MICA GENERATING STATION UNIT 5
MICA GENERATING STATION UNIT 6

ASSESSMENT REPORTS

With Respect to

the Applications by the British Columbia Hydro and Power Authority

for Environmental Assessment Certificates

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

Prepared by:

Environmental Assessment Office

March 1, 2010

This document consists of two Assessment Reports for two EA certificates, consolidated to a single document for review purposes. Please note:

- Material common to both proposed Projects is not highlighted;
- Material unique to the proposed Mica Unit 5 Project is highlighted in yellow; and,
- Material unique to the proposed Mica Unit 6 Project is highlighted in green.
SUMMARY OF THE ASSESSMENT REPORTS
This summary is intended to give a brief overview of some of the key components of the Assessment Reports. For details on specific components, readers are referred to the Assessment Reports themselves.

Overview of Proposed Project
The Proponent is proposing to install two approximately 500 MW turbines into existing turbine bays at the Mica Generating Station, located about 135 km north of Revelstoke. The proposed Projects would each add approximately 500 MW of capacity to the existing 1805 MW of capacity at the Mica Generating Station. The new units would enable more generation during the time of day (or season) when customer demand for electricity is high and/or the value of the power is the highest. A capacitor station would be developed as part of the proposed Mica Generating Station Unit 5 Project to increase the power transfer capacity of the existing transmission lines that connect the Mica Generating Station to the Nicola Substation.

Overview of the Environmental Assessment
In managing the Environmental Assessments (EA) for the proposed Projects, EAO assessed whether they would result in any significant adverse environmental, social, economic, heritage and health effects. The EA focused on assessing specific potential effects on the following:

- Hydrology
- Water quality
- Geophysical environment
- Atmospheric environment
- Fish and aquatic habitat
- Vegetation resources
- Wildlife and terrestrial habitat
- Noise
- Economy and regional economic benefits
- First Nations employment, income and business opportunities
- Population and demographics
- Accommodation
- Community/public services, emergency services and facilities
- Traffic
- Land use
- Recreation
- Archaeological resources
- Public health and safety
- Healthy living

EAO assessed relevant issues raised by First Nations during the course of the EAs and whether the Crown has fulfilled its obligations for consultation and accommodation. These Assessment Reports have been provided to the Ministers for consideration as they decide whether or not to issue EA Certificates for the proposed Projects.

The EAO is satisfied that:
- consultation with government agencies and the public have been adequately carried out by the Proponent;
- relevant issues identified by the public and government agencies were duly considered and assessed by the Proponent during the review of the Application;
- the Crown’s consultation duty has been discharged; and,
- the proposed Projects would not result in any significant adverse effect.
PREFACE

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

- opportunities for the involvement of all interested parties;
- consultations with First Nations;
- technical studies to identify and examine potential significant adverse effects;
- strategies to prevent, or reduce, adverse effects; and,
- development of comprehensive reports summarizing input and findings.

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

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

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

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Victoria BC V8W 9V1
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<tbody>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BC Hydro</td>
<td>British Columbia Hydro and Power Authority</td>
</tr>
<tr>
<td>BCTC</td>
<td>British Columbia Transmission Corporation</td>
</tr>
<tr>
<td>BCUC</td>
<td>British Columbia Utilities Commission</td>
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<tr>
<td>BP</td>
<td>Before Present</td>
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<tr>
<td>CEA Agency</td>
<td>Canadian Environmental Assessment Agency</td>
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<tr>
<td>CEAA</td>
<td><em>Canadian Environmental Assessment Act</em></td>
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<tr>
<td>cfs</td>
<td>cubic feet per second</td>
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<td>COSEWIC</td>
<td>Committee on the Status of Endangered Wildlife in Canada</td>
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<td>dBA</td>
<td>Decibel</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>EAO</td>
<td>Environmental Assessment Office</td>
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<td>EMF</td>
<td>Electromagnetic Fields</td>
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<tr>
<td>GOM</td>
<td>General Optimization Model</td>
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<tr>
<td>GWh</td>
<td>Gigawatt Hour</td>
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<tr>
<td>HEC-RAS</td>
<td>Hydrologic Engineering Center River Analysis System</td>
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<tr>
<td>HYSIM</td>
<td>Hydroelectric Simulation Model</td>
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<tr>
<td>kW</td>
<td>Kilovolts</td>
</tr>
<tr>
<td>MAF</td>
<td>Million Acre Feet</td>
</tr>
<tr>
<td>MRFESAP</td>
<td>Mica-Revelstoke Fish Entrainment Strategy Action Plan</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Environment</td>
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<tr>
<td>MW</td>
<td>Megawatts</td>
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<tr>
<td>RCMP</td>
<td>Royal Canadian Mounted Police</td>
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<td>ROW</td>
<td>Right of Way</td>
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<td>SARA</td>
<td>Species at Risk Act</td>
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<td>VEC</td>
<td>Valued Ecosystem Component</td>
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<td>VC</td>
<td>Valued Component</td>
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<td>WUP</td>
<td>Water Use Plan</td>
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**Mica Generating Station Unit 5 (Unit 6) Project – March 1, 2010**
PART A – INTRODUCTION AND BACKGROUND

1 Purpose of the Reports

The purpose of these Reports is to summarize the environmental assessment (EA) of the Application by the British Columbia Hydro and Power Authority (Proponent) for an EA certificate for the proposed Mica Generating Station Unit 5 (Unit 6) Project (proposed Project). The EAO is required to prepare these Reports for provincial ministers who are responsible for making decisions on the proposed Project under section 17 of the BC Environmental Assessment Act (Act). For energy projects the deciding Ministers are the Ministers of the Environment and Energy, Mines and Petroleum Resources.

The Reports:

- Describe the provincial and federal EA processes, the proposed Projects and consultations undertaken during the EA;
- identify the potential environmental, heritage, health, social and economic effects of the proposed Projects and how the Proponent proposes to mitigate effects;
- identify the commitments proposed by the Proponent; and
- set out conclusions based on the proposed Projects’ potential for significant adverse effects.

The review processes for the proposed Mica Unit 5 Project and the proposed Mica Unit 6 Project were carried out concurrently, though the Proponent is seeking two separate EA certificates for the two proposed Projects. Much of the material in the Assessment Reports is common to both proposed Projects, but there are key items for which each assessment is unique (a capacitor station in the Mica Unit 5 Project and potential for additional water discharge in the Mica Unit 6 Project). Separate Assessment Reports for the two separate EA certificate Applications have been prepared within a single document.

2 Project Overview

2.1 Proponent Description

The Proponent for the proposed Project is the British Columbia Hydro and Power Authority (BC Hydro), a BC Crown corporation that began operations in 1962. BC Hydro’s primary business activities are the generation and distribution of electricity. As one of the largest electric utilities in Canada, BC Hydro serves over 94% of British Columbia’s population. BC Hydro has its head office in Vancouver, BC.
2.2 Project Description and Scope

The Proponent is proposing to install an approximately 500 MW turbine into an existing turbine bay at the Mica Generating Station, located about 135 km north of Revelstoke (Figure 1). The proposed Project would add approximately 500 MW of capacity to the existing generating capacity at the Mica Generating Station, where four turbines currently operate to produce capacity of 1805 MW. If both proposed Projects were constructed, the total generating capacity would be 2805 MW. The installation would not change the operation of the facilities as defined under the Columbia River Treaty (as described below). However, the new unit would enable more generation during the time of day (or season) when customer demand for electricity is high and/or the value of the power is the highest.

Figure 1: Location Map of Mica Dam (Application Figure 1.1)
The existing Mica Dam facilities (Figure 2) were constructed under the terms of the Columbia River Treaty, signed with the United States in 1961 and ratified in 1964. The Proponent was appointed as the Canadian Entity to manage most activities required by the Treaty in Canada. Under the terms of the Treaty, the Proponent built and now operates a total of 15.5 million acre-feet (MAF) of storage at the Mica (7.0 MAF), Hugh L. Keenleyside (7.1 MAF) and Duncan (1.4 MAF) projects in coordination with the United States to maximize power generation and flood control benefits in both countries. Kinbasket Reservoir, upstream of Mica Dam, has a total licensed storage volume of 12 MAF. Of this, 7 MAF is operated under the terms of the Columbia River Treaty. In return for the construction of these projects, Canada received an up-front payment for the flood control benefits, as well as one-half of the annual additional power generation benefits produced by the downstream U.S. projects on an on-going basis.

Figure 2: Photograph of Mica Dam (Ministry of Energy, Mines and Petroleum Resources)

The Mica Generating Station has several uses in the Proponent’s system operations. At times, relatively constant flows are used to create base energy generation requirements. At other times, the Mica Generating Station units are operated as peaking units, where they are used to generate large quantities of electricity for brief periods of time to meet peak system demands (for example, high demand from residential users in winter evenings). During some seasons, the Mica Generating Station is operated to maintain reservoir elevations within flood control requirements.
In addition to the three dams built under the terms of the Columbia River Treaty, the Proponent also operates the Revelstoke Generating Station south of Mica Generating Station. Revelstoke Generating Station operations are similar to run-of-river power generation; very similar amounts of water pass through the Mica Generating Station and Revelstoke Generating Station each day and the fluctuation of the Revelstoke Reservoir is generally less than 1.5 m. During the spring and early summer freshet season, Mica Generating Station discharges are often curtailed to ensure that the combination of local inflows and Mica Generating Station discharge does not exceed the discharge capacity of the Revelstoke Generating Station. Therefore, a number of factors related to system optimization, energy demand and treaty obligations are used to establish the operation requirements at Mica Generating Station.

Assembly of the generation unit would be confined to the existing powerhouse, specifically the Unit 5 (Unit 6) turbine bay. The existing powerhouse would also be used for temporary storage, sorting and preparation of the equipment as well as for offices for construction personnel.

**Unit 5 Only:** A capacitor station would be developed as part of this proposed Project to increase the power transfer capacity of the existing transmission lines that connect the Mica Generating Station to the Nicola Substation. It would be located near the midpoint of the lines and would be operated and maintained by the British Columbia Transmission Corporation (BCTC) and owned by the Proponent. A number of potential locations were examined and a site near Seymour Arm (referred to as Site 76) has been identified as the preferred capacitor station site (Figure 3). The capacitor station footprint would require a fenced area of approximately 3 to 4 hectares. Depending on the final site configuration, the footprint may be accommodated within the existing transmission line ROW or may require some additional land adjacent to the ROW. Platform space for any future capacitors would be included in this development.

A passive reflector would be situated in a nearby clearcut area. The passive reflector would consist of a billboard-like structure that would reflect the microwave signal between Silverstar repeater (near Vernon) and the capacitor station, allowing the BCTC operations centre in the Lower Mainland to communicate operations instructions to the capacitor station.

**Unit 6 only:** With the addition of the proposed Project, the Mica Generating Station would operate within the limits of its water license diversion of 65,000 cubic feet per second (cfs), and, as such, no significant operational impacts would be expected. However, given that new turbine design allows for a higher diversion, the Proponent has included in this assessment the effects of a total plant diversion of 68,000 cfs. The Proponent may apply for an additional Water License for the 3,000 cfs after the completion of this EA.
The EAs for the proposed Mica Unit 5 and Mica Unit 6 Projects are concurrent, as described in further detail in section 3.1 of this report.

Figure 3: **Unit 5 Only**: Location Map of Capacitor Station (BC Hydro)
If the proposed Project is issued an EA Certificate, the Proponent would work towards an operational date of October 2013 (2014). In addition to an EA Certificate, the Proponent also must apply to the BC Utilities Commission (BCUC) for a determination pursuant to subsection 44.2(3)(a) of the Utilities Commission Act, of whether it is in the public interest to accept expenditures to move the proposed Project from the definition phase to the implementation phase. A draft Addendum with proposed changes to the Columbia River Water Use Plan would be prepared for submission to the BC Comptroller of Water Rights, who would direct the Proponent accordingly.

Installation of the generating unit component of the proposed Project would be at Mica Generating Station (52°03′00″ latitude and 118°34′00″ longitude), within the Columbia Shuswap Regional District and the area covered by the Revelstoke Land and Resource Management Plan. Mica Generating Station is located in the Columbia Mountains, between the Selkirk Ranges to the East and the Monashee Ranges to the West; it is also downstream of the Kinbasket Reservoir and upstream of the Revelstoke Reservoir on the Columbia River.

Mica townsite is the settlement closest to the Mica Generating Station site. Located at the confluence of Mica Creek and Revelstoke Reservoir (8 km downstream of the Mica Generating Station), Mica townsite is accessed by Highway 23. Mica townsite was used as a base of operations for the original construction of Mica Dam in the 1960s and 1970s. The current townsite is approximately 500 m inland of the original Mica townsite due to the creation of Revelstoke Reservoir in the 1980s. At present, Mica townsite does not have status as an incorporated community; existing buildings are used primarily by the Proponent. When space is available, the townsite accommodation is made available to forestry workers, tourists and others.

The City of Revelstoke (population 7,230, approximately 135 km downstream of Mica Dam) and Town of Golden (population 3,811, approximately 155 km upstream of Mica Dam) are located in the vicinity of the Mica Generating Station site. Both communities are serviced by rail and are located on the Trans-Canada Highway; key industries in the area include forestry, the railway, and tourism.

**Unit 5 Only:** The capacitor station and passive reflector sites associated with the proposed Project would be centered at 51°13′44.542″ latitude and 119°01′02.0984″ longitude, within the Columbia Shuswap Regional District but in the area covered by the Okanagan Shuswap Land and Resource Management Plan. The proposed sites are west of the Seymour Arm of Shuswap Lake. The closest community to the proposed sites is Seymour Arm. Other nearby communities include the Village of Chase (population 2,409, 100 km to the southwest by road), the District Municipality of Sicamous (population 2,676, 50 km to the south by boat) and the City of Salmon Arm.
(population 16,012, 135 km to the southwest by road). Both forestry and tourism are important industries in these communities.

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

- A vertical shaft Francis turbine with a runner throat diameter of approximately 5.5 metres and a maximum discharge capacity of approximately 330 cubic metres per second;
- An umbrella type generator, air cooled, with a rated capacity of approximately 500 MW;
- A bank of three single phase 16 kV / 500 kV generator transformers;
- Additional ancillary mechanical and electrical equipment for the turbine, generator and switchgear;
- Source, transportation and storage of aggregates.
  - **Unit 5 only:** Contractor's offices, parking and lay down areas, contractor's concrete batch plant, source, transportation and storage of aggregates, and upgrade of existing warehouse facilities required for the proposed Project;
  - **Expansion of the existing Mica townsite facilities;**
  - A 500kV capacitor station situated at site 76 along the existing 5L71/72 transmission line corridor which connects the Mica Generating Station to the Nicola Substation.
  - **Unit 6 only:** Use of existing infrastructure including expanded Mica Village facilities, contractor's office, parking and laydown areas, concrete batch plant and warehouse facilities; and,

As turbines generally have a 50-year operating life, the Proponent is not developing plans for decommissioning of the proposed Project at this time but has committed to meeting applicable legislative requirements at the time of decommissioning.

2.3 Project Benefits

**Employment:** Construction of the generating unit component of the proposed Project would generate approximately 428 (371) person years of direct employment for trades people, engineers and other professionals. Two operations positions would be created at the Mica Generating Station for at least 100 person years of direct employment during operations. **Unit 5 Only:** Construction of the capacitor station component would create between 21 and 22 person years of direct employment as well as maintenance
opportunities over the lifetime of the proposed Project. Local contractors and employment would be utilized to the greatest extent possible.

**Economic:** Capital costs for the generating unit component of the proposed Project are estimated to be **between $420 million and $560 million** ($420 million and $700 million), while the capital cost for the capacitor station component is estimated to be **$66 million (Unit 5 Only)**. According to the socio-economic studies in the Applications (section 9), income in the local study area could increase by **between $4.3 and $8.2 million** (up to $2.1 million) during the construction period. Income tax payments to provincial and federal governments could total approximately **$6.2 million** ($4.8 million) during the construction period. Based on current tax guidelines, the annual grants-in-lieu that the Proponent pays is estimated to increase by **$280,000 per year** with the addition of each proposed Project during the operation period. The exact payment would be subject to the Province amending an Order in Council, which defines the total amount and percentage allocations to be paid by the Proponent. Annual water rent payments to the provincial Government would increase by an estimated **$2.6 million** ($2.2 million) during the operation period.

**Environmental:** Energy efficiency gains from the proposed Project would result in an energy gain of **134 GWh/year** (50 GWh/year), in part because the new unit would be more efficient relative to the four original units and generate more electricity from the same amount of water. These incremental gains in renewable energy could offset **48,000 tonnes/yr** (18,000 tonnes/yr) of carbon dioxide emissions from a Combined Cycle Natural Gas Turbine.¹

Therefore, the proposed Project is consistent with the BC Energy Plan goals that all new electricity generation projects will have zero net greenhouse gas emissions, and that clean or renewable electricity generation continues to account for at least 90 per cent of total generation in BC. As well, the proposed Project would increase overall system flexibility which enables energy gains on the system as a whole.

**BC Hydro System Benefits:** The proposed Project would provide **465 MW of additional long-term dependable capacity** to meet increasing electricity demands during winter months over the next 50 years. This additional dependable output capacity could be reliably sustained for 16 hours during an extended peak demand period and would also create overall system shaping benefits, giving the Proponent increased ability to shape energy into higher value seasons of the year and into higher value hours of the day.

**Unit 5 Only:** The capacitor station would provide voltage support for the existing 5L71/72 transmission lines, increasing their power transfer capability which is currently limited by voltage stability.

¹ A typical power plant fuelled by natural gas
2.4 Project Land Use
The Mica Generating Station is located within the Revelstoke Resource Management Zone of the Revelstoke Higher Level Plan. Under the Official Community Plan for Electoral Area B of the Columbia Shuswap Regional District, much of the land in the study area is designated as Rural/Resource, except the land around the Mica Generating Station (zoned as Institutional) and the land around Mica townsite and a nearby heli-ski lodge (zoned as Resort/Commercial).

Land use along the Highway 23 corridor between the Mica townsite and the Revelstoke Dam is mainly recreation and forestry related, with most recreational use occurring in summer. Formal camping facilities are available at one provincial park and two forest service sites while numerous undeveloped campsites and boat launches are also located along the reservoir, which is used for recreational boating and fishing. Two heli-skiing operations with a total of four guest lodges are active near the Mica Generating station. During the ski season (mid-December to April), these companies use Highway 23 to transport guests between Revelstoke and the ski lodges.

The Mica Generating Station is also located within the Revelstoke Timber Supply Area. Two forest licensees have active year-round operations in the area, using Highway 23 to transport workers and logs between harvest sites and Revelstoke. There is no active mining near the Mica Generating Station or the Highway 23 corridor. However, some properties between Revelstoke and Mica are in the exploration phase.

Unit 5 Only: The capacitor station and passive reflector sites are located in the area covered by the Okanagan-Shuswap Land and Resource Management Plan, and are zoned as Rural and Resource Lands in the Official Community Plan for Electoral Area F of the Columbia Shuswap Regional District. The capacitor station site is located mainly along the existing transmission lines ROW. A second small parcel of land for a reflector is located just above the capacitor station site.

The capacitor station site is also located within the Okanagan Timber Supply Area. There is a registered woodlot on the east side of the transmission line, as well as a registered trapline and a guide-outfitter operation on or near the capacitor station site. There are no range tenures at the capacitor station site, and the closest agricultural activity is near the community of Seymour Arm. Overall, the Application states there was little evidence of use in the area during site visits although hunting and/or other recreational activities may occur.
3 Assessment Process

3.1 Provincial Environmental Assessment (EA) Process

The review processes for the proposed Mica Unit 5 and Mica Unit 6 Projects were carried out concurrently. The Proponent applied in writing to the Executive Director of Environmental Assessment Office (EAO) on March 4, 2008, requesting that the proposed Projects be designated as reviewable Projects under section 7 of the Environmental Assessment Act. Although the installation of the fifth and sixth units was previously licensed, the Proponent requested to opt in to the EA process to ensure that EAO procedures and timelines would apply to these proposed Projects.

These applications were granted under section 7(3)(a) on March 31, 2008. The EAO designated these proposed Projects as reviewable after noting the following considerations:

- The proposed rated nameplate capacity of each proposed project is 500 MW of electricity;
- Although there is some uncertainty as to whether these proposed Projects are reviewable having regard to existing water licenses and transition provisions under the Act, both projects exceed the rated nameplate capacity threshold of 50 MW or more of electricity under the Act; and,
- Simultaneous review of these proposed Projects would provide an efficient, timely and cost effective process for government agencies, First Nations, and the public.

