to develop emergency preparedness planning and to assess the consequences of failure for structures at the Churchill Falls Power Generation facility as well as the Project.³⁹⁰ Nalcor has committed to working with each community that has been identified in the Dam Break Study to develop evacuation strategies in the event of a dam failure. These community plans will be in place prior to inundation and will ensure that in the event of a dam failure all potentially affected individuals will be evacuated from the flood zone within the necessary timeframes.³⁹¹ For example, the Town of Happy Valley-Goose Bay submitted that it accepts responsibility for updating its emergency response plan to include the

³⁸⁶ Clyde McLean, CEAR 835 at pg. 229.

³⁸⁷ CEAR 504 at pg. 34.

³⁸⁸ EIS Vol. IA, pg. 4-86.

³⁸⁹ Gilbert Bennett, CEAR 846 at pg. 145.

³⁹⁰ CEAR 504 at pg. 98.

³⁹¹ Marion Organ, CEAR 952 at pg. 175.

Project and that it had been working closely with Nalcor to develop the details of that plan.³⁹² By law, Nalcor has no authority to evacuate communities or implement emergency response actions. Nalcor's commitment is to work with those providers and assist as appropriate.

IV. Environmental Issues

218. Environmental issues will be discussed for each biophysical VEC: aquatic environment, terrestrial environment, and atmospheric environment.

(i) Aquatic

(a) Fish and Fish Habitat

219. Many interveners throughout the hearing have expressed concerns about the effects of the Project on fish and fish habitat.³⁹³

220. Nalcor's environmental assessment of the aquatic environment focused primarily on fish and fish habitat, as this was deemed to be an overall indicator of aquatic ecosystem health.³⁹⁴ The study team assessed the nature of every interaction between the Project and fish and fish habitat, as well as the magnitude, geographic extent, duration, frequency, reversibility, likelihood, and level of certainty of each potential effect, and the existing level of disturbance on fish and fish habitat in the lower Churchill River.³⁹⁵

³⁹² Wyman Jacques, CEAR 1113 at pg. 381.

³⁹³ For example, DFO, CEAR 884 at pg. 75; Grand Riverkeeper, CEAR 908 at pg. 60.

³⁹⁴ EIS Vol. IIA, pg. 4-1.

³⁹⁵ EIS Vol. IIA, pgs. 4-6 and 4-7.

221. The definition of significant adverse environmental effect for fish and fish habitat was any adverse effect that would prevent conditions from stabilizing at their original conditions within several generations, whether in respect of habitat quantity, fish populations, fish mortality, habitat quality, or fish health.³⁹⁶
222. The study team drew from extensive baseline research on fish and fish habitat in the lower Churchill River that was collected over several decades.³⁹⁷ This baseline research provided Nalcor with a thorough understanding of fish habitat, fish habitat use, and water quality throughout the river.³⁹⁸ As a result of this baseline research, several conclusions were formed regarding the potential effects of the Project on fish and fish habitat. First, there will be a 11,865 ha increase of fish habitat as a result of the formation of the Muskrat Falls and Gull Island reservoirs; 3,652 ha at Muskrat Falls Reservoir and 8,213 ha at the Gull Island Reservoir.³⁹⁹
223. Second, there will be some changes in fish habitat quality as a result of the Project. Levels of total suspended sediment will increase in the reservoirs from baseline river conditions and there will be a period of trophic upsurge.⁴⁰⁰ These levels will not exceed the natural variability that fish can use as habitat.⁴⁰¹ In addition, based on extensive literature reviews, experience from other large-scale hydroelectric projects, and modelling specific to the lower Churchill River, it is expected that post-impoundment

³⁹⁶ EIS Vol. IIA, pg. 4-7.

³⁹⁷ EIS Vol. IIA, pgs. 4-7 to 4-17.

³⁹⁸ CEAR 933.

³⁹⁹ EIS Vol. IIA, pg. 4-38.

⁴⁰⁰ EIS Vol. IIA, pgs. 4-57 and 4-58.

⁴⁰¹ Jim McCarthy, CEAR 884 at pg. 31.

habitats will effectively stabilize within 15 to 20 years of inundation.⁴⁰² Calculations regarding overall change in the productive capacity of the habitat within the Assessment Area indicate that, in terms of species composition, the fish within the lower Churchill River will not be affected by the Project.⁴⁰³ This issue was further explored in the Wednesday morning session which concluded the evidentiary portion of the hearings. Mr. McCarthy was unequivocal in his responses to questioning by the panel and others that the abundance and assemblages of fish post project would be similar to pre-project. In respect of the tables showing the reduction of available habitat, Mr. McCarthy explained that the tables simply showed calculations based on DFO criteria, when it was clear from field studies that habitat that was rated as zero based on that criteria was in fact productive. Mr. McCarthy explained that the table allows the proponent to understand what the issues are and ensure that the compensation measures are in place *prior* to habitat being lost. He also confirmed that the cumulative, or combined effects, are all taken into consideration in response to the panel. (Wednesday, April 13 session in Goose Bay, Transcript citation not available at time of completion of submission and CEAR document 1205).

224. Third, the construction and operation of the Gull Island and Muskrat Falls reservoirs is not anticipated to cause significant mortality of fish within the Project Area. In part, this will be due to compensation flows during construction and the limited drawdown of the reservoirs during operations.⁴⁰⁴ DFO will require that Nalcor obtain an approval under section 32 of the *Fisheries Act* for incidental mortalities of fish during impoundment and

⁴⁰² EIS Vol. IIA, pg. 4-58.

⁴⁰³ EIS Vol. IIA, pg. 4-50.

⁴⁰⁴ EIS Vol. IIA, pg. 4-51.

for entrainment during operations.⁴⁰⁵ One of the conditions that would be attached to such an authorization would be detailed monitoring requirements.⁴⁰⁶ However, as mentioned previously, Nalcor has identified mitigation strategies that it will use if fish are stranded during impoundment and DFO has accepted that with these mitigation measures, there will not likely be any population level effects on fish during impoundment.⁴⁰⁷ In addition, since there are only limited movements of fish between the dam sites at present, fish mortality caused by entrainment is predicted to be localized and minimal.⁴⁰⁸ DFO agreed with this conclusion.⁴⁰⁹ Therefore, the Project is not likely to result in any population level fish mortality.

225. Fourth, peak fish mercury concentrations during reservoir operation may increase as a result of the Project, but they will be at the low to moderate range of what has been observed for other boreal reservoirs.⁴¹⁰ Fish population health will not be affected by this change.⁴¹¹ In addition, mercury levels in fish are expected to peak within 5 to 15 years of inundation and will return to baseline levels within 35 years.⁴¹² No evidence has been filed which would contradict those predictions.

226. As a result of these conclusions and the proposed fish habitat compensation strategy, discussed below, the study team concluded that no significant adverse effects are

⁴⁰⁵ Fisheries and Oceans Canada, CEAR 639 at pgs. 11 and 30.

⁴⁰⁶ Tilman Bieger, CEAR 1113 at pg. 247.

⁴⁰⁷ Gilbert Bennett, CEAR 385 at pg. 315; Jim McCarthy, CEAR 884 at pg. 13; Tilman Bieger, CEAR 1113 at pg. 243.

⁴⁰⁸ EIS Vol. IIA, pg. 4-52; response to IR JRP.51; Component Study 7 of 11 for Fish and Fish Habitat.

⁴⁰⁹ Tilman Bieger, CEAR 1113 at pg. 287.

⁴¹⁰ EIS Vol. IIA, pg. 4-56.

⁴¹¹ EIS Vol. IIA, pg. 4-59.

⁴¹² EIS Vol. IIA, pg. 4-56.

predicted for fish and fish habitat, either during construction or operation.⁴¹³ DFO similarly concluded that the Project will not result in environmental effects that are not “unmanageable or unacceptable”.⁴¹⁴

227. To verify this conclusion, Nalcor has designed long-term environmental effects monitoring programs to ensure that fish and fish habitat respond to the Project as expected and that Nalcor’s planned mitigation measures are working as intended.⁴¹⁵ Nalcor has accepted each of DFO’s recommendations for fish and fish habitat monitoring programs.⁴¹⁶ In addition, Nalcor and the Province have committed to expanding its network of real-time water monitoring stations in the river and out into Goose Bay and Lake Melville should the Project proceed, in order to ensure that Nalcor’s effects predictions are accurate.⁴¹⁷

(b) Groundwater Quality

228. Several concerns were raised in relation to groundwater effects of the Project and, specifically, that the Project would result in decreased drinking water quality in Happy Valley-Goose Bay and Mud Lake through saltwater intrusion during impoundment.⁴¹⁸

229. Nalcor studied this issue using a precautionary approach – conservative estimates of the freshwater input from the Churchill River were used, and the saline input from Lake Melville was overestimated. Even with these conservative values and zero compensation

⁴¹³ EIS Vol. IIA, pgs. 4-57 and 5-49.

⁴¹⁴ Tilman Bieger, CEAR 884 at pg. 99.

⁴¹⁵ EIS Vol. IIA, pg. 4-61; CEAR 1189 at pg. 3.

⁴¹⁶ Todd Burlingame, CEAR 1113 at pg. 269.

⁴¹⁷ Clyde McLean, CEAR 1113 at pg. 103.

⁴¹⁸ Clarice Blake-Rudkowski, CEAR 884 at pgs. 54, 55, and 268.

flows, the greatest extent of saltwater intrusion was found to be 3 km upriver from the mouth of the river.⁴¹⁹ With the 30 percent compensation flow that Nalcor has committed to, no saltwater intrusion beyond the mouth of the river is predicted.⁴²⁰

230. Nalcor assessed whether or not the groundwater aquifers that are used for drinking water by local communities could be affected by the Project. For Mud Lake, a field program and associated assessment was conducted. The study concluded that groundwater consistently flowed towards either the Churchill River or the Channel and that at no time was there groundwater flow from either the Channel or the Churchill River inland towards the resident's wells.⁴²¹ Existing literature for the Town of Happy Valley-Goose Bay was reviewed.⁴²² It was determined that there is limited potential for interaction between the River and the groundwater supply and subsequently limited potential for Project-related effects. As stated, the aquifer that is supplying fresh groundwater to the Happy Valley-Goose Bay well field is described as a leaky confined aquifer, which means that it is not directly connected to the immediate surface water system, namely the Churchill River. The groundwater source is considered to be non-GUDI (Groundwater Under Direct Influence from Surface Water). In other words, it is not considered to be vulnerable to direct surface water influence in the immediate area of the wells that form the well field.

231. The Water Resources Management Division of the Department of Environment and Conservation confirmed that the Project would not likely affect drinking water in either

⁴¹⁹ Hatch (2008), Saltwater Intrusion Component Study, at pg. 8-1.

⁴²⁰ Hatch (2008), Saltwater Intrusion Component Study, at pg. 8-1.

⁴²¹ Response to IR JRP 63(l) at pg. 24; response to IR JRP.63(m) at pg. 25; response to IR JRP.160 at pg. 3.

⁴²² Response to IR JRP 63(l) at pg. 24, response to IR JRP.63(m) at pg. 25.

community.⁴²³ Health Canada reached the same conclusion.⁴²⁴ Nevertheless, Nalcor has committed to monitoring drinking water wells in Mud Lake during impoundment to confirm the predictions of the salt water intrusion model and groundwater study.⁴²⁵

232. Concerns were raised in the community of Northwest River that the primary source of that community's drinking water, Grand Lake, had experienced saltwater intrusion as a result of the Upper Churchill project.⁴²⁶ This saltwater intrusion has also adversely affected certain fish species in Grand Lake.⁴²⁷ While Nalcor does not expect the Project to affect the salinity or flow of water in Grand Lake,⁴²⁸ Nalcor has expressed its willingness to investigate that issue and to incorporate plans to remedy this issue as part of its fish compensation program.⁴²⁹

(c) Methylmercury

233. One of the environmental effects associated with reservoir creation is the release of methylmercury into the aquatic environment from inundated land. This is a natural process, and methylmercury is common in many natural lakes in the Canadian Shield, but several interveners expressed concerns that consumption of fish with elevated methylmercury concentrations can represent a risk to humans and wildlife.⁴³⁰

⁴²³ Dorothea Hanchar, CEAR 884 at pg. 232.

⁴²⁴ Health Canada, CEAR 702 at pg. 8.

⁴²⁵ CEAR 1189 at pg. 6.

⁴²⁶ For example, Ed Tuttau, CEAR 961 at pg. 67; Ted Blake, CEAR 961 at pg. 80.

⁴²⁷ Ted Blake, CEAR 961 at pg. 80.

⁴²⁸ Gilbert Bennett, CEAR 961 at pg. 19.

⁴²⁹ Gilbert Bennett, CEAR 1221 at pg. 8.

⁴³⁰ EIS Vol. IIA, pg. 4-18.

234. In order to predict the effects the Project will have on mercury levels in the lower Churchill River, Nalcor first assessed baseline concentrations in water, sediments, plankton and fish for the lower Churchill River system and surrounding region.⁴³¹ Data for mercury in fish in the lower Churchill River has been collected since the mid-1970's (as a result of elevated levels from the Upper Churchill Development) and for the other components since the 1990's.⁴³²
235. Once the baseline concentrations of mercury in the river were established, Nalcor developed detailed models to predict mercury accumulation and exposure in the Gull Island and Muskrat Falls reservoirs post-inundation.⁴³³ These models were based upon thorough studies of other hydroelectric projects across Canada.⁴³⁴
236. Using these models, Nalcor was able to estimate relative peak mercury concentrations in the lower Churchill River post-inundation with a high degree of confidence.⁴³⁵ The results found that the Project's reservoirs will fall in the "low" to "moderate" levels of methylmercury when compared with other hydroelectric reservoirs.⁴³⁶ A conservative peak increase factor between 2.3 and 4.8X was estimated for large fish species, which extrapolated the peak increase factor for 700 mm northern pike – the species with the highest peak increase factor – across all other fish species.⁴³⁷ The models also predicted

⁴³¹ EIS Vol. IIA, pg. 2-54.

⁴³² EIS Vol. IIA, pg. 2-54.

⁴³³ EIS Vol. IIA, pg. 4-53.

⁴³⁴ EIS Vol. IIA, pg. 4-53; Response to IR JRP.20(a).

⁴³⁵ EIS Vol. IIA, pg. 4-57.

⁴³⁶ Jim McCarthy, CEAR 884 at pg. 43; Michael Parent, CEAR 908 at pg. 127.

⁴³⁷ EIS Vol. IIA, pg. 4-55; Response to IR JRP.166(b) at pg. 21.

that mercury concentrations would peak within 5-15 years after flooding, declining thereafter to baseline levels within about 35 years.⁴³⁸

237. NRCan concluded that Nalcor modelled mercury increases in the lower Churchill River appropriately.⁴³⁹ Similarly, Keith Clarke for DFO stated during the hearings that Nalcor's mercury predictions were consistent with the current state of knowledge on mercury accumulation.⁴⁴⁰ Finally, Environment Canada concluded that Nalcor's predictions for mercury increases in fish were reasonable.⁴⁴¹
238. Applying these peak increase factors to all fish species in the lower Churchill River, and comparing them against the concentrations that have been found to affect fish behaviour or fecundity, Nalcor found that the predicted mercury body burden levels will not likely have an effect on fish health at the population level.⁴⁴²
239. Mercury concentrations in adult lake trout, northern pike, lake whitefish, longnose sucker, and white sucker may nevertheless exceed Health Canada's "commercially sold" limit for mercury concentrations in fish.⁴⁴³ Allison Denning from Health Canada stressed that these commercial thresholds are much lower than would be expected for "country foods".⁴⁴⁴ However, to ensure that human mercury exposure does not pose an unacceptable risk to human health, Nalcor will conduct further work prior to impoundment to establish comprehensive mercury baseline data for local communities

⁴³⁸ Response to IR. JRP.156(d) at pg. 11.

⁴³⁹ Michael Parent, CEAR 908 at pg. 87.

⁴⁴⁰ Keith Clarke, CEAR 908 at pg. 93.

⁴⁴¹ Neil Burgess, CEAR 908 at pg. 97.

⁴⁴² EIS Vol. IIA, pg. 4-59; Jim McCarthy, CEAR 884 at pg. 43.

⁴⁴³ Response to IR. JRP.156(d) at pg. 11.

⁴⁴⁴ Allison Denning, CEAR 908 at pg. 182.

and will monitor fish mercury concentrations following inundation to verify that the mercury levels in fish do not exceed Nalcor's predictions.⁴⁴⁵ Mercury levels in seals will also be monitored. Should mercury levels in fish exceed Health Canada's thresholds for human consumption, fish consumption advisories will be developed as required based on maximum daily allowable consumption and allowable monthly consumptions for each species.⁴⁴⁶ Likewise, based on the results of mercury monitoring in seals, consumption may be assessed.⁴⁴⁷ As an approach, consumption advisories are not unique to this project. For example, Health Canada currently has in effect, across the country, consumption advisories for tuna and other fish species.⁴⁴⁸ Experiences with other projects such as La Grande Reservoir in northern Quebec have proven that when communicated effectively and clearly and when community members are involved in the process, consumption advisories are effective in decreasing peoples' exposure to mercury.⁴⁴⁹

240. Nalcor has initiated a Human Health Risk Assessment ("HHRA") to assess the potential human health risk associated with mercury exposure and has completed an interim HHRA. The overall approach of the HHRA is to use available baseline mercury data from previous studies and to collect additional baseline mercury data by conducting a food consumption survey and hair sampling in the communities of Mud Lake, North West River, Happy Valley-Goose Bay, Churchill Falls and Sheshatshiu.⁴⁵⁰ The HHRA will include a quantitative assessment of the amount of mercury that local residents in

⁴⁴⁵ Response to IR. JRP.164(a) at pg. 4.

⁴⁴⁶ Response to IR. JRP.156(d) at pg. 11 and Colleen Leeder CEAR 1086, pt. 14.

⁴⁴⁷ Gilbert Bennett, CEAR 1163 at pg. 34.

⁴⁴⁸ Gilbert Bennett, CEAR 961 at pg. 39.

⁴⁴⁹ Loren Knopper, CEAR 1163 at pg. 25.

⁴⁵⁰ Response to IR JRP.78(a) at pg. 2.

Innu and non-Innu communities may be exposed to and the risks associated with that exposure. Nalcor has met with representatives from Health Canada and DFO to ensure that the data to support the HHRA and the approach and methodology of the HHRA is adequate to satisfy the requirements of the EIS Guidelines.⁴⁵¹

241. Nalcor filed its interim HHRA on January 31, 2011.⁴⁵² This interim HHRA did not include the comprehensive survey to collect hair samples and dietary information from the general population, which will be scheduled if and when the Project is sanctioned.⁴⁵³ However, this interim HHRA incorporated extensive literature research and past baseline studies in several of these communities. The interim HHRA concluded that human health concerns related to mercury (inorganic mercury and methylmercury) exposure are considered to be low to likely negligible for all communities considered in the HHRA. The HHRA applied conservative assumptions where there were uncertainties and as such, the results of the assessment are likely conservative and over-predict potential exposures and risks to the communities considered in the HHRA.⁴⁵⁴

242. Health Canada submitted concerns that the interim HHRA in some cases underestimates and in some cases overestimates mercury exposures to people. Nalcor will update the interim HHRA as described above to develop a more precise hazard quotient measure. Health Canada considers a hazard quotient over 1 to be of potential concern to human health.⁴⁵⁵ Nalcor agrees that any hazard quotient value over 1 is of potential concern to

⁴⁵¹ Response to IR JRP.81(b) at pg. 5.

⁴⁵² CEAR 588, Attachment E.

⁴⁵³ CEAR 588, Attachment E, Executive Summary.

⁴⁵⁴ CEAR 588, Attachment E, Executive Summary.

⁴⁵⁵ CEAR 702 at pgs. 12-15.

human health, but stresses that the risk of health effects is low, that more detailed baseline information will be gathered following sanction of the Project with a focus on population of concern, and extensive monitoring and mitigation programs will be designed to ensure that mercury exposure does not produce unacceptable risk to human health.⁴⁵⁶

243. Nalcor has committed to updating the interim HHRA if the Project is sanctioned so that Health Canada's modelling concerns are addressed. In addition, Nalcor will work together with Health Canada in finalizing the HHRA and in designing consumption advisories and communications strategies to ensure that Nalcor's proposed mitigation strategy is appropriate and effective.⁴⁵⁷ Again, based on experiences with other projects and a commitment to a robust education plan, Nalcor is confident that these consumption advisories will be effective in reducing human exposure to methylmercury.⁴⁵⁸

(d) DFO Habitat Compensation Plan

244. Under the *Fisheries Act*, any harmful alteration, disruption or destruction of fish habitat ("HADD") requires authorization from DFO. In most cases, issuance of a HADD authorization is conditional on developing habitat compensation and monitoring to ensure that there will be no net loss in the productive capacity of fish habitat.⁴⁵⁹
245. In May 2008, DFO presented its HADD determination to Nalcor. This determination identified fish habitat that would be destroyed and also fish habitat that would be altered

⁴⁵⁶ Interim Human Health Risk Assessment, CEAR 588, Attachment E at pg. 96; Loren Knopper, CEAR 1163 at pg. 27.

⁴⁵⁷ Todd Burlingame, CEAR 908 at pg. 315.

⁴⁵⁸ Loren Knopper, CEAR 1163 at pg. 25.

⁴⁵⁹ Response to IR JRP.107(a).

by the Project. The habitat that would be destroyed included the habitat falling directly under the footprint of the proposed generating facilities. Due to the predicted lag in stabilization in the proposed reservoirs and concern at the time related to future habitat utilization within the reservoirs, DFO conservatively included all fish habitat within the footprint of the reservoirs to constitute a portion of the determination.⁴⁶⁰

246. Nalcor has consulted with DFO and the public since the submission of the EIS with the purpose of achieving a mutually agreeable, scientifically defensible approach to fish habitat compensation.⁴⁶¹ A series of Technical Workshops in both St. John's and Happy Valley-Goose Bay were completed on March 12 and 23, 2010 to facilitate stakeholders' input and comments on the Compensation Strategy as it progressed.⁴⁶² Several interveners in the hearing participated in this process.⁴⁶³ Additionally, workshops and meetings were completed with DFO representatives to review the Compensation Strategy components and potential monitoring requirements in January, February and March, 2010.⁴⁶⁴ While some concerns were raised that the Fish Habitat Compensation Plan was not finalized prior to the public hearings, section 4.6.1 of the EIS Guidelines requires Nalcor to develop a Compensation Strategy for the environmental assessment, not a finalized Compensation Plan. The Compensation Plan should not be finalized because findings of the Panel may be required to be integrated into the Plan.

⁴⁶⁰ Fish Habitat Compensation Strategy, Appendix C to Nalcor's response to IR JRP.153 at pg. 12.

⁴⁶¹ Response to IR JRP.107(a).

⁴⁶² Response to IR JRP.153.

⁴⁶³ Eldred Davis, CEAR 908 at pg. 36; Grand Riverkeeper, CEAR 908 at pg. 63.

⁴⁶⁴ Response to IR JRP.153.

247. Nalcor's proposed Fish Habitat Compensation Strategy recognizes that while many fish species will be able to successfully utilize the habitat available within the Muskrat Falls and Gull Island reservoirs post-impoundment, there are certain life-cycle stages that may require assistance in terms of modified and/or constructed habitat features to alleviate predicted challenges with respect to short-term habitat stability and water quality issues and/or long-term habitat suitabilities.⁴⁶⁵ Emphasis has been focused on the long term maintenance of fish populations within the reservoirs with priorities being placed on implementing compensation and enhancement efforts on susceptible and/or socially important species and life-cycle stages.⁴⁶⁶
248. In addition to constructing new fish habitat or enhancing existing habitat, Nalcor's proposed Fish Habitat Compensation Strategy also includes an Adaptive Management Program.⁴⁶⁷ This Program will provide for the monitoring of compensation or enhancement measures to verify their success, and will also compare actual fish habitat utilization to the predicted post-Project outcomes. Monitoring programs will be established to confirm these predictions and results may trigger actions outlined in the plan, including timely investigations into possible mitigations in the case of failures of the Compensation Strategy to meet predetermined targets.⁴⁶⁸ DFO stated during the hearings that the compensation strategy proposed by Nalcor has a significant commitment to long-term comprehensive monitoring of the habitat in the reservoirs and that DFO expects that this monitoring will be adequate to confirm the predictions

⁴⁶⁵ Fish Habitat Compensation Strategy, Appendix C to Nalcor's response to IR JRP.153 at pg. 94.

⁴⁶⁶ Fish Habitat Compensation Strategy, Appendix C to Nalcor's response to IR JRP.153 at pg. 94; CEAR 1205.

⁴⁶⁷ Fish Habitat Compensation Strategy, Appendix C to Nalcor's response to IR JRP.153 at pg. 109.

⁴⁶⁸ Fish Habitat Compensation Strategy, Appendix C to Nalcor's response to IR JRP.153 at pg. 111.

regarding fish habitat utilization in the reservoirs post-inundation.⁴⁶⁹ DFO also submitted that it anticipates the Project can be completed without causing what DFO would consider unacceptable negative effects on fish and fish habitat.⁴⁷⁰

249. DFO has submitted that Nalcor's Compensation Strategy is acceptable in principle, but that more details will be required before any HADD authorization is granted.⁴⁷¹ These details will be developed following the conclusion of the environmental assessment process, and will incorporate comments from all stakeholders.⁴⁷² With all of this additional information, Nalcor will develop a Fish Habitat Compensation Plan and, again, stakeholders will be provided with opportunities to influence that Plan's final design.⁴⁷³ DFO will not grant Nalcor any HADD authorizations until this Plan is finalized.

250. Nalcor is confident that through its Fish Habitat Compensation Plan, the Project will achieve no net loss of fish and fish habitat, will ensure the biodiversity of the aquatic ecosystem in the lower Churchill River, and will preserve the River's long-term sustainability.⁴⁷⁴ DFO has also noted that Nalcor has "a lot of experience" in engineering and constructing physical fish habitat in the region.⁴⁷⁵ In fact, Nalcor has succeeded in constructing suitable spawning habitat for the Upper Salmon and Cat Arm projects and has demonstrated its commitment to follow-up and monitoring most recently with the Granite Canal project, for which Nalcor has been implementing monitoring and follow-

⁴⁶⁹ Tilman Bieger, CEAR 884 at pg. 195.

⁴⁷⁰ DFO, CEAR 1047 at pg. 2.

⁴⁷¹ DFO, CEAR 639 at pg. 24.

⁴⁷² Tilman Bieger, CEAR 730 at pg. 137.

⁴⁷³ Tilman Bieger, CEAR 730 at pg. 137.

⁴⁷⁴ Jim McCarthy, CEAR 884 at pg. 38.

⁴⁷⁵ Tilman Bieger, CEAR 884 at pgs. 76 and 77.

up programs for the past seven years.⁴⁷⁶ DFO expects that the artificial fish habitat that Nalcor creates for the Project will be utilized by fish within a year.⁴⁷⁷ Finally, DFO has concluded that the proposed fish habitat compensation program is expected to provide sufficient habitat for each life-cycle of every fish species found in the Project Area.⁴⁷⁸

(ii) Terrestrial

251. Many concerns raised during the hearing also relate to Project effects on the terrestrial environment.⁴⁷⁹
252. In assessing potential effects of the Project on the terrestrial environment, Nalcor assessed potential effects on biodiversity, ecological function and the sustainability of each KI in the ecosystem.⁴⁸⁰ KIs were selected based on a species' sensitivity to Project interactions; its ability to indicate effects on a larger component of the environment; its importance to stakeholders, including Aboriginal stakeholders; and that species' population status and vulnerability.⁴⁸¹ Mammalian KIs for the Project were the George River caribou herd, the Red Wine Mountains caribou herd, Moose, Black Bear, Beaver, Marten and Porcupine. Birds that were chosen as KIs were Canada Goose, Surf Scoter, Ruffed Grouse, Osprey, Wetland Sparrows, Harlequin Duck and other avifauna species of concern, namely: Common Nighthawk, Olive-sided Flycatcher, Gray-cheeked Thrush and Rusty Blackbird.

⁴⁷⁶ Marion Organ, CEAR 1113 at pg. 6.

⁴⁷⁷ Michelle Roberge, CEAR 884 at pg. 160.

⁴⁷⁸ Tilman Bieger, CEAR 1136 at pg. 173.

⁴⁷⁹ For example, Innu Nation, CEAR 940 at pg. 26; Sierra Club Atlantic, CEAR 940 at pg. 149; Grand Riverkeeper, CEAR 940 at pg. 323.

⁴⁸⁰ EIS Vol IIB, pg. 5-1.

⁴⁸¹ EIS Vol IIB, pg. 5-1.

253. For each KI, effects of the Project were assessed based on the measurable parameters of change in that species' habitat, change in that species' health, and mortality.⁴⁸² Significant adverse environmental effects were determined to be those that would cause a decline in a species such that a sustainable population could not be maintained within the Assessment Area.⁴⁸³ The sole exception to this definition was caribou, for which a significant adverse environmental effect was defined as an effect that that would cause a population decline, such that the viability or recovery of the herd in question would be threatened.⁴⁸⁴

(a) Change in Habitat

254. Nalcor delineated existing areas or ecotypes within the lower Churchill River ecosystem using an ecological land classification ("ELC").⁴⁸⁵ Each ecotype was evaluated in terms of its ability to provide habitat for each of the KI species in the Assessment Area.⁴⁸⁶ To evaluate change in habitat resulting from the Project, Nalcor measured the loss of primary habitat for a species, the loss of staging or breeding habitat, or the number of breeding sites, depending on the KI.⁴⁸⁷ These determinations were informed by extensive baseline studies that evaluated existing habitat use for each KI species.⁴⁸⁸

⁴⁸² EIS Vol IIB, pg. 5-14.

⁴⁸³ EIS Vol IIB, pg. 5-16.

⁴⁸⁴ EIS Vol IIB, pg. 5-16.

⁴⁸⁵ Response to IR JRP.4(b) at pg. 5.

⁴⁸⁶ Response to IR JRP.4(b) at pg. 5.

⁴⁸⁷ EIS Vol IIB, pg. 5-36.

⁴⁸⁸ See the Large Mammal Component Studies, Furbearers Component Studies, and Avifauna Component Studies.

255. Change in habitat for the purposes of Nalcor’s environmental assessment included physical disturbance such as site clearing, which can represent a long-term or permanent change, as well as disturbance due to noise levels, dust and human presence, which can temporarily reduce the quality of habitat for wildlife. Species differ in their ability to adjust to these disturbances and for specific species these temporary disturbances may cause local declines.⁴⁸⁹ Physical disturbance from the Project consists of 126 km² through the creation of the two reservoirs and another 35 km² of other Project components, totalling 161 km². As a precautionary approach, the environmental assessment was based on up to 200 km² of habitat being lost or altered as a result of the Project.⁴⁹⁰
256. A quantification of the habitat to be altered or lost for each species through the Project was provided for each KI.⁴⁹¹ Based on the experience of past developments in Canada,⁴⁹² “high” magnitude habitat loss was conservatively defined as greater than 25% of the Assessment Area habitat being affected by the Project.⁴⁹³ “Moderate” magnitude habitat loss was 5% to 25% of the Assessment Area habitat being affected by the Project, and “low” magnitude habitat loss was anything below this threshold.⁴⁹⁴

⁴⁸⁹ EIS Vol IIB, pg. 5-36.

⁴⁹⁰ Response to IR JRP.124(b) at pg. 4.

⁴⁹¹ EIS Vol IIB, pg. 5-38.

⁴⁹² Such as the Long Harbour Commercial Nickel Processing Plant, Newfoundland and Labrador Refinery Project, Southern Head Marine Terminal and Associated Works Related to the Crude Oil Refinery Development Proposal, Flemish Pass Exploration Drilling Program, Laurentian Sub-basin Exploration Drilling Program, Husky White Rose Development Project, Petro-Canada Jeanne d’Arc Basin Exploration Drilling Program, StatoilHydro Canada Ltd. Exploration and Appraisal/Delineation Drilling Program for Offshore Newfoundland, Exploration Drilling in Annieopsquotch, Bonnavinkie and Gambo Leases, and the White Rose Oilfield. See Response to IR JRP.4(a) at pg. 3.

⁴⁹³ Response to IR JRP.4(a) at pg. 3.

⁴⁹⁴ Response to IR JRP.4(a) at pg. 3.

257. Generally, the Project will account for low magnitude effects in terms of habitat loss for each KI since the amount of primary habitat directly affected by the Project accounts for a small portion of the total primary habitat available to each KI species within the Assessment Area.⁴⁹⁵ In each of these cases, primary habitat loss effects for KI species were found to be not significant.⁴⁹⁶ Shannon Crowley for the Department of Environment and Conservation similarly concluded that for furbearer, small game and big game species, with the exception of caribou, the Department has no concerns about species persistence at the population level.⁴⁹⁷ Mitigation measures, such as relocating active beaver colonies, replacing osprey nests with artificial platforms and creating new hardwood stands, will also reduce any habitat loss effects on KI species. In addition, for habitat types that will be particularly affected by the Project, such as wetlands and hardwood forest, Nalcor has committed to habitat enhancement programs (e.g., Osprey nest platforms, wetland and hard wood enhancement) during reservoir preparation.⁴⁹⁸
258. Wetland Sparrows represented the only KI for which habitat loss would be of a “high” magnitude, since these birds are highly dependent on habitat found primarily along the lower Churchill River valley.⁴⁹⁹ However, there will be alternative habitat available and

⁴⁹⁵ With respect to the George River caribou herd, see EIS Vol IIB, pg. 5-42; the Red Wine Mountains caribou herd EIS Vol IIB, pg. 5-43; Moose EIS Vol IIB, pg. 5-47; Black Bear EIS Vol IIB, pg. 5-48; Beaver EIS Vol IIB, pg. 5-50; Marten EIS Vol IIB, pg. 5-51; Porcupine EIS Vol IIB, pg. 5-52; Canada Goose EIS Vol IIB, pg. 5-53; Surf Scoter EIS Vol IIB, pg. 5-54; Ruffed Grouse EIS Vol IIB, pg. 5-55; Osprey EIS Vol IIB, pg. 5-57; Harlequin Duck EIS Vol IIB, pg. 5-58; Other Species of Concern EIS Vol IIB, pg. 5-60.

⁴⁹⁶ With respect to the George River caribou herd, see EIS Vol IIB, pg. 5-79; Moose EIS Vol IIB, pg. 5-83; Black Bear EIS Vol IIB, pg. 5-85; Beaver EIS Vol IIB, pg. 5-86 and 5-87; Marten EIS Vol IIB, pg. 5-88; Porcupine EIS Vol IIB, pg. 5-89 and 5-90; Canada Goose EIS Vol IIB, pg. 5-90 and 5-91; Surf Scoter EIS Vol IIB, pg. 5-92 and 5-93; Ruffed Grouse EIS Vol IIB, pg. 5-94 and 5-95; Osprey EIS Vol IIB, pg. 5-95 and 5-96; Harlequin Duck EIS Vol IIB, pg. 5-98 and 5-99; Other Species of Concern EIS Vol IIB, pg. 5-100 and 101.

⁴⁹⁷ Shannon Crowley, CEAR 923 at pg. 271.

⁴⁹⁸ Perry Trimper, CEAR 923 at pg. 21.

⁴⁹⁹ EIS Vol IIB, pg. 5-57.

Nalcor will create new wetland habitat along the riparian fringe of the newly created reservoirs or along tributary streams and watercourses adjacent to the reservoir.⁵⁰⁰ Similar wetland enhancement programs have been carried out throughout North America and have been successful.⁵⁰¹ Alan Hanson for the Canadian Wildlife Service concluded that at a landscape level, the Project will not have a great effect on the availability of Wetland Sparrow habitat.⁵⁰² Therefore, it is expected that Wetland Sparrow populations will remain sustainable and thus the residual environmental effect of Project activities on these birds is considered to be not significant.⁵⁰³

259. The Red Wine Mountains caribou herd attracted considerable attention both in the environmental assessment and in the course of the hearings. In predicting potential effects of the Project on this herd, Nalcor was able to draw from decades of telemetry data for these caribou in the Assessment Area.⁵⁰⁴ This extensive dataset was incorporated into a detailed model referred to as “Resource Selection Function”, or “RSF”, which was able to predict caribou occupancy in any given habitat type. Isabelle Schmelzer for the Department of Environment and Conservation expressed concerns that this RSF only used data for Forestry Management District 19 and that this was insufficient to predict potential effects of the Project on the entire Red Wine Mountains caribou range.⁵⁰⁵

260. Nalcor made a conscious decision to use data for Forestry Management District 19 only, as the forestry mapping provided more detailed vegetation description that in turn

⁵⁰⁰ EIS Vol IIB, pg. 5-97; Response to IR JRP.155(c) at pg. 13.

⁵⁰¹ Perry Trimper, CEAR 923 at pgs. 28 and 35; Alan Hanson, CEAR 923 at pg. 146; CEAR 1038.

⁵⁰² Alan Hanson, CEAR 923 at pg. 160.

⁵⁰³ EIS Vol IIB, pg. 5-97.

⁵⁰⁴ Perry Trimper, CEAR 923 at pg. 18.

⁵⁰⁵ Isabelle Schmelzer, CEAR 923 at pg. 252.

provided higher accuracy for identifying caribou habitat. The unused data to the west of District 19 was less reliable in terms of correlating with caribou habitat in the Assessment Area.⁵⁰⁶ Based on a thorough analysis of habitat preferences throughout Forestry Management District 19, Nalcor was able to make several important conclusions. First, total disturbance effects on the Red Wine Mountains Herd from the Project will remain well below the threshold that has been found to trigger population effects on caribou.⁵⁰⁷ It should be stressed that the footprint of the Project is primarily confined to the river valley, of which >90% is considered poor caribou habitat.⁵⁰⁸ This was confirmed by Stuart Luttich, who studied caribou in Labrador for several decades and concluded that caribou usage of the lower Churchill River valley has always been minimal.⁵⁰⁹ Second, regional movements of this herd are expected to be maintained and it is predicted that Red Wine Mountains caribou will remain dispersed across the landscape.⁵¹⁰ Third, the availability of primary habitat within the Red Wine Mountains caribou range after inundation will be similar to existing conditions, as the influence of the Project will affect less than 1% of the primary seasonal ranges.⁵¹¹ Finally, due to a decrease in water velocity in the Churchill River and an increase in stable ice cover during the winter, caribou crossing the reservoirs will encounter much less resistance than at present.⁵¹²

⁵⁰⁶ Brock Simons, CEAR 940 at pg. 17.