On April 18, 2008, EAO issued Orders under section 10(1)(c) of the Act stating that the proposed projects could not proceed without EA Certificates.

3.1.1 Pre-Application Stage

Before these Applications were accepted for the review, the following steps occurred:

1. The EAO established a working group (Working Group) comprised of government agency and First Nations representatives to participate in the EA of the proposed Projects (see Appendix A for a list of Working Group members). The same working group participated in the EA process for each proposed Project. The purpose of the Working Group is to provide technical and First Nations input throughout the EA process, and to comment on documentation prepared by EAO and the Proponent.

2. On October 28, 2008, EAO issued procedural Orders pursuant to section 11 of the Act, defining the scope of the proposed Projects, and the procedures and methods for conducting the EA. This included directing the Proponent to
prepare draft Terms of Reference which set out the information to be gathered and studies to be completed before the EA Applications could be submitted.

3. Copies of the draft Terms of Reference were posted on the EAO website and placed in local libraries. To seek input on the draft Terms of Reference, the EAO held concurrent public comment periods for both proposed Projects starting on October 29, 2008, and ending on November 28, 2008. Open houses were held between October 29, 2008, and November 6, 2008, in Revelstoke, Chase, Golden and Valemount. No comments were received during the public comment period and approximately 18 people attended the open houses. The EAO also sought comments on the draft Terms of Reference from the Working Group, including First Nations.

4. The EAO approved final Terms of Reference on December 19, 2008.

5. The EAO issued procedural Orders under section 13 of the Act on December 19, 2008, amending Schedule B of the section 11 Orders to include additional First Nations whose asserted traditional territories the proposed Projects lie within.

6. **Unit 5 Only:** Upon written request of the Proponent dated March 12, 2009, the EAO issued procedural Orders under section 13 of the Act on April 17, 2009, amending the section 11 Order for the proposed Mica Unit 5 Project to remove reference to the switchgear building extension.

7. The Proponent undertook the studies and information gathering required by the Terms of Reference and compiled them into Applications which were submitted to EAO on July 27, 2009.

8. The EAO, with input from the Working Group and First Nations, determined that the Applications contained the information required by the Terms of Reference. (The Applications are posted on the EAO website.)

9. The EAO assessed the Proponent’s First Nations and public consultation activities during the pre-Application stage, and activities proposed during the Application review stage, and determined that they were adequate and allowed sufficient opportunities for the public and First Nations to review and comment on the proposed Projects; the Proponent was notified of this on August 26, 2009.

The Proponent also consulted with regional community and First Nations representatives on a number of occasions throughout the pre-Application phase of the proposed Projects. An advisory Core Committee was created to integrate First Nation and stakeholder values into environmental assessment and water use planning.
decisions related to potential incremental impacts of the proposed Project. Core committee members were recruited through both direct invitation and public advertisement. Sub-committees for environment and community impacts were established, and a Transmission Committee also focused on issues related to the capacitor station, including site selection. These committees were a continuation of the consultation process that has been ongoing in the region since 2001, initially focused on the Columbia River Water Use Plan (WUP). Further details on this consultation process are available in section 2.1 of the Application.

3.1.2 Application Review stage

The review of the Applications was initiated on September 2, 2009 and the Applications were posted to EAO’s electronic Project Information Centre on that day. The Applications were also made available in public libraries in the communities of Chase, Revelstoke, Golden and Valemount.

A 45-day public comment period on the Applications was held from September 9, 2009 to October 24, 2009. Three public comments were received on the Applications during the public comment period.

In addition, open houses were held in Seymour Arm on September 14, 2009, Revelstoke on September 15, 2009, Golden on September 16, 2009 and Valemount on September 17, 2009. The open houses provided information about the proposed Projects and allowed people an opportunity to ask questions and express support for or concerns about the proposed Projects. Representatives of both EAO and the Proponent made presentations at these open houses. Approximately 60 people attended.

The public comment period and open houses were advertised in seven local newspapers in September 2009.

A project update was circulated by email in September 2009 to the Proponent’s existing distribution lists of local and regional governments and stakeholders in local communities including Valemount, Revelstoke, Golden and Nakusp, and was made available on the Proponent’s project information website. The Proponent’s regional community relations representative also responded to information requests from interested community members.

A copy of the Proponent’s consultation report, which contains details of public consultations, can be found in Appendix F.
3.2 Federal Review

The Proponent initiated discussions with the Canadian Environmental Assessment (CEA) Agency in October, 2007, to determine whether the proposed Projects would trigger a federal review under the Canadian Environmental Assessment Act (CEAA). The Proponent received communication, via the CEA Agency, from the following federal agencies indicating that no federal review triggers were identified:

- Fisheries and Oceans Canada;
- Indian and Northern Affairs Canada;
- Industry Canada; and,
- Transport Canada.

Environment Canada confirmed that the current International River Improvements Act license is valid for the proposed Projects. Additional discussions occurred with the Major Projects Management Office and Parks Canada. In a letter dated December 1, 2008, the CEA Agency confirmed that no triggers for the completion of an environmental assessment pursuant to CEAA were identified for the proposed Projects as described.

3.3 First Nations Consultation

Part C of this Report provides a detailed review of First Nations consultations and EAO conclusions with respect to the consultation process used, asserted aboriginal rights and the potential for impacts to those rights.
PART B – REVIEW OF THE APPLICATION

This part of the report sets out EAO’s substantive evaluation of the Application.

4 General

4.1 Assessment Methodology

4.1.1 Assessing whether there are likely to be significant adverse effects

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

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

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

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

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

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2 This is generally consistent with the analysis used in federal environmental assessments under the Canadian Environmental Assessment Act, although EAO has added the factor of “probability”.

Mica Generating Station Unit 5 (Unit 6) Project – March 1, 2010
and/or infrequent effects may have a lower impact than long term and/or frequent effects.

- **Reversibility**: This refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impact than irreversible or permanent effects.

- **Context**: This refers to the ability of the environment to accept change. For example, the effects of a project may have an impact if they occur in areas that are ecologically sensitive, with little resilience to imposed stresses.

- **Probability**: The likelihood that an adverse effect would occur in circumstances where it is not certain that the effect would materialize.

The development and refinement of mitigation measures is a key component of the EA process and one where the EAO spends an extensive amount of time facilitating discussion and negotiation among the Proponent, interested parties and First Nations. In the case of this proposed Project, the Proponent has made 57 (38) commitments which are set out in detail in Appendix E. Key commitments will be discussed in the following sections of this report but for a full explanation and consideration of commitments readers are advised to consult Appendix E.

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

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

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

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

The EAO is also required to ensure that the honour of the Crown is discharged by ensuring appropriate consultation and accommodation of First Nation interests in respect of the decision by ministers as to whether to issue an EA certificate. There is often considerable overlap between the interests of First Nations and the assessment of environmental, economic, social, heritage and health effects.
EAO’s assessment of whether the EA process for the proposed Project has fully and honourably discharged the Crown’s duties and obligations to consult with and accommodate, if appropriate, First Nations is provided in Part C.

4.2 Spatial Boundaries

The direct effects of the proposed Project on identified valued components (VCs) were considered for both the local regional study area. The VCs considered in this EA are the following:

- Environmental: hydrology; water quality; geophysical environment; atmospheric environment; fish and aquatic habitat; vegetation resources; wildlife and terrestrial habitat; and noise.
- Economic: employment and economic benefits; and First Nations employment, income and business opportunities.
- Social: population and demographics; accommodation; community/public services, emergency services and facilities; traffic; traditional land use; land use; and recreation;
- Heritage: archaeological resources;
- Health: public health and safety; and healthy living.

Environmental VCs: Local and regional study areas were defined for each VC based on potential area of influence during construction and operations. During operations, the focus of the studies is on the areas where notable hydraulic impacts were identified (i.e. increased flows and water velocities, changes in reservoir elevations as identified in the findings of the hydrology assessment). Key study areas are illustrated in Figure 4 and 5 of this report, and Figures 5.1 to 5.5 of the Application. Key study areas for activities taking place at sites at or near the Mica Generating Station are:

- Kinbasket Reservoir: Selected VC assessments included study areas in Kinbasket Reservoir, including the drawdown zone.
- Mica Dam Forebay: The forebay is the area of Kinbasket Reservoir within 1 km of the dam face. Within this area expected changes in intake area velocity and volume could influence the temperature of water withdrawals and fish entrainment rates.
- Mica Dam Tailrace: The tailrace is the 3.6 km section of Revelstoke Reservoir from Mica Dam downstream to the Blue Bridge. Based on modelling results, the hydraulic impacts (i.e. changes in flows, depths, wetted area, and water velocities) associated with the proposed Project would be greatest in this section of the study area.
- Revelstoke Reservoir and the lower, accessible sections of tributaries entering the reservoir could be affected by operations of the proposed Project. These areas were selected based on potential incremental changes in reservoir fluctuations, flushing rates, and thermal profiles related to the proposed Project.
- Revelstoke Dam Tailrace: The tailrace is the seasonally flowing section of the Columbia River from Revelstoke Dam to Revelstoke Airport. This area was selected based on potential incremental changes in Revelstoke Generating Station discharge patterns related to the proposed Project that may affect downstream water quality.

- Mid Columbia River: The mid Columbia River includes the seasonally flowing channel from the Revelstoke Airport to Arrowhead headland of Arrow Lakes Reservoir. This reach of Arrow Lakes Reservoir is most river-like in March to May when Arrow Lakes Reservoir levels are at a minimum. This area was selected based on potential incremental changes in Revelstoke Generating Station discharge patterns related to the proposed Project that may affect downstream fish and fish habitats.

- Arrow Lakes Reservoir: Selected assessment disciplines included study areas in Arrow Lakes Reservoir, including the drawdown zone.
Figure 4: Detailed map of Mica Dam Tailrace (From Application Figure 4.1)
Figure 5: Columbia Shuswap Regional District (BC Stats 2006 Census)
**Environmental VCs continued:** The regional terrestrial study area extended from Kinbasket Reservoir to Arrowhead headland of Arrow Lakes Reservoir. The local study areas focused on areas containing new infrastructure and structures as well as construction related staging areas and facilities, generally the area up to 400m on either side of the Revelstoke Reservoir from the Mica tailrace to Mica townsite.

**Unit 5 Only:** The biophysical study area for activities related to the capacitor station includes the capacitor station site and passive reflector site, the immediate footprint of each construction area, as well as any new associated infrastructure (if needed), and a 100m buffer around these facilities (Figure 6 of this report or Figure 4.5 of the Application).
Figure 6: **Unit 5 Only**: Location of Capacitor Station and Passive Reflector Sites (From Application Figure 4.5)
Economic, Social and Health VCs: A regional study area was established to include the proposed Project and surrounding region encompassing the zone of influence for specific effects related to the proposed Project. A map of the Columbia Shuswap Regional District is provided in Figure 5, indicating many areas relevant to the regional study area. Regional study areas were based on specific rationale for each VC assessment and will be described in corresponding sections. For example:

- for human environment studies, the primary study area for socio-community impact assessment includes the City of Revelstoke, Mica townsite and the adjacent Electoral Area B of the Columbia Shuswap Regional District. (Unit 5 Only: This study area also includes the community from which the capacitor station activities would be staged, which is Seymour Arm);

- for the economic impact assessment, the primary study area encompasses the area bounded by Golden (East), Sicamous and Salmon Arm (West), Nakusp (South) and Valemount (North); and

- for the land use assessment, the primary study area is the corridor between the Mica Generating Station and the City of Revelstoke along Highway 23, as well as the immediate area around the proposed capacitor station site and passive reflector (Unit 5 Only).

Detailed descriptions of the communities that fall within the regional study area (Mica townsite, Revelstoke, Valemount, Nakusp, Golden, Chase, Salmon Arm, Sicamous, and Seymour Arm) are included in section 9.1.1.2 of the Proponent’s Application.
4.3 Temporal Boundaries

Temporal boundaries are defined by the characteristics of the proposed Project and the valued components being assessed, and include the periods when the valued components would be affected by the proposed Project.

Baseline: Baseline information describes pre-existing ecological, physical and human-related characteristics of the environment. The baseline information is derived from a variety of sources including reservoir inflows datasets since 1940, studies carried out since 2000 related to the Columbia River Water Use Plan and the Revelstoke Unit 5 Project, and studies undertaken specifically for the proposed Project.


Activities associated with proposed Project construction include:

- construction mobilization;
- installation of turbine, generator and ancillary equipment within the existing powerhouse;
- **Unit 5 Only:** construction of related facilities (contractor's offices, parking, laydown areas, concrete batch plant and aggregate, warehouse, and Mica townsite expansion);
- material handling and general waste disposal; and
- transport of supplies and personnel

**Unit 5 Only:** Activities associated with construction of the capacitor station include:

- site preparation and installation of foundation;
- erection of transmission towers, microwave radio communication tower, and control room
- installation of generator, diesel tank, electrical equipment, and control/communication instrumentation
- site cleanup and restoration/landscaping
- transport of supplies and personnel

Activities associated with the construction of the passive reflector include:

- site preparation and installation of foundation;
- erection of reflector structure; and
- topping or removal of trees that are in key lines of sight.
**Operations and Maintenance:** This phase would last at least 50 years following construction, with activities including:

- operation of the generating unit and capacitor station; and,
- scheduled maintenance of approximately one month per year for the generating unit and regular maintenance of the capacitor station.

It is not anticipated that there would be significant changes to either existing delivery of services required for operation and associated logistics or the existing monitoring and management activities at the Mica Generating Station.

**Decommissioning, closure and post-closure:**

**Unit 5 Only:** Temporary facilities (contractor’s offices, parking, laydown areas, concrete batch plant and aggregate storage, warehouse, and Mica townsite) would be reused for the proposed Mica Unit 6 Project and therefore would not be decommissioned as part of the proposed Mica Unit 5 Project. **Unit 6 Only:** Temporary facilities (contractor’s offices, parking, laydown areas, concrete batch plant and aggregate storage, warehouse, and Mica townsite) would be pre-existing from the proposed Mica Unit 5 Project. Temporary facilities no longer required upon the completion of the proposed Project would be decommissioned.

As decommissioning of major project components would occur more than 50 years in the future, a separate environmental assessment based on the legislative requirements at the time of decommissioning would be undertaken prior to decommissioning.

**4.4 Cumulative Effects**

Cumulative effects were assessed when biophysical residual effects of the proposed Project had the potential to combine with the effects of other known projects or activities (existing or likely to occur in the foreseeable future) within the specified cumulative effects study area boundary and timeframe. Cumulative effects assessments were completed generally following CEA Agency methods as set out in the Terms of Reference, which were approved in December, 2008, before EAO’s cumulative impacts approach was developed. Steps completed for each cumulative effects assessment included scoping, defining the context, describing the study boundaries, and determining the significance of the residual cumulative effects.

The effects of current operations of existing hydroelectric developments on the Columbia River mainstream (i.e., Mica, Revelstoke and Hugh L. Keenleyside Dams and generating stations) were integrated into the effects assessment presented as the baseline condition for assessing the potential environmental impacts of the proposed Project.
The main issues scoped for cumulative effects assessment, based on the Proponent’s discussions with the Core Committee and First Nations, were:

- Hydrology (Dam Discharges and Reservoir Water Levels);
- Water Quality;
- Fish and Aquatic Environment;
- Archaeology;
- Traditional Use; and,
- Shoreline stability.

Following the assessment, no residual impacts were identified on archaeology, traditional use and shoreline stability and therefore these VCs were not addressed further in the cumulative effects assessment.

A number of projects, facilities and activities including hydroelectric projects, major construction projects, recreation sites, timber harvesting, and trapping and hunting were considered by the Proponent as potentially interacting with the proposed Project to cause cumulative impacts on the VCs noted above. Most projects/facilities/activities were determined not to have potential interactions given the timing of the construction phase and the reservoir-specific effects of operations. The following projects were included in the cumulative impacts assessment:

- **Unit 5 only**: The proposed Mica Unit 6 Project: Installation of a sixth generating unit into a pre-existing bay at the Mica Generating Station.
- The proposed Revelstoke Unit 6 Project: Installation of a sixth generating unit into a pre-existing bay at the Revelstoke Generating Station and associated transmission reinforcements.

**Unit 5 Only**: At the capacitor station and passive reflector sites, no residual impacts related to hydrology, fish and aquatic habitat, water quality, archaeology, or traditional uses were identified. As such, these sites were not addressed further in the cumulative effects assessment.

### 5 Environmental Effects

#### 5.1 Hydrology

**5.1.1 Background Information**

The study area for hydrologic effects resulting from activities taking place on sites at or near the Mica Generating Station extends from Kinbasket Reservoir to Hugh L. Keenleyside Dam and includes Mica, Revelstoke and Hugh L. Keenleyside Dams and
their associated reservoirs, Kinbasket, Revelstoke and Arrow Lakes, respectively. Detailed hydraulic modelling, including an erosion assessment, was undertaken only for the Mica Dam Tailrace area as it was determined that this would be where the greatest project effects would occur.

Currently, Kinbasket and Arrow Lakes Reservoirs experience annual draw downs of up to 35 m and 15 to 20 m respectively, while Revelstoke Reservoir has a variation of less than 1.5 m. Since the dams were developed and the reservoirs created, vegetation has been killed or removed, armouring\(^3\) of the banks has occurred, unstable reservoir shorelines have eroded and sediments have been deposited. Dams in the system rarely spill.

The General Optimization Model (GOM) and Hydroelectric Simulation Model (HYSIM) are existing BC Hydro models developed over the past two decades. These models were used to simulate the operation of generating stations, dams and reservoirs for the optimization of power generation across the Proponent’s system network. The HYSIM is based on 60 years of inflow data between 1940 and 2000. The GOM is based on ten years of inflow data between 1964 and 1974 (i.e., a subset of the 60 years), capturing wet, dry and normal years. Results of the models presented in the Application take Columbia River Treaty storage/discharge obligations into account and project how the addition of an extra generating unit would affect reservoir fluctuations and dam discharges throughout the year in dry, wet and normal years. The Mica Generating Station would continue to operate as it currently does within its current water license; however, a larger volume would be able to flow through the generating units in a shorter period of time, allowing a more concentrated peak of electricity generation when required. **Unit 6 Only:** The Proponent may choose to apply for an additional 3000cfs water license to take full advantage of the capacity of the turbine that would be available once the proposed Project is installed. This potential increase in water use is taken into account in the analyses undertaken below.

The Hydrologic Engineering Center River Analysis System (HEC-RAS) assessment was conducted to provide detailed information on water elevation and velocities in the Mica Dam Tailrace. This information was used to assess the difference in flow characteristics between the baseline condition and the flow regime predicted once the proposed Project would become operational. An erosion assessment of the Mica Dam Tailrace area was also conducted to assess erosion potential as a result of the proposed additional generation capacity. Results of this study confirmed that hydraulic assessments downstream of the Tailrace were not required. Calibration was conducted using surveyed cross sections, surveyed water surface profile and velocity data

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\(^3\) Armour consists of material in direct contact with the streambank (e.g. stones) that protects from erosion
collected in Mica Dam Tailrace. The hydraulic assessment was undertaken with the following inputs:

- Revelstoke Reservoir at full pool (573.02 m)
- a baseline case of existing operations of four (five) units at the Mica Generating Station with discharge held constant at 1155 m³/s (40,800 cfs) [1520 m³/s (53,700 cfs)]; and
- a proposed new operation of five (six) units at the Mica Generating Station with discharge held constant at 1520 m³/s (53,700 cfs) [1925m³/s (68,000 cfs)].

**Unit 5 Only: Capacitor Station:** The local study area for hydrology effects associated with activities at the capacitor station and passive reflector sites includes the proposed construction footprint of the two sites and a 100 m buffer around each. Both the sites are located at least 500 m from the nearest waterway. No waterways or drainage channels were observed within the study area, and no construction activities are proposed outside the study area boundary. A hydrology overview is provided in section 7.1 of the Application but no site specific hydrological modelling (like that required for the activities occurring at Mica Generating Station) was undertaken given the absence of waterways on the sites.

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

**Construction**

During construction of the proposed Project, the Mica Generating Station would maintain baseline operations with the four (five) existing units.

**Operations**

**Kinbasket Reservoir:** **Unit 5 Only:** The maximum increase of 0.65 m would occur in July of a wet year, while the maximum decrease of -0.58 m would occur in March of a dry year. Normal reservoir fluctuations at both these times of year would be 5 m. **Unit 6 Only:** The maximum increase of 0.25 m would occur in August of a dry year, while the maximum decrease of -0.65 m would occur in March of a dry year. Normal reservoir fluctuations at these times of year would be 5 m and 6 m respectively.