⁵⁰⁷ EIS Vol IIB, pg. 5-80.

⁵⁰⁸ Brock Simons, CEAR 940 at pg. 23.

⁵⁰⁹ Stuart Luttich, CEAR 1136 at pg. 256.

⁵¹⁰ EIS Vol IIB, pg. 5-80.

⁵¹¹ Response to IR JRP.157(n) at pg. 25; Response to IR JRP.157(h) at pg. 15; Brock Simons, CEAR 940 at pg. 22..

⁵¹² Response to IR JRP.157(a) at pg. 3.

261. The data that Nalcor used for its RSF models spanned decades and provided highly detailed information about caribou movements and habitat preferences in the Assessment Area. Focussing on data from Forestry Management District 19 in the RSF models was sufficient to predict with a high level of certainty that little primary habitat would be affected by the Project particularly as the majority of the Project footprint occurs within District 19.⁵¹³
262. All of the experts on caribou agreed during the hearing that predation and hunting, not the availability of habitat, are the primary limitations on the Red Wine Mountains caribou herd.⁵¹⁴ Due to this predation and hunting, as is discussed below under Cumulative Effects, Nalcor concluded that the Red Wine Mountains herd is currently experiencing significant *cumulative* effects.⁵¹⁵ However, the Project is not expected to change the risks posed by these current threats.⁵¹⁶ Access roads will be controlled and the majority of those that will not be inundated will be decommissioned.⁵¹⁷ In order to minimize the Project's effects on the herd, Nalcor will implement a variety of mitigation measures, such as restricting access to facilities and minimizing Project activities when individual caribou are in the area.⁵¹⁸ As a result of the minimal overlap of surface disturbance on the primary habitat in the herd's territory, in conjunction with the mitigation measures that Nalcor has proposed, the residual environmental effects of the Project on the Red Wine Mountains caribou herd are not expected to have any incremental adverse effect and thus

⁵¹³ Brock Simons, CEAR 940 at pg. 23.

⁵¹⁴ Gilbert Bennett, CEAR 940 at pg. 321.

⁵¹⁵ EIS Vol IIB, pg. 5-112 and 5-113.

⁵¹⁶ Response to IR JRP.157(h) at pg. 15; EIS Vol IIB, pg. 5-80; Brock Simons, CEAR 940 at pg. 23..

⁵¹⁷ Marion Organ, CEAR 940 at pg. 259.

⁵¹⁸ EIS Vol IIB, pg. 5-36.

are not likely to be significant.⁵¹⁹ The Wildlife Division for the Province agreed with this conclusion,⁵²⁰ though they stressed that monitoring would be necessary to verify this prediction.⁵²¹ Nalcor has committed to monitoring both the Red Wine Mountains herd and the George River herd to ensure that its effects predictions are accurate.⁵²²

263. A further species that attracted considerable attention during the hearings was the Surf Scoter. The Canadian Wildlife Service concluded that there will be minimal direct impact of the Project for most of the waterfowl that breed in the Project Area,⁵²³ but that there is insufficient baseline information about Surf Scoter use of the Project Area during spring staging and how the Project might affect these birds, which are currently in decline elsewhere in Canada, and requested additional baseline work in respect of the Project.⁵²⁴
264. Nalcor completed aerial surveys and incorporated the best available information about how Surf Scoters use the lower Churchill River and similar staging areas and concluded that the Project would not have a significant effect on that species. Nevertheless, Nalcor has committed to carrying out further behavioural and spatial/temporal studies of Surf Scoters in the Project Area prior to inundation that would be completed at ashkui or other areas of open water.⁵²⁵ Nalcor does not expect that the results of these studies will affect the effects predictions for Surf Scoters or other waterfowl, but these studies will inform

⁵¹⁹ EIS Vol IIB, pg. 5-80 and 5-81.

⁵²⁰ CEAR 205 at pg. 9.

⁵²¹ Izabelle Schmelzer, CEAR 923 at pg. 294.

⁵²² CEAR 1189 at pg. 4.

⁵²³ Scott Gilliland, CEAR 923 at pg. 117.

⁵²⁴ Scott Gilliland, CEAR 923 at pgs. 128 and 129.

⁵²⁵ Gilbert Bennett, CEAR 923 at pg. 142.

Nalcor's mitigation and follow-up programs.⁵²⁶ Through the implementation of these mitigation and follow-up programs, Nalcor is confident that the Project is not likely to result in any significant adverse environmental effects on waterfowl and particularly the late-nesting Surf Scoter. Environment Canada agreed that regardless of the outcome of the further baseline work, the Project would not likely result in population level effects on Surf Scoter.⁵²⁷

265. Finally, Environment Canada has suggested that Nalcor implement the goal of a No Net Loss of wetland function by undertaking the creation of a comparable amount of riparian wetland habitat to that lost through the Project.⁵²⁸ However, Nalcor submits that implementing this goal would be unnecessary in the absence of any predicted significant adverse effects. Furthermore, the remaining wetland habitats post-inundation will fulfill the same array of functions as all existing wetlands in the Project Area.⁵²⁹ Finally, requiring Nalcor to implement a No Net Loss wetland policy may be cost-prohibitive.

266. Annette Lutterman submitted that the wetlands that will be lost through inundation represent some of the most valuable wetlands in the Project Area and that the loss of seasonal variation in flows will prevent the success of any reproduction of this habitat.⁵³⁰ However, much of Ms. Lutterman's work was based on experiences in reservoirs with large drawdowns such as the Upper Churchill.⁵³¹ The reservoirs associated with the

⁵²⁶ Perry Trimper, CEAR 1136 at pg. 39.

⁵²⁷ Scott Gilliland, CEAR 923 at pg. 159.

⁵²⁸ Environment Canada, CEAR 658 at pg. 47.

⁵²⁹ Response to IR JRP.155(c) at pg. 12.

⁵³⁰ Annette Lutterman, CEAR 1136 at pgs. 185, 186 and 205.

⁵³¹ Perry Trimper, CEAR 1136 at pg. 274.

Project will be far more capable of supporting healthy riparian habitats.⁵³² Nalcor has provided several examples of successful enhancement programs of exactly this type of wetland habitat.⁵³³ These artificial wetlands are working at a scale that is similar to many of the wetlands that will be inundated by the Project.⁵³⁴ Accordingly, Nalcor is confident in its ability to reproduce these habitat types for the Project.

267. Furthermore, Nalcor is evaluating further optimization of its proposed operating regime for the Muskrat Falls reservoir to allow spring flooding above FSL.⁵³⁵ This will better enhance the viability of all riparian habitats, both artificial and natural, by mimicking to a great degree the spring flood that is currently experienced on the River.⁵³⁶ Ms. Lutterman agreed that this represented the most optimal operating framework for a large reservoir.⁵³⁷ Finally, to the extent that some wetlands will inevitably be lost through the Project, Nalcor has demonstrated that wetland function in the Project Area will not be affected and that this will not result in any significant adverse effect.

(b) Change in Health

268. In addition to concerns that the Project will result in significant habitat loss for terrestrial wildlife, concerns have been raised that the Project may affect the health of certain wildlife, particularly through mercury contamination.⁵³⁸

⁵³² Perry Trimper, CEAR 1136 at pg. 275.

⁵³³ CEAR 1038.

⁵³⁴ Perry Trimper, CEAR 1136 at pg. 284.

⁵³⁵ Marion Organ, CEAR 1136 at pg. 270.

⁵³⁶ Perry Trimper, CEAR 1136 at pgs. 284 and 285.

⁵³⁷ Annette Lutterman, CEAR 1136 at pgs. 273 and 274.

⁵³⁸ For example, Bruno Marcocchio, CEAR 940 at pg. 150.

269. During construction, Nalcor found that the potential for direct health-related effects on KIs is limited to Black Bear, which may interact with possible contaminants associated with site waste management and camp operations.⁵³⁹ Proper management of site waste and camp operation facilities will minimize these environmental effects of the Project on Black Bear health and any residual environmental effects will not be significant.⁵⁴⁰
270. In terms of operations, there will be an increased potential for bioaccumulation of methylmercury for KIs that feed on aquatic organisms. To evaluate this possible effect on health, an ecological risk assessment (“ERA”) was completed for two species considered particularly vulnerable to methylmercury because of their ecological niche: Osprey and river otter.⁵⁴¹ Hazard Quotients (“HQs”) were developed, which consisted of the ratio of expected daily intake of mercury, divided by the daily dose of mercury known to correspond with toxicological effects.⁵⁴² An HQ of 0.8 (instead of the normal 1.0) was determined to be a conservative threshold of mercury exposure necessary to predicate changes in health, and this threshold accounted for exposures to mercury through food other than fish in the Project Area, as well as mercury exposure outside the Assessment Area for these migrating Osprey.⁵⁴³ If these additional exposures were included in the ERA, the appropriate HQ would be 1.⁵⁴⁴
271. Results of the ERA indicated that HQs for Osprey were near but below 0.8 for all scenarios and that there is thus a low probability of adverse health effects on Osprey

⁵³⁹ EIS Vol IIB, pg. 5-73.

⁵⁴⁰ EIS Vol IIB, pg. 5-73; EIS Vol IIB, pg. 5-84.

⁵⁴¹ EIS Vol IIB, pg. 5-73.

⁵⁴² EIS Vol IIB, pg. 5-74.

⁵⁴³ Perry Trimper, CEAR 908 at pg. 167.

⁵⁴⁴ Perry Trimper, CEAR 908 at pgs. 167 and 168.

through mercury accumulation.⁵⁴⁵ River otter were estimated to have an HQ of 0.93, which will necessitate thorough monitoring to ensure that adverse health effects are not experienced.⁵⁴⁶ However, there was considerable conservatism built into the model that likely overestimated actual mercury exposures. For example, the ERA assumed that all fish species will experience peak levels of methylmercury at the same time, which will not be the case.⁵⁴⁷ Similarly, Lake Trout, the fish species with the highest predicted methylmercury concentrations in muscle tissue, was included in the ERA even though it is expected that these fish will be relatively inaccessible to both river otter and Osprey due to their preferred deep-water habitat.⁵⁴⁸ Therefore, while the results of the ERA for river otter highlight the importance of a thorough monitoring program, which Nalcor has committed to,⁵⁴⁹ river otter are not expected to experience any population level health effects as a result of the Project.⁵⁵⁰

272. Environment Canada has submitted that Nalcor's HQ calculations were underestimated and that the correct HQ results should be 0.95 for Osprey and 0.96 for river otter.⁵⁵¹ However, Neil Burgess for Environment Canada conceded during the hearings that his agency calculated HQ to include the additional mercury exposures in food other than fish in the Project Area and in Osprey wintering grounds.⁵⁵² As explained above, Nalcor's

⁵⁴⁵ EIS Vol IIB, pg. 5-74.

⁵⁴⁶ Response to IR JRP.156(d) at pg. 11.

⁵⁴⁷ Response to IR JRP.156(d) at pg. 17.

⁵⁴⁸ Response to IR JRP.156(d) at pg. 17.

⁵⁴⁹ CEAR 1189 at pg. 4.

⁵⁵⁰ Response to IR JRP.156(d) at pg. 11.

⁵⁵¹ Environment Canada, CEAR 658 at pg. 31.

⁵⁵² Neil Burgess, CEAR 908 at pg. 168.

exclusion of these additional exposures was the basis for the 0.8 HQ threshold, as opposed to 1. If these added exposures are included in the calculation, then the HQ threshold should be 1, which is still higher than Environment Canada's predictions for both Osprey and river otter. So while Nalcor and Environment Canada each calculated HQ's slightly differently, the results from both models suggest that no terrestrial wildlife will be likely to experience health effects from mercury exposure at a population level.

273. Environment Canada also suggested that Nalcor's baseline levels of mercury for both Osprey and river otter were insufficient.⁵⁵³ Nalcor agrees that the samples it was able to collect from Osprey and river otter were insufficient in and of themselves to develop meaningful predictions. However, the ERA studies that Nalcor conducted were based on extensive background research from other areas, as well as site-specific values for mercury exposure in the Project Area.⁵⁵⁴ In addition, Nalcor is considering new techniques for obtaining river otter samples prior to inundation, and Nalcor has committed to both gathering additional baseline data on Osprey and river otter mercury exposure prior to inundation and monitoring mercury exposure in these species post-inundation to ensure that terrestrial wildlife exposure to mercury does not produce any adverse health effects.⁵⁵⁵ As a result, Nalcor is confident that its predictions for mercury exposure to terrestrial wildlife are strong.

274. Since Osprey and river otter are the terrestrial species most vulnerable to the effects of methylmercury accumulation, based on their baseline mercury exposure and heavy reliance on fish in their diet, and since no adverse health effects are predicted for these

⁵⁵³ Neil Burgess, CEAR 908 at pg. 105.

⁵⁵⁴ Perry Trimper, CEAR 923 at pg. 68.

⁵⁵⁵ Response to IR JRP.156(d) at pg. 17.

two animals, mercury accumulation is not expected to pose adverse health effects for other terrestrial species either.

(c) Mortality

275. Several interveners raised the issue of direct mortality of terrestrial wildlife caused by the Project.⁵⁵⁶ Mortality during construction and operation of the Project could occur through vehicle collisions, by drowning during inundation of the reservoirs, or indirectly as a consequence of increased access resulting in hunting and/or trapping.⁵⁵⁷
276. Nalcor will implement several mitigation measures designed to minimize the risk of wildlife mortality. These mitigation measures include posting speed limits on all roads, ensuring careful site waste management, scheduling reservoir impoundment for a period with minimal risk to drowning, and imposing a No Harvesting (or other harassment) Policy.⁵⁵⁸ As a result of the mitigation measures Nalcor plans to implement, mortality is not predicted to result in a significant adverse environmental effect for any terrestrial KIs.⁵⁵⁹

⁵⁵⁶ For example, Dr. Justina Ray, CEAR 940 at pg. 52; Bruno Marcocchio, CEAR 940 at pg. 163.

⁵⁵⁷ EIS Vol IIB, pg. 5-75.

⁵⁵⁸ EIS Vol IIB, pg. 5-76.

⁵⁵⁹ With respect to the George River caribou herd, see EIS Vol IIB, pg. 5-79; Red Wine Mountains caribou EIS Vol IIB, pg. 5-80 and 5-81; Moose EIS Vol IIB, pg. 5-83; Black Bear EIS Vol IIB, pg. 5-85; Beaver EIS Vol IIB, pg. 5-86 and 5-87; Marten EIS Vol IIB, pg. 5-88; Porcupine EIS Vol IIB, pg. 5-89 and 5-90; Canada Goose EIS Vol IIB, pg. 5-90 and 5-91; Surf Scoter EIS Vol IIB, pg. 5-92 and 5-93; Ruffed Grouse EIS Vol IIB, pg. 5-94 and 5-95; Osprey EIS Vol IIB, pg. 5-95 and 5-96; Wetland Sparrows EIS Vol IIB, pg. 5-97 and 5-98; Harlequin Duck EIS Vol IIB, pg. 5-98 and 5-99; Other Species of Concern EIS Vol IIB, pg. 5-100 and 101.

(d) Species at Risk

277. Concerns were raised during the hearing about potential Project effects on species at risk.⁵⁶⁰
278. Section 4.4.4.3(p) of the EIS Guidelines required Nalcor to identify species of special interest or conservation concern, with an emphasis on rare, vulnerable or threatened species.
279. The *Species at Risk Act*⁵⁶¹ (“SARA”) imposes obligations on the responsible authority to identify adverse effects on a listed wildlife species and its critical habitat, and to ensure that those effects are mitigated and monitored.
280. Specifically, Section 79(2) of SARA states that the responsible authority:
- Must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.
281. This is reinforced by the requirement of subsection 16(1) of the CEAA to consider all of the environmental effects of a project.
282. With regard to species at risk, Nalcor’s approach to the environmental assessment included all federally SARA-listed species as KIs. These included the Red Wine Mountains caribou herd, Harlequin Duck, Common Nighthawk, Olive-sided Flycatcher, Gray-cheeked Thrush and Rusty Blackbird. None of these species have recovery strategies or action plans, with the exception of the Harlequin Duck which has an Eastern

⁵⁶⁰ For example, Isabelle Schmelzer, CEAR 923 at pg. 268.

⁵⁶¹ R.S.C. 2002, c. 29.

Population Management Plan.⁵⁶² No critical habitat has been designated for any of these species.

283. Red Wine Mountains caribou are listed as Threatened in the SARA and in the *Newfoundland and Labrador Endangered Species Act* (“NLESA”).⁵⁶³ As previously described, the majority of the footprint of the Project will occur within low quality habitat within this herd’s range.⁵⁶⁴ Predation and hunting, not the availability of habitat, are described as the limiting factors causing the decline of the Red Wine Mountains caribou herd, and the Project is not expected to negatively affect the risks posed by these threats.⁵⁶⁵ As a result, residual environmental effects from the Project on the Red Wine Mountains caribou herd are expected to be not significant.⁵⁶⁶
284. Nalcor will implement several mitigation measures to minimize the Project’s effect on Red Wine Mountains caribou, including a No Harvesting (or other harassment) Policy, designing work schedules to minimize travel in designated areas during calving and post-calving periods, and removing trees from the riparian zone surrounding the reservoirs to provide unimpeded access for wildlife.⁵⁶⁷ Nalcor will also continue its role on the Labrador Woodland Caribou Recovery Team regarding the Red Wine Mountains Herd and will support telemetry work to monitor population numbers, calf survival, and

⁵⁶² Response to IR JRP.105(b) at pg. 4.

⁵⁶³ S.N.L. 2001, c. E-10.1.

⁵⁶⁴ Response to IR JRP.157(h) at pg. 15.

⁵⁶⁵ Response to IR JRP.157(h) at pg. 15; EIS Vol IIB, pg. 5-80.

⁵⁶⁶ EIS Vol IIB, pg. 5-80 and 5-81.

⁵⁶⁷ EIS Vol. IIB, Appendix IIB-A at pgs. 11 and 13.

movement and distribution patterns.⁵⁶⁸ In the National Energy Board's recent decision on the Horn River project in British Columbia, the Board noted that:

The Board is of the view that offset measures could include contributing to research activities which address data deficiencies and scientific uncertainties related to caribou ecology, or supporting activities relating to the conservation, mitigation and restoration of caribou habitat. Offset measures could also include participating in the development of provincial and federal recovery strategies and action plans for boreal woodland caribou, such as the national recovery strategy...⁵⁶⁹

Therefore, Nalcor submits that its participation on the Labrador Woodland Caribou Recovery Team and its support of regional research on woodland caribou should be considered as mitigation measures to minimize and offset adverse effects of the Project on the Red Wine Mountains caribou.

285. For Harlequin Duck, loss of breeding habitat due to the Project will be minimal, given that all known breeding sites are above the projected level of the reservoirs.⁵⁷⁰ In addition, the Canadian Wildlife Service noted during the hearings that breeding habitat availability is not a threat to the recovery of harlequin duck.⁵⁷¹ Nevertheless, Nalcor will design an avifauna management plan to reduce the possibility of loss or disturbance to active nest sites.⁵⁷² Harlequin Duck may use ashkui in the lower Churchill River that will be affected by the Project. However, ashkui will remain at the confluences of tributaries where Harlequin Duck are known to breed.⁵⁷³ Therefore, Nalcor concluded that Harlequin Duck will be able to adapt relatively easily to changes in the hydrology of the

⁵⁶⁸ EIS Vol IIB, pg. 7-6.

⁵⁶⁹ National Energy Board Decision GH-2-2010 at pg. 38.

⁵⁷⁰ EIS Vol IIB, pg. 5-58.

⁵⁷¹ Alan Hanson, CEAR 923 at pg. 107.

⁵⁷² EIS Vol IIB, pg. 5-58.

⁵⁷³ EIS Vol IIB, pg. 5-59.

lower Churchill River and that any effects on Harlequin Duck resulting from the Project would be not significant.⁵⁷⁴

286. Effects management for Harlequin Duck will be achieved through standard mitigation to be included in Nalcor's Environmental Protection Plans and by the use of Best Management Techniques that will include, for example, the prohibition of hunting by Project personnel, temporal and spatial avoidance of sensitive habitat, proper handling of fuels to avoid spills and the provision of a minimum of 20 metre buffer (i.e. no clearing) zone in areas adjacent to potential Harlequin Duck breeding habitat.⁵⁷⁵ Nalcor's proposed mitigation strategies have been informed by Environment Canada's Harlequin Duck Eastern Population Management Plan.⁵⁷⁶
287. Although the remaining birds of concern occur in the Assessment Area, most are not restricted to regionally uncommon habitats.⁵⁷⁷ In fact, the percentage of primary habitat within the Assessment Area that will be lost due to the Project is less than 2% for each of these species.⁵⁷⁸ In addition, availability of breeding habitat is not a threat to the recovery of these species.⁵⁷⁹ As a result, the Project is not anticipated to result in significant adverse effects for any of these species.
288. Nalcor plans to conduct aerial surveys of the lower Churchill River and surrounding locations to verify ashkui formation post-inundation.⁵⁸⁰ In addition, Nalcor will

⁵⁷⁴ EIS Vol IIB, pg. 5-59.

⁵⁷⁵ Response to IR JRP.105(a) at pg. 3.

⁵⁷⁶ Response to IR JRP.105(b) at pg. 4.

⁵⁷⁷ EIS Vol IIB, pg. 5-29.

⁵⁷⁸ EIS Vol IIB, pg. 5-60.

⁵⁷⁹ Alan Hanson, CEAR 923 at pg. 107.

⁵⁸⁰ EIS Vol IIB, pg. 7-8.

implement an Avifauna Management Plan that will minimize the risk of disturbance to avifauna nests and Nalcor's mitigation measures for wetlands and riparian habitat will benefit these species as well.⁵⁸¹

289. In summary, Nalcor submits that the Project will not likely result in any significant adverse environmental effect on species at risk. Environment Canada has submitted that it supports this conclusion.⁵⁸²

(e) Rare Plants

290. Nalcor has not identified any SARA-listed plant species of concern within the footprint of the Project. However, the Government of Newfoundland and Labrador's Wildlife Division has expressed concerns that impoundment for the Project may potentially extirpate regionally uncommon plant species from Labrador.⁵⁸³ Nalcor has commissioned extensive studies of vascular plants species considered rare or listed under the SARA or NLESA.⁵⁸⁴ Shelley Moores of the Province's Department of Environment and Conservation agreed that Nalcor went through a "very rigorous" process of evaluating what plant species may be affected by the Project.⁵⁸⁵ While none of the plant species listed under SARA or the NLESA were found in these surveys, Nalcor met with the Newfoundland and Labrador Department of Environment and Conservation in Corner

⁵⁸¹ EIS Vol. IIB, Appendix IIB-A at pg. 137.

⁵⁸² Environment Canada, CEAR 658 at pg. 6.

⁵⁸³ Government of Newfoundland and Labrador, CEAR 307.

⁵⁸⁴ Response to IR JRP.158(a) at pg. 2.

⁵⁸⁵ Shelley Moores, CEAR 923 at pg. 216.

Brook on March 17, 2010 to discuss certain plant species that had limited observations in the region.⁵⁸⁶

291. Nalcor commissioned supplemental surveys in 2010 which were documented in the report entitled “2010 Plant Survey in the Vicinity of the Lower Churchill River Watershed”.⁵⁸⁷ This report concluded that there are eight plant species that are considered potentially regionally uncommon within the Project Area, including Canada yew.⁵⁸⁸ Generally, these plant species are considered common in southern Canada and are reaching their northern extent in central Labrador.⁵⁸⁹ The Department of Environment and Conservation suggested the inclusion of an additional two plant species for this list, namely Marsh Horsetail and Hidden Fruit Bladderwort. Note that Nalcor has identified sufficient numbers of Marsh Horsetail outside the footprint of the Project downstream that would justify its exclusion.⁵⁹⁰
292. For each of the nine species that are considered regionally uncommon, preferred habitats have been identified.⁵⁹¹ In order to prevent the loss of these species from the region, Nalcor will relocate these regionally rare plants from the flood zone to suitable habitat outside of the flood zone if in the event that sufficient numbers are not identified beyond the Project footprint.⁵⁹² Establishing populations of these species outside of the flood

⁵⁸⁶ Response to IR JRP.158(a) at pg. 2.

⁵⁸⁷ CEAR 588, Attachment F.

⁵⁸⁸ CEAR 588, Attachment F, at pg. 18.

⁵⁸⁹ Response to IR JRP.158(b) at pg. 6.

⁵⁹⁰ Perry Trimper, CEAR 923 at pg. 225.

⁵⁹¹ Response to IR JRP.158(b) at pg. 6.

⁵⁹² Response to IR JRP.158(d) at pg. 8.

zone will mean that the effect of flooding in the lower Churchill River will not be expected to be significant.⁵⁹³

(iii) Atmospheric

293. In addition to aquatic and terrestrial environmental effects, Nalcor assessed the potential atmospheric effects of the Project. The Project is expected to produce minimal GHG emissions, both during construction and operations.⁵⁹⁴ Because the two reservoirs are deep and narrow, compared to other large hydroelectric facilities in Canada and elsewhere, they are anticipated to release low quantities of GHG over their lifetime, compared to other facilities of similar electricity output.⁵⁹⁵ Further, the World Commission on Dams has stated that reservoirs in boreal climates generate fewer GHGs than elsewhere.⁵⁹⁶ Absolute estimates of GHG emissions for the Project are in the range of 50,000 to 200,000 tonnes of carbon dioxide equivalent (“CO₂e”) per year, which at the peak of construction would represent approximately 3 percent of total annual provincial GHG emissions.⁵⁹⁷

294. The majority of the lands proposed to be inundated are currently unmanaged in terms of forest clearing and are considered to be carbon neutral with respect to sequestration.⁵⁹⁸ While some concerns were raised during the hearing regarding the loss of carbon sinks associated with the Project, Environment Canada has concluded that Nalcor’s approach is

⁵⁹³ Response to IR JRP.158(d) at pg. 8.

⁵⁹⁴ EIS Vol. IIA, pg. 3-3.

⁵⁹⁵ EIS Vol. IIA, pg. 3-12.

⁵⁹⁶ World Commission on Dams, “Dams and Development: A New Framework for Decision-Making” (2000) online: <http://www.internationalrivers.org/files/world_commission_on_dams_final_report.pdf> at pg. 77.

⁵⁹⁷ EIS Vol. IIA, pg. 3-13.

⁵⁹⁸ EIS Vol. IIA, pg. 3-12.

consistent with the most appropriate international standards and that its estimates are based on reasonable assumptions.⁵⁹⁹

295. Finally, the supply of clean, renewable power from the Project will assist the Atlantic Provinces and the Federal Government in meeting their GHG reduction targets.⁶⁰⁰ Nalcor has estimated that the Project will result in potential annual displacement of GHG emissions from existing generation facilities of up to 11,500,000 tonnes of GHG, which includes displacement of the Holyrood Plant that will no longer be used following the completion of the Project.⁶⁰¹ That displacement represents a permanent and significant displacement of GHG emissions. As a result, Environment Canada has submitted that the Project may have a beneficial environmental effect through its potential to offset GHG emissions elsewhere.⁶⁰²
296. Transportation of people and materials to and from the Project sites will result in some air pollutant emissions, but these emissions will be low in magnitude and will be spread out over a large area over several years.⁶⁰³ Accordingly, transportation emissions are unlikely to substantially affect air quality in the Assessment Area.⁶⁰⁴
297. The Project will also emit some air pollutants from construction equipment during the construction phase. Air pollutant emissions estimates for construction equipment were calculated based on the expected fuel consumption for each heavy vehicle or equipment

⁵⁹⁹ Environment Canada presentation, CEAR 667.

⁶⁰⁰ Response to IR JRP.85(d) at pg. 7.

⁶⁰¹ Response to IR JRP.85(d) at pg. 5.

⁶⁰² Environment Canada, CEAR 658 at pg. 6.

⁶⁰³ EIS Vol. IIA, pg. 3-14.

⁶⁰⁴ EIS Vol. IIA, pg. 3-14.

unit type.⁶⁰⁵ Overall, total air pollutant emissions to the atmosphere on an annual basis during construction were anticipated to be relatively low compared to the annual emissions from other sources in Newfoundland and Labrador, at less than 2 percent. As air quality in Newfoundland and Labrador is considered good currently, and few other emission sources exist in the Assessment Area, a small incremental increase in air pollution during construction only is not expected to noticeably change ambient air quality.⁶⁰⁶

298. Finally, Nalcor considered the potential for the Project to result in fugitive dust emissions. Given the expected low magnitude of these emission sources, the low frequency of occurrence, limited duration of occurrence, and the mitigation that will be applied, such as dust suppressants, airborne dust concentrations in the Project Area will remain well below Air Quality standards and guidelines.⁶⁰⁷
299. As a result, the environmental effects of air pollutant emissions from the Project are predicted to be not significant.⁶⁰⁸

(iv) Environmental Protection Plans

300. In order to implement each of the mitigation measures proposed in the environmental assessment, Nalcor will implement Environmental Protection Plans (“EPPs”) for the construction, and operation and maintenance phases of the Project.⁶⁰⁹

⁶⁰⁵ EIS Vol. IIA, pg. 3-14.

⁶⁰⁶ EIS Vol. IIA, pg. 3-15.

⁶⁰⁷ EIS Vol. IIA, pg. 3-16 to 3-17.

⁶⁰⁸ EIS Vol. IIA, pg. 3-21.

⁶⁰⁹ EIS Vol. IA, pg. 3-8.

301. EPPs will be intended to:

- (a) identify environmental concerns and general protection measures to be considered in the development of mitigation measures;
- (b) provide a reference document for the development of site-specific mitigation measures;
- (c) provide expectations with regards to orientation and awareness; and
- (d) communicate changes to the program through the revision process and provide a reference to the applicable legislative requirements and suggested reference material for the development of mitigation measures.⁶¹⁰

302. In addition to developing a general EPP for the Project, Nalcor will also develop separate EPPs for sites and activities requiring non-standard mitigation measures.⁶¹¹ These separate EPPs will address reservoir preparation, rehabilitation of riparian habitat, inundation, and fish habitat compensation.⁶¹²

303. Nalcor's EPPs will ensure that environmental effects from the Project are minimized and that the mitigation commitments that Nalcor has made throughout the environmental assessment process will be implemented as intended.

⁶¹⁰ EIS Vol. IA, pg. 4-65.

⁶¹¹ Response to IR JRP.114 at pg. 2.

⁶¹² Response to IR JRP.114 at pg. 2.

V. Socio-economic and Cultural

304. Issues relating to possible socio-economic effects of the Project can be summarized according to each of the four socio-economic VECs selected for the Project: Economy, Employment and Business; Communities; Land and Resource Use; and Cultural Heritage Resources.⁶¹³

(i) *Economy, Employment and Business*

(a) Economy

305. Concerns were raised in the hearing that the Project would produce short-term benefits that would not justify its environmental effects.⁶¹⁴

306. Nalcor disagrees that the positive economic effects of the Project will be short-term. The Project will generate over ten years of construction activity and by any standard this constitutes a long-term construction project. The Project will directly and indirectly result in significant investments in local infrastructure.⁶¹⁵ Individuals and businesses will develop expertise to allow them to succeed for the future.⁶¹⁶ The Project will produce large quantities of relatively inexpensive power for local residents, businesses and industry that will last for generations. As a result of this surplus power, the Project will likely induce other industrial development to the region.⁶¹⁷ The Department of Labrador and Aboriginal Affairs concluded that the Project will serve as a catalyst for resource

⁶¹³ EIS Vol. III, pg. 1-1.

⁶¹⁴ For example, Nunatsiavut presentation CEAR 645; Grand Riverkeeper presentation CEAR 678.

⁶¹⁵ Gilbert Bennett, CEAR 1178 at pg. 61.

⁶¹⁶ Gilbert Bennett, CEAR 1178 at pg. 61.

⁶¹⁷ Gilbert Bennett, CEAR 1178 at pg. 60; Newfoundland and Labrador Department of Labrador and Aboriginal Affairs presentation, CEAR 634; Wade Locke, CEAR 817 at pg. 53; Ron Bowles, CEAR 817 at pg. 139.

development throughout Labrador.⁶¹⁸ With increased industrial activity in the region, both directly through the Project and through induced industrial developments, other industries will develop in the Province to support this increased development, such as engineering, environmental services, and medical and legal professions.⁶¹⁹ This will move Labrador towards a more diversified economy.

307. In addition, the Project will provide the Province with significant long-term revenues that it will use to fund various short-term and long-term programs and services throughout the Province. To that end, the Project will generate in excess of \$1 billion in direct revenue each year to the provincial government following retirement of debt obligations.⁶²⁰ In addition, Nalcor has estimated that the Project will result in approximately \$340 million in annual tax revenue to the Government of Newfoundland and Labrador during construction of the Project.⁶²¹ This does not include taxes from any further industrial development and businesses that may result from the Project.
308. Finally, overall Project construction is expected to enhance provincial income by a total \$2.1 billion, with an additional \$20 million for each year of operations.⁶²² This reflects all incomes earned by workers and businesses living or operating anywhere in the Province that are employed directly or indirectly, or whose employment is induced by the

⁶¹⁸ CEAR 1166.

⁶¹⁹ Gilbert Bennett, CEAR 1208 at pgs. 308 and 309.

⁶²⁰ Nalcor presentation CEAR 670 at pg. 13.

⁶²¹ Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35; Nalcor presentation CEAR 670 at pg. 13.

⁶²² Response to IR 146, Attachment A: Supplemental Report on Need, Purpose and Rationale, at pg. 35.

Project.⁶²³ This does not include any additional industrial and commercial activity that may occur in Labrador as a result of the Project.⁶²⁴

309. Residents of businesses located in Labrador are expected to receive \$700 million of this \$2.1 billion in construction-related income.⁶²⁵ Given the population distribution and existence of businesses, it is expected that Labrador West and the Upper Lake Melville areas will be the primary beneficiaries of Project income effects within Labrador.⁶²⁶ The Nunatsiavut Government has asserted that the Project should improve the economy at a household level for Inuit.⁶²⁷ Nalcor submits that the increase in local incomes as a result of the Project will improve the economy at the household level for individuals that gain employment with the Project. The Project offers choice to the residents of Labrador to avail of the economic opportunities if they so chose.

310. To enhance these potential economic benefits, Nalcor will adopt an industrial benefits planning strategy (also see the “Benefits Strategy” located at CEAR 806) as part of its corporate philosophy, and will be a party to other benefits mechanisms required as part of any engagement and benefits strategies developed with other groups.⁶²⁸

311. As a result of the expected increase in income and tax revenues in the province, the residual adverse socio-economic effects of the Project on economy during construction and operation are expected to be not significant.⁶²⁹ Nevertheless, Nalcor will monitor

⁶²³ EIS Vol. III, pg. 3-10.

⁶²⁴ Wade Locke, CEAR 817 at pg. 53; Ron Bowles, CEAR 817 at pg. 139.

⁶²⁵ Response to IR JRP.11 at pg. 5.

⁶²⁶ EIS Vol. III, pg. 3-13.

⁶²⁷ Nunatsiavut Government, CEAR 690.

⁶²⁸ EIS Vol. III, pg. 3-15.

⁶²⁹ EIS Vol. III, pg. 3-33.

expenditures by amount, type, location and type of contractor.⁶³⁰ If the results of this monitoring show that economic effects are not being distributed as intended, Nalcor will have the opportunity to modify its industrial benefits plan (also see the “Benefits Strategy” which includes “Industrial Benefits (Part IV)” located at CEAR 806).

312. Concerns were raised during the hearing surrounding potential increases in electricity rates as a result of the Project.⁶³¹ However, the Project will not result in any rate increases in Central or Western Labrador since customers in those areas will continue to be served by power from the Upper Churchill Falls facility.⁶³² In other regions, rates will likely increase in the short-term as the fuel costs at the Holyrood Plant rise.⁶³³ This is beyond Nalcor’s control. Rate setting is the responsibility of the PUB, who is mandated to set rates that are reasonable and not unjustly discriminatory.⁶³⁴ The PUB is also responsible for long-term planning of the electricity grid in the Province to ensure that reliability standards are met. The PUB approves Nalcor’s generation planning reports each year, the latest of which was provided to the Panel during the hearing.⁶³⁵
313. In setting electricity rates for consumers, the PUB must allow utilities to recover prudently incurred operational costs, power purchases, and to earn a reasonable rate of return, but only on those assets that are used and useful for delivering power to that particular class of consumers.⁶³⁶ Electricity rates for consumers in the Province will go up

⁶³⁰ EIS Vol. III, pg. 3-38.

⁶³¹ For example, Helios submission CEAR 683 at pg. 10; Nunatsiavut Government, CEAR 690.

⁶³² Gilbert Bennett, CEAR 1164 at pgs. 52 and 53.

⁶³³ Gilbert Bennett, CEAR 1164 at pg. 54.

⁶³⁴ Gilbert Bennett, CEAR 776 at pg. 205.

⁶³⁵ CEAR 773.

⁶³⁶ Gilbert Bennett, CEAR 776 at pg. 206.

in the future, but this is because investments must be made by utilities to ensure that future demands in the Province will be reliably met. The Project represents the least expensive and most reliable way for the Province to do this, in accordance with subsection 3(b)(iii) of the *Electrical Power Control Act, 1994*. In fact, over the first fifty years of the Project, it is expected to result in total savings of over \$41 billion for ratepayers in the Province in comparison to the No Project alternative⁶³⁷ Notably, the project will not result in increased rates in Labrador.⁶³⁸

(b) Employment

314. Similarly, interveners have alleged that employment benefits from the Project will be insufficient to justify environmental effects, are short-term, or will not be experienced adequately in the region surrounding the Project.⁶³⁹
315. The Project will result in considerable long-term benefits, including a decade of construction employment for local workers (as compared with three years for Voisey's Bay),⁶⁴⁰ many decades of operational employment for local workers, and training of local workers.
316. Total direct construction-related Project employment will be approximately 15,600 person-years, 10,200 of which are expected to be filled by residents of Newfoundland and Labrador.⁶⁴¹ An additional 5,200 person-years of employment will be created through indirect employment in the Province, and a further 8,000 person-years of

⁶³⁷ Gilbert Bennett, CEAR 776 at pg. 23.

⁶³⁸ Gilbert Bennett, CEAR 1164 at pgs 52 and 53.