**Mica Dam:** Highest peak daily discharge could increase by a maximum of 325 m³/s (335 m³/s) compared to baseline, with periods of higher flow being balanced by longer periods of low flow.

**Mica Tailrace (Hydraulic Modelling):** A maximum increase in water surface elevation of (0.22 m) (0.29 m) above baseline is predicted to occur immediately downstream of Mica Dam. Average increase in water surface elevation over the entire Tailrace is predicted to be 0.05 m (0.07 m). Maximum water velocities of 1.0 m/s to 2.0 m/s [1.5
m/s to 2.4 m/s] (a maximum increase of 0.5 m/s above baseline) would be predicted to occur in the 2 km reach immediately downstream of Mica Dam. Both increases are anticipated to attenuate by the time water flows under the Blue Bridge (about 3.6 km downstream of Mica Dam).

Based on field reconnaissance, the majority of the channel is bedrock, riprap-lined, or naturally self-armoured. Therefore, the maximum water velocities predicted to occur in the 2 km immediately downstream of Mica Dam are not anticipated to have an impact on bank erosion. Two sandy banks (100 m and 10 m) with potential for erosion were observed approximately 5.6 km upstream of Mica townsite. With installation of both proposed Mica Generating Units, the model predicts a small increase in both modelled water level (0.10 m) and flow velocity (0.5 m/s) in the area of the sandy banks. Additionally, data collected for the tailrace model calibration demonstrate that lower velocities are usually located along the banks of the river while higher velocities occur in the centre of the channel (away from the banks), again reducing the impact of potential bank erosion. Therefore, the banks are expected to self-armour and the changes in erosion potential are anticipated to be minimal.

**Revelstoke Reservoir:** Change in minimum and maximum surface elevations would be within the overall existing 1.5 m fluctuation of the reservoir. **Unit 5 Only:** The maximum increase of 0.75 m would occur in March of a wet year, while the maximum decrease of -0.22 m would occur in February of a wet year. Normal fluctuations at both these times of year would be 0.6 m. **Unit 6 Only:** the maximum increase of 0.32 m would occur in March of a dry year, while the maximum decrease of -0.53 m would occur in January of a wet year. Normal fluctuations at these times of year would be 0.5 m and 0.9 m, respectively. The proposed Project would bring Mica and Revelstoke Generating Stations into closer hydraulic balance and therefore create more stable elevations in Revelstoke Reservoir.

**Revelstoke Dam:** Discharges would be very similar to baseline discharges, with brief periods of higher flow being balanced by longer periods of low flow.

**Arrow Lakes Reservoir:** **Unit 5 Only:** For the proposed Project, the maximum increase of 0.24 m would occur in March of a dry year, while the maximum decrease of -0.55 m would occur in July of a wet year. Normal fluctuations at these times of year would be 11 m and 2 m, respectively. **Unit 6 Only:** For the proposed Project, the maximum increase of 0.37 m would occur in February of a dry year, while the maximum decrease of -0.20 m would occur in August of a dry year. Normal fluctuations at these times of year would be 10 m and 2 m, respectively.

**Hugh L. Keenleyside Dam:** There would be no noticeable effects on peak discharge.
Unit 5 Only: Capacitor station: Given the lack of wetlands or defined drainage channels within or near the proposed construction footprints, the Proponent anticipated minimal effects to the hydrology at both the capacitor station and passive reflector sites. Some earthworks may be required at both sites but no changes to the local hydrology are expected.

Mitigation

As discussed above, the resulting changes in water levels and discharges as a result of the addition of the proposed Project were not anticipated by the Proponent to be significant compared to the normal interannual variation in reservoir fluctuations and dam discharges, nor were they anticipated to have an impact on erosion or shoreline stability. However, mitigation that may be required for the effects of these hydrologic changes on other assessment areas is discussed in the relevant sections of the Assessment Report that follow.

Unit 5 Only: At the capacitor station site, no changes to the local hydrology are anticipated and therefore no mitigation measures are proposed.

Potential Residual Effects

No residual hydrologic effects were anticipated by the Proponent other than changes in water levels and discharges during operations as described above. Potential residual effects resulting from hydrologic changes are discussed in the following individual assessment areas: Water quality, Fish and Aquatic Habitat, Vegetation, Wildlife and Terrestrial Habitat, Land Use and Recreation, and Archaeological Resources.

Cumulative Effects Analysis for Hydrology Effects

The Proponent undertook analyses of the cumulative effect of the addition of the proposed Mica Unit 6 (Unit 5 Only) and Revelstoke Unit 6 Projects to the Columbia system using the hydrologic models and study areas described above. Detailed results are available in section 12.2.2.1 and Appendix 12-II of the Application. The results of these studies indicate that predicted changes in reservoir elevation and dam discharge throughout the system would not likely be significant in comparison to the normal variation in elevation and discharge at present-day baseline conditions.

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

During the review of the Application, additional issues were raised by the Okanagan Nation Alliance and Lakes Division of the Secwepemc Nation. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix D.
Key issues identified by the Okanagan Nation Alliance and Lakes Division include:

- The proposed Project may increase shear stresses on riverbanks during construction or operations, resulting in increased rates of bank erosion.
  
  o Proponent Response: No increase in shear stress is anticipated during construction. The potential for erosion during operations is addressed in the Application.

- How can sandy banks experiencing a 100% increase in water velocity endure insignificant erosion potential?
  
  o Proponent Response: The increase in velocity would be 64%, not 100%. There would be some erosion of the identified sandy banks containing coarse material which would armour the bank after very little erosion, as is evidenced by the existing self armoured bank. Comparison of the length of the sandy bank compared to the total length of the bank (1.7%) indicates that the small amount of erosion combined with the small percentage of sandy bank would result in an insignificant erosion potential.

- What are the statistical uncertainties and difficulties associated with the HEC-RAS model in extrapolating output beyond its calibration data?
  
  o Proponent Response: There are no precise statistical values for model accuracy when extrapolating. Calibration graphs for the water level and velocity demonstrate that the calibration is very good. The extrapolation increases the modelled water depth (on average 0.13 m and a maximum of 0.50 m) above the calibrated water depth. The calibrated water depths range from 8 m to 12 m. Therefore the increase in water depth due to extrapolation is not significant compared to the calibrated water depth and the extrapolations can be made with certainty.

- Why wasn’t calibration data obtained from multiple years to statistically assess differences between years?
  
  o Proponent Response: The calibration would not change over different years unless there were significant changes in the river due to sediment or debris movement. Mica Dam acts as a trap for sediment or debris coming from upstream. Since Mica and Revelstoke Dams have operated in a similar manner for many years, the calibration of a river model is not expected to change from year to year.

- How much could the calibration data change from year to year if the channel is staying the same or if the channel is changing as a result of impoundment?
  
  o Proponent Response: Mica Dam was completed in 1973 and has been operating for 36 years. Hydraulic conditions in the Mica Tailrace area, due to operation of the Mica Generating Station, have reached an equilibrium after nearly 4 decades of operation.

These issues were resolved to EAO’s satisfaction as noted in Appendix D.
Significance Analysis for Hydrology Effects

- **Magnitude:** The incremental impact of the proposed Project to water levels and stream flow velocities is not significant in comparison to natural fluctuations or normal drawdown/refill related to reservoir operations;

- **Geographic Extent:** The proposed Project’s operations would affect Kinbasket, Revelstoke, and Arrow Lakes Reservoirs, with the most effects being confined to the Mica Dam Tailrace;

- **Duration and Frequency:** The proposed Project would have impacts on a daily basis for the duration of operations (at least 50 years);

- **Reversibility:** Effects of the proposed Project on erosion would be permanent. However, effects on water levels and flow velocities would be reversible if pre-project operating conditions were resumed;

- **Context:** The proposed Project is situated in areas that have a history of significant ongoing industrial development and disturbance; and,

- **Probability:** The models used to assess potential hydrologic effects are well-proven. The GOM and HYSIM are based on extensive historic data sets, and HEC-RAS was ground truthed in the field. The modelled changes in flow velocities and water levels are likely to occur.

5.1.4 Conclusion

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

5.2 Water Quality

5.2.1 Background Information

The water quality assessment study area for activities taking place on sites at or near the Mica Generating Station includes the Mica Dam Forebay, the Mica Dam Tailrace, Revelstoke Reservoir, Revelstoke Dam Tailrace, and the Mid-Columbia River (described in detail in section 4.2 of this report). Much of the water quality baseline information for the study area was collected and summarized in a comprehensive review and data gap analysis conducted during the WUP process (RL&L 2001a; 2001b). Where available, this information was supplemented with more recent information.

Measures of water quality used in the assessment include:

- Temperature (thermal profile);
- Dissolved gases (oxygen and total gas pressure);
• Transparency (light transmittance and Secchi depth); and,
• Water chemistry and nutrients (pH, carbon, phosphorus and nitrogen).

Detailed baseline conditions for the study area are provided in section 6.2.3 of the Application.

**Unit 5 Only: Capacitor Station**: The water quality study area for activities related to the capacitor station includes the proposed construction footprint of capacitor station and passive reflector sites and a 100 m buffer around each. Both the sites are located at least 500 m from the nearest waterway. No waterways or drainage channels were observed within the study area and no construction activities are proposed outside the study area boundary. No water quality sampling was undertaken given the lack of water at the sites and there is no historical water quality data for the Celista Creek watershed.

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

**Construction**

**All reservoirs and tailraces**: Oil, fuel or other hazardous materials could enter the tailraces or reservoirs due to spills or accidents during construction. However, only very large spills would have the potential to impact water quality downstream of Mica Tailrace. The risk of a large spill would be reduced through an appropriate Environmental Management Plan.

**Mica Dam Tailrace**: Cementitious materials could enter the river as a result of concrete works during construction. Habitat and vegetation at the temporary material storage and laydown areas, batch plant, and parking areas could be disrupted, resulting in increased erosion and sediment input into adjacent watercourses, although all work will be undertaken outside the riparian buffer zone defined for the proposed Project. **Unit 6 Only**: Reclamation of temporary facilities constructed for the proposed Mica Unit 5 Project and used for the proposed Mica Unit 6 Project could have short term erosion impacts due to disturbed soil. These impacts would be managed through the environmental management plans and reclamation plan. The increased workforce could have implications on waste effluent, though existing facilities are capable of handling this load and would continue to work within licensed limits.

**Revelstoke Reservoir**: The increased workforce residing at Mica townsite could have implications on waste effluent management, though the Mica townsite septic system has the capacity to handle the increase in demand associated with the proposed Project.

**Unit 5 Only: Capacitor Station**: During high rainfall events there is the potential for soil erosion which could result in sedimentation occurring off site, but given the distance of the capacitor station and passive reflector sites to Celista Creek, any soil loss from
erosion is expected to be minor and would dissipate well before reaching the creek. Another source of potential water quality degradation would be a spill during construction from storage fuel tanks, machinery, chemical storage containers or equipment. However, given the distance between the site and Celista Creek, any hydrocarbon or chemical spills would be able to be contained before reaching the creek. As such, the Proponent does not anticipate the proposed Project to have an effect on the water quality of Celista Creek or Shuswap Lake.

Operations

**Mica Dam Forebay:** Based on modelling results presented in the Hydrology section of this report (5.1), any potential changes in water quality due to the proposed Project would be masked by the much larger effects of reservoir size, seasonal weather patterns, and the annual operation of the reservoir for flood control and power production.

**Mica Dam Tailrace:** As established in the Hydrology section of this report (5.1), the greatest impacts on flow will be in this portion of the study area, with brief periods of higher discharge being balanced by longer periods of low discharge:

- Water temperature: in summer, warmer tailrace temperatures would be expected during the longer periods of zero discharge;
- Shoreline erosion: a slight increase in erosion would be anticipated after initial operation of the additional generating unit, but effects would be short lived as the system would stabilize to the new flow regime while self-armouring; and,
- Total Gas Pressure: longer duration of synch-condense operations\(^4\) would have the potential to increase the duration of and therefore the volume of gas supersaturated water\(^5\) released into the tailrace. However, the level of supersaturation at any time would not change. The health of aquatic organisms (including fish) could be affected.

**Revelstoke Reservoir:** Revelstoke Reservoir levels would be expected to exhibit reduced daily fluctuations for most of the year, with daily fluctuations of less than 0.2 m compared to the overall operating range of 1.5 m.

- Water temperature: Minor changes to the thermal regime and stratification could occur but would likely be masked by natural influences such as tributary inputs, ambient air temperatures, wind events, and changes in atmospheric pressure related to weather patterns.

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\(^4\) Synch-condense operations occur when the water is displaced from the turbine using air pressure. The turbine may spin in the air but no electricity is generated.

\(^5\) Water that has a higher concentration of dissolved gases than under normal circumstances.
• Shoreline erosion: The anticipated slight stabilization of water levels could cause a decrease in shoreline erosion. In turn, a slight decrease in turbidity could cause an increase in primary productivity and increase the health and abundance of aquatic/terrestrial species utilizing this habitat.

Revelstoke Dam Tailrace and Mid-Columbia River: The proposed Project would not affect peak discharge at Revelstoke Generating Station, but would result in some small changes within the predicted variability of normal operations. No significant effects on sewage effluent, turbidity, temperature, or total gas pressure are anticipated.

Unit 5 Only: Capacitor Station: During operation, minor amounts of chemicals (dielectric synthetic liquid and mineral oil) would be present inside electrical equipment at the capacitor station sites. Spill containment would be provided for all liquid-containing equipment, such that spills would be prevented in the event of equipment leaks. Diesel fuel would also be stored on the capacitor station site. The diesel would be stored in double walled tanks located within barriers that would prevent the spread of spills should the tank rupture. No hydrocarbons or chemicals would be stored at the passive reflector site. As such, the Proponent does not anticipate the proposed Project to have an effect on the water quality of Celista Creek or Shuswap Lake.

Mitigation

Although no significant adverse effects were anticipated by the Proponent, the following mitigation measures are proposed in the Application to avoid potential impacts to water quality:

• Environmental Management Plans and Best Management Practices during construction would address erosion control and sediment retention, cementitious materials, vehicle and site maintenance, and spill prevention and emergency response;

• The Proponent would augment the existing Columbia WUP Ecological Productivity Study with the addition of moored thermistor stations to assess the potential effect of the proposed Project on the thermal strata and ecological productivity of Kinbasket and Revelstoke reservoirs. The temperature monitoring would occur over the duration of the existing WUP study;

• A new Columbia River total gas pressure study of the Mica plant operating record would be carried out at three years post in-service to identify any changes in synchronous condense operation. If the synchronous condense operation is significantly greater than historic, then the Proponent would undertake a total gas pressure monitoring program to confirm that the current Best Management Practices are still applicable; and,

• Total Gas Pressure Flush Procedure being used for current operations would continue to be used to mitigate dissolved gas supersaturation from synch-condense operations.
**Unit 5 Only:** Although no significant adverse effects to water quality were anticipated by the Proponent at the capacitor station or passive reflector sites, the following precautionary measures are proposed:

- Temporary sediment erosion control measures would be used downstream of site during construction;
- Reseeding or cover of topsoil piles would be used to minimize soil loss and wind erosion;
- The proposed Project design would ensure to accommodate for surface run-off and groundwater seepage from site; and,
- Any hydrocarbons or chemical stored on site would be stored in suitable facilities with appropriate spill kits in the same location.

**Potential Residual Effects**

Although the Proponent did not anticipate the potential effects listed below to be significant, a cumulative effects analysis was still carried out and is described in the next section.

- Changes to water temperature in tailrace could adversely affect spawning, incubation, and rearing of resident fish species.
- Incremental change the duration of time and therefore the volume of supersaturated water released into the tailrace due to increased duration of synch condense operations.

**Unit 5 Only:** No residual effects are anticipated by the Proponent for the capacitor station site.

**Cumulative Effects Analysis for Water Quality Effects**

**Unit 5 Only:** Two potential cumulative impacts on water quality effects due to changes in the maximum or frequency of peak discharges from the incremental effects of the proposed Mica Unit 6 Project in addition to the proposed Project are identified by the Proponent:

*Total Gas Pressure:* Increased duration of synch-condense operations could result in an incremental change to total gas pressure volumes in the Mica Tailrace and affect the health of downstream aquatic organisms. Mitigation through total gas pressure flushing procedures presently in effect at Mica Dam would continue. Measures to monitor and mitigate the proposed Project’s operations on gas supersaturation in the Tailrace and to assess potential effects on aquatic life include the Total Gas Pressure Flush Procedure and the Mica Dam Total Gas Pressure Monitoring and Abatement Program.
**Thermal Profile:** Increased daily dam releases could influence the thermal profile of Mica Dam forebay and alter downstream temperatures. In the summer when discharge stops, temperatures in the tailrace would increase followed by a rapid decrease as generation resumes. Lesser changes would likely occur in the winter (when the air temperature would often be lower than the water temperature), with temperatures cooling during low flows and increasing during high flows. These changes to water temperature could affect spawning, incubation, and rearing habitat for resident fish species in the Mica Tailrace area.

The Proponent anticipated it is unlikely that any operational induced temperature changes would result in temperatures that exceed the British Columbia Water Temperature Guidelines designed for protection of sensitive species such as bull trout (Oliver and Fidler, 2001). This conclusion is based on intensive temperature studies related to operations of Arrow Lakes Generation Station at Hugh L. Keenleyside Dam (Golder, 2003). As discussed above, the Proponent has committed to water quality monitoring through the Reservoirs Ecological Productivity Monitoring Program; information from these studies would identify whether future mitigation/compensation requirements would be needed.

The installation of the proposed Revelstoke Unit 6 Project is not anticipated to increase the frequency or duration of synch-condense operation at Mica Dam, or to result in significant change to the maximum or frequency of peak discharges. Therefore no cumulative effects related to total gas pressure or altered temperature profiles are anticipated from the addition of the proposed Revelstoke Unit 6 Project.

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

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

Significance Analysis for Water Quality Effects

- **Magnitude:** The incremental impact of the proposed Project to water quality is not significant in comparison to water quality changes due to natural fluctuations or normal drawdown/refill related to reservoir operations. Closer hydraulic balance between Mica and Revelstoke Dams would result in fewer daily fluctuations and smaller potential for erosion in Revelstoke Reservoir;

- **Geographic Extent:** The proposed Project’s operations would affect Kinbasket, Revelstoke, and Arrow Lakes Reservoirs, with the most effects being confined to the Mica Dam Tailrace;

- **Duration and Frequency:** The proposed Project would have impacts on a daily basis for the duration of operations (at least 50 years);
5.2.4 Conclusion

Based on the above analysis and having regard to the Proponent’s commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on water quality. A small positive benefit of reduced erosion in Revelstoke Reservoir is anticipated.

5.3 Geophysical Environment

5.3.1 Background Information

The geophysical assessment study area for activities taking place on sites at or near the Mica Generating Station is the footprint of temporary construction related facilities, the existing warehouse and laydown area, and the Mica Generating Station itself as these are the areas that would be directly affected by the proposed Project.

No key terrain features exist in this study area. Mica Generating Station and the warehouse facilities are pre-existing and any areas that would be used for temporary purposes have been previously disturbed. Facility sites and areas directly impacted by the proposed Project would be as follows:

- The Mica Generating Station is carved out of rock and located approximately 1000 ft inside the base of a mountain;
- The warehouse and laydown area have been in place since initial construction of the Mica Generating Station;
- The concrete batch plant would be located next to the warehouse on a silt/gravel base previously used for the same purpose (and would have been used for the proposed Mica Unit 5 Project (Unit 6 Only)); and
- The area within Mica townsite where construction trailers or parking areas would be located is in a grassed field over a clay/loam base (and would have been used for the proposed Mica Unit 5 Project (Unit 6 Only)).

**Unit 5 Only:** The geophysical study area for activities related to the capacitor station includes the proposed construction footprint at the capacitor station and passive reflector sites, and a 100 m buffer around each, as this is where the major capacitor
station components will be located. The geophysical characteristics of the capacitor station site are as follows:

- **Geomorphology:** the capacitor station would be situated on a generally flat alluvial fan associated with Celista Creek, consisting of sand and gravel with some till and boulders.

- **Subsurface soils:** Gravelly sand occurs to approximately 1.5 m depth. Under the gravelly sand is a gravel and sand/sand layer, likely of glacio-fluvial origin. Some bedrock (shale typical of the BC interior) was encountered at depths of 0.15 to 1.8 m depth;

- **Groundwater:** No water was found in test pits 20 minutes after excavation. Some groundwater seepage was visible at the base of the slope to the northeast of the site but did not cause overland flow; and

- **Geotechnical:** A fault passes 2 km east of the site. There is low probability of a liquefaction layer in the overburden zone and no settlement concern for soils up to 5 m depth.