⁶³⁹ For example, Nunatsiavut Government presentation CEAR 645.

⁶⁴⁰ EIS Vol. III, pg. 3-5.

⁶⁴¹ Response to IR JRP 165, table 7-6.

employment in Newfoundland and Labrador are expected to be induced by the Project.⁶⁴² During operations, 280 total person-years of employment (80 direct) are expected to be created in Newfoundland and Labrador on an annual basis.⁶⁴³ Total employment in Labrador is expected to reach almost 15,000 person-years.⁶⁴⁴ In addition to the long-term direct employment that will result from the Project, the jobs that will be available for monitoring for the Project represent considerable opportunities for local workers to gain long-term permanent employment in the region.⁶⁴⁵

317. During the hearings, Matthew Pike for the Melville Native Housing Association expressed the following sentiment about employment benefits from the Project:

I left -- personally I left a well-paying job in St. John's to come back to Labrador because I see the opportunity here and I'm sticking around with hopes that there's opportunity here for young people like myself.

Because if you look behind me, I'm the youngest one in this room. There's not too many young people here today presenting or even attending this Panel but I do care about this community and I do want to see a lot of opportunity here for people who are living in St. John's, who are living in Fort Mac, who are trained and qualified, to be able to come home and work.⁶⁴⁶

This quote demonstrates the significant employment benefits associated with the Project for local workers, especially the youth in the local communities.

318. Nalcor will promote local employment through implementing an adjacency policy for hiring people for the Project, which will give priority to qualified and experienced workers in the vicinity of the Project. This policy will first satisfy any IBA commitments with local Aboriginals, and then will give priority to qualified and experienced residents

⁶⁴² Response to IR JRP 165, table 7-6.

⁶⁴³ Response to IR JRP 165, table 7-7.

⁶⁴⁴ CEAR 670 at pg 5.

⁶⁴⁵ Perry Trimper, CEAR 1164 at pgs. 35 and 37.

⁶⁴⁶ Matthew Pike, CEAR 817 at pgs. 123 and 124.

of Labrador, followed by qualified and experienced residents of Newfoundland, then qualified and experienced residents of Canada, and finally qualified and experienced workers from abroad.⁶⁴⁷ This policy will ensure that all residents of Labrador are given priority for gaining employment with the Project, not just residents of Upper Lake Melville, as was asserted by the Nunatsiavut Government in this hearing.⁶⁴⁸ While concerns were raised that the adjacency policy for the Voisey's Bay project was ineffective since unions were not required to follow it,⁶⁴⁹ the benefits agreement that Nalcor has entered into with the Province requires that the adjacency policy be honoured in all collective bargaining agreements.⁶⁵⁰

319. As part of the adjacency policy, Nalcor will compensate Labrador workers from differing regions for the costs of travel to work on the Project.⁶⁵¹ This may be done under various mechanisms ranging from chartered flights or commercial flights paid for by Nalcor, reimbursement to the individual or contractor for commercial flights, or even as a part of an allowance or other mechanism in the total compensation of the worker.⁶⁵² This compensation will ensure that residents of isolated Labrador communities have the same opportunities to gain employment with the Project as other residents of Labrador.

320. Nalcor has also worked extensively with governments, Aboriginal groups, women's organizations, training institutions and labour organizations to discuss Project labour requirements, to identify existing or anticipated gaps in the labour supply pool, and to

⁶⁴⁷ EIS Vol. III, pg. 3-24; Gilbert Bennett, CEAR 817 at pg. 12.

⁶⁴⁸ Nunatsiavut Government presentation CEAR 645.

⁶⁴⁹ For example, Keith Russell, CEAR 1163 at pg. 323.

⁶⁵⁰ Gilbert Bennett, CEAR 1163 at pg. 302.

⁶⁵¹ CEAR 838.

⁶⁵² CEAR 838.

explore and discuss potential approaches to address potential gaps.⁶⁵³ For example, Nalcor worked together with the Innu Nation, Nunatsiavut Government and NunatuKavut through the Labrador Aboriginal Training Partnership (“LATP”) to prepare and submit a proposal to the Human Resources and Skills Development Canada (“HRSDC”) under the Aboriginal Skills and Employment Partnership program (“ASEP”).⁶⁵⁴ 335 individuals are currently being funded through this program and 125 have obtained employment through the assistance of LATP.⁶⁵⁵ Nalcor intends to work with the partners to extend this program throughout the construction phase of the Project.⁶⁵⁶

321. Nalcor also consulted extensively with various women’s organizations in developing a Gender Equity Program for the Project.⁶⁵⁷ This Program will include the following:

- (a) All workers on site will complete mandatory training in gender sensitivity, diversity, equity, respectful workplace and inclusion;
- (b) On-site accommodations will accommodate a female workforce;
- (c) Awareness of gender sensitivity, inclusion and respectful workplace will be part of daily safety meetings;
- (d) Practices will be monitored, reported and will inform company policy and workplace design;

⁶⁵³ EIS Vol. III, pg. 3-25; Paul Dinn, CEAR 817 at pg. 206.

⁶⁵⁴ Response to IR JRP.133 at pg. 2.

⁶⁵⁵ Presentation by the Labrador Aboriginal Training Partnership, CEAR 1097.

⁶⁵⁶ Todd Burlingame, CEAR 1086 at pg. 357.

⁶⁵⁷ CEAR 1121 at pg. 1.

- (e) The construction site will be an inclusive environment that values diversity. Clearly articulated policies on harassment will be communicated and supported by clear protocols;
- (f) Clear processes for bringing complaints forward that is safe and communicates no prejudice to the complainant will be communicated to all workers;
- (g) A gender based analysis will be incorporated into planning so that the workforce culture and policies are created with an appreciation of gender differences and recognition of potentially different impacts on women and men;
- (h) Nalcor will ensure that promotional materials and public information materials include images and profiles of its collaborative partners;
- (i) Nalcor will profile the company's commitments at all opportunities and will monitor practices as part of its accountability framework; and
- (j) The role of supervisors in monitoring and supporting inclusionary practices will be an expectation of supervisors on the construction site and during operations.⁶⁵⁸

322. The Gender Equity Program incorporates several of the recommendations suggested by the Women in Resource Development Corporation ("WRDC"), and the WRDC expressed its support for this Program during the hearings.⁶⁵⁹ The Gender Equity Program will be implemented in conjunction with a Project Diversity Plan, a Women's Employment Plan, and a business access strategy that will encourage hiring of all types of workers for whom there exist current barriers to employment, including women and

⁶⁵⁸ CEAR 1121 at pgs. 2 and 3.

⁶⁵⁹ Daphne Hart, CEAR 1208 at pg. 9.

Aboriginal people.⁶⁶⁰ This Diversity Plan will be designed to exceed federal standards for employment equity.⁶⁶¹

323. As a result of the increase in employment through the Project, as well as the mitigation measures that Nalcor has proposed to ensure these employment benefits are appropriately distributed among the population, the residual adverse socio-economic effects of the Project on Employment during construction and operation are expected to be not significant.⁶⁶² Nalcor will monitor employment by the number employed, location of primary residence, occupational category, gender and Aboriginal status and these results will inform Nalcor's hiring, training and retention strategies.⁶⁶³

(c) Business

324. Finally, concerns were raised that local businesses would be adversely affected by the Project and that any benefits would be short lived.⁶⁶⁴

325. Nalcor measured potential Project-related effects on business through assessing the number of businesses in the construction and related trades sectors in Labrador and the value of contracts obtained by Labrador and Newfoundland businesses.⁶⁶⁵ A significant adverse effect on business was defined as one resulting in substantial decreases in the number of businesses in construction and related trades in Labrador and value of

⁶⁶⁰ Response to IR JRP.115(c) at pg. 9 and CEAR 806 at pgs. 7,8, and 9.

⁶⁶¹ Heather MacLellan, CEAR 1086 at pg. 229.

⁶⁶² EIS Vol. III, pg. 3-35.

⁶⁶³ EIS Vol. III, pg. 3-38.

⁶⁶⁴ For example, Mina Campbell-Hibbs, CEAR 961 at pg. 49; Leander Baikie, CEAR 961 at pg. 129; James Lyall, CEAR 1061 at pgs. 29 and 38.

⁶⁶⁵ EIS Vol. III, pg. 3-28.

contracts obtained by Newfoundland and Labrador businesses as compared to current levels over the life of the Project.⁶⁶⁶

326. All bidding for work associated with the Project will be based on an international competitive bidding basis. Newfoundland and Labrador benefits, as well as technical and commercial considerations, will be selection factors in awarding Project contracts.⁶⁶⁷ Nalcor will develop a Contracting and Purchasing Policy for the Project that will include sizing and designing of packages, where appropriate, to fit the capabilities of Newfoundland and Labrador companies.⁶⁶⁸ Nalcor will also hold Project-specific supplier development seminars in Labrador, prior to the start of construction. These seminars will provide the business community with the latest information on Project requirements, the procurement procedures and other means by which the business community in Labrador will be kept informed of opportunities.⁶⁶⁹ Based on economic modelling that Nalcor has conducted, it is estimated that between \$500 million and \$1 billion in goods and services will be supplied by Newfoundland and Labrador-based businesses.⁶⁷⁰ In addition, the valuable knowledge and experience that these local businesses develop through supplying the Project will enable them to better compete for similar work in the future.⁶⁷¹
327. Business opportunities arising from the Project will be beneficial to many firms in Labrador; however, some might be adversely affected if skilled and experienced workers

⁶⁶⁶ EIS Vol. III, pg. 3-28.

⁶⁶⁷ EIS Vol. III, pg. 3-31.

⁶⁶⁸ EIS Vol. III, pg. 3-31.

⁶⁶⁹ Response to IR JRP.132(b) at pg. 5.

⁶⁷⁰ Gilbert Bennett, CEAR 817 at pg. 17.

⁶⁷¹ Gilbert Bennett, CEAR 817 at pg. 21.

are lost to the Project.⁶⁷² Nalcor has consulted with various business organizations in the Upper Lake Melville area, including the Labrador North Chamber of Commerce and the Innu Business Development Centre, to inform them of the opportunities and also the labour requirements associated with the Project.⁶⁷³ Nalcor will inform local businesses of its employment needs as early as possible in order to allow local businesses to retain their existing workers and to identify gaps in supply and demand of workers so that appropriate training programs can be implemented.⁶⁷⁴ Walt Mavin for the Department of Human Resources, Labour and Employment confirmed that employee retention programs have been successful in relation to other developments in the Province in the past.⁶⁷⁵

328. Nalcor has committed to establishing a Labrador Business Opportunities Committee and a full-time coordinator position in Labrador as part of its Benefits Strategy.⁶⁷⁶
329. In the long-term, business opportunities in Labrador will increase through power being made available as a result of the Project. This conclusion was also made by the Newfoundland and Labrador Department of Labrador and Aboriginal Affairs.⁶⁷⁷
330. As a result of the increased business opportunities in the province that will flow from the Project, as well as Nalcor's efforts to maximize positive effects of the Project on local businesses, the residual adverse socio-economic effects of the Project on Business during construction and operation are expected to be not significant.⁶⁷⁸ Nalcor will monitor

⁶⁷² EIS Vol. III, pg. 3-32.

⁶⁷³ Response to IR JRP.106(a) at pg. 2.

⁶⁷⁴ Response to IR JRP.106(a) at pg. 2.

⁶⁷⁵ Walt Mavin, CEAR 817 at pg. 181.

⁶⁷⁶ EIS Vol. III, pg. 3-31.

⁶⁷⁷ Newfoundland and Labrador Department of Labrador and Aboriginal Affairs presentation, CEAR 634.

⁶⁷⁸ EIS Vol. III, pg. 3-36.

business expenditures and contract awards and will modify its industrial benefits strategy (also see the “Benefits Strategy” located at CEAR 806) where necessary to optimize opportunities for businesses in Newfoundland and Labrador.⁶⁷⁹

331. Several interveners in the hearing expressed concerns that no power from the Project would be made available for communities along the Labrador coast that are reliant on diesel fuel for their electricity production.⁶⁸⁰ It is important to clarify the difference between Nalcor and Newfoundland and Labrador Hydro. The decision to interconnect to any communities in the Province is a decision that is driven by the cost of the interconnection and that cost compared to the continued operation of the isolated systems. That assessment and ultimate decision is made by Newfoundland and Labrador Hydro, not Nalcor, and must be approved by the PUB. Newfoundland and Labrador Hydro’s mandate is to deliver energy to every customer in the province who requires energy, and to deliver that energy using the least cost alternative available.⁶⁸¹ If Newfoundland and Labrador Hydro concludes that there is a cost benefit to interconnecting to any particular community or communities, that interconnection will take place.⁶⁸²

332. The reality for many isolated communities in Labrador is that the cost of constructing additional transmission to connect them to the interconnected system is greater than the continued cost of diesel.⁶⁸³ In fact, in 2001 the Province estimated that the cost of

⁶⁷⁹ EIS Vol. III, pg. 3-38.

⁶⁸⁰ For example, Grand Riverkeeper presentation CEAR 678; Mr. Lyle, CEAR 692 at pg. 137.

⁶⁸¹ *Electrical Power Control Act, 1994*, s. 3(b)(iii); Gilbert Bennett, CEAR 776 at pgs. 80 and 81.

⁶⁸² Gilbert Bennett, CEAR 692 at pgs. 137 and 138.

⁶⁸³ Gilbert Bennett, CEAR 706 at pg. 46.

constructing transmission lines to these communities would be in the range of \$300 million.⁶⁸⁴ With inflation and increased costs for materials and labour, that number would be even higher today.⁶⁸⁵ That being said, Nalcor is currently leading a research and development project in Ramea to assess the feasibility of integrating wind, hydrogen and diesel for small off-grid communities to reduce the cost and environmental effects of the current diesel generators.⁶⁸⁶

333. In addition, future industrial activity in Labrador that is enabled by the available power from the Project may create economically viable opportunities to link up adjacent communities that are currently on diesel service.⁶⁸⁷ For example, Vale has expressed interest in having an interconnection from the Project to its Voisey's Bay project, which might make transmission to remote communities in the vicinity of that project more economically feasible.⁶⁸⁸ So while the Project will not directly provide interconnected transmission services to these coastal communities, Nalcor and Newfoundland and Labrador Hydro will continue to assess options to reduce the dependence of isolated communities on diesel power and will implement these options as soon as they become technically and economically feasible.

⁶⁸⁴ Gilbert Bennett, CEAR 1221 at pg. 7.

⁶⁸⁵ Gilbert Bennett, CEAR 1221 at pg. 7.

⁶⁸⁶ Charles Bown, CEAR 776 at pg. 267.

⁶⁸⁷ Charles Bown, CEAR 776 at pg. 272.

⁶⁸⁸ Gilbert Bennett, CEAR 1221 at pg. 7.

(ii) Communities

334. Grand Riverkeeper and other interveners raised concerns about the increased pressures on community services and infrastructure that are alleged to result from the Project.⁶⁸⁹
335. Nalcor fully assessed potential Project effects on current capacity of local infrastructure and services. A significant adverse effect on physical or social infrastructure and services was defined as one when demands from the Project exceed the existing capacity of the system on an ongoing and consistent basis during the life of the Project.⁶⁹⁰ Similarly, a significant adverse effect on community health was defined as one when the socio-economic effects of the Project led to a deterioration of the determinants of health on an ongoing and consistent basis during the life of the Project such that community health or delivery of health services cannot be effectively managed on a regular basis.⁶⁹¹
336. Demands on infrastructure and services will arise directly from Project activities as a result of in-migration of workers and their families to the Upper Lake Melville area and to Happy Valley-Goose Bay in particular.⁶⁹² Those infrastructure components that are expected to be most affected to increases in demand are the passenger terminal at the Goose Bay Airport, the dock facilities at the Port of Goose Bay, and local roads in Happy Valley-Goose Bay.⁶⁹³
337. Upgrades to the trans-Labrador Highway west of Happy Valley-Goose Bay are presently underway. Any movements on this highway for the Project will be planned with the

⁶⁸⁹ Grand Riverkeeper presentation CEAR 678.

⁶⁹⁰ EIS Vol. III, pg. 4-15 and 4-24.

⁶⁹¹ EIS Vol. III, pg. 4-34.

⁶⁹² EIS Vol. III, pg. 4-51.

⁶⁹³ EIS Vol. III, pg. 4-51.

capacity constraints of the highway and, as such, any use of this highway is not expected to be problematic.⁶⁹⁴ Projected Project-related traffic represents less than one percent of the design capacity of the Trans Labrador Highway.⁶⁹⁵

338. Project personnel travelling through the airport at Happy Valley-Goose Bay will result in increased demands at this facility. The airport and passenger terminal is being expanded, with a scheduled completion date of 2011, to increase its capacity for meeting the increasing demands.⁶⁹⁶

339. In terms of the use of port facilities, as the Project is still in the planning phase the exact routing for material delivery has yet to be determined and will depend on the award of supplier contracts. Depending upon the award of contracts, the dock at Happy Valley-Goose Bay may need to be upgraded prior to Project construction. These upgrades would relate to the delivery of heavy loads such as transformers and would not be due to the frequency of deliveries exceeding the capacity of the dock facilities. These upgrades would need to be completed prior to the delivery of heavy loads which would be later in the construction schedule. If it is determined that these upgrades are required Nalcor will coordinate and provide the necessary support to the Port Authority for this work.⁶⁹⁷ Transport Canada has submitted that the Project will not result in a significant increase in shipping to the Port of Goose Bay.⁶⁹⁸

⁶⁹⁴ EIS Vol. III, pg. 4-51.

⁶⁹⁵ Response to IR JRP 29.

⁶⁹⁶ EIS Vol. III, pg. 4-51.

⁶⁹⁷ Marion Organ, CEAR 1164, at pg. 29.

⁶⁹⁸ Transport Canada, CEAR 635, at pg. 18.

340. Therefore, potential constraints on physical infrastructure and services have been identified and will be addressed prior to construction so that the Project will not cause existing infrastructure capacity to be exceeded.⁶⁹⁹
341. Social service components that may be affected by the Project are security and education services, and housing and accommodations. Experience and current and projected labour market conditions suggest that relatively few construction workers will relocate for employment reasons, although some Project management personnel, and others employed indirectly in industries supporting the Project or in government and service sector occupations, will do so.⁷⁰⁰ For example, Joe Goudie for the Melville Native Housing Association explained in the hearings that past residents of Labrador who have moved away for work opportunities may move back to the region as a result of the opportunities associated with the Project.⁷⁰¹
342. Nalcor studied the socio-economic effects and mitigation programs of several other large-scale projects across the region and the country.⁷⁰² Lessons from these past projects were used to design effects management programs for the Project, such as the use of high-quality, on-site accommodations complexes. For the Hibernia project, which involved nearly twice as many construction workers as will be required for the Project, on-site accommodations complexes were used to separate project personnel from the surrounding communities; community focus groups held throughout the construction phase noted that the number of in-migrants was minimal, and that crime, cost-of-living,

⁶⁹⁹ EIS Vol. III, pg. 4-51.

⁷⁰⁰ EIS Vol. III, pg. 4-53.

⁷⁰¹ Joe Goudie, CEAR 817 at pg. 119.

⁷⁰² Colleen Leeder, CEAR 1086 at pg. 9.

disruption of the local fishery, and increased housing costs were not perceived to be problems.⁷⁰³

343. Similarly, Nalcor plans to minimize effects on local communities through the use of a fully-contained accommodations complex located in close proximity to the construction site. Workers will be transported to and from the airport in Happy Valley-Goose Bay by buses, and these bus trips will be closely coordinated with flight schedules so that workers do not spend time in the community while waiting for a flight or a shuttle to the camp.⁷⁰⁴ As a result of this separation of Project workers from the local communities, Nalcor expects that the majority of Project-related demands on social infrastructure and services will be minimized.⁷⁰⁵

344. The use of an accommodations complex does not mean that the Project will have no effect on the local communities. Nalcor and relevant government agencies, such as the Department of Innovation, Trade and Rural Development, will monitor infrastructure capacity throughout the life of the Project to assess whether additional infrastructure is required.⁷⁰⁶ In addition, Nalcor will continue to work with the Town of Happy Valley-Goose Bay on municipal planning issues so that any issues that might occur during Project construction will be mitigated.⁷⁰⁷ To that end, Nalcor has held workshops with the Council and management of the Town of Happy Valley-Goose Bay to discuss infrastructure capacity issues in detail and these workshops will continue.⁷⁰⁸ Since

⁷⁰³ Colleen Leeder, CEAR 1086 at pg. 17.

⁷⁰⁴ Todd Burlingame, CEAR 1136 at pg. 149.

⁷⁰⁵ EIS Vol. III, pg. 4-53.

⁷⁰⁶ EIS Vol. III, pg. 4-56; Rita Malone, CEAR 817 at pg. 203..

⁷⁰⁷ Gilbert Bennett, CEAR 692 at pg. 93.

⁷⁰⁸ Karen Wheeler, CEAR 817 at pg. 57.

infrastructure capacity in the Project Area will be monitored closely throughout the life of the Project and the relevant government agencies will be provided with adequate time to remedy any shortfalls in capacity, the Project is not expected to result in existing social infrastructure and services capacity being exceeded.⁷⁰⁹

345. The socio-economic effects of the Project on community health determinants are dependent on social responses, health practices and coping skills, and the availability of social support networks, particularly that of the family. For those who obtain employment with the Project, there is the possibility of increased income, self-esteem and social status, which in turn may positively affect other aspects of health and well-being such as improved personal health practices and coping skills. For some, increased income and community-worker interactions may have adverse effects in terms of poor personal health practices and coping skills. Both positive and adverse residual effects are likely.⁷¹⁰
346. Nalcor will minimize the potential for increased stress on individuals and their families through implementing an Employee Assistance Program (“EAP”) to enhance health and well-being of employees who choose to use it.⁷¹¹ Where feasible, flexible work schedules will be available to provide opportunities for workers to optimize other values important to them, such as the practice of traditional harvesting activities, outside the workplace.⁷¹² This has been successful in past projects.⁷¹³ Nalcor will minimize the potential for increased demands on regional health services by providing paramedic,

⁷⁰⁹ EIS Vol. III, pg. 4-53.

⁷¹⁰ EIS Vol. III, pg. 4-54.

⁷¹¹ EIS Vol. III, pg. 4-54; Response to IR JRP.140(a) at pg. 3.

⁷¹² Response to IR JRP.140(a) at pg. 3.

⁷¹³ Colleen Leeder, CEAR 1086 at pg. 19.

emergency response and basic counselling services on-site.⁷¹⁴ Nalcor will also continue to liaise with Labrador Grenfell Health and the NL Department of Health and Community Services throughout their planning process to further minimize adverse effects of the Project on health services.⁷¹⁵ With the implementation of such effects management measures, in conjunction with government programs such as the Northern Strategic Plan that will see over \$650 million invested in Labrador to promote social development in the region,⁷¹⁶ residual adverse effects of the Project on community health are predicted to be not significant.⁷¹⁷ The Labrador-Grenfell Health Authority and NL Department of Health and Community Services agrees with Nalcor's effects predictions on community health and proposed mitigation strategies.⁷¹⁸

347. Nalcor will seek to enhance positive socio-economic effects through implementing appropriate policies and strategies for matters that are within its control, such as employment and material procurement.⁷¹⁹ Other matters are outside of Nalcor's control and mandate, such as municipal infrastructure. For these issues, Nalcor will participate in a more indirect, facilitative manner, reflecting the more indirect linkage of these issues to the Project.⁷²⁰ The Joint Review Panel for the Muskeg River Mine Expansion Project confirmed that local infrastructure and capacity are the responsibilities of government,

⁷¹⁴ EIS, Vol. III, pg. 8-3.

⁷¹⁵ EIS Vol. III, pg. 4-54.

⁷¹⁶ Ron Bowles, CEAR 817 at pgs. 130 and 131.

⁷¹⁷ EIS Vol. III, pg. 4-54.

⁷¹⁸ Dr. Faith Stratton, CEAR 1086 at pgs. 72 and 75.

⁷¹⁹ Response to IR JRP.162(a) at pg. 2.

⁷²⁰ Response to IR JRP.162(a) at pg. 2.

not project proponents, and that the Panel did not have the mandate to resolve pre-existing socio-economic issues.⁷²¹

348. The Project will result in substantial dividends and tax revenues accruing to the Government of Newfoundland and Labrador.⁷²² As the Department of Finance submitted during the hearing, budgets are set by the provincial legislature based on the revenues that are available to it and the funding proposals submitted by each government department.⁷²³ The needs of each department are balanced against one another and prioritized by the Cabinet, who then submits the budget to the legislature for approval.⁷²⁴ Nalcor's unique position as a Crown corporation allows it to work closely with multiple provincial agencies and departments to balance these needs and obtain government funding for programs related to Nalcor's projects.⁷²⁵

349. Therefore, where Nalcor will not take direct responsibility for an issue under a governmental authority's control, Nalcor has committed to working closely with the relevant authorities to assist them in meeting needs that arise from the Project. For example, Nalcor has committed to raising the issue of a housing shortage in Happy Valley-Goose Bay as an issue requiring a priority response with the Newfoundland and Labrador Housing Corporation.⁷²⁶ Nalcor fully expects to continue addressing issues in this manner.

⁷²¹ EUB/CEAA Joint Review Panel Report (EUB Decision 2006-128) (December 17, 2006) at pgs. 15 and 16.

⁷²² Nalcor presentation CEAR 670 at pg. 13.

⁷²³ Terry Paddon, CEAR 817 at pgs. 90 and 91.

⁷²⁴ Terry Paddon, CEAR 817 at pg. 91.

⁷²⁵ Gilbert Bennett, CEAR 817 at pg. 26.

⁷²⁶ Gilbert Bennett, CEAR 817 at pg. 125; Colleen Leeder, CEAR 1086 at pg. 13.

350. The agencies responsible for community infrastructure and services that may be affected by the Project have shown that they accept responsibility for ensuring local infrastructure and services are able to accommodate the Project, and are in fact already planning to meet that goal. For example, Rita Malone for the Department of Innovation, Trade and Rural Development explained during the hearings that her Department works with municipalities, other provincial departments and the federal government to ensure adequate infrastructure is in place to support development in the Province.⁷²⁷ Similarly, the Labrador-Grenfell Health Authority has submitted that it is responsible for ensuring adequate health care capacity in the region and that it will plan so that Project-related needs are met.⁷²⁸ The Province has committed to providing all of the resources that the Health Authority requires to assess additional needs that will arise from the Project and to ensure that sufficient health capacity exists if and when the Project proceeds.⁷²⁹
351. Pursuant to subsection 37(2.1)(b) of the CEAA, any mitigation measures that will be implemented by a government department or agency constitute mitigation that may be used to minimize adverse environmental effects. Nalcor submits that once the mitigation measures that it has proposed have been taken into account, together with all mitigation measures that have been proposed by government agencies, the Project is not likely to result in any significant adverse effects to community health, services or infrastructure.
352. It is important to remember that while the Project cannot solve every pre-existing problem or capacity shortage in each of the local communities, the Project will result in considerable long-term revenue to the Province that will better enable it to address these

⁷²⁷ Rita Malone, CEAR 817 at pg. 213.

⁷²⁸ Dr. Faith Stratton, CEAR 1086 at pgs. 74 and 78.

⁷²⁹ Delia Connell, CEAR 1086 at pg. 87; Dr. Faith Stratton, CEAR 1086 at pg. 87.

issues. Without the Project, the Province's ability to simply maintain the existing services it provides in the region may be at risk.

353. The Mayor of the Town of Happy Valley-Goose Bay stated that the Town Council was in favour of the Project, so long as it met three conditions: the provision of a block of power from the Project for the local communities and future industry; the development of a Labrador Heritage Fund from the proceeds of this and other projects; and a competitive electricity rate for industrial, commercial and residential consumers in the vicinity of the Project.⁷³⁰ The Labrador North Chamber of Commerce suggested similar conditions.⁷³¹
354. In response to the first condition request, Newfoundland and Labrador Hydro has an obligation to deliver least-cost electricity to customers who need it, no matter where they are in the province.⁷³² In addition, the ability of Newfoundland and Labrador Hydro to provide large blocks of power to communities and industry located in close proximity to the Project will be much greater than providing the same service farther away since there will be available electricity close by. Therefore, Newfoundland and Labrador Hydro will be able to provide local communities and industry with large blocks of energy relatively quickly if and when they need it in the future.⁷³³
355. With respect to the request for a Heritage Fund, Nalcor submits that the Province does not set aside funds for particular areas.⁷³⁴ The areas where the Province chooses to invest are based on the priorities set by the Cabinet and legislature, as discussed above. Just as

⁷³⁰ Mayor Abbass, CEAR 692 at pgs. 67 and 68.

⁷³¹ Sterling Peyton, CEAR 706 at pg. 9.

⁷³² Gilbert Bennett, CEAR 776 at pg. 15.

⁷³³ Gilbert Bennett, CEAR 706 at pg. 27.

⁷³⁴ Gilbert Bennett, CEAR 1164 at pg. 239.

revenues from offshore oil and gas developments were used to fund the College of the North Atlantic in Labrador, revenues from the Project should be directed to those areas of the Province that need investment the most, both in Labrador and on the Island.⁷³⁵

356. In terms of a competitive electricity rate for local consumers, the price of electricity in the vicinity of the Project will be less than in other, more isolated areas. However, this is not because Nalcor will be subsidizing local consumers; it is because the delivered cost of energy includes both the cost of electricity generation and the cost of transmission, and being in close proximity to generation means that the transmission component of the delivered cost of energy will be less. So being in proximity to the Project is a cost advantage for consumers in the area, whether they're industrial, commercial, or residential.⁷³⁶

357. Overall, Nalcor believes that local communities will benefit from this Project as a result of increased business activity and capacity, employment incomes to individuals, employment, training and infrastructure improvements. The Labrador North Chamber of Commerce has stated its support for this Project.⁷³⁷ Similarly, the Mayor for the Town of Happy Valley-Goose Bay stated in the hearings that in his opinion the Project was “amazing” and that it would provide many positive opportunities and benefits.⁷³⁸

358. Suggestions were made during the hearing that a more appropriate approach to assessing potential socio-economic effects of the Project would have been to use a Genuine Progress Index (“GPI”) and/or the Mackenzie Valley Review Board Social and Economic

⁷³⁵ Gilbert Bennett, CEAR 1164 at pg. 239.

⁷³⁶ Gilbert Bennett, CEAR 706 at pg. 26.

⁷³⁷ Sterling Peyton, CEAR 706 at pg. 8.

⁷³⁸ Mayor Abbass, CEAR 692 at pg. 82.

Assessment Framework (“MVRB Framework”).⁷³⁹ Nalcor submits that the socio-economic assessment that was carried out for the Project was appropriate and that the GPI approach would not have meaningfully changed the way that Nalcor predicted effects, nor would it have improved upon Nalcor’s proposed mitigation measures. The approach and methodology to assess the socio-economic effects of the Project was appropriate and thorough. The methodology that was used has been successfully used in assessing all large resource development projects in Newfoundland and Labrador over the past 20 years. This includes the assessments of the Terra Nova oilfield, White Rose oilfield, Newfoundland Transshipment Terminal, Voisey’s Bay Mine/Mill and Trans-Labrador Highway projects. In the past five years, this approach and methodology has been used for the Voisey’s Bay Processing Plant, the Newfoundland and Labrador Refining Company, and the North Amethyst satellite oilfield. These assessments, undertaken for CEAA and/or provincial requirements, were all found to be adequate for the purpose of assessing project effects to economy, employment, business, physical infrastructure, and social services, including health. In addition, Professor Rudd on behalf of the Grand Riverkeeper agreed that using a GPI approach would not have been appropriate in these circumstances.⁷⁴⁰

359. In addition, while the MVRB Framework was not specifically used by Nalcor in conducting the socio-economic assessment for the Project, Nalcor’s approach was in fact very similar to the MVRB Framework. The Mokami Status of Women suggested that the MVRB Framework would have required Nalcor to more fully identify and understand the

⁷³⁹ For example, Petrina Beals, CEAR 1086 at pg. 330.

⁷⁴⁰ Murray Rudd, CEAR 1163 at pg. 126.

downstream social effects of the Project on local women and local communities.⁷⁴¹ However, Nalcor carried out extensive consultation with women's organizations, Aboriginal communities, and local municipalities in order to determine potential socio-economic effects of the Project and to develop effective mitigation strategies.⁷⁴² Nalcor submits that no real evidence has been submitted to suggest that its local consultation was in any way inadequate or that women's issues have not been adequately addressed through its Gender Equity Program.

(iii) Land and Resource Use

360. Several interveners have submitted during the hearing that their traditional and current land and resource use will be affected by the Project.⁷⁴³
361. Section 4.4.4.4 of the EIS Guidelines requires Nalcor to assess land and resource use within the Project Area. Nalcor assessed potential Project effects on land and resource use on the basis of effects on hunting, trapping and fishing; navigation and winter travel; recreational use of the land; forestry; mineral lands; special area; berry picking and medicinal plants; agriculture; and landscape and river aesthetics.⁷⁴⁴ This was done through extensive phone and face-to-face interviews in the communities of Happy Valley-Goose Bay, Northwest River, Mud Lake, Churchill Falls, Labrador City and Wabush.⁷⁴⁵ Nalcor also provided funding to Aboriginal groups to conduct land and resource use studies, and performed a thorough review of literature and relevant

⁷⁴¹ For example, Petrina Beals, CEAR 1086 at pg. 318.

⁷⁴² CEAR 1189; EIS Vol IA, pgs. 7-5 to 7-9.

⁷⁴³ For example, Tom Sheldon, CEAR 1086 at pg. 279.

⁷⁴⁴ EIS Vol. III, pg. 5-7.

⁷⁴⁵ Colleen Leeder, CEAR 1086 at pg. 21.

government data for aspects such as hunting and fishing bag limits, licences outfitting, forestry tourism and mining.⁷⁴⁶

362. A significant adverse environmental effect on land and resource use was defined as one where the proposed use of land for the Project is not compatible with adjacent land use activities as designated through a regulatory land use process or where the Project creates a change or disruption that widely restricts or degrades land and resource use to a point where activities cannot continue at or near current levels within the Assessment Area over the long term.⁷⁴⁷
363. While Project-related loss of habitat may affect the distribution and abundance of some game species, the Project will not affect the viability or sustainability of these populations within the Assessment Area. The Project will also result in a net increase in fish habitat. Therefore, while the pattern and location of hunting, trapping and fishing activities in the Assessment Area might be permanently altered because of the Project, populations of fish and game species are anticipated to remain at a level necessary to continue to sustainably support these land use activities.⁷⁴⁸
364. There will be some increased access to the lower Churchill River as a result of new access roads built for the Project. This will provide increased opportunities for land and resource use activities in the Assessment Area. Any potential adverse effects of increased access, such as increased competition for resources, will be mitigated through reclaiming the majority of the access roads over time and limiting harvesting activities by Project

⁷⁴⁶ Colleen Leeder, CEAR 1086 at pg. 22.

⁷⁴⁷ EIS Vol. III, pg. 5-9.

⁷⁴⁸ EIS Vol. III, pg. 5-34.

employees while on site.⁷⁴⁹ DFO has submitted that a no fishing policy for workers, such as the policy Nalcor proposed in its EIS, will be important in controlling fishing activity within the Project area.⁷⁵⁰

365. Employment for the Project is anticipated to have both adverse and positive effects on land and resource use. While Project workers will have less time to engage in hunting, trapping and fishing, wages will provide the financial means to support harvesting activities. To mitigate adverse environmental effects, Nalcor will support flexibility in work schedules and rotations, job-sharing and cultural leave provisions where possible.⁷⁵¹
366. The Project will result in minor interference with navigation on the lower Churchill River.⁷⁵² However, the reservoirs will continue to be navigable waterways once flooded and the river will still be navigable because the Project will result in reduced flow and more stable ice conditions in the river upstream of Muskrat Falls after impoundment. Within the reservoirs, the primary impediments to navigation will occur during and shortly after construction when trees that were not cleared during the reservoir clearing process will be present along some sections of the new shoreline. Nalcor will work with Transport Canada, as per their recommendations to identify issues with navigation and implement necessary mitigations.⁷⁵³
367. Downstream of Muskrat Falls, it is expected that the freeze up date will be delayed by two weeks and the break up date will occur one week later than at present. The amount of

⁷⁴⁹ EIS Vol. III, pg. 5-34.

⁷⁵⁰ Fisheries and Oceans Canada, CEAR 639 at pg. 34.

⁷⁵¹ EIS Vol. III, pg. 5-34.

⁷⁵² Transport Canada, CEAR 635 at pg. 19.

⁷⁵³ Marion Organ, CEAR 836 at pg. 45.

time that downstream residents will be able to use the area for boating or for snowmobiling in the winter will not be affected, nor will the stability of the ice. Therefore, both Nalcor and Transport Canada concluded that downstream crossing of the river is not expected to be significantly affected by the Project.⁷⁵⁴ Furthermore, it should be noted that Nalcor will be required to work with Transport Canada to develop appropriate terms and conditions to be placed upon an approval under the *Navigable Waters Protection Act* to mitigate effects on navigation if the Project is approved.⁷⁵⁵

368. The Project will also likely result in the loss of some ashkui on the main stem of the lower Churchill River, which are areas used by waterfowl for staging and by the Labrador Innu for hunting, in late winter and early spring. Based on detailed modelling carried out for the Project, Nalcor expects that ashkui will continue to form at the deltas of tributaries due to the increased velocity of flow and higher temperature of water compared to elsewhere in the reservoirs.⁷⁵⁶ Mitigation measures to enhance fish habitat will also contribute to ashkui formation at selected deltas prior to inundation.⁷⁵⁷ Environment Canada submitted that there is insufficient baseline information on how ashkui are used by waterfowl and that this information is required to inform monitoring and follow-up programs.⁷⁵⁸ Nalcor has committed to collecting this baseline information prior to inundation.⁷⁵⁹ Regardless, other ashkui that form in the lower Churchill River

⁷⁵⁴ Response to IR JRP.71(e) at pg. 7; Transport Canada, CEAR 635 at pg. 10.

⁷⁵⁵ Transport Canada, CEAR 635 at pg. 11.

⁷⁵⁶ Response to IR JRP.154(c) at pg. 6.

⁷⁵⁷ Response to IR JRP.48(f) at pg. 7.

⁷⁵⁸ Glenn Troke, CEAR 1113 at pg. 65.