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

**Construction**

**Unit 5 Only:** Activities undertaken at the Mica Generating Station and warehouse facility are not expected to result in soil erosion. There would be no footings, foundations or deep excavations required to set up the concrete batch plant. At the Mica townsite, gravel would be spread on the site to provide a level base for trailers. There would be no footings, foundations or deep excavations required to set up the trailers. There would be some clearing, and minor amounts of levelling may be required at the various sites. While there is a possibility that some soil erosion could occur during construction or use of the sites, such erosion will be prevented or minimized through the use of Best Management Practices and the Environmental Management Plans described in section 13 of the Application. Many temporary facilities constructed for the proposed Project would be reused for the proposed Mica Unit 6 Project. Those temporary facilities no longer required upon completion of the proposed Mica Unit 6 Project would be decommissioned as part of that proposed Project. The effect of decommissioning major project components would be addressed at the time of decommissioning.

**Capacitor station:** The sites would require minor earthworks to establish a flat working area within the construction footprint. Construction would not affect landscape features or cause erosion other than that associated with the temporary stock piles. The Proponent considers potential erosion and soil loss from the temporary stockpiles to be minor and anticipated that erosion would be contained by placement of sediment control
structures and implementation of the sediment and erosion control measures specified in the Environmental Management Plans.

**Unit 6 Only:** Facilities and work areas developed for the proposed Mica Unit 5 Project would be re-used for the proposed Project. Those no longer required upon completion of the proposed Project would be decommissioned. The possibility of soil erosion during decommissioning would be prevented or minimized through the use of Best Management Practices and the Environmental Management Plans described in section 13 of the Application. The effect of decommissioning major project components would be addressed at the time of decommissioning.

**Operations**

No soil erosion was anticipated during operations as a result of proposed Project facilities in the Mica Generating Station area. **Unit 5 Only:** No operational effects were anticipated for the capacitor station or passive reflector sites.

**Mitigation**

No specific mitigation measures are proposed by the Proponent for the Mica Generating Station area or the capacitor station sites other than the use of Best Management Practices and the provisions of Environmental Management Plans discussed above.

**Potential Residual Effects**

The Proponent did not anticipate significant residual effects to the geophysical environment as a result of the construction, operation or decommissioning of temporary facilities for the proposed Project at the Mica Generating Station area. Any potential residual effects associated with decommissioning of major project components would be addressed through the environmental review process in place at that time.

**Unit 5 Only:** The only residual effect at the capacitor station and passive reflector sites would be minor earthworks required for infrastructure construction, which the Proponent does not consider to be a significant residual effect.

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

During the review of the Application, no additional issues were raised by government agencies, First Nations, or members of the public.
**Significance Analysis for Geophysical Environment Effects**

- **Magnitude**: Potential for erosion would be associated with minor clearing and levelling (decommissioning) of temporary construction facilities as well as minor permanent earthworks for the capacitor station and passive reflector (Unit 5 Only);

- **Geographic Extent**: Geophysical effects would be confined to construction sites near Mica Dam Tailrace and to the capacitor station and passive reflector sites (Unit 5 Only);

- **Duration and Frequency**: Potential for erosion effects would be confined to the construction period. No geophysical effects are anticipated during operations;

- **Reversibility**: Erosion effects would be irreversible;

- **Context**: The proposed Project is situated in areas that have a history of significant industrial development and disturbance; and

- **Probability**: Proper implementation of Environmental Management Plans and Best Management Practices would reduce the likelihood of erosion.

5.3.4 Conclusion

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

5.4 Atmospheric Environment *(Mica Unit 5 only)*

5.4.1 Background Information

The study area for the capacitor station component of the proposed Project was defined as the area within a 10 km radius of the capacitor station site. A dispersion model called SCREEN3 (developed by the United States Environmental Protection Agency and selected with the guidance of BC Ministry of Environment (MOE)) was used to model potential air quality impacts from generators associated with the capacitor station. Temporary generators would be used during the construction period and a standby generator would remain on-site during operations. Only intermittent generator use would be expected during operations, to a maximum of 1% of the time in any year (88 hours). Conservative assumptions were used for the model (i.e. the largest generator potentially operating at any time during construction or operations (that is, the standby generator) operating 100% of the time during persistent worst-case meteorological conditions).

No baseline data were available regarding background ambient air quality in the study area. In consultation with BC MOE, and in consideration of the remote location from
any significant anthropogenic emissions sources, it was determined that the assessment did not require consideration of background ambient air quality. Two regulated pollutants from diesel engines (Particulate matter less than 2.5 microns (PM$_{2.5}$) and Nitrogen Dioxide (NO$_2$)) were assessed against air quality objectives set by BC MOE and Canada-Wide Standards. The nearest human receptors to the capacitor station site were identified as those visiting an industrial site approximately 1.5 km to the south, or at those at the nearest residence approximately 2.2 km to the east.

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

The SCREEN3 model indicates that neither PM$_{2.5}$ nor NO$_2$ emissions would exceed 1-hour or 24-hour maximum air quality objectives during construction or operational uses. The largest atmospheric effects are predicted to occur within 1 km of the capacitor station site. Therefore, as actual generator usage during construction and operations is anticipated to be much lower than in the conservative assumptions used for the model, no significant adverse atmospheric effects are anticipated by the Proponent.

Mitigation

No mitigation measures were proposed for construction or operations given that no significant adverse effects were anticipated by the Proponent.

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

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

Significance Analysis for Atmospheric Environment Effects

- **Magnitude**: Conservative estimates of particulate matter and nitrogen dioxide emissions indicate that emission levels would not exceed 1-hour or 24-hour air quality objectives;
- **Geographic Extent**: The largest atmospheric effects are predicted to occur within 1 km of the capacitor station site with effects at the nearest industrial receptor (1.5 km) or residential receptor (2.2 km) being much lower;
- **Duration and Frequency**: Generators would be used on a temporary basis during construction, and the backup generator would be expected to operate less than 88 hours per year (1% of the time) during operations;
- **Reversibility**: Atmospheric effects would be irreversible;
- **Context**: The capacitor station would be located in a remote area, away from any significant anthropogenic emissions sources; and
• **Probability:** The models used to assess potential atmospheric effects are conservative and adequately calibrated. Therefore the predicted risk level for atmospheric effects are likely to occur.

5.4.4 Conclusion

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

5.5 **Fish and Aquatic Habitat**

5.5.1 Background Information

The fish and aquatic habitat assessment study area for activities taking place on sites at or near the Mica Generating Station was defined based on the extent to which operations for the proposed Project would likely result in direct measurable and biologically significant physical changes. The study area comprises the Kinbasket Reservoir, the Mica Dam Tailrace, the Revelstoke Reservoir and lower, accessible portions of tributaries, the Revelstoke Dam Tailrace, and the mid-Columbia River.

The assessment of effects on aquatic habitats and fisheries resources relied on operations and hydraulic modelling data used to identify potential physical changes to the aquatic system (section 6.1 of the Application and section 5.1 of this report), and a review and summary of aquatic resource information collected in the study area since the early 1970s. Much of the fish and aquatic environment baseline information was collected and summarized in a comprehensive review and data gap analysis conducted as part of the WUP process (RL&L 2001a; 2001b). Additional studies were conducted on seasonal fish and fish habitat attributes in the Mica Dam Tailrace area in 2008 and 2009 to gather baseline data.

The initial aquatic habitat and fish resource parameters of concern were identified through screening exercises associated with WUP activities and Core Committee discussions (outlined in section 3.1.2 of this report) and include: fish species status; rare or endangered species; entrainment; habitat; tributaries; aquatic macrophytes, benthic substrates, and invertebrate populations; and limnology and productivity. Detailed baseline information on each of these parameters in the five study areas is provided in section 6.5.2 of the Application.

In the following water bodies there are other species that may potentially occur based on their presence in tributaries or elsewhere in the Columbia Basin but these are not species that would typically reside in the water body or use the water body for any

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6 The study of biological, chemical, physical, geological, and other attributes of inland waters
significant life history function, and therefore, would not be affected by the proposed Projects.

**Kinbasket Reservoir:** Kinbasket Reservoir is deep, cold and nutrient poor, which limits biological productivity. The extreme annual fluctuations in water level (about 29 m) severely reduce the productivity of invertebrates and vegetation that reside in the reservoir drawdown zone between the high and low water levels. This, in turn, directly limits fish production due to absence of food and shelter. Results of surface gill net sets indicated that kokanee (*Oncorynchus nerka*) were the most abundant species in surface open water habitat, with species diversity increasing nearer to shore. Other species observed include rainbow trout (*Oncorychus mykiss*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni*) and burbot (*Lota lota*).

Bull trout is the only documented fish species in Kinbasket Reservoir that is either provincially or federally listed (provincially blue listed). Although not confirmed to date, other listed fish species that may occur in Kinbasket Reservoir are white sturgeon (*Acipenser transmontanus*), pygmy whitefish (*Prosopium coulteri*), and Columbia sculpin (*Cottus hubbsi*). Historically, white sturgeon, which is currently listed as endangered (Schedule 1) by the federal *Species at Risk Act* (SARA), was distributed throughout the Columbia River drainage in Canada. Anecdotal reports of white sturgeon sightings in Kinbasket Reservoir suggest a remnant population in the system but in a limited sampling program in the fall of 1995, 2008, and 2009, no white sturgeon were captured.

**Mica Dam Tailrace:** Annual water surface levels of Revelstoke Reservoir vary by approximately 1.5 m with the backwater effect from Revelstoke Reservoir exerting a major influence on water levels in the tailrace through most of the year. Prior to the initiation of the Mica Dam Tailrace Fish Indexing Program in 2008, little information was available on the resident fish species composition or habitat use of the tailrace. Initial sampling from this program indicates that the Mica Dam tailrace is used by five species of sportfish (sub-adult and adult bull trout, burbot, kokanee, and rainbow trout; and all age classes of mountain whitefish). Three species of non-sportfish (slimy sculpin (*Cottus cognatus*), prickly sculpin (*Cottus asper*) and a sucker (not identified to species)) were also recorded. Results also indicate that mountain whitefish likely use the tailrace for spawning.

Bull trout is the only documented fish species in the Mica Dam Tailrace area either provincially or federally listed. Although not confirmed to date, other listed fish species that may occur in the tailrace are white sturgeon, pygmy whitefish, and the Columbia sculpin based on their presence in the basin. No white sturgeon were captured or observed in sampling programs conducted in 1995 and 2008.
Revelstoke Reservoir: A productive sport fishery has developed in Revelstoke Reservoir. The predominantly stable reservoir water levels and proximity to Revelstoke allow easy recreational access. Sport fish are the most abundant fish populations in the reservoir. Since impoundment in 1984, there has been a trend towards increased abundance of kokanee and bull trout, with a corresponding decrease in the abundance of mountain whitefish and rainbow trout.

Bull trout is the only documented fish species in Revelstoke Reservoir that is either provincially or federally listed. Numerous anecdotal reports of white sturgeon sightings in Revelstoke Reservoir over the past two decades suggest that there may be one or more white sturgeon in the reservoir. However, no white sturgeon were captured or observed in sampling programs conducted in 1995 and 2008, supporting an assumption of low population abundance of this species in Revelstoke Reservoir.

Revelstoke Dam Tailrace: Revelstoke Dam Tailrace is characterized by shallow depths and rocky substrates. Due to the large daily flow fluctuations, current velocities are high to moderate during periods of high daily discharge and low during periods of seepage (zero) discharge. Results from the Large River Fish Indexing Program suggest mountain whitefish or kokanee are generally the most abundant sportfish species in the tailrace area, followed by bull trout. Sucker species (primarily largescale sucker (Catostomus macrocheilus)) were the most abundant non-sportfish between 2001 and 2005, and sculpin species were the most abundance non-sportfish between 2006 and 2008 (In this study, sucker species and sculpin species were either not identified to species or combined for analysis). Mountain whitefish likely use the tailrace for spawning. There are approximately 50 adult (reproductively active) white sturgeon in the Arrow Lakes Reservoir. A small proportion (less than 20%) of these use the tailrace for spawning in any given year.

Rare and endangered species in the basin have been previously described above.

Mid-Columbia River: The mid Columbia River downstream from the Revelstoke Dam Tailrace consists of a shallow braided channel form within a wide valley. Although based on limited data, results suggest that the river-like portions of the mid Columbia River are used by the same species that are present in the Revelstoke Dam Tailrace.

The same listed species that inhabit the Revelstoke tailrace are also found in the mid Columbia River and upper Arrow Lakes Reservoir. Use of the mid Columbia River (other than as a movement corridor) by listed species other than the white sturgeon is unknown although WUP programs to identify fish use of the mid Columbia River are presently underway. White sturgeon is present in the mid Columbia River, including during the late spring and summer period for staging, spawning, egg incubation and early life stage development. In fall, feeding aggregations have been recorded near the
mouths of tributaries used by spawning kokanee. Mature, pre-spawning white sturgeon move upstream to the Revelstoke Tailrace (near the Revelstoke Golf Course) in mid-June and July and may remain in this area until mid to late August.

**Unit 5 Only: Capacitor Station:** The fish and aquatic resources study area for activities related to the capacitor station includes the proposed construction footprint of capacitor station and passive reflector sites and a 100 m buffer around each. Both the sites are located at least 500 m from the nearest waterway. Because no waterways or drainage channels were observed within the study area and no construction activities are proposed outside the study area boundary, a fish and aquatic environment assessment was not undertaken for either site and no fish or aquatic field surveys were undertaken. As there are no fisheries resources in the study area, in-stream work windows are not relevant to the capacitor station assessment.

An overview of fish and aquatic resources in the mainstem of Celista Creek downstream from Humamilt Lake to Shuswap Lake is provided in section 7.4.2 of the Application to provide context and background information. This overview is based on a review of literature, personal communication with First Nations and community residents, and a site visit to assess the proximity of the waterway to the study area.

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

**Construction**

Construction and installation activities for the proposed Project would occur primarily within the confines of the existing Generating Station and intake structures in non-wetted areas and in previously disturbed areas. Construction is not anticipated to involve any in-water construction activities. All construction materials would be transported to the site using existing infrastructure. Construction of the proposed Project would not affect current operations at the Mica Generating Station which eliminates the potential for any incremental impacts related to flow changes during construction. Construction of the proposed Project would not require the diversion of any permanent or seasonal water course.

**Unit 6 Only:** Decommissioning of work areas and facilities constructed for the proposed Mica Unit 5 Project and no longer required after completion of the proposed Project could result in short-term disturbance of upland habitat which has the potential for increasing sediment deposition in waterbodies. Any potential impacts would be mitigated by applying Best Management Practices and through implementation of the Environmental Management Plans as described in section 5.8 of this report.

**Kinbasket Reservoir:** The Proponent anticipated that the only potential aquatic habitat and fisheries resources effects on Mica Dam Forebay during construction would result
from accidental spills or other fluids into the reservoir. Section 5.8 of this report introduces the Environmental Management Plans designed to manage the risk of contaminants entering Kinbasket Reservoir.

**Mica Dam Tailrace:** Construction activities would occur adjacent to watercourses (i.e., laydown areas and warehouse areas, the existing generating station footprint) and would have the potential to affect the Mica Dam Tailrace and upper Revelstoke Reservoir.

- Mixing of concrete and transport to the Mica Generating Station site could lead to increased runoff/sedimentation at both the batch plant and along the access road, thereby potentially causing impacts on water quality which could impact fish health.
- The workforce for the proposed Project would result in additional use of the sanitary facilities at the Mica Generating Station and townsite, both of which will have the capacity to handle additional demand.
- Accidental spill or placement of construction materials or other fluids into the tailrace could impact the aquatic environment. The risk of contaminants entering the tailrace would be managed through the Environmental Management Plans.

Mica Dam Tailrace is used year-round by rearing fish, and whitefish spawning occurs in late fall/winter. Although in-stream works are not planned as part of the proposed Project, if they were required, they should be limited, if possible, to periods between June and September. Necessary authorizations would be obtained should in-stream works become required.

**Revelstoke Reservoir and all downstream study areas:** Construction activities could affect aquatic habitat and fisheries resources in the tailrace and the effects could be carried downstream into upper Revelstoke Reservoir. Spills of contaminants during construction could potentially impact the aquatic environment downstream of the tailrace. Risks of spills that could impact these areas would be reduced by following the Environmental Management Plans. As stated above, the additional workforce associated with proposed Project is not anticipated to exceed the capacity of the septic system at the Mica townsite.

**Operations**

The addition of the proposed generating unit would result in an incremental increase in the maximum daily discharge volume of about 325 (335) m³/s. Operation of this proposed unit would result in higher instantaneous discharges from the Mica Generating Station, mainly during periods of peak energy demand in winter and summer months, but potentially at any time of the year. A similar volume of water would be passed through the station on any given day compared to current flow conditions, so that
shorter peak generation periods of high flow would be balanced by longer periods of low flow.

**Kinbasket Reservoir:**

**Mica Dam Forebay temperatures:** The proposed Project would allow an incremental increase in the daily maximum flow that could be discharged through the turbines at the Mica Generating Station, with the potential to alter the thermal profile in the Mica Dam Forebay. However, this incremental impact is expected to be masked by much larger changes from reservoir filling and drawdown operations, or from natural influences. This assessment is supported by studies conducted at Hugh L. Keenleyside Dam related to the addition of an expansion plant at that location (Golder, 2003).

**Entrainment:** The proposed Project would create higher discharge capacity from the forebay and create the potential to increase fish entrainment⁷. Although preliminary models indicate that incremental impacts to entrainment associated with additional generating units would be minimal, several uncertainties were identified. These critical uncertainties will be further investigated through the Detailed Assessment Phase of the Mica-Revelstoke Fish Entrainment Strategy Action Plan (MRFESAP) (to be carried out from 2009 to 2012). Should this future monitoring identify incremental impacts directly attributable to the proposed Project, the proponent has committed to undertaking future actions appropriate to the severity of the impact using one or more of: mitigation via new or existing programs and budgets; mitigation via new or expanded project(s) within the Columbia Basin Fish and Wildlife Compensation Program; and integration of mitigation into the next review of the Columbia River WUP.

**Mica Dam Tailrace:**

**Downstream Fish Habitat:** Changes in tailrace flow velocities and water levels could affect habitat suitability for fish residing in the tailrace. A small gain of habitat would be associated with increased water depth and wetted channel width between the tailrace and the Blue Bridge when five (six) units would be in operation. The slight increase in water depths during high discharge periods could provide some additional feeding areas to adult or large juvenile fish, though significant benefits to aquatic productivity are not expected.

The proposed Project would also result in a slight increase in overall flow velocity between the tailrace and the Blue Bridge, although HEC-RAS models indicate that sizeable areas of suitable habitat (i.e., those areas with velocities <1.0 m/s) would still be available when five (six) units would be in operation. Since the greatest incremental increases in daily flow velocity effects would be expected in the winter, when fish

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⁷ Fish passing through the turbine
typically avoid unnecessary movement, the increased energy required to maintain feeding stations or move through the channel in faster-flowing water could negatively affect growth and condition of certain species or age classes.

Some adult or large juvenile fish could benefit from higher velocities during portions of the year (e.g. bull trout and mountain whitefish which prefer or tolerate high velocity habitats) while others would experience a reduction in suitable habitat (e.g. kokanee and burbot, which prefer lower velocity habitats). The increased maximum daily flow velocity and changes in the frequency occurrence of these velocities would likely have a negative effect on rearing use of the area. The greater incremental increase in velocity closest to the tailrace would result in fish relocation downstream during maximum discharge periods, or general redistribution of resident fish in the area as an adaptation to higher flows. The Proponent anticipated that effects of velocity changes resulting from the operation of the proposed Project are expected to be low and not measurable at the population level.

*Bank Erosion:* During initial operation of five (six) units, a slight increase in erosion and sediment transport would be expected while the system stabilizes to the new flow regime and any areas affected by erosion self-armour. This would result in a short-term increase in turbidity and suspended sediment in the Mica Tailrace and the deposition of this material in Revelstoke Reservoir. However, any effects are anticipated to be short term and would not be expected to have a measurable effect on aquatic life.

*White Sturgeon Use:* The tailrace provides potentially suitable spawning habitat for white sturgeon, although there is no evidence that sturgeon presently spawn in the area or did so historically. The projected incremental changes to velocities and depth in the Mica Dam Tailrace that would result from the proposed Project would be well within the swimming capabilities of adult white sturgeon, and the incremental changes arising from operations of the proposed Project are not expected to have any effect on potential future uses of the area for white sturgeon feeding or spawning.

*Fish Spawning/Egg Incubation:* Changes to water temperatures in Mica Dam Tailrace resulting from operations of the proposed Project have the potential to affect the spawning or egg incubation of resident fish species. Rapid temperature changes presently occur in the tailrace during the summer due to heating during low flow or cooling immediately following discharge. The effect of these changes on fish use of the area are unclear, but may reduce fish use of the area as indicated by seasonal sampling results in 2008.

The increased discharge capacity at the Mica Generating Station as a result of the proposed Project is not expected to result in incremental changes in downstream water temperatures that would be distinguished from natural changes in reservoir thermal
profiles or from normal reservoir filling and drawdown operations. The incremental effect of the proposed Project resulting in shorter peak discharge and longer periods of low flows cannot be predicted and impacts on fish spawning and egg incubation remain uncertain. The seasonal fish community indexing program would include temperature monitoring in the tailrace to determine the incremental effects.

*Stranding:* The proposed Project is expected to increase the maximum tailrace levels by an average of 0.05 m (0.07 m), which could increase the stranding of fish or fish eggs. Adult and sub-adult fish are least susceptible to stranding, while fish eggs, larvae, fry, and young-of-the-year are most susceptible to stranding. Based on results of surveys to date, predicted minor incremental changes in water level fluctuations in the Mica Dam Tailrace, limited amounts of dewatered area, the steep bank configuration, and the predominant use of the tailrace by adults and sub-adults for feeding only, the potential for operations of the proposed Project to dewater substantial numbers of fish or fish eggs/larvae is anticipated to be low. However, pending further information on mountain whitefish spawning activity and egg distribution in the tailrace, the direction or magnitude of this impact cannot be accurately determined and, therefore, this has been identified as a potential residual effect. An additional study was undertaken in winter 2009/2010 to confirm the findings of the 2008/2009 study.

**Revelstoke Reservoir:**

*Temperature and Productivity:* April is the only month where water residence time\(^8\) in Revelstoke Reservoir is expected to increase. Changes in thermal stratification due to increased discharge capacity at the Mica Generating Station and reduced water level fluctuations in Revelstoke Reservoir are expected to be minor during summer months in terms of their predicted effects on thermal stratification in the reservoir. Overall, impacts of increased discharge capacity associated with the proposed Project and resultant impacts to productivity and fish species in Revelstoke Reservoir are expected to be low and would not be expected to result in a residual impact.

*Littoral Zone, Productivity, and Macrophytes:* Based on models and thresholds developed for the Columbia River WUP, the proposed Project is expected to have minimal effects on nearshore aquatic habitat that would affect productivity or macrophyte growth. These effects would not likely be measurable at the population level for resident species.

*Fish Stranding, Rearing, Tributary Access and Spawning:* Variability in reservoir water levels is expected to decrease with operation of the proposed Project, and therefore a low but beneficial effect is anticipated for littoral habitat productivity and the fish populations that use these areas.

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\(^8\) The average length of time that water spends in the reservoir

*Mica Generating Station Unit 5 (Unit 6) Project – March 1, 2010*
Revelstoke Dam Tailrace and mid-Columbia River:

*Fish Habitat Suitability:* Model results indicate that operational changes at Revelstoke Generating Station would result in a reduction in the frequency of both maximum and minimum daily flows below Revelstoke. The potential for decreased flow variations during certain periods could provide some benefit to adult and larger juvenile fish that use the Revelstoke Dam Tailrace and mid Columbia River for feeding, providing higher minimum available habitat and reduced daily peak flow volumes and amplitudes. This may reduce energy expenditures required to relocate to different habitats as water levels change or to maintain position in the higher flow velocities. Fish using the tailrace and mid Columbia River are adapted to river conditions and are able to tolerate the highly unstable flow conditions that presently exist in these areas. For this reason, the predicted effects would be ranked as potentially positive but low.

*White Sturgeon Spawning:* During the white sturgeon spawning and egg incubation period (July and August), modelling results indicate minor changes to the frequency of low flow periods in average and dry years, and slight reduction in the frequency of high flow periods in wet years. These slight changes are thought to be unlikely to affect sturgeon use or spawning success in the area as modelled changes are well within annual and seasonal flow variations during which spawning has been previously documented. Consequently, the predicted effects of the proposed Project on white sturgeon spawning and egg incubation are expected to be low (not measurable) and would not result in a residual impact. Given the endangered status of this species, however, there are existing WUP white sturgeon monitoring programs in place that would examine the effects of flow alterations on white sturgeon spawning success.

*White Sturgeon Incubation and Rearing:* Changes to water temperature as a result of changes in the temperature and instantaneous volume of water discharged from Revelstoke Dam have the potential to adversely impact sturgeon incubation. However, these changes in water temperatures are expected to be minimal due to the small increment in change to the discharge regime at Revelstoke Dam associated with operation of the proposed Project. Therefore, the Proponent anticipated temperature effects of the proposed Project on incubation and rearing of white sturgeon (or other resident fish species) to be minimal. Given the endangered status of this species, there is a WUP program to monitor temperatures below Revelstoke Dam and a laboratory based WUP program to examine the effects of temperature on white sturgeon egg incubation.

*Fish and Egg Stranding:* The minor incremental decrease in the frequency of daily discharge variation below Revelstoke Dam may affect the incidence of fish stranding by
reducing the amount of habitat dewatered during that day. This is expected to provide a low but potentially beneficial impact for resident fish species that spawn and rear in the tailrace and mid Columbia River. The rate at which flows are increased or decreased from Revelstoke Generating Station, which may influence stranding rates, should not change with operation of the proposed Project. Consequently, the effects of the proposed Project on fish and fish egg stranding in the Revelstoke Dam Tailrace that may affect resident fish species is expected to be potentially positive but low (not measurable) and would not result in a residual impact.

Given the endangered status of white sturgeon, there is a WUP program to monitor white sturgeon spawning in the tailrace area. A component of this study is the determination of the effects of flow fluctuations on white sturgeon egg and larval stranding.

**Unit 5 Only: Capacitor Station Construction and Operations:** Given that there are no fisheries resources or waterways within the study area, construction and operations of the capacitor station and passive reflector is not anticipated to affect fisheries resources or habitat within Celista Creek or downstream habitat within Shuswap Lake. Therefore, construction of the capacitor station is not considered to have an effect on any fish populations or habitat suitability within the Celista Creek watershed.

**Mitigation**

The following mitigation measures are proposed by the Proponent:

- Best Management Practices and an Environmental Management Plan would be developed with procedures specified to reduce risks associated with hazardous materials or construction materials entering fish habitat;
- The Proponent would implement the objectives of the Detailed Assessment Phase of the MRFESAP for the proposed Mica and Revelstoke Generating Station Projects;
- The Proponent would augment the existing Columbia WUP Ecological Productivity Study with the addition of moored thermistor stations to assess the potential effect of the proposed Project on the thermal strata and ecological productivity of Kinbasket and Revelstoke reservoirs. The temperature monitoring would occur over the duration of the existing WUP study.
- Data on fish species composition, abundance, distribution, and biological characteristics in the tailrace (especially key index fish) would be undertaken through the Mica Dam Tailrace Fish Indexing, Temperature and Habitat Program (2 years pre-project and 3 years post-project). An objective of the program would be to determine if there is any use of the tailrace by white sturgeon. This information would be used as a basis to address any effects on fish use in the area;
• Potential impact of incremental changes in daily flow fluctuations in the tailrace on stranding of whitefish are being confirmed through further surveys in winter 2009/2010.

**Unit 5 Only: Capacitor Station:** Despite that no waterways, waterbodies, wetlands or drainage channels occur within or near the proposed construction footprint and that the proposed footprint is located more than 500 m from Celista Creek, the mitigation measures proposed for hydrology and water quality as well as the Best Management Practices and Environmental Management Plans in place for construction would further ensure avoiding risk to fish or aquatic habitats.

**Potential Residual Effects**

Although the Proponent does not anticipate the potential residual effects listed below to be significant, a cumulative effects analysis was still carried out and is described in the next section.

• Kinbasket Reservoir: Higher discharge capacity could alter entrainment rates that could in turn impact reservoir fish populations
• Mica Tailrace: Changes in downstream flow velocities and levels could affect habitat suitability for fish residing in the tailrace
• Mica Tailrace: the incremental increase in the magnitude of daily load shaping could increase stranding of fish and fish eggs/larvae.

Also, the potential of fish stranding in Revelstoke Tailrace associated with Mica Unit 6 and Revelstoke Unit 6 is addressed in the cumulative impacts analysis that follows, even though stranding in this area was not identified as a residual effect of the Mica Unit 6 project.

**Cumulative Effects Analysis for Fish and Aquatic Habitat Effects**

Three (Four) potential cumulative impacts of combined operation of the proposed Mica Unit 5, Mica Unit 6, and Revelstoke 6 Unit Projects were identified in relation to fish and aquatic habitat.

*Entrainment at Mica Dam:* Increased entrainment was identified as a potential cumulative impact of adding fifth or sixth generating units at Revelstoke and Mica Dams (RL&L, 1995). There would be a slight increase in daily discharge from the Mica Dam (particularly during times of peak demand) with the proposed Mica Unit 6 Project compared to proposed Mica Unit 5 Project operations in an effort to balance with the increased discharge capacity of Revelstoke Dam. The MRFESAP technical committee reviewed modeled representations of incremental impacts of additional units at Mica and Revelstoke Generating Stations, and did not find them to be significant.
As noted earlier in this section, the Detailed Assessment Phase of the MRFESAP will assess the impacts of fish entrainment in response to operations and capacity changes on fish populations in both Kinbasket and Revelstoke Reservoirs. The results of these assessments will define the level of effort required to mitigate or compensate in order to meet fisheries management objectives for the Columbia basin.

**Habitat Suitability in the Mica Tailrace: Unit 5 Only:** The proposed Mica Unit 5 and 6 Projects could affect habitat suitability for fish residing in the Mica Dam Tailrace, increasing water level and velocity fluctuations in Mica Tailrace during peak electricity demand periods.

Anticipated effects to habitat suitability in the Mica Tailrace would be the same as described in section 5.5.2 of this Report, only the cumulative increase in flow velocity (1.0 m/s maximum, 0.6 m/s average) and water level (0.51 m maximum, 0.12 m average) would be larger than for the individual proposed Projects. Cumulative effects of the two proposed Projects are still not anticipated to result in measurable population level effects in resident fish, though the specific nature of impacts to fish and fish habitats are not yet known. The Mica Dam Tailrace Fish Indexing Program would be conducted before and after the operation of both proposed Projects and would help to better understand fish uses of the tailrace and to verify anticipated cumulative effects of additional generating units at Mica Dam.

**Unit 6 Only:** The addition of the proposed Revelstoke Unit 6 Project is not anticipated to result in any significant changes in the magnitude or frequency of discharge variation at Mica Dam.

**Fish and fish egg/larvae stranding in the Mica Tailrace:** The incremental impacts of the proposed Projects are expected to increase the Tailrace water level by a maximum of 0.51 m (closest to the dam) or an average of 0.12 m throughout the tailrace study area during periods of peak generation.

The potential impact of cumulative effects of daily flow fluctuations during the operation of five and six units (including potential cumulative impacts of Revelstoke Unit 6) on most resident fish species is unknown. Based on the predicted minor incremental changes in water level fluctuations in Mica Tailrace, the limited amount of dewatered area, and the steep bank configuration, the potential that Project operations would dewater substantial numbers of fish or fish eggs/larvae in this section is expected to be low.

The greatest impact is likely on mountain whitefish that are spawning in the area. Given the possibility that spawning by whitefish occurs in the incremental affected habitat area and the possibility that the incremental increase in daily maximum water levels could strand eggs, a monitoring program was recommended in the process of the Proponent’s Core Committee process (described in section 3.1.2 of this report) and implemented by
the Proponent in 2009 to collect baseline data on mountain whitefish egg stranding. Studies to date have not identified any impacts of existing operations on mountain whitefish eggs.

**Unit 6 Only: Fish stranding in the Revelstoke Tailrace:** No residual stranding impacts were identified for either of the proposed Mica Unit 5 or Mica Unit 6 Projects. However, the modelled incremental increase in the magnitude of daily load shaping arising from the addition of the proposed Mica Unit 6 and Revelstoke Unit 6 Projects could potentially have a cumulative negative effect on stranding of fish and fish eggs in the Revelstoke tailrace and mid Columbia River. These river sections do not appear to support large numbers of small fish species or juvenile stages of larger species, which are most susceptible to stranding. However, the effects of current operation of Revelstoke Dam on downstream stranding have not been systematically examined and are therefore, unknown. Consequently, the potential cumulative effects of the proposed Mica Unit 6 and Revelstoke Unit 6 Projects are also unknown.

Implementation of the year-round minimum 141.6 m$^3$/s (5000 cfs) flow at Revelstoke Dam has the potential to reduce the effects of the proposed Mica Unit 6 and Revelstoke Unit 6 Projects on fish and fish egg stranding in the Columbia River downstream of Revelstoke Dam. However, the level of protection provided by this minimum flow is uncertain. Detailed stranding studies have been conducted in the lower Kootenay River, the Columbia River below Hugh L Keenleyside Dam, and the Duncan River. The results of these studies and WUP studies to monitor fish stranding potential in the mid Columbia River resulting from present operations of Revelstoke Dam would be used to develop future monitoring studies for the mid Columbia River and to assess the impacts of Revelstoke Unit 6.

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

During the review of the Application, additional issues were raised by the Ktunaxa Nation Council, Okanagan Nation Alliance, and Lakes Division of the Secwepemc Nation. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix D.

Key issues identified include:

- Multiple aspects of the assessment are not able to quantify the effects of current and proposed operations due to lack of information. Many programs will be able to provide preliminary results in 2009 and 2010. A commitment to update the Applications with these findings is required to evaluate the significance of these elements in the assessment.
  - Proponent Response: The assessments for the proposed Projects have been completed and are contained in the Applications which are currently
being reviewed. The findings of the studies currently underway will be considered in terms of ongoing BC Hydro operations in the area. As applicable and depending on study results and the severity of the impact, appropriate mitigation or compensation will be considered.

- The Ktunaxa Nation Council, Lakes Division and the Okanagan Nation Alliance all raised fish entrainment as an issue when providing comments on drafts of the assessment report, highlighting several uncertainties that were identified in the first phase of the MRFESAP as well as uncertainties as to whether the MRFESAP will be completed and whether it will adequately mitigate and/or compensate fish entrainment through Mica Dam. First Nations’ view on fish entrainment is described in further detail in section 10.2 of this report.
  - Proponent Response: A commitment related to implementing the objectives of the Detailed Assessment Phase of the MRFESAP for Mica and Revelstoke was added to the table of commitments. To meet the Detailed Assessment Phase current study objectives, $1.1 million funding (including contingency) has been approved, scheduled to be spent by December, 2013. Both the study timeline and objectives could be subject to change by agreement between the Proponent and the Fish Entrainment Technical Committee. Changes to the timeline or objectives will be accommodated first through a trade-off analysis within the program or use of funding contingency.

These issues were resolved to EAO’s satisfaction as noted in Appendix D.

Significance Analysis for Fish and Aquatic Habitat Effects

- **Magnitude:** The magnitude of effects on fish and aquatic habitat due to periodic water temperature changes, increased flow velocity, and increased water levels associated with changes to peak discharge would be low and incremental to current reservoir and dam operating conditions.

- **Geographic Extent:** The proposed Project’s operations would affect Kinbasket, Revelstoke, and Arrow Lakes Reservoirs, with the most effects being confined to the Mica Dam Tailrace;

- **Duration and Frequency:** The proposed Project would have impacts on a daily basis for the duration of operations (at least 50 years);

- **Reversibility:** Effects of changes in peak discharge on fish habitat suitability would be reversible if pre-project operating conditions were resumed;

- **Context:** The proposed Project is situated in areas that have a history of significant industrial development and disturbance; and,

- **Probability:** Effects on fish and aquatic habitat from operational changes in the reservoirs and tailrace areas are likely to occur. The specific nature of effects is unknown at this time.
5.5.4 Conclusion

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

5.6 Vegetation Resources

5.6.1 Background Information

Baseline information for vegetation resources is provided for the regional terrestrial study area for activities taking place at or near the Mica Generating station as described in section 4.2 of this report, namely the area from Kinbasket Reservoir to the headland of Arrowhead in Arrow Lakes Reservoir.

The vegetation assessment study area for activities taking place on sites at or near the Mica Generating Station is the Kinbasket Reservoir (753 m to 754 m elevation band) (Unit 5 Only) and Mica Dam Tailrace (including adjacent construction areas). These areas were selected based on predicted temporal and spatial changes in water levels as modelled in section 5.1 (Hydrology) of this report, areas required for construction, and input from First Nations and stakeholders. Potential effects on vegetation in the 753 m to 754 m elevation band of Kinbasket Reservoir could occur as a result of the new operation conditions associated with the proposed Mica Unit 5 Project. No substantially different hydrologic changes would occur in Kinbasket Reservoir due to operation conditions associated with the proposed Mica Unit 6 Project, and the Proponent does not anticipate any new vegetation effects to be associated with the proposed Mica Unit 6 Project. Therefore, the 753 m to 754 m elevation band is considered in the study area for the proposed Mica Unit 5 Project but not the proposed Mica Unit 6 Project. Impacts on three valued ecosystem components (VECs) related to vegetation resources were assessed: Rare plant species, rare plant communities, and invasive species.

**Unit 5 Only:** The local study area for direct impacts of activities related to the capacitor station includes the construction footprints of the capacitor station and passive reflector, with a 100 m buffer around each site, as well as the line of sight path to the passive reflector. The regional study area for indirect impacts of activities related to the capacitor station includes the area of the Northern Shuswap Highlands located within the Okanagan-Shuswap Forest District, which supports similar vegetation resources to the local study area. Detailed field surveys were undertaken at the local study area while literature surveys and database searches were used to assess the local and regional study areas. Impacts on four VECs related to vegetation resources were
assessed: loss of vegetation and associated habitat, rare plant species, rare plant communities, and invasive species.

Rare species and communities that could potentially occur in the study area were identified by searching the BC Conservation Data Centre for endangered and threatened species known to potentially occur in the Interior Cedar-Hemlock zone of the Columbia, Headwaters, and Okanagan-Shuswap Forest Districts (Unit 5 Only). Endangered or threatened species were defined as those that are federally or provincially listed as threatened or endangered through the Provincial blue or red list, the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or the federal Species at Risk Act (SARA).

A list provided by Ministry of Agriculture and Lands (2008) was used as a reference to identify plants considered as noxious, weeds, invasive and nuisance species that would be of potential concern and would not be desirable to introduce or spread through construction activities.

Detailed field surveys were undertaken for Mica Dam Tailrace and construction areas. Baseline data from the Kinbasket and Arrow Lakes Revegetation Management Plan (a ten year study associated with the Columbia River WUP) were used for Kinbasket Reservoir. A literature review and reconnaissance surveys were undertaken to allow a complete overview of baseline conditions in the general bio-physical study area. Detailed methods and baseline conditions are presented in section 6.6.2 and 6.6.3 and Appendix 6.6 of the Application, and in section 7.5.2 and Appendix 7-IV of the Application for the capacitor station.

The study areas are all located within the Interior Cedar-Hemlock biogeoclimatic zones, while both the Engelmann Spruce-Subalpine Fir and Alpine Tundra zones occur in the study area vicinity at higher elevations. The Interior Cedar-Hemlock zone forest has an interior, continental climate dominated by easterly moving air masses that produce cool, wet winters and warm, dry summers. The mean annual temperature ranges from 2ºC to 9ºC with few very cold winter days or very hot summer days. Mean annual precipitation is 500 mm to 1200 mm with 25% to 50% falling as snow.

**Unit 5 Only: Kinbasket Reservoir:** The Kinbasket Reservoir drawdown zone exhibits continually fluctuating and extraordinary site conditions (extremes in dry/wet stress, erosion, wave action, sediment deposition and driftwood accumulation). The vegetation species and communities that have become established in the drawdown zone are adapted to this continual disturbance regime and are unique to reservoirs habitats. Eighteen vegetation communities were identified in the Kinbasket Reservoir drawdown zone between elevation 742 m and 754 m (LGL, 2007), with Lady’s thumb-Lamb’s quarter and Bluejoint Reedgrass communities occurring within the 753 m to 754 m
elevation band. Seven provincially listed species were identified in Kinbasket Reservoir in 2007, while only three of these species were found to reoccur in 2008.