⁷⁵⁹ CEAR 1189 at pg. 4.

watershed beyond the reservoirs will be available for use by wildlife and the Innu.⁷⁶⁰ For that reason, Environment Canada concluded that regardless of the outcome of the supplemental baseline work that Nalcor has agreed to perform, the Project will not likely result in population level effects on waterfowl that use ashkui for staging.⁷⁶¹ Nalcor submits that any effects on Innu land and resource use will similarly be minimal and localized and that there will be sufficient ashkui in the Assessment Area for Innu to continue fishing, hunting and trapping to the same extent as they have historically done.⁷⁶²

369. In terms of potential effects of the Project on berry picking and medicinal plants, habitat loss will be localized and is not anticipated to be of sufficient scale or magnitude to cause a reduction in the level of existing activities within the Assessment Area. Canada yew plants within the inundated area will be re-located to an area above the future reservoir limits.⁷⁶³

370. Finally, it is anticipated that consumption advisories for fish species will be developed and issued to limit human exposure to methylmercury. These advisories are expected for the main stem of the lower Churchill River, but are not expected to extend beyond Goose Bay or into Lake Melville.⁷⁶⁴ For some people, this may result in decreased fish harvesting and consumption. However, those people will have opportunities to fish outside of the main stem of the River where mercury levels in fish will not be affected by

⁷⁶⁰ Response to IR JRP.154(c) at pg. 6.

⁷⁶¹ Scott Gilliland, CEAR 923 at pg. 159.

⁷⁶² EIS Vol. III, pg. 5-34.

⁷⁶³ EIS Vol. III, pg. 5-35.

⁷⁶⁴ Colleen Leeder, CEAR 1086 at pg. 14.

the Project. In addition, Nalcor's studies indicated that the majority of fish harvesting in the Project Area in fact occurs in Lake Melville or in tributaries, outside of the area where fish consumption advisories will likely be implemented.⁷⁶⁵ The conclusion was confirmed by the oral evidence of several interveners during the hearing, as well as by Minister Kemuksigak of the Nunatsiavut Government.⁷⁶⁶ Further, Nalcor committed to investigate the rehabilitation of Grand Lake as part of its fish compensation strategy which would increase fishing opportunities in the immediate area (Gilbert Bennett, CEAR 1221 pages 8ff). Finally, mercury levels in fish within the main stem are expected to peak in 10 to 15 years, after which they will decline, approaching baseline levels within 35 years.⁷⁶⁷

371. Mitigation measures proposed by Nalcor to minimize adverse effects on land and resource use include:
- (a) Compensating trappers for trap lines that will be flooded by the Project;
 - (b) Restricting access to Project roads and work areas during construction;
 - (c) Implementing a no-harvesting and firearms prohibition policy for all Project employees;
 - (d) Allowing flexibility in work schedules and rotations to enable employees to engage in traditional activities;

⁷⁶⁵ Lower Churchill River Fish Consumption and Angling Survey Component Study at pg. 6-4; CEAR 1150.

⁷⁶⁶ Patricia Kemuksigak, CEAR 1086 at pg. 305; also Patricia Kemuksigak, CEAR 1164 at pg. 170; Derryl Shiwak, CEAR 1118 at pg. 21; Carl McLean, CEAR 961 at pg. 148.

⁷⁶⁷ EIS Vol. III, pg. 5-35.

- (e) Providing country foods as part of the regular menu rotation at the accommodation complexes;
- (f) Re-establishing Canada yew plants that are located within the inundated area;
- (g) Preparing the reservoirs to reduce adverse aesthetic effects and to improve navigability;
- (h) Replacing boat access points that are lost due to the Project;
- (i) Maintaining access to portage routes at Gull Island and Muskrat Falls;
- (j) Scheduling construction to minimize disruption to boating; and
- (k) Creating snowmobile trails equal to the amount inundated.⁷⁶⁸

372. Since any adverse effects on land and resource use resulting from the Project will not be of sufficient scale or magnitude to cause a reduction in the level of existing activities within the Assessment Area, residual adverse effects on land and resource use are expected to be not significant.⁷⁶⁹ This distinguishes the Project from the Whites Point Quarry Project, which was referenced by the Sierra Club during the hearings,⁷⁷⁰ where it was found that the project in question was incompatible with how the local residents used and valued the land permanently.⁷⁷¹

⁷⁶⁸ EIS Vol. III, pg. 5-32 and 5-33.

⁷⁶⁹ EIS Vol. III, pg. 5-36.

⁷⁷⁰ Bruno Marcocchio, CEAR 1136 at pg. 312.

⁷⁷¹ Final Report for the Whites Point Quarry and Marine Terminal Project (October 2007), online: <http://www.ceaa.gc.ca/B4777C6B-docs/WP-1837_e.pdf> at 103.

373. Nalcor will monitor certain post-impoundment conditions to ensure that its effects predictions for land and resource use are accurate. For example, Nalcor will monitor ice formation downstream of Muskrat Falls and ashkui utilization by waterfowl.⁷⁷² However, Nalcor considers general monitoring of land and resource to be the responsibility of provincial and federal agencies, not Nalcor.⁷⁷³ Nalcor has committed to provide Project-related information to these authorities in order to assist them in carrying out their responsibilities, but the nature and extent of this information will be based on the requirements of the responsible government agencies.⁷⁷⁴
374. During the hearing, the NunatuKavut Community Council (“NCC”) presented a compilation of traditional traplines of their membership that was prepared in 1994.⁷⁷⁵ Of particular relevance was the identification of trapping areas within the lower Churchill River watershed. The representatives of the NCC were uncertain of the origin and methods behind the mapping but were aware of the involvement of Dr. Evelyn Plaiice.⁷⁷⁶ Based on these comments, Nalcor believes the maps were derived at least in part from intensive land-use use interviews conducted in the 1980s. As part of the baseline research associated with the environmental assessment of military training activities at 5 Wing Goose Bay (DND 1994) [**CEAR Document number unassigned at filing time, this information was filed Wednesday, April 13 2011 titled “Subject – Supplemental Information”**], Perry Trimper (a member of the Nalcor consultants’ team) worked with Dr. Plaiice during 1987-1988. Interviews were conducted with active and former trappers

⁷⁷² Response to IR JRP.71(e) at pg. 7; Response to IR JRP.48(c) at pg. 4.

⁷⁷³ Response to IR JRP.113(a) at pg. 2.

⁷⁷⁴ Response to IR JRP.113(a) at pg. 2.

⁷⁷⁵ Greg Mitchell, CEAR 1208 at pg 257.

⁷⁷⁶ Greg Mitchell, CEAR 1208 at pg 259.

from throughout Labrador and north-eastern Quebec using consistent questionnaires and 1:50,000 topographic map sheets. This information was compiled in the DND (1994) [CEAR Document number unassigned see above for explanation of document] EIS by community (instead of ethnic origin as presented by the NCC). Regardless, the extent of this trapping activity (occurring prior to the 1980s up to 1994) was presented in documents (e.g., DND 1994) reviewed for the environmental baseline for this Project. While the value of the information presented by the NCC is obvious, Nalcor contends that no additional evidence of contemporary activity was presented by NCC and that the NCC's compilation of traditional traplines does not change Nalcor's conclusions regarding the potential effect of the Project on current land and resource use including trapping.

(iv) Cultural Heritage Resources

375. Concerns were raised during this hearing that cultural heritage resources would be lost as a result of the Project.⁷⁷⁷
376. Section 4.4.4.5 of the EIS Guidelines requires Nalcor to assess cultural heritage resources that may be affected by the Project. Under the Newfoundland and Labrador *Historic Resources Act*, historic resources include objects (such as stone tools) and structural remains pre-dating 1960 that show evidence of manufacture, alteration or use by humans, as well as burial, cultural, spiritual and other heritage sites and materials dating to the Pre-contact and Historic Periods.⁷⁷⁸

⁷⁷⁷ For example, Ed Tuttauq, CEAR 961 at pg. 65; Scott Nielsen, CEAR 961 at pg. 93.

⁷⁷⁸ EIS Vol. III, pg. 6-2.

377. A significant adverse environmental effect on cultural heritage resources was defined as the loss or disturbance of known historic and archaeological resources without the appropriate documentation, or salvage and retrieval of the material culture and the information it contains, and without prior approval from the provincial regulatory agency.⁷⁷⁹
378. In carrying out its assessment of historical and cultural resources, Nalcor undertook the longest and most intensive archaeological assessment that has ever been done in the region, involving over 1,400 individual testing locations, more than 45,000 test pits and recording over 350 sites.⁷⁸⁰ Within the Assessment Area, Nalcor identified 46 archaeological sites, consisting of 26 sites with pre-contact components, including two historic Hudson's Bay Company trading posts, as well as six historic tilts and 14 historic campsites and other indeterminate historic occupations.⁷⁸¹ Two additional cultural heritage sites were identified by the Innu as sites of cultural and spiritual importance.⁷⁸² Historically and culturally significant portage routes and trails were also recorded and documented.⁷⁸³
379. Nalcor followed the mitigation guidelines under the *Historic Resources Act* to plan Project activities in a way that would reduce any adverse environmental effects on historic resource values.⁷⁸⁴ Nalcor and the Provincial Archaeology Office ("PAO") have worked together for over 10 years on designing and implementing Nalcor's

⁷⁷⁹ EIS Vol. III, pg. 6-6.

⁷⁸⁰ Fred Schwarz, CEAR 1011 at pg. 11.

⁷⁸¹ EIS Vol. III, pg. 6-6.

⁷⁸² EIS Vol. III, pg. 6-10.

⁷⁸³ Fred Schwarz, CEAR 1011 at pg. 16.

⁷⁸⁴ EIS Vol. III, pg. 6-13.

archaeological program, and the PAO has expressed its satisfaction with Nalcor's work to date and its plans to protect and recover historical resources through the life of the Project.⁷⁸⁵

380. Of the 46 historic and archaeological sites registered for the Assessment Area, two have already been excavated archaeologically, with no further mitigation required. There is potential for some of the remaining sites to be disturbed or lost as a result of the Project. In accordance with its Historic and Archaeological Resources Mitigation Plan, Nalcor has proposed data recovery and field recording programs for these sites to ensure information and material from these sites will be recovered and archived.⁷⁸⁶
381. Interactions with the cultural and spiritual site at Muskrat Falls (Manitu-utshu) have been reduced through a Project redesign and development of an alternate layout that considered cultural and spiritual importance of the site.⁷⁸⁷
382. Scott Nielsen submitted that while Nalcor has complied with all necessary regulatory requirements in carrying out its archaeological programs, there are shortfalls in the regulatory requirements.⁷⁸⁸ For example, Mr. Nielsen requested that Nalcor commit to analyzing the artefacts that are discovered and collected through the archaeological program.⁷⁸⁹ Nalcor has accepted this request.⁷⁹⁰

⁷⁸⁵ Martha Drake, CEAR 1086 at pgs. 185 and 190.

⁷⁸⁶ Attachment A to Response to IR JRP.104.

⁷⁸⁷ EIS Vol. III, pg. 6-17.

⁷⁸⁸ Scott Nielsen, CEAR 1086 at pgs. 156 and 157.

⁷⁸⁹ Scott Nielsen, CEAR 1086 at pg. 143.

⁷⁹⁰ Fred Schwarz, CEAR 1086 at pg. 216; CEAR 1120.

383. Mr. Nielsen also expressed concerns that Nalcor had not identified all possible historical sites in the Project Area.⁷⁹¹ Nalcor submits that to the extent that any historical sites that may be affected by the Project have not already been identified, they will be identified through the detailed Project planning process and the second phase of the historical resource assessment program. Furthermore, Nalcor's EPP will include a Historic and Archaeological Resources Contingency and Response Plan that outlines procedures to follow upon discovery of historic and archaeological resources, such as pre-contact or historic artefacts, sites, structures, objects or materials.⁷⁹² Finally, as a response to an undertaking, Nalcor committed to work with communities to develop ways to commemorate areas and items of historical importance and to commemorate those areas on the river as well as making historical information available and displayed locally (see CEAR 1136, pages 3-4).
384. As a result, any potential adverse environmental effects on cultural heritage resources are expected to be not significant.⁷⁹³

VI. Cumulative Effects

(i) Approach

385. Several concerns were raised during this hearing regarding Nalcor's approach to cumulative effects.⁷⁹⁴ Specifically, there were concerns that Nalcor did not adequately

⁷⁹¹ Scott Nielsen, CEAR 1086 at pg. 159.

⁷⁹² EIS Vol. III, pg. 6-17.

⁷⁹³ EIS Vol. III, pg. 6-16.

⁷⁹⁴ For example, Fisheries and Oceans Canada, CEAR 639 at pg. 35; Clarice Blake-Rudkowski, CEAR 707 at pg. 42; Stuart Luttich, CEAR 1136 at pg. 235..

assess the interaction of the Project with environmental effects associated with the Upper Churchill project.

386. Nalcor's approach to cumulative effects was based upon the CEAA, CEA Agency guidance,⁷⁹⁵ section 4.5.3 of the EIS Guidelines and standard environmental assessment practice in Canada.⁷⁹⁶ Environment Canada confirmed that Nalcor's approach to cumulative effects was adequate.⁷⁹⁷
387. Subsection 16(1) of the CEAA states that every environmental assessment must consider "...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", as well as the significance of these environmental effects.
388. The Joint Review Panel and the National Energy Board on the Express Pipeline Project articulated a useful test for considering cumulative effects for a project. The Joint Review Panel identified three requirements that must be met before they would consider as relevant any evidence related to cumulative effects.
389. First, there must be an environmental effect of the project being assessed. Second, that environmental effect must be demonstrated to operate cumulatively with the environmental effects from other projects or activities. Third, it must be known that the other projects or activities have been, or will be, carried out are not hypothetical.⁷⁹⁸

⁷⁹⁵ CEA Agency Cumulative Effects Practitioners Guide, 1999; CEA Agency Reference Guide: Addressing Cumulative Environmental Effects, 1994; CEA Agency, "Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act" (2007).

⁷⁹⁶ Response to IR JRP.97(a) at pg. 3.

⁷⁹⁷ Environment Canada, CEAR 730 at pg. 206.

⁷⁹⁸ NEB-CEAA Joint Review Panel, *Environmental Assessment of the Express Pipeline Project: Joint Review Panel Report OH-I-95*, (May 1996), pages 187-188.

390. In its decision, the Joint Review Panel also noted that a further requirement is that the cumulative effect be likely.⁷⁹⁹
391. In conducting its Cumulative Effects Analysis (“CEA”) for the Project, Nalcor first developed a pre-Project baseline of the existing environment, which captured the environmental and socio-economic effects of previous developments and activities.⁸⁰⁰ Such a baseline allows for a thorough assessment of changes to the environment that will result from the Project, and reflects the reality that many of the natural and human systems that have been affected by major developments in the past, such as the Churchill Falls Power Station, have already adjusted in response to those residual effects.⁸⁰¹
392. The use of this pre-Project baseline was the subject of several intervenor challenges. For example, DFO expressed concerns that Nalcor’s assessment of existing mercury levels in fish does not represent natural background levels and that any increase in mercury levels represents a cumulative effect.⁸⁰² However, Nalcor’s significance assessment for the expected increases in mercury levels in fish considered whether or not the future levels will pose a health risk to humans or other animals that eat those fish, or to the fish themselves. For the purpose of the environmental assessment, it should not matter whether all of the increase in mercury levels occurred as a result of the Project, or the Project in conjunction with other past developments, so long as the effects associated with those increases are fully considered.

⁷⁹⁹ CEA Agency Cumulative Effects Practitioners Guide, 1999, Section 2.1.

⁸⁰⁰ Response to IR JRP.163(a) at pg. 3.

⁸⁰¹ Response to IR JRP.97(a) at pg. 3.

⁸⁰² Fisheries and Oceans Canada, CEAR 639 at pg. 35.

393. Similarly, changes in local perceptions about the safety of country foods as a result of the Upper Churchill project has informed Nalcor's communication strategy for consumption advisories.⁸⁰³ Since it is important that country foods remain a part of the local diet, consumption advisories for the Project will need to account for underlying fears around country foods that are found in the pre-Project baseline. As a result, Nalcor has committed to focussing on education and promotion of healthy strategies in its consumption advisories, including moderate consumption of fish from a variety of sources, as well as on improving availability of nutritious foods.⁸⁰⁴

394. The use of pre-project baselines for cumulative effects assessments is generally accepted practice in Canadian environmental assessments. For example, in the Final Report of the EUB-CEAA Joint Review Panel for the Cheviot Coal Project, the Panel stated that:

In this case, the Panel notes that [the Proponent] used present conditions to describe the environmental "baseline" associated with the region. The Panel believes that this is an appropriate starting point for the Cheviot Project CEA and notes that the baseline includes current mining, logging, and oil and gas activities in the region. Since these activities have already received approval, the Panel believes that their inclusion as baseline conditions (as opposed to more pristine predevelopment conditions) is appropriate.⁸⁰⁵

395. Utilizing a pre-Project baseline allowed Nalcor to fully assess the effects of the Project on the environment and Nalcor submits that this approach was the correct approach to take. This approach accounted for those elements of the environment that have adapted to the Churchill Falls development and the fact that a new equilibrium has developed on the River. Nalcor's cumulative effects assessment also incorporated residual environmental effects from the Churchill Falls development by assessing cumulative effects against

⁸⁰³ CEAR 1150 at pg. 6.

⁸⁰⁴ CEAR 1150 at pg. 6.

⁸⁰⁵ EUB Decision 2000-59, "Final Report of the EUB-CEAA Joint Review Panel for the Cheviot Coal Project" (September 2000) at pg. 38.

objective standards, such as a species' viability in the Assessment Area. In other words, if a species was particularly vulnerable in the region as a result of the Churchill Falls development and the Project contributed further to that species' decline such that the species was no longer viable in the region, that would have constituted a significant cumulative effect.

396. Once the pre-Project baseline had been developed, the Project's activities were assessed against this existing baseline, together with proposed mitigation measures, to predict likely residual Project effects.⁸⁰⁶ Past and existing developments influenced this assessment as well, through consideration of VECs and KIs that were already affected by past projects and through considering how similar developments had affected the environment previously.⁸⁰⁷
397. Finally, predicted Project effects were considered on a cumulative basis with effects of reasonably foreseeable future projects that will overlap with likely Project effects on both a temporal and spatial basis.⁸⁰⁸ A precautionary approach was employed in the CEA such that, even if some predicted effects from other projects were likely to be negligible, they were still assessed in the CEA so that conservative and reliable cumulative effects predictions were made.⁸⁰⁹
398. Developments that will not overlap spatially or temporally with the Project were not considered in the CEA. For example, the Project will not affect the biophysical environment upstream of the Project footprint. Changes in the watershed above Churchill

⁸⁰⁶ Response to IR JRP.97(a) at pg. 3.

⁸⁰⁷ Response to IR JRP.97(a) at pg. 4.

⁸⁰⁸ Response to IR JRP.97(a) at pg. 4.

⁸⁰⁹ Response to IR JRP.97(a) at pg. 4.

Falls due to other hydroelectric developments only overlap with those of the Project downstream of Churchill Falls, and it is only those downstream effects that were considered in the CEA.⁸¹⁰

399. As a result of this screening process, developments that were considered in the CEA were the Voisey's Bay Mine/Mill, Labrador West mining developments, NATO special forces training, general economic and infrastructural development in the Upper Lake Melville area, cultural and recreational land use, commercial forestry, Trans-Labrador Highway upgrades, and additional transmission.⁸¹¹ For each VEC or KI, only those developments that had the potential to overlap with the Project's effects were assessed. For example, the cumulative effects of the Voisey's Bay Mine/Mill were assessed for Economy, Employment and Business because the effects overlapped with those of the Project. The cumulative effects of the Voisey's Bay Mine/Mill were not assessed for either the Aquatic or Terrestrial Environment VECs because there was no spatial overlap with the effects of the Project.⁸¹²

(ii) Conclusions for Cumulative Effects

400. For each VEC and KI with the exception of the Red Wine Mountains caribou herd, the CEA concluded that the Project would not result in cumulative significant adverse environmental effects. In other words, for each VEC and each KI, the residual effects of the Project in conjunction with other projects that have been or will be carried out were

⁸¹⁰ Response to IR JRP.97(a) at pg. 6.

⁸¹¹ Response to IR JRP.97(a) at pg. 7.

⁸¹² Response to IR JRP.97(a) at pg. 7.

not found to be significant, based on the definitions of significance for each KI outlined above.

401. With respect to the Red Wine Mountains caribou herd, the cumulative effects assessment concluded that the herd is currently experiencing significant cumulative effects. If left unchecked, the ongoing pressures of predation and illegal hunting will likely contribute to a further decline in numbers and viability of the herd.⁸¹³ However, the Project will not contribute to these pressures.⁸¹⁴ In fact, Nalcor's proposed mitigation strategies and its involvement on the Labrador Woodland Caribou Recovery Team will encourage the herd's chances of recovery.⁸¹⁵ Therefore, as discussed above, Nalcor concluded that the residual environmental effects of the *Project* on the Red Wine Mountains caribou herd is not expected to have any incremental adverse effect and thus are not likely to be significant.⁸¹⁶ The Wildlife Division for the Province agreed with this conclusion.⁸¹⁷ Since the status of the Red Wine Mountains caribou herd will not change as a result of the Project, the *Project* is not likely to result in any significant cumulative effect on the herd.⁸¹⁸

⁸¹³ EIS Vol. IIB, pg. 5-112 and 5-113.

⁸¹⁴ Response to IR JRP.157(h) at pg. 15; EIS Vol IIB, pg. 5-80; Brock Simons, CEAR 940 at pg. 23..

⁸¹⁵ EIS Vol IIB, pg. 7-6.

⁸¹⁶ EIS Vol IIB, pg. 5-80 and 5-81.

⁸¹⁷ CEAR 205 at pg. 9.

⁸¹⁸ Perry Trimper, CEAR 1136 at pgs. 71 and 72.

VII. Adaptive Management, Monitoring and Follow-Up

402. Adaptive management, monitoring and follow-up are key to the environmental assessment process, and several interveners have challenged the comprehensiveness of these proposed programs.⁸¹⁹

403. The purposes of monitoring and follow-up were defined in section 4.6.4 of the EIS

Guidelines:

Monitoring programs will ensure that the Project is implemented as proposed, that the mitigation or compensation measures proposed to minimize the Project's environmental effects are effectively implemented, and that the conditions set at the time of the Project's authorization and the requirements pertaining to the relevant laws and regulations are met.

...

The purpose of the follow-up program is to verify the accuracy of the predictions made in the assessment of the effects as well as the effectiveness of the mitigation measures. The duration of the follow-up program shall be as long as is needed to evaluate the effectiveness of the mitigation measures

404. In accordance with the EIS Guidelines, Nalcor has committed to extensive monitoring and follow-up throughout the life of the Project.⁸²⁰ The details of this monitoring will be developed prior to construction and will incorporate the results of this hearing process.⁸²¹

However, Nalcor has committed to working with various regulators in developing the specifics of these programs and will make all monitoring results publicly available.⁸²²

405. Dr. Rosenberg stated during the hearings that long-term monitoring is needed in order to measure the accuracy of effects predictions and to inform mitigation and adaptive

⁸¹⁹ For example, Robin Goodfellow-Baikie, CEAR 1113 at pg. 85; Tom Sheldon CEAR 1113 at pg. 293; Roberta Benefiel, CEAR 1113 at pg. 206.

⁸²⁰ For example, refer to response to IR JRP.112.

⁸²¹ Response to IR JRP.112 at pg. 4.

⁸²² Gilbert Bennett, CEAR 1113 at pg. 40.

management processes.⁸²³ Nalcor completely agrees. The objective of each follow-up program will be to test the accuracy of the predictions made in the EIS for a given biophysical, social, or economic component that would be tested by analysis of the data collected, and to verify the effectiveness of mitigation measures. If Project effects are not as predicted, adaptive management measures will be implemented to refine and optimize relevant mitigation and monitoring.⁸²⁴

406. Nalcor's approach to adaptive management is consistent with the CEA Agency's guidance and involves a systematic approach that builds on trial and error and adjusts practices to address evolving issues and conditions.⁸²⁵ This adaptive management process can be summarized in 8 steps:

- (1) Nalcor identifies a potential Project effect on a KI or VEC;
- (2) Nalcor develops a management goal for that effect;
- (3) Nalcor designs a monitoring and follow-up program to track the Project's effects on that VEC or KI and the accuracy of Nalcor's effects predictions;
- (4) Nalcor implements that monitoring and follow-up program;
- (5) Nalcor analyzes and interprets the data gathered through the monitoring and follow-up program and communicates the results to regulators;

⁸²³ Dr. Dave Rosenberg, CEAR 1163 at pg. 228.

⁸²⁴ Response to IR JRP.112 at pg. 8.

⁸²⁵ CEA Agency, "Adaptive Management Measures Under the Canadian Environmental Assessment Act" (2009); Response to IR JRP.112 at pg. 11.

- (6) Based on the results of the monitoring and follow-up, Nalcor evaluates the attainment of the goals established in Step 2;
- (7) If the results require, Nalcor adapts the monitoring and follow-up program to better achieve the goals established in Step 2; and
- (8) Nalcor continues to conduct monitoring and follow-up, adapting as necessary, until the goals established in Step 2 are achieved.⁸²⁶

407. Nalcor has successfully utilized this approach to monitoring, follow-up and adaptive management in previous developments.⁸²⁷ This approach will allow Nalcor to respond to changing circumstances or unforeseen events in a timely and efficient manner to ensure that the Project does not result in any significant adverse environmental effects. If Nalcor's ability to adaptively manage the Project is constrained by overly prescriptive conditions or recommendations, this could impair the purpose of adaptive management and result in less effective adaptive management of the Project. For example, Keith Clarke with DFO explained that requiring specific mitigation to prevent entrainment before any results are gathered might actually lead to greater harm than if DFO and the Proponent adaptively managed the same issue in the future.⁸²⁸

408. Some interveners have expressed concerns with the lack of detail in Nalcor's proposed monitoring and follow-up programs. However, Nalcor's proposed monitoring and follow-up programs are preliminary at this point and will incorporate input from this hearing

⁸²⁶ Response to IR JRP.112 at pg. 12.

⁸²⁷ Response to IR JRP.112 at pg. 9.

⁸²⁸ Keith Clarke, CEAR 1113 at pg. 263.

process, as well as the detailed Project plans that will be developed once the environmental assessment is complete and a decision is made to proceed with the Project.

409. In addition, several interveners requested that Nalcor form a local monitoring committee.⁸²⁹ In response to this request, Nalcor has committed to forming a Monitoring and Follow-up Committee comprised of representatives of Aboriginal groups, communities, impartial scientific experts, and representatives of federal and provincial regulators.⁸³⁰ This Committee will facilitate communication of monitoring and follow-up objectives, define monitoring and follow-up requirements, consider proposals to meet those requirements, review and advise on results, and provide feedback to Nalcor in order to continually improve Nalcor's environmental performance.⁸³¹ All activities, advice and recommendations of this Committee will be made available to the public.⁸³²
410. The Nunatsiavut Government recommended that Nalcor provide funding to allow the ArcticNet program to monitor Lake Melville, including the use of a particular research vessel that would cost roughly \$56,000 per day.⁸³³ Nalcor has committed to discussing potential monitoring and follow-up programs with each Aboriginal group, including the Nunatsiavut Government.⁸³⁴ However, given that Nalcor will be working with all stakeholders to develop suitable monitoring and follow-up programs, Nalcor submits that it is not appropriate to recommend such a specific monitoring program at this time.

⁸²⁹ For example, Robin Goodfellow-Baikie, CEAR 1113 at pg. 88.

⁸³⁰ CEAR 1188 at pg. 1.

⁸³¹ CEAR 1188 at pg. 1.

⁸³² CEAR 1188 at pg. 1.

⁸³³ Tom Sheldon, CEAR 1113 at pgs. 297 and 317.

⁸³⁴ CEAR 1188 at pg. 1.

411. It is also important to note that once the environmental assessment for a development project is complete, that project will typically require further regulatory authorizations. These authorizations are often contingent on detailed project plans, mitigation strategies and monitoring programs. For example, the Project will require authorization under section 5 of the *Navigable Waters Protection Act* to construct any work in, on, over, under, through or across the Churchill River. Transport Canada will work with Nalcor to develop detailed mitigation strategies to ensure that the public's right to safe navigation is protected if the Project proceeds.⁸³⁵ Similarly, the Project will require authorization under the *Fisheries Act* and this will necessitate a final Fish Habitat Compensation Plan that is acceptable to DFO.⁸³⁶ Developing such mitigation and monitoring strategies requires engineered drawings and detailed timelines of construction activities.⁸³⁷
412. Since the planning details that support these further regulatory authorizations are not required during the environmental assessment phase, Nalcor submits that detailed monitoring and follow-up plans for issues that require further regulatory approval be developed during those future processes and not at this time. Environment Canada expressed a similar opinion when it submitted that "...Environment Canada does not expect to see detailed programs or contingency plans at this stage of project planning. Rather our expectation and recommendation is that these programs be developed in future and approved by the appropriate agencies prior to construction."⁸³⁸ It should be noted that with respect to the Fish Habitat Compensation Plan, DFO has submitted that Nalcor "has

⁸³⁵ Transport Canada, CEAR 635 at pg. 10.

⁸³⁶ Fisheries and Oceans Canada, CEAR 639 at pg. 24.

⁸³⁷ Transport Canada, CEAR 635 at pg. 10.

⁸³⁸ Environment Canada, CEAR 615 at pg. 3.

considerable experience in monitoring the functioning of habitat constructed for compensation at other sites, and that it is likely that an appropriate and effective monitoring program can be designed and implemented for both the incidental habitat gains and the physical works in question”.⁸³⁹

413. Therefore, Nalcor submits that while details of some proposed monitoring and follow-up programs have not yet been finalized, Nalcor will be required to work with the relevant regulators to design these programs and these programs will ensure that Nalcor’s effects predictions are verified once the Project is commenced. Given the expertise of these permitting bodies, Nalcor submits that these regulators are in the best position to make detailed decisions regarding Project implementation, follow-up and monitoring and the JRP should have regard for this when considering the recommendations to include in its Report. Providing the regulators with flexibility in how to manage the Project will also allow them to adapt to future conditions to increase benefits and reduce adverse effects.
414. Innu Nation raised a question regarding the adequacy of the socio-economic baseline used in the EIS⁸⁴⁰ to support an assessment of project effects on Innu, Innu governments and Innu social service agencies, and proposed an institute similar to the Institute for Environmental Monitoring and Research in relation to social monitoring.⁸⁴¹ Nalcor has made every attempt to engage Innu Nation to participate in the collection of, and/or to provide this data. The history of these attempts is provided in the response to IR JRP.1. Innu Nation declined to participate or provide this information. Nalcor is confident that sufficient socio-economic baseline data upon which to base effects predictions has been

⁸³⁹ Fisheries and Oceans Canada, CEAR 639 at pg. 25.

⁸⁴⁰ Rick Hendriks, CEAR 1113 at pg. 152.

⁸⁴¹ Rick Hendriks, CEAR 1113 at pg. 145.

collected.⁸⁴² With respect to a socio-economic monitoring institute, its establishment does not appear to present any inherent advantages in collecting information that will clearly measure the effects of the Project, as compared to the socio-economic monitoring that Nalcor has proposed.⁸⁴³ Nalcor has a long history of success with its own biophysical programs and working with others with monitoring mandates and responsibilities.⁸⁴⁴ Although this concept may merit consideration by provincial and regional authorities, Nalcor sees no reason to establish such an institute for the purpose of the Project.

415. The Panel expressed concerns during the hearing that some regulators were proposing recommendations that they may not have the legislative mandate to enforce.⁸⁴⁵ The Environmental Assessment Projects Committee's *Interim Approach for Determining Scope of Project for Major Development Proposals with Specific Regulatory Triggers under the Canadian Environmental Assessment Act* expressly considers this issue as follows:

Where [a federal authority] has suggested the inclusion of a particular component of the development proposal in the scope of project and lacks its own regulatory instruments to ensure directly the implementation of mitigation measures and/or follow-up requirements, it may use any other approaches appropriate in the circumstances to achieve this goal, such as:

- having the mitigation measures and/or follow-up requirements included in provincial permits or authorizations and receiving monitoring reports from the province or proponent;
- entering into an agreement with the proponent, supported by a letter of credit or security bond, where appropriate, and receiving monitoring reports from the proponent; or

⁸⁴² CEAR 1190 at pg. 1.

⁸⁴³ CEAR 1190 at pg. 4.

⁸⁴⁴ CEAR 1190 at pg. 3.

⁸⁴⁵ For example, Chair Member Doelle, CEAR 1113 at pg. 79.

- having the mitigation measures and/or follow-up requirements included in [a responsible authority's] permits or authorizations and receiving monitoring reports from the [responsible authority] or proponent.

Whichever option(s) is/are chosen, where [a federal authority] is taking the lead with respect to certain mitigation measures and follow-up requirements, [responsible authorities] will provide appropriate support to [federal authority's] efforts in a manner consistent with the [responsible authority's] obligation to ensure the implementation of mitigation measures and follow-up. [A responsible authority] may, for example, include as a condition of its permitting the successful conclusion of an agreement between [a federal authority] and a proponent.⁸⁴⁶

The CEA Agency's OPS on Follow-up Programs under the *Canadian Environmental Assessment Act* also confirms that responsible authorities may include recommendations from other regulators in conditions to their authorizations.⁸⁴⁷ In addition, the CEA Agency's OPS on Adaptive Management directs that while the proponent plays a leading role in designing and implementing adaptive management measures, responsible authorities and other federal authorities may also design and inform adaptive management programs.⁸⁴⁸ Therefore, the federal responsible authorities for the Project, namely DFO and Transport Canada, may include recommendations for mitigation or monitoring from other regulators, such as Environment Canada, in the terms and conditions of any approvals that they issue for the Project.

416. Alternatively, the Province may choose to issue a regulation or order that legislatively mandates Nalcor to adhere to certain conditions to the Project. This approach was used

⁸⁴⁶ Environmental Assessment Projects Committee, *Interim Approach for Determining Scope of Project for Major Development Proposals with Specific Regulatory Triggers under the Canadian Environmental Assessment Act*, online: <<http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=A2CA1289-1>>.

⁸⁴⁷ CEA Agency, "Operational Policy Statement on Follow-up Programs under the *Canadian Environmental Assessment Act*" (November 2007) online: <http://www.ceaa.gc.ca/499F0D58-B7A1-46C3-BD7E-6E0BD88DED07/Follow-up_Programs_under_the_CEEA.pdf> at pg. 2.

⁸⁴⁸ CEA Agency, "Adaptive Management Measures Under the Canadian Environmental Assessment Act" (2009) at 7.

for the Voisey's Bay Mine/Mill Project,⁸⁴⁹ as well as Vale Inco's Long Harbour Processing Plant.⁸⁵⁰

417. Therefore, there are several ways that valid recommendations arising under the JRP process may be addressed.

E. CONCLUSION

418. Many of the concerns that were raised during the hearing relate to past effects of the Churchill Falls development and the belief that the Project would result in the same or similar effects for the lower Churchill River. This Project is fundamentally different than the Churchill Falls development; the footprint is considerably smaller, the operating regime and operating philosophy are different, and the Project will not involve diverting other river systems, as was done for the Churchill Falls development. In fact, the Project will flood only approximately 5% of the area inundated for the Churchill Falls development but will generate nearly half of the energy as the Churchill Falls development.⁸⁵¹ The Churchill Falls development was never the subject of an environmental assessment or review panel process. The overall awareness and approach towards the environment has changed dramatically since the time that the Churchill Falls development was built, and many technological improvements over this period have reduced the environmental effects of large hydroelectric projects such as the Project. As a

⁸⁴⁹ NL Reg. 74/99.

⁸⁵⁰ NL Reg. 26/09.

⁸⁵¹ Gilbert Bennett, CEAR 1178 at pg. 24.

result, the predicted environmental effects of the Project are very different and much less than the effects of the Churchill Falls development.

419. In every respect of the environmental assessment for the Project, thorough studies were undertaken to understand the existing environment and how it will be affected by the Project in conjunction with other projects in the region that have been or will be carried out. In many respects, the scope of the studies undertaken for this environmental assessment was unprecedented for environmental assessments in the region and across the country. Nalcor's findings that there is not likely to be any significant adverse environmental effects caused by this Project has not been contradicted by any Project-specific evidence that was provided during the hearings.
420. Nalcor's evidence clearly shows that Nalcor has integrated and balanced the three objectives of sustainable development in the planning and decision-making process for this Project. As a result, each component of this Project is designed to ensure sustainable development:
- (a) Regarding the environment, the Project will result in effects, but none of these effects will deny humans and wildlife the ability to use the environment in much the same way as they have historically done. In addition, the Project will not affect the viability of any species within the lower Churchill River watershed.
 - (b) Regarding social considerations, the Project will provide training and jobs to local communities, and will greatly increase business activity in the area and throughout the Province of Newfoundland and Labrador. Nalcor has worked, and will continue to work, closely with Aboriginal groups, women's organizations, training institutions and labour organizations to maximize benefits in the local

communities. Nalcor is also uniquely positioned to work with government agencies on social issues and the government revenues associated with the Project will support many social services and programs throughout the Province.

- (c) Regarding economic considerations, individual incomes will be increased by \$2.1 billion during construction and another \$20 million for each year of operations. The Government will receive \$1 billion each year in direct revenues once debt obligations have been satisfied and an additional \$340 million in tax revenue during construction of the Project. Ratepayers in the Province will save \$41 billion as a result of the Project over the next fifty years. Finally, the Project will greatly increase the power available for economic development in the Province and will induce further industrial development in Newfoundland and Labrador.

421. The Project represents the most attractive undeveloped hydroelectric project in North America. It will continue to harness renewable energy for decades and perhaps even centuries to come. It will ensure a secure, reliable and competitively-priced supply of energy for current and future needs of Newfoundland and Labrador. It will allow the Province to reinvest revenues from oil and gas development in a way that will secure prosperity for present and future generations of Newfoundlanders and Labradoreans. It will induce further industrial development in the Province that in turn will move the Province towards a more diversified economy. It will provide tremendous employment opportunities, especially for the Province's youth. Finally, it will accomplish all of this with a relatively small environmental footprint.

422. Nalcor requests that this Panel approve the Project by:

- (a) Determining that the Project is not likely to cause any significant adverse environmental effects based on the extensive mitigation that has been proposed;
and
- (b) Determining that the Project is in the public interest and should proceed.