**Mica Dam Tailrace and Construction Areas:** The majority of the tailrace from Mica Generating Station to the Blue Bridge consists of relatively steep, rocky shorelines with occasional flat vegetated benches. One small wetland area occurs just north of the Blue Bridge in Nagle Creek. The east side of the section from the Blue Bridge to Mica townsite is characterized predominantly by low-gradient shoreline and includes occasional gravel-sand beaches, small bays and two wetland areas. The west side of this section has areas of various slopes, ranging between very steep-sided and low-gradient, with presence of rocky, muddy or vegetated shorelines. This section contains one wetland area just south of the Blue Bridge, which is flooded in spring, but dry during summer. Eight vegetation communities and four non-vegetated habitats were identified in the tailrace area. No rare, endangered or threatened plant species or communities as identified above were observed during field surveys. Five species of noxious weeds and ten species considered to be invasive/nuisance were identified in this area.

Construction areas including the concrete batch plant, water treatment plant, aggregate storage area and laydown area, truck wash area and warehouse and laydown area would be located on previously disturbed sites. Vegetation on these sites exists primarily of noxious/invasive species or early seral stage species. Gravel trailer pads would be developed for accommodation at Mica townsite, where dry meadow vegetation communities and old condemned houses scheduled for demolition exist at present. A small grassland/meadow and small wetland complex exist nearby and would be protected by exclusion zones from construction activities.

**Unit 5 Only: Capacitor Station:** The local study area for the capacitor station site also falls within the Interior Cedar-Hemlock biogeoclimatic zone, with Engelmann Spruce-Subalpine Fir zone at higher elevations and Interior Douglas Fir zone at lower elevations. The vegetation surrounding the local study area is mosaic of clear cut forest blocks and mature new growth forests of differing successional stages. The majority of the capacitor station site occurs within a previously cleared ROW, while the passive reflector site occurs within a young clear cut. To the southeast of the capacitor station is an area of new growth Hemlock-Red Cedar at young climax stage, approximately 50-60 years old. No threatened ecological communities or plant species with the potential to occur locally were observed at either site in the local study area. Several noxious weeds and nuisance plants were present in the local study area (including orange hawkweed (*Hieracium aurantiacum*), oxeye daisy (*Chrysanthemum leucanthemum*) and bull thistle (*Cirsium vulgare*)), predominantly located within the disturbed ROW, on the edge of clear cut blocks, and along forestry roads and tracks.
5.6.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Construction

**Unit 5 Only: Kinbasket Reservoir:** No effects are anticipated during construction as Kinbasket Reservoir vegetation would not be affected by construction activities.

**Mica Tailrace and Construction Areas:** All construction (and decommissioning) activities would occur outside the riparian zone in previously disturbed areas as described above and no new roads would be constructed.

*Rare plant species and communities:* Given the current level of disturbance at these sites and the fact that no rare plant species or communities were identified in the Mica Dam Tailrace and construction areas, the proposed Project is not expected to affect rare plant species or communities in these areas.

*Invasive Species:* Given the level of previous disturbance, invasive weeds species have been identified across the majority of sites. An increase in construction traffic may result in a spread of species off-site or introduction of new invasive species across the sites. The Proponent considers it unlikely that the invasive species would spread into surrounding natural areas as no vegetation clearing or construction activities are proposed outside currently disturbed areas. The riparian zone would be fenced and signs would be placed at sites of high value wildlife and vegetation features to help ensure there would be no accidental encroachment of construction activities into surrounding natural areas.

**Unit 5 Only: Capacitor Station:**

*Loss of vegetation:* To accommodate the capacitor station footprint, less than one hectare of mature Western Hemlock-Western Red Cedar (Tsuga heterophylla and Thuja plicata) forest would be cleared. This forest forms part of a larger intact and connected patch that extends the length of Celista Creek valley and also into the adjoining Seymour River valley. This forest is not old growth and no large trees are present within the footprint. Less than 10 trees may also be cleared along the line-of-sight between the capacitor and the reflector. No trees would be cleared to accommodate the passive reflector, which can be accessed by existing logging roads. The proposed Project would result in a small reduction in ecological value at a local scale, but the Proponent does not consider this loss to be significant at a regional level.

*Rare plant species and communities:* No rare or threatened plant species or ecological communities were observed in the local study area. Although the site could provide limited suitable habitat for four species, these species were not observed in the portion of the study area that was surveyed. Given the small area of habitat present on site, the
Proponent considers it unlikely that the proposed Project would affect rare or threatened plant species or ecological communities in these areas.

*Invasive species:* There is the potential for construction machinery to introduce additional weeds into the region via soil and seeds trapped on the machinery.

**Operations**

**Unit 5 Only: Kinbasket Reservoir:** A predicted increase in reservoir levels by 0.6 m, 30% of the time, would cause slightly increased inundation within the 753 m to 754 m elevation band of Kinbasket Reservoir as a result of the proposed Project.

*Rare plant species:* Seven provincially listed plant species were recorded in the reservoir in 2007. However, the potential effect of increased inundation on these species is unknown.

*Rare plant communities:* No rare or threatened vegetation communities were identified in Kinbasket Reservoir. In general, the increase in inundation would have an effect on vegetation communities within Kinbasket Reservoir; however the extent or consequence of the incremental increase is unknown. Depending on the actual elevation changes, there is potential for small trees in the band of interest to die off, or for a change in the distribution of vegetation communities. The specific potential effect on the spatial extent and species richness of the Lady’s thumb-Lamb’s quarter and Bluejoint Reedgrass communities is unknown (the two communities identified in the 753m to 754m elevation band), however, given their occurrence at a range of elevations and ability to adapt to a range of drying and wetting patterns, it is unlikely that either of these communities would disappear from Kinbasket Reservoir. Of note is the occurrence of a full pool level (normal maximum level) in Kinbasket Reservoir in 2007 (first occurrence in 7 years) which did affect small conifer trees at higher elevation bands but did not result in the disappearance of any vegetation communities.

*Invasive Species:* Operation of the proposed Project is not anticipated to change the composition or abundance of invasive plants within Kinbasket Reservoir.

**Mica Tailrace and Construction Areas:**

*Rare plant species and communities:* Given the current level of disturbance at these sites and the fact that no rare plant species or communities were identified in the Mica Dam Tailrace and construction areas, the proposed Project is not expected to affect rare plant species or communities in this area.

*Invasive Species:* During operations, no effects are predicted because vegetated areas would not be modified. In addition, invasive plant species have largely been identified in
dry meadow ecosystems outside of the drawdown zone, and therefore are unlikely to become a problem in areas covered by wetland or wet meadow ecosystems

**Unit 5 Only: Capacitor Station:** No loss of vegetation or effects on rare plant species/communities are anticipated during operations. There is the potential for construction machinery to introduce weeds into the area.

**Mitigation**

- The riparian zone (30 m or as calculated per the *Riparian Areas Regulation*) would be fenced and signs would be placed at sites of high value wildlife and vegetation features to prevent accidental encroachment of construction activities into surrounding natural areas;
- Measures to limit weed spread, control invasive species and monitor-post construction would be implemented through a Weed Management Plan;
- Construction areas would be re-vegetated with native grasses, shrub and tree species with the long-term objective of achieving a local natural ecosystem;
- **Unit 5 Only:** The area required for construction activities and facility expansion would be limited to a previously disturbed areas as described in section 4 of the Application;
- The existing Columbia River WUP program *Kinbasket Reservoir Inventory of Vegetation Resources* would be augmented to include a modelling component and extend the period of data collection by one year;
- Existing cleared areas at the proposed sites for the capacitor station and passive reflector would be used for construction equipment, buildings, laydown areas and storage locations wherever possible;
- Vegetation removal would be minimized by marking and restricting clearing to those areas required for construction and safe/reliable operation of the capacitor station; and,
- The area marked for clearing at the capacitor station would be inspected by a biologist for any rare or threatened plant species identified in the Application. Any identified plants would be relocated outside of the construction footprint.

**Potential Residual Effects**

**Unit 5 Only:** The proponent anticipated that the following residual effects may occur:

- There is a potential residual effect on plant species and communities from water level changes in Kinbasket Reservoir. Specific effects are unknown at present as magnitude, geographic extent, duration and frequency of an effect would only become known during post-construction monitoring. However the Proponent does not anticipate this potential effect to be significant.
• There would be a loss of less than one hectare of mature western hemlock-western red cedar forest associated with construction of the capacitor station and passive reflector. The Proponent does not anticipate this potential effect to be significant.

Unit 6 Only: No potential residual effects were anticipated by the Proponent.

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

During the review of the Application, additional issues were raised by the Ktunaxa Nation Council, the Lakes Division of the Secwepemc Nation, and MOE. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendices B and D.

Key issues identified include:

• Lakes Division asked why weren’t vegetation transects included in the shore and drawdown zone? What bias does this introduce into the data and analysis?
  o Proponent response: The shoreline transects were located as close to the shoreline as practical. Safety and access issues prevented sampling in some areas of the drawdown zone. The placement of transects does not introduce bias into the data and analysis.

• Table 14.1 of the Application refers to a reconnaissance for rare plants to be undertaken as part of the Environmental Management Plan process. The Ktunaxa Nation Council requested a firm commitment to undertake this reconnaissance.
  o Proponent Response: A commitment to undertaking a rare (red and/or blue listed) plant field reconnaissance prior to finalizing the relevant Environmental Management Plans was added to the table of commitments.

• MOE indicated that the riparian zone on the east side of Revelstoke Reservoir should be restored and sensitive areas marked to prevent damage after construction is complete.
  o Proponent response: A commitment to restore and provide signage for the riparian zone in areas on the east side of the Revelstoke Reservoir adjacent to the existing warehouse and concrete batch plant area as required in order to protect sensitive areas was added to the table of commitments.

These issues were resolved to EAO’s satisfaction as noted in Appendices B and D.

Significance Analysis for Vegetation Resources Effects

• Magnitude: Unit 5 Only: The proposed Project would result in a 0.6 m increase in water level, 30% of the time in a ten year period, in Kinbasket reservoir and a
loss of less than 1ha of mature western hemlock-western red cedar forest at the capacitor station site. Unit 6 Only: Effects of the proposed Project would consist of minor clearing of grassy areas and some weed control, as well as restoration to with native grasses and shrub species;

- **Geographic Extent: Unit 5 Only:** Operations of the proposed Project would affect all vegetation around the 753 m – 754 m elevation band of Kinbasket reservoir. Construction (decommissioning) effects would be confined to construction areas near the Mica Dam Tailrace. **Unit 5 Only:** Vegetation loss would be confined to the capacitor station footprint and line-of-sight for the passive reflector;

- **Duration and Frequency:** Unit 5 Only: The loss of trees at the capacitor station would occur once but would be permanent. Increased water levels (and consequent flooding of vegetation) in Kinbasket reservoir would occur approximately 30% of the time in a ten year period. **Unit 6 Only:** Restoration of native habitat would occur as temporary construction sites were decommissioned;

- **Reversibility:** Unit 5 Only: Vegetation loss at the capacitor station would be irreversible. However operational effects of the generating unit would be reversible if pre-project operating conditions were resumed. Minor clearing of grassy areas and weed control are reversible.

- **Context:** The proposed Project is situated in areas that have a history of significant industrial development and disturbance, except the clearing associated with the capacitor station and passive reflector sites (Unit 5 Only); and,

- **Probability:** Unit 5 Only: Effects on fish and aquatic habitat from operational changes in the reservoirs and tailrace areas are likely to occur. The specific nature of effects is unknown at this time. Unit 6 Only: Effects are not likely to occur.

### 5.6.4 Conclusion

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

### 5.7 Wildlife and Terrestrial Habitat

#### 5.7.1 Background Information

Wildlife and terrestrial habitat resources were assessed within the same regional areas as vegetation resources based on the rationale described in the previous section. However, regional study area boundaries were extended to include habitats of wildlife populations with larger home ranges to better assess indirect effects to wildlife.
resources. Specifically, areas of known suitable habitats, movement corridors and existing habitat features outside the study area but within the Interior Cedar-Hemlock biogeoclimatic zone were considered in the baseline (Figure 6.52 of the Application).

The wildlife assessment local study areas for activities taking place on sites at or near the Mica Generating Station are the Mica Dam Tailrace between Mica Dam and the Blue Bridge (including construction areas) and Highway 23. Potential effects related to clearing of construction areas near the Mica Dam Tailrace were included in the assessment for the proposed Mica Unit 5 Project only, as no further clearing would be required for the proposed Mica Unit 6 Project.

Wetlands, bird nesting habitat, and amphibian and reptile habitat in Kinbasket Reservoir were also included in the assessment of the proposed Mica Unit 5 Project at the request of First Nations and stakeholders due to the timing of potential increases in reservoir levels. No substantially different hydrologic changes would occur in Kinbasket Reservoir as a result of the proposed Mica Unit 6 Project in addition to those associated with the proposed Mica Unit 5 Project, and therefore the Proponent does not anticipate any new wildlife effects to be associated with the proposed Mica Unit 6 Project.

Baseline information for the study area was gathered through literature review, reconnaissance field visits, field surveys and transects. Specific methodologies, survey sites, data collection periods for different species, and overall baseline results for the study areas are detailed in section 6.7.2 of the Application.

VECs for the wildlife and terrestrial habitat assessment include: important wildlife habitats, bird species at risk, mammal species at risk; and amphibian species at risk. Other effects on wetlands or wildlife not at risk are noted where relevant. In the Kinbasket Reservoir, effects on wetlands, amphibian habitat, and bird nesting habitat were assessed.

Unit 5 Only: For the activities related to the capacitor station, the local study area is the construction footprints of the capacitor station and passive reflector, with a 100 m buffer around each site as well as the line of sight path to the passive reflector. The summer regional study area for indirect impacts of the capacitor station includes the area of the Northern Shuswap Highlands located within the Okanagan-Shuswap Forest District, which is large enough to include home ranges of species that may potentially be influenced by the proposed Project. It also includes and support habitat areas and resources that are similar to the proposed construction footprint. The winter regional study area used was defined as the riparian and upland areas along Celista Creek from the capacitor station site to Humamilt Lake. This boundary was chosen as it includes the movement corridor of Celista Creek and known high value moose winter habitat areas. These study areas are illustrated in Figures 7.1 and 7.3 of the Application.
Given the small size of the capacitor and reflector sites, no targeted wildlife surveys were undertaken; instead survey effort included wildlife habitat assessments, incidental/opportunistic observations made during the vegetation assessment and winter snow-track surveys. Species inventories were made of all wildlife previously recorded and observed during site visits. Threatened wildlife usage of the sites was assessed via presence or absence of suitable habitat, literature reviews and discussions with local residents and First Nations. Seasonality of species within the area was assessed through review of literature and available habitat. Specific methodologies, survey sites, data collection periods for different species, and overall baseline results for the study areas are detailed in section 7.6.2 of the Application.

VECs for the wildlife and terrestrial habitat assessment at the capacitor station include: roosting and nesting locations; feeding resources; movement corridors; and ungulate winter habitat.

Unit 5 Only: Kinbasket Reservoir:

Wetland Habitat: Surveys undertaken in the Valemount area identified a remnant wetland (referred to as Valemount Peatland) at the north end of Kinbasket Reservoir (Canoe Reach) (Northwest Hydraulic Consultants, 2008). Other wetlands have also been identified within the 742 m to 755 m elevation band.

Waterbird and Songbird Nesting Areas: Five bird species were found to nest exclusively within the drawdown zone of Kinbasket Reservoir: savannah sparrow (Passerculus sandwichensis), spotted sandpiper (Actitis macularius), killdeer (Charadrius vociferous), Wilson’s snipe (Gallinago delicata) and northern harrier (Circus cyaneus). These species are all ground nesters.

Amphibian and Reptile Habitat: Long-toed salamanders (Ambystoma macrodactylum) were only located at one pond situated at 753 m elevation and western terrestrial garter snakes occurred at 757 m elevation only, and did not occur within the drawdown zone of Kinbasket Reservoir (LGL, 2008). Western toads (Bufo boreas) were distributed across an elevational range of 748 m to 757 m. There did not appear to be a correlation between western toad numbers and elevation. The elevational distribution of Columbia spotted frogs (Rana luteiventris) ranged from 745 m to 757 m with larger aggregations in a wetland between 751 m to 753 m elevation. During summer, observations of frog and toad species and their larvae were prominent in the drawdown zone of the Valemount Peatland.

Mica Dam Tailrace and construction areas:

Important Wildlife Habitats: No wetlands occur at any of the proposed construction sites, while one small wetland is located in the Nagle Creek estuary, about 500 m north of the
Blue Bridge. Potential nest sites for waterbirds and/or songbirds occur north of the warehouse, north of Mica townsit, and in the area proposed for workforce accommodation within Mica townsit. Potential nest trees for raptors or cavity birds occur in upland habitats at Mica townsit and the warehouse area. No known ungulate migration corridors exist within the tailrace area.

**Bird species at risk:** Eight blue-listed (vulnerable) bird species were observed: surf scoter (*Melanitta perspicillata*), California gull (*Larus californicus*), wandering tattler (*Tringa incana*), great blue heron (*Ardea herodias*), sandhill crane (*Grus canadensis*), barn swallow (*Hirundo rustica*), rough-legged hawk (*Buteo lagopus*), and purple martin (*Progne subis*). Most of these species were only observed during the May survey. Three western grebes (*Aechmophorus occidentalis*), which are Red-listed, were observed in fall swimming on Revelstoke Reservoir. This species has been reported by others as being sporadic in the area, using the reservoir only as brief stopover (BC Hydro, 2006; RL&L, 2001).

**Amphibian species at risk:** One amphibian species, western toad, although yellow-listed, is designated as special concern (Schedule 1) under SARA. Western toads were observed confirmed in two isolated ponds near Mica townsit and in two ponds between the townsit and the warehouse area adjacent to Highway 23. Toads have also been observed migrating across the highway to forested areas.

**Mammal species at risk:** Mountain caribou (*Rangifer tarandus caribou*), a red-listed mammal species which is also listed as threatened (Schedule 1) under SARA, was observed in the study area. A small herd of eight mountain caribou was observed outside the Mica Tailrace area and anecdotal information from BC Hydro personnel identified mountain caribou as occasional visitors to the study area.

**Highway 23:**

**Mammal species at risk:** Mountain caribou graze at low elevations adjacent to the highway when they are moving between lower and higher elevations. This movement generally occurs in March and April in areas north of Downie Creek. A small herd was encountered on Highway 23 during field surveys.

**Other mammal species:** Ministry of Transportation data for the years 1990, 1991, 2006, 2007, and January 2008 indicate that 31 mammals were reported killed through vehicle collisions, including four moose, one coyote, 24 deer, one porcupine and one bear. In the surveys, mammals were predominantly observed in wetlands, in upland forested areas or along roads.
Unit 5 Only: Capacitor Station:

Roosting and nesting locations: Approximately 5 to 10 wildlife trees (Classes 1 and 2) and also several fallen logs (Class 9 wildlife trees), are within the area to be proposed to be cleared. These trees and logs are providing habitat to local wildlife species with a number of trees containing cavities excavated by primary cavity nesters (such as woodpeckers), however, these were small and no cavity nests were observed. No eagle nests or other stick nest sites were observed in the local study area. There are no critical life-stage refuges such as winter hibernacula, dens or nest sites that would be disturbed as a result of the proposed Project. While there is some potential for federally or provincially listed wildlife species to utilise the study area, no critical life-stage habitats exist.

Feeding resources: One berry patch is located within the proposed construction footprint of the capacitor station. Berry patches are a known food resource for wildlife, particularly bears and birds. Numerous similar berry producing shrubs are present within the ROW immediately adjacent to the capacitor site.

Movement corridors: Large wildlife, such as ungulates and bears, appear to be using the ROW as a movement corridor.

Ungulate winter habitat: The habitat present at the capacitor station site appears to be of low-value for wildlife during late winter. The site does not support habitat that is critical to the winter survival of any wildlife species, and there are no federally or provincially listed species that are reliant on the site. Furthermore, based on field observations and local knowledge, moose regularly use winter habitat that is present along Celista Creek north of the capacitor site and areas of high-value habitat are present on the southern side of Humamilt Lake.

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

Construction

Unit 5 Only: Kinbasket Reservoir: No effect on wildlife in Kinbasket Reservoir is anticipated during construction as no construction activities would take place in the reservoir.

Mica Dam Tailrace and construction areas:

Unit 5 Only: Important Wildlife Habitats: Provided that activities are limited to areas identified in section 4 of the Application, no adverse effects are predicted on wetlands during construction as no wetlands occur at any of the proposed facility or activity sites.
Bird species at risk: The clearing of vegetation could result in the reduction of potential nest sites for water birds and/or songbirds in proposed facility locations north of the warehouse and north of Mica townsite. Clearing of the small grassland meadow area on the north side of Mica townsite could reduce potential nesting and cover for songbirds. The removal of nest trees in upland habitats (e.g., Mica townsite, warehouse area) could result in the reduction of potential nest sites for raptors or cavity nesting birds. The removal of foraging habitat through clearing may lead to a reduction in numbers of bird species at risk in the area. Indirect adverse effects on birds may arise through increased noise and/or dust during construction, which may alienate birds from the area. Although no new roads are planned for the proposed Project, increased traffic on existing access roads between Mica townsite and the Mica Generating Station could lead to collisions of birds with vehicles. In addition, bird fatalities could occur through collisions with facilities associated with construction of the proposed Project (i.e., batch plant, trailers at Mica townsite).

Amphibian species at risk: No adverse effects are predicted on amphibians at construction sites because none of the proposed areas provide habitat for amphibians, and no amphibians were identified in these areas during surveys. Increased vehicle traffic on Highway 23 during construction may cause mortalities of amphibians from collisions. Potential adverse effects are spatially limited to the two known breeding habitats for Western Toad mentioned above.

Mammal species at risk: During construction, mammal species at risk could be directly affected through clearing of forage vegetation (although expected to be minimal) or indirectly through increased noise and/or dust, which may alienate mammals from the area. The only areas where this is predicted not to be a potential factor are fenced areas which are off limits to mammals.

Unit 6 Only: No negative effect on terrestrial habitat or wildlife is anticipated as a result of decommissioning and reclamation of temporary construction facilities associated with the proposed Project.

Highway 23:

Mammal species at risk: An increase in traffic on Highway 23 during construction may lead to collisions vehicles with mammals and other wildlife species, putting drivers and animals in danger of being injured or killed. There is a potential for increased road kill, posing a particular threat to the already endangered mountain caribou. Local drivers are aware of this and warn each other (by radio contact or flashing their lights) when there are animals on the road. Drivers who are unfamiliar with these seasonal wildlife movements could create problems for animals.
Operations

Unit 5 Only: Kinbasket Reservoir:

*Bird nesting areas and amphibian habitat:* There is a potential for a positive or negative effect on bird nesting areas and/or amphibian habitat due to water level changes in wetlands if water levels increase beyond predicted levels (within the 753 m to 754 m elevation band). Positive effects could occur in the growing season between June 1 and August 31, providing extra vegetation cover for birds and amphibians. Negative effects could occur during the bird nesting and rearing season (July). Specific effects are unknown at this time.

Mica Dam Tailrace and construction areas:

*Important Wildlife Habitats:* During operations, water level and velocity changes could affect one small wetland located in the Nagle Creek estuary. The potential effect on this wetland could be both positive and negative depending on the time of year. A positive effect could occur in early spring (i.e., between March 15 and April 29) when water levels increase, reducing the drawdown zone and providing more hiding cover for waterbirds arriving during spring migration. A negative effect could be detected when water surface levels decrease between June 20 and July 31, leaving a wider drawdown zone and potentially causing a reduction in shoreline hiding cover and exposure of usually inundated vegetation. As the increase and decrease of water surface levels is temporary (i.e., a maximum of six weeks), the Proponent does not anticipate considerable potential adverse effects to wetlands in the tailrace.

*Bird species at risk:* During operations, no adverse effects to bird nesting sites are anticipated for the tailrace area, because water level increases are predicted to occur in Revelstoke Reservoir outside of the nesting season, in early spring, while water level decreases are predicted for the nesting/rearing season (i.e., July and August). No adverse effect on nest trees is anticipated from temporarily higher water surface levels or velocities because the majority of nest trees occur in areas above the drawdown zone. No effect is predicted on ungulate migration corridors during construction or operations because no known corridors occur in the tailrace area. No adverse effect is predicted on bird species at risk from increased water surface levels, velocities or wave action because modelling by Korman and Buszowski (2008) found no differences in habitat availability between four units at the Mica Generating Station and five units at the Mica Generating Station in Arrow Lakes Reservoir (where water fluctuations would be higher than in Revelstoke Reservoir). During operations, potentially increased water surface levels in Revelstoke Reservoir would occur in March/April, prior to the breeding season, which is in mid May for the majority of waterbirds (BC Hydro, 2006; Korman and Buszowski, 2008).
Amphibian species at risk: There are no adverse effects predicted on rare amphibian species at risk during operations because there are no amphibian habitats in the drawdown zone of Revelstoke Reservoir that could be affected by water level fluctuations, velocities or wave action, and no amphibians were observed in areas influenced by reservoir operations.

Mammal species at risk: No adverse effects are predicted on mammal species at risk during operations, largely because water level fluctuations are limited in time and extent and do not pose a threat to mammals.

Highway 23:

Mammal species at risk: No effect due to traffic volume during operations is expected, as operations of the proposed Project would only require two additional operators.

Unit 5 Only: Capacitor Station Construction and Operations: Construction and Operations are not expected to cause an increase in wildlife mortality rates or predation due to the small area of land being cleared and minor increase in traffic. Regarding potential noise impacts on wildlife, research literature assessed by the Proponent indicates that while animals may temporarily avoid an area until they become acclimatized to the noise, the physiology and habitation patterns of animals are not significantly impacted over the long term. Because the capacitor station noise level would be relatively low at the property line (less than the noise of normal conversation) and would occur infrequently and for short durations, the Proponent does not anticipate that operations noise would have a significant impact on wildlife.

Roosting and nesting locations: Approximately 5 to 10 wildlife trees (Classes 1 and 2) and also several fallen logs (Class 9 wildlife trees), are proposed to be cleared. Although no nests or dens were observed during field surveys, should nesting sites become established in the local study area then measures would to be taken to minimise disturbance of these sites. The Proponent does not anticipate the loss of wildlife trees at the capacitor station site to be significant due to the abundance of similar habitat in the regional study area.

Feeding resources: Construction of the capacitor station would result in the loss of a berry patch located within the portion of the ROW proposed for the construction footprint. Due to the numerous berry producing shrubs present within the ROW immediately adjacent to the capacitor site, the Proponent does not consider the loss of this berry patch to be critical to the ongoing survival of wildlife within the area.

Movement corridor: While construction of the capacitor station could initially discourage wildlife use of the ROW, the Proponent does not anticipate that the proposed Project is likely to disrupt or fragment the ability of wildlife to traverse through the area or move...
between summer and winter habitat. Over time wildlife would become familiar with human infrastructure and are likely to continue using the ROW and surrounding land as a movement corridor, moving around the perimeter of the capacitor station site.

*Ungulate winter habitat:* No effects on ungulate winter habitat are anticipated due to the low value of the capacitor station site in later winter for wildlife, and due to field observations that moose generally use winter habitat in the regional study area that is of much higher value than the capacitor station site.

Mitigation:
The following mitigation measures are proposed in the Proponent's Application:

**Unit 5 Only: Kinbasket Reservoir:**

- A selection of representative wetlands would be identified and monitored as part of a new WUP monitoring program that would use data from existing WUP monitoring programs. The study would include two years of monitoring before and three years of monitoring after the in-service date of the proposed Mica Unit 5 Project; and,
- The Kinbasket and Arrow Amphibian and Reptile Life History and Habitat Use Assessment Study would be augmented by three years to provide a full 11 years of data.

**Mica Tailrace and construction areas:**

- A scoping study associated with the proposed Mica Unit 5 Project would be undertaken to determine the elevation of the Nagle Creek wetland area and the probability that proposed Project operations could affect the area. As part of the study associated with the proposed Mica Unit 5 Project, the Proponent would assess the potential impact on the Nagle Creek wetland of both the proposed Mica Unit 5 Project and the proposed Mica Unit 6 Project;
- Where possible, vegetation clearing would be scheduled to occur outside the bird breeding season (April 1 to July 31). When this is not possible, presence/absence of nests would be confirmed before clearing activities were undertaken. Should any nests be identified, the Proponent would discuss with MOE how to best deal with the specific situation;
- Two raptor nesting platforms away from construction areas, built to standards acceptable to MOE, would be put in place at the outset of construction activities and would be left in place for the duration of the proposed Mica Unit 6 Project;
- Native trees and shrubs would be replanted if vegetation removal were required;
- The riparian zone (30 m or as calculated per the *Riparian Areas Regulation*) would be fenced and signs would be placed at sites of high value wildlife and...
vegetation features to prevent accidental encroachment of construction activities into surrounding natural areas;

- Construction activities and facility expansion would be limited to those previously disturbed areas described in section 4 of the Application;
- Information about species at risk and speed limits would be included in workers’ information packages to minimize collisions with wildlife; and,
- Vehicles would be prevented from using the Old Bend Highway near the Mica townsite.

Highway 23:

- The Proponent would discuss improving signage along Highway 23 to warn drivers of the presence of caribou and other wildlife with the Ministry of Transportation and Infrastructure and MOE;
- The proponent would work with the Ministry of Transportation and Infrastructure to install signs along two sections of Highway 23 to warn drivers of amphibian habitats at these locations. Contractors would be encouraged to schedule heavy truck traffic to avoid animal migration periods where possible.

Unit 5 Only: Capacitor Station:

- The loss of wildlife trees at the capacitor station would be minimized by avoiding clearing activities where possible;
- Wildlife trees would be inspected by a biologist for active nest or den sites prior to vegetation clearing. The Proponent would consult with MOE when deciding how to deal with active nest sites or den sites to be cleared prior to disturbing the nest or den; and,
- Vegetation clearing would occur outside bird breeding season where possible as noted above.

Potential Residual Effects

- The Proponent anticipated that potential residual effects on wildlife and wildlife habitat due to noise, traffic, dust, or changes in reservoir fluctuation would not be significant (for more information please refer to table 6.46 (6.47) of the Application).

- **Unit 5 Only**: Approximately 5 to 10 wildlife trees (Classes 1 and 2) and also several fallen logs (Class 9 wildlife trees) are proposed to be cleared. The Proponent did not anticipate the effect of this impact to be significant.

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

During the review of the Application, additional issues were raised by the Ktunaxa Nation Council, Okanagan Nation Alliance and Lakes Division of the Secwepemc
Nation. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix D.

- The Okanagan Nation Alliance and Lakes Division noted that hydrological modeling identified the potential for an increase in 0.6m elevation in July during construction and operation phases, where amphibians and ground nesters have been identified in the Kinbasket Reservoir drawdown zone. The only mitigation measures proposed to address this impact are future monitoring. A risk management analysis would provide better insight on the need to draft a contingency plan conducted to determine if and how amphibian species will be impacted.
  - Proponent Response: The probability that the inundation will occur and the potential window of impact is described in the Application. Ongoing WUP programs are designed to gather additional information on potential nest mortality of migratory birds, amphibian life history and reptile habitat use related to ongoing reservoir operations. The Proponent commits to undertaking future actions appropriate to the severity of the impact should future monitoring programs uncover incremental impacts directly attributable to the proposed Project as described in Commitment #8.

- The Ktunaxa Nation Council noted that there is considerable uncertainty regarding the potential to detect and subsequently mitigate for western toad mortality. A more rigorous approach was requested.
  - Proponent Response: Commitment 23 for the proposed Mica Unit 5 Project was updated to include a field survey initiated in the Spring of 2010 to assess the location, timing and level of risk associated with amphibian migrations at the locations noted and develop a mitigation plan which would be included in the Wildlife Protection Plan. This Wildlife Protection Plan would also apply to the proposed Mica Unit 6 project Commitment 16.

These issues were resolved to EAO’s satisfaction as noted in Appendix D.

Significance Analysis for Wildlife and Terrestrial Habitat Effects

- **Magnitude:** Construction effects on wildlife and terrestrial habitat are anticipated to be minimal. Operations effects in Kinbasket Reservoir would likely be limited to some bird and amphibian habitat in wetlands. Five to ten wildlife trees would be cleared at the capacitor station site but this is a small percentage of similar trees in the larger region (Unit 5 Only);

- **Geographic Extent:** Wildlife and Terrestrial habitat effects would occur in the construction areas near Mica townsite /Mica Tailrace, the Highway 23 corridor, the 753 m – 754 m elevation band of Kinbasket Reservoir, and the capacitor station/passive reflector sites (Unit 5 Only);

- **Duration and Frequency:** Potential traffic and noise effects on wildlife would be confined to the construction period. During operations (at least 50 years),
amphibian habitat could be affected in the Nagle Creek wetland in March-April and June-July, and wetland and bird habitat could be affected in Kinbasket Reservoir 30% of the time in a 10 year period (during the critical growth season for plants from June 1 to August 31) (Unit 5 Only);

- **Reversibility:** Noise and traffic disturbance would be reversible once construction activities are complete, with the exception of any traffic mortalities. Effects of altered water levels in the Mica Dam Tailrace and Kinbasket Reservoir (Unit 5 Only) would be reversible if pre-project operating conditions were resumed. The loss of wildlife trees at the capacitor station would be permanent (Unit 5 Only);

- **Context:** The proposed Project is situated in areas that have a history of significant industrial development and disturbance; and,

- **Probability:** Specific potential effects on wildlife and terrestrial habitat from operational changes in the Nagle Creek wetland and Kinbasket Reservoir (Unit 5 Only) are likely to occur. The specific nature of effects is unknown at this time. **Unit 5 Only:** Loss of 5-10 wildlife trees at the capacitor station site is probable.

### 5.7.4 Conclusion

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

### 5.8 Environmental Management Plans and Existing Operating Procedures

#### 5.8.1 Construction Environmental Management Plan

The purpose of the construction Environmental Management Plan is to guide the Proponent’s contractors in adhering to applicable environmental legislation, Best Management Practices guidelines, industry standards, regulatory requirements and proposed Project commitments. The Environmental Management Plan would be structured or amended as required to include and/or meet any terms and conditions that may be imposed by permits, licences or other approvals. The Environmental Management Plan covers construction and decommissioning of temporary facilities and activity areas that would occur during and immediately after construction of the proposed Project.

The Environmental Management Plan would be prepared prior to commencement of construction and would consist of component plans for the proposed Project. Plans would be submitted to the appropriate environmental agencies and interested First Nations for review and input before work commences. The Proponent would retain at least one Environmental Monitor during construction to inspect, evaluate, and report on compliance with these Commitments, requirements set out in the Environmental
Management Plans, terms and conditions of environmental regulatory approvals, and provincial Best Management Practices. The Environmental Monitors(s) would have authority to suspend work if terms and conditions of commitments, Best Management Practices, regulatory approvals and/or applicable legislation are not being met.

The Environmental Management Plan is discussed below. Additional detail is provided in section 13 of the Proponent’s Application. Environmental Management Plans would be developed from legislation, Best Management Practices, guides, industry standards and other documentation. Environmental Management Plans would likely include the following:

Biophysical management

**Vegetation and Soils:** This plan would include measures to mitigate potential impacts to soils and vegetation during site clearing (e.g. inspect site for rare/endangered species prior to clearing and protect or transplant any identified species), during construction (e.g. establish protection zones to exclude activity from sensitive environmental areas), and during site cleanup and reclamation (e.g. restoration of top soil and vegetation to minimize erosion). A weed management plan would also be prepared (compliant with the *Weed Control Act*), including instruction for safe storage and use of herbicides where necessary.

**Wildlife Management:** The Terrestrial Habitat Mitigation Plan would include mitigation measures and procedures related to re-vegetation, restoration, protection of key wildlife features (wildlife trees), vehicle-wildlife collisions and bear awareness. Applicable standards and legislation such as the *Wildlife Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act* would be adhered to. Key mitigation measures would include, but not be limited to, surveys for raptor nests within 500m of active work sites prior to construction, creation of alternative raptor nesting sites at least 1 km away from active work sites at Mica Generating Station, protection of high value habitat including use of barrier fencing, and bear awareness measures.

**Fish and Fish Habitat:** A Fish and Fish Habitat Mitigation and Compensation Plan would not be required for the proposed Project because Fisheries and Oceans Canada has not identified any necessary authorizations under the *Fisheries Act* for the proposed Project as described. Any measures identified in the Environmental Assessment Certificate to ensure the protection of fish and fish habitat would be included as part of the Terrestrial Habitat Mitigation Plan.

**Socio-Economic:** This plan would address measures to enhance employment of local and/or First Nations personnel as well as provide accommodation for the construction workforce. Mitigation of traffic and public safety impacts would be addressed through
the activity-specific work plan titled Traffic Management, Wildlife Protection and Public Safety.

**Noise Management:** All combustion engines, generators, compressors would be fitted with noise suppression equipment. This noise suppression equipment would be maintained so that it meets manufacturers’ specifications and conforms to relevant noise restriction by-laws for construction.

**Activity-specific work plans**

**Waste Management Plan:** This plan would provide guidelines concerning the proper storage and disposal of hazardous and non-hazardous construction waste materials. These practices would be in accordance with appropriate environmental waste management procedures and legislation such as the *Environmental Management Act* that are intended to minimize waste and potential for creating health risks and problems for wildlife. The Waste Management Plan would include, but not be limited to: procedures for waste minimization, recycling, storage and disposal; types and quantities of materials requiring disposal; waste material haulers and approved facilities, where applicable; and types and quantities of hazardous materials anticipated to be used during construction. The plan would specify details related to non-hazardous and domestic waste, hazardous waste, and medical waste.

**Water Quality Monitoring Plan:** No water quality sampling is proposed for the proposed Project and a Water Quality Monitoring Plan is not proposed. Should water quality sampling become required, a plan would be developed and would include detailed procedures and guidelines concerning the collection and analysis of water quality samples during the construction phase of the proposed Project.

**Erosion Control and Sediment Retention Plan:** This plan would provide contractors with guidelines concerning the proper implementation of erosion control and sediment retention measures and Best Management Practices in an attempt to minimize soil disturbance and siltation reaching groundwater or watercourses. Disturbance to riparian vegetation would be avoided whenever possible, and clearing activities would be conducted according to applicable legislation and Best Management Practices. Erosion control methods would be applied where there is the potential for erosion due to rainfall, flowing water or steep slopes. The plan would address, but not be limited to, the following: nature and location of erosion control measures, as required; procedures to be used during clearing and other construction activities with the potential to result in erosion and/or sedimentation; removal and disposal of temporary erosion control and sediment retention measures; erosion protection for steep slopes, stockpiles and disturbed areas during storm events; and restoration of eroded or unstable soil to the equivalent of its original condition.

*Mica Generating Station Unit 5 (Unit 6) Project – March 1, 2010*
Cementitious Materials Control Plan: This plan would provide guidelines on the use and containment of concrete and concrete wash water during construction of the proposed Project. The release of effluent from concrete production into instream habitat has the potential to raise pH levels and severely harm or kill fish or other aquatic organisms. Where the use of cast-in-place concrete is necessary, management procedures and guidelines such as those contained in Fisheries and Oceans Canada’s Land Development Guidelines for the Protection of Aquatic Habitat and the Proponent’s concrete Best Management Practices would be implemented.

Materials Handling and Management Plan: This plan would specify requirements for materials inventory, including availability of Material Safety Data Sheets (MSDS), of all chemicals and hazardous substances on site. This inventory would be updated regularly and specific storage, handling and disposal requirements would be identified to protect workers and the environment. In general, hazardous liquids would be stored with secondary containment to comply with relevant legal requirements. All hydrocarbons, including waste oils, would be provided secondary containment facilities that meet current industry standards. An environmental protection plan prepared by the contractor would describe hydrocarbon handling, transport, reception, transfer, use and disposal procedures designed to manage pollution risk and minimize spill potential. Spill response procedures would also be covered in the environmental protection plan, described in the emergency preparedness and response documentation.

Sulphur Hexafluoride Management Plan: Management of sulphur hexafluoride (a potent greenhouse gas), including handling, disposal, transport or other related activities would follow the pertinent sections of the Proponent’s Best Management Practices. The plan would be developed in accordance with the Transportation of Dangerous Goods Act, Workplace Hazard Management Information System (WHMIS), and supplier’s instructions. Employees would be trained in all procedures required for the handling or use of sulphur hexafluoride in the course of their duties, minimizing contamination with air, moisture, oil, or other unwanted substances. Intentional venting of sulphur hexafluoride would be prohibited, except for small amounts needed to do gas sampling or to protect human life in an emergency. Health and safety concerns would be addressed through the Health and Safety Plan described below.

Vehicle and Site Maintenance: Guidelines would be developed for maintenance workshops to minimize potential environmental risks. Regular vehicle maintenance and repair would be conducted on a concrete surface. In the event that a vehicle needs to be serviced in the field, appropriate environmental protection equipment would be used. Spill kits and personnel trained in spill management would be available in these maintenance facilities to respond to incidents as required. Guidelines for operator training on the hazards and consequences of spills, as well as on safe methods of transfer, transportation, and storage, would be included in spill prevention guidelines.
Spill Prevention and Emergency Response Plan: This plan would provide appropriate guidelines and procedures so that environmental emergencies are dealt with in a safe, quick and effective manner that minimizes adverse effects to terrestrial and aquatic environments. The plan would adhere to requirements of the Spill Reporting Regulation and would include, but not be limited to: equipment refuelling and servicing procedures; spill notification procedures; containment, recovery and clean-up procedures; procedures for the unexpected failure or malfunction of a temporary containment systems; location and nature of clean-up materials and equipment; and contact information for persons and organizations to be contacted in the event of spills or other environmental emergencies.

Air Quality and Dust Control Plan: This plan would outline the methods to be used during all phases of construction to maintain air quality and control dust. These methods would include include Best Management Practices and mitigation measures relating to soil and rock stockpiles, access roads, vehicle and equipment operations, and other construction activities.

Fire Protection: This plan would include guidelines for development and implementation of appropriate fire procedures, techniques, requirements, and obligations. Personnel would be trained in firefighting techniques. The Fire Protection Plan would include information on the local fire brigade, company roles and responsibilities, communications, evacuation and muster points, and other applicable information.

Traffic Management, Wildlife Protection and Public Safety: This plan would outline procedures and provisions for diverting traffic away from and/or safely through/past construction areas, restricting public access to active construction sites, managing construction traffic to and from the site; and safety measures including driver awareness, wildlife impacts, signage, flag persons and monitoring. The Traffic Safety Management Plan for the proposed Project would need to be approved by the BC Ministry of Transportation and Infrastructure prior to the commencement of construction activities.

Health and Safety Plan: This plan would outline specific procedures and protocols for working around the active construction site. Required personal safety devices, proper protocols for working in and around machinery, and the location of existing structures, utilities, and potential hazards associated with the work site would be addressed. A Health and Safety orientation course would be prepared and administered to all workers prior to beginning work on site.
Other

Construction environmental training and awareness: Training needs for all personnel whose work could potentially result in a significant impact upon the environment would be identified so as to schedule appropriate training. Mechanisms would be in place to make employees and contractors aware of the significant environmental impacts (actual or potential) of their work activities; and their roles and responsibilities in achieving conformance with Environmental Management Plan policies and procedures, including emergency preparedness and response requirements.

Environmental Monitoring and Reporting: The Environmental Management Plan would also contain a description of the monitoring roles and responsibilities for the on-site Environmental Manager/Monitor, a description of what constitutes an environmental incident and a description of the incident response and reporting procedures.

Appendices: Appendices to the Environmental Management Plan would include, but not be limited to:

- Emergency and Environmental Contacts;
- Spill Response Contractors and Response Materials Suppliers;
- Sample Spill Kit Contents;
- Reclamation and Vegetation Plan;
- Archaeological Impact Management Plan; and,
- Contractor Environmental Orientation Record.

5.8.2 Existing Operating Procedures

Components of existing operating procedures are discussed in greater detail in section 13 of the Proponent’s Application. The new generating unit would be operated along with the existing generating units at the Mica Generating Station and, as such, would operate in accordance with the approved Columbia River WUP and in accordance with approved Local Operating Orders developed in compliance with the Columbia River WUP. The Columbia River WUP would be reviewed and an addendum would be prepared to address any impacts of the proposed Project on the provisions of the WUP. Local Operating Orders and Operational Procedure Documents would be reviewed and revised as necessary to incorporate the specific and general commitments made in the Application in relation to the operation of the proposed Project. The Columbia River WUP and the Local Operating Orders are consistent with the objectives of The Proponent’s Environmental Policy managed under the Environmental Management System.
Provisions to address accidents and malfunctions during operations are addressed by specific plans and provisions such as:

- Generation Emergency Plan: Mica Generating Station and Dam, Revelstoke Generating Station and Dam;
- BC Hydro’s Mica Generating Station Public Safety Management Plan;
- The Mica Generating Station Product Spill Response Plan; and,
- Mica Generating Station Local Operating Order 3G-MCA-06, relating to Mica Dam and its discharge facilities (generation and spill).

**Unit 5 Only:** For the Capacitor Station, BCTC would follow its Environmental Management and Operational Procedures during operation and maintenance of the capacitor station, as amended from time to time, including:

- BCTC’s Environmental Responsibility Principles;
- BCTC’s Environmental Management System;
- BCTC Spill contingency plan (site specific; to be developed prior to capacitor station operation);
- BCTC Emergency response procedures;
- Pest Management Plan for Control of Weeds in BCTC Facilities; and,
- BCTC and BC Hydro Health and safety standards.

5.8.3 Decommissioning

**Unit 6 Only:** Decommissioning of temporary facilities would occur as construction is proceeding and would be guided by the Construction plans.

As major proposed Project components are expected to have an operating life span of 50 years or more, decommissioning is not immediately applicable to the proposed Project. However, a Decommissioning Management Plan would be prepared prior to future decommissioning activities in accordance with the regulatory regime at that time. Agency review and input on the Decommissioning Management Plan would also be in accordance with the regulatory regime at the time of decommissioning. The Decommissioning Management Plan would include guidance on actions and activities to be implemented during decommissioning of the proposed Project to decrease the potential for adverse environmental effects and would likely include procedures relating to:
• Environmental planning and mitigation;
• Cultural impact mitigation;
• Socio-economic mitigation; and,
• Public health and safety.

6 Economic Effects

6.1 Economy and Regional Economic Benefits (Including First Nations Employment, Income and Business Opportunities)

6.1.1 Background Information

The study area for economy and regional economic effects includes the Mica townsites, Revelstoke, Electoral Area B of the Columbia Shuswap Regional District, Golden, Sicamous, Salmon Arm, Valemount, and Nakusp. **Unit 5 Only:** The study area for activities taking place at the capacitor station and passive reflector sites focuses on Seymour Arm, the community closest to the proposed capacitor station site, and includes Salmon Arm and Sicamous (the staging location for barging materials and transporting workers to and from Seymour Arm).

In 2006, the labour force participation rates in Revelstoke, Golden and Valemount were significantly higher than the province as a whole, while participation in Salmon Arm, and in particular, Sicamous was lower than the provincial average. This reflects the fact that Salmon Arm and Sicamous are popular retirement communities. Table 1 shows that all study area communities showed higher unemployment rates in 2006 than did BC overall, likely due to their reliance on resource based industry.

Table 1: Labour Force Overview (Application table 9.3, source: Statistics Canada 2006 census)

<table>
<thead>
<tr>
<th></th>
<th>Labour Force (15+)</th>
<th>Employees</th>
<th>Self-Employed</th>
<th>Participation Rate (%)</th>
<th>Unemployment Rate (%)</th>
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<tbody>
<tr>
<td>British Columbia</td>
<td>2,226,380</td>
<td>1,873,050</td>
<td>313,000</td>
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<tr>
<td>Revelstoke</td>
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<td>3,720</td>
<td>435</td>
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<td>Golden</td>
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<td>1,985</td>
<td>255</td>
<td>71.9</td>
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<td>Nakusp</td>
<td>790</td>
<td>660</td>
<td>125</td>
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<td>Sicamous</td>
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<td>1,000</td>
<td>270</td>
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<td>Salmon Arm</td>
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<td>6,345</td>
<td>1,395</td>
<td>60.1</td>
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<td>Valemount</td>
<td>640</td>
<td>540</td>
<td>85</td>
<td>76.6</td>
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</table>
The 2006 Census also provides industrial and occupational characteristics of the labour force. Table 2 shows a breakdown of the local and regional labour force by industry division.

<table>
<thead>
<tr>
<th>Industry Division</th>
<th>BC</th>
<th>Revelstoke</th>
<th>Golden</th>
<th>Nakusp</th>
<th>Sicamous</th>
<th>Salmon Arm</th>
<th>Valemount</th>
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<td>Farms</td>
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<td>3.1</td>
<td>13.9</td>
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<td>1.9</td>
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<td>Fishing, hunting and trapping</td>
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<td>Support activities for farms</td>
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<td>0</td>
<td>0.3</td>
<td>0</td>
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<tr>
<td>Support activities for forestry</td>
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<td>4.4</td>
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<tr>
<td>Mining and oil and gas extraction</td>
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<td>0.8</td>
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<td>10.8</td>
<td>9.9</td>
<td>9.3</td>
<td>3.1</td>
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<td>Manufacturing</td>
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<td>11.4</td>
<td>8.6</td>
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<td>Wholesale trade</td>
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<td>2.2</td>
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<td>Retail trade</td>
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<td>15.2</td>
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<tr>
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<td>8.4</td>
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<td>8.6</td>
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<td>Finance and insurance</td>
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<td>2.3</td>
<td>3.4</td>
<td>4.7</td>
</tr>
</tbody>
</table>
At present, there is a trend towards economic diversification in the study region. Two major construction projects are underway in the study area: Revelstoke Mountain Resort (with a 15 year development plan including homes, condominiums and townhouses) and Phase 3 of the Kicking Horse Canyon Project (upgrading 18 km of the Trans Canada highway near Yoho National Park). Two mining operations are currently active in the area. Roca Mines employs 100 workers near Trout Lake (80 km east of Revelstoke) who are housed in a camp on-site. Merit Mining Corp may develop a property 35km north of Revelstoke no earlier than 2013, depending on the results of exploration activities. **No known major developments are planned near the proposed capacitor station site (Unit 5 Only).**

The Proponent provides detailed information in section 9.3.2.1 and Appendix 9 of the Application on the labour force overview and demand for labour in the study area. In summary, 2006 Census data shows that, compared to the province as a whole, the majority of the study area workforce is employed in industry and occupations that could be relevant for major construction projects such as the proposed Project. Within the study area, there are indications that the economy is weakening and the demand for labour may not be as competitive as was the experience for the Revelstoke 5 Project.

A priority for study area residents is the Proponent’s support of maximizing local employment and skills training related to construction activities, as well as environmental assessment, planning and monitoring. A shortage of qualified tradespeople has been a problem in Revelstoke, and a number of issues related to delivery and uptake of training programs in the region have been identified in the Application. The Proponent offers a number of programs that could assist area residents.

The First Nations and Tribal Councils that the Proponent was directed to consult with are at different stages of economic development with varying skills and businesses that could be offered to the proposed Project. The Proponent is working with each First Nation to ensure awareness of opportunities presented by the proposed Project and the means through which bands or band members could take advantage of these opportunities.

Experience with First Nations hiring for the Revelstoke Unit 5 Project indicates that First Nations have been employed in almost all trades on the job site and highest participation was observed later in the project (2008-2009). The target for equity hire (First Nations, women in non-traditional occupations, disabled persons and members of ethnic minorities) was 16% for the Revelstoke Unit 5 Project. The average equity hire was 11.3% with First Nations workers making up the majority of equity hire workers most weeks. Many of the trades required for employment on hydro projects are highly skilled with many years of apprenticeship, which may be a limiting factor for First
Nations and other local residents. There have been no First Nations businesses identified as being involved in the construction of Revelstoke Unit 5 as of the Application submission date.

The proposed Project is a named project under the Collective Agreement between the Columbia Hydro Constructors Ltd and the Allied Hydro Council of British Columbia. This means that the Collective Agreement would be in place for the construction of the proposed Project. The capacitor station is not part of the Columbia Hydro Constructors Agreement as it would be constructed and maintained by BCTC (Unit 5 Only). A central tenet of the Columbia Hydro Constructors Agreement is a commitment to employ local labour. It contains a defined set of hiring and training procedures which aim to provide as many jobs as possible to qualified residents of nearby communities and for qualified members of equity groups, including First Nations, women working in non-traditional job classifications, disabled people and members of ethnic minorities. Further detail is provided in section 9.3.2.1 of the Application.

Study area communities support a wide variety of businesses including many that may be capable of providing goods or services to the proposed Project. The two major contractors now working at the Revelstoke Unit 5 Project spend thousands of dollars in the community every week. Local businesses are expected to also have the opportunity to provide services and supplies to the proposed Project.

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

**Unit 5 Only: Construction**

Construction would generate approximately 428 person-years of direct employment for a variety of trades, engineering and management staff. Of this, approximately 324 person years would be created for trades and 104 person years for engineering and management. Pre-tax income generated by the direct construction employment at the Mica Generating Station over the life of the proposed Project is anticipated to total $15.3 million for trades and $9.2 million for management and professionals.

Based on experience from the Revelstoke 5 Project, scenarios of 20% and 45% local hire were used to model potential direct benefits to the community. The 20% local hire scenario would generate approximately 80 person years of local employment and $3.4 million of local after-tax income during project construction. Alternatively, the 45% local hire scenario would generate approximately 161 person years of local employment and $6.3 million of local after-tax income.

Indirect impacts include employment and income generated from project expenditures on goods and services in the local area. Induced impacts include employment and income generated from workers employed on the proposed Project spending their
income on goods and services in the local area. Based on total local direct employment, the number of induced and indirect jobs generated during construction can be estimated using employment impact ratios. It is anticipated that for every local person directly hired by the proposed Project, 0.18 induced jobs, and 0.27 indirect jobs would be generated.

A higher number of direct employees (or a larger project size) implies a greater magnitude of local purchases and therefore a larger number of induced/indirect jobs generated (BC Stats, 2004). Under the 20% local hire scenario described above, 36 induced and indirect person years of employment would be created in the local economy, and these positions would generate approximately $890,000 in after-tax income. Those totals increase to 73 person years and $1.8 million in after-tax income under the 45% local hire scenario.

**Government Revenues:** The federal and BC Provincial governments would collect income tax revenues of approximately $4.5 million and $1.7 million annually respectively.

**Mica townsite impacts:** The Mica townsite would be expanded to accommodate the proposed Project workforce. Based on estimates of $110 per day, the total cost of housing direct employees is estimated to be $6.2 million. These expenditures represent an introduced revenue flow to the contracted service firms, and would have local economic impacts.

Under a scenario of 5% of additional revenue accruing to service providers at Mica townsite, two person-years of employment (direct, indirect, and induced) would be created. Under a scenario where 10% of additional revenue accrues to service providers at Mica townsite, four person years of employment with associated after-tax income of between $51,000 and $102,500 would be created.

**First Nations Employment, Income and Business Opportunities:** The number and types of jobs that will be created by the proposed Project are identified in section 4 of the Application; varying levels of training from no training/on the job training to many years of apprenticeship and experience would be required for these positions. Most apprenticeship positions would require a minimum of Grade 12 or a General Education Development (GED) Certificate to enter the apprenticeship.

Examples of the types of businesses serving the Revelstoke Unit 5 Project include: construction companies (e.g. material suppliers, contractors/sub-contractors, equipment sales and services), bulk fuel dealers, vehicle maintenance companies, transportation companies, professional services, and businesses providing amenities to support workers (e.g. food and beverage, accommodation, entertainment).
A number of initiatives exist to enhance First Nations employment and business opportunities on the proposed Project:

- Columbia Hydro Constructors Agreement
- BC Hydro Contractors Database
- BC Hydro Procurement Strategy
- BCTC Aboriginal Business Development Policy

**Capacitor Station**: As set out in section 4 of the Application, capacitor station construction would primarily occur when the site is free of snow during the period from August 2011 to October 2013. A small work force would be required to clear the site, construct the station, and install the capacitor equipment. The total manpower requirement is 21 to 22 person years with the size of the workforce peaking at approximately 25 individuals.

Although a detailed breakdown of person years by trade is not currently available, the following types of trades would be required: fallers, equipment operators, truck drivers, carpenters, metalworkers, pipefitters, mechanics (diesel generator), electricians, labourers, linemen and construction supervisors. Much of the preliminary work (i.e., clearing, and grading) could be performed by unskilled labourers. Skilled workers and foremen would be required for the installation of the transmission towers, civil, and mechanical construction. Specialized electricians would be required to install the capacitors and perform other electrical construction tasks.

Unlike the component of the proposed Project located at the Mica Generating Station, there would be no hiring agreement in place for the capacitor station and there would be no requirement to hire unionized labour. These factors should act to increase access to employment for local area residents. Housing the workforce in or near the community of Seymour Arm would generate positive economic benefits for local commercial establishments including the hotel, pub and floating store.

Depending upon the exact placement of the capacitor station, encroachment on an existing woodlot could occur. Should an interaction between the station and woodlot be identified, discussions would be held with the license holder and market value compensation would be provided as described below in the mitigation section.

**Operations**

Two additional employees would be required to operate the Mica Generating Station following installation of the new generating unit, creating at least 100 person-years of direct employment. Ongoing maintenance expenditures are expected to increase as
the generating unit ages. The capacitor station would require two maintenance personnel to service the facility every 6 to 12 months.

**Government Revenues:** The proposed Project would increase annual water rental payments to the Provincial government by $2.6 million. Based on current tax guidelines, the annual grants-in-lieu that the Proponent pays to the Columbia-Shuswap Regional District, the Regional District of Fraser-Fort George, and the Village of Valemount in lieu of property tax is estimated to increase by $280,000, subject to the Province amending an Order in Council which defines the total amount and percentage allocations to be paid by the Proponent.

**First Nations Employment, Income and Business Opportunities:** Business opportunities during the operations period would primarily be related to maintenance work and ongoing supply of catering services to the Mica townsite.

**Unit 6 Only: Construction**

Construction would generate approximately 371 person-years of direct employment for a variety of trades, engineering and management staff. Of this, approximately 335 person years would be created for trades and 36 person years for engineering and management. Pre-tax income generated by the direct construction employment at the Mica Generating Station over the life of the proposed Project is anticipated to total $15.6 million for trades and $3.3 million for management and professionals.

To avoid overestimating the degree of local hire for the proposed Project, the analysis assumes that hiring for the proposed Mica Unit 5 Project would have extensively exhausted the pool of qualified local construction labour. Scenarios of 0% and 10% local hire for construction workers were used to model potential direct benefits to the community (details on the rationale for these numbers is provided in section 9.3.3.1 of the Application). The 0% local hire scenario would generate no local employment or after-tax income during project construction. Alternatively, the 10% local hire scenario would generate approximately 40 person years of local employment and $1.5 million of local after-tax income.

Indirect impacts include employment and income generated from project expenditures on goods and services in the local area. Induced impacts include employment and income generated from workers employed on the proposed Project spending their income on goods and services in the local area. Based on total local direct employment, the number of induced and indirect jobs generated during construction can be estimated using employment impact ratios. It is anticipated that the indirect and induced impact for every local person directly hired by the proposed Project would be the same as for the proposed Mica Unit 5 Project, that is 0.18 induced jobs and 0.27 indirect jobs would be generated.
A higher number of direct employees (or a larger project size) implies a greater magnitude of local purchases and therefore a larger number of induced/indirect jobs generated (BC Stats, 2004). Under the 10% local hire scenario described above, 17.5 induced and indirect person years of employment would be created in the local economy, and these positions would generate approximately $430,000 in after-tax income.

_Government Revenues:_ The federal and BC Provincial governments would collect income tax revenues of approximately $3.5 million and $1.3 million annually respectively from proposed Project construction.

_Mica townsites impacts:_ The Mica townsites would have been expanded to accommodate the workforce for the proposed Project during the proposed Mica Unit 5 Project. Based on estimates of $110 per day, the total cost of housing direct employees is estimated to be $6 million. These expenditures represent an introduced revenue flow to the contracted service firms, and would have positive local economic impacts.

Under a scenario of 5% of additional revenue accruing to service providers at Mica townsites, two person-years of employment (direct, indirect, and induced) would be created. Under a scenario where 10% of additional revenue accrues to service providers at Mica townsites, four person years of employment with associated after-tax income of between $50,000 and $100,000 would be created.

_First Nations Employment, Income and Business Opportunities:_ The number and types of jobs that will be created by the proposed Project are identified in section 4 of the Application; varying levels of training from no training/on the job training to many years of apprenticeship and experience would be required for these positions. Most apprenticeship positions would require a minimum of Grade 12 or a General Education Development (GED) Certificate to enter the apprenticeship.

Examples of the types of businesses serving the Revelstoke Unit 5 Project include: construction companies (e.g. material suppliers, contractors/sub-contractors, equipment sales and services), bulk fuel dealers, vehicle maintenance companies, transportation companies, professional services, and businesses providing amenities to support workers (e.g. food and beverage, accommodation, entertainment).

A number of initiatives exist to enhance First Nations employment and business opportunities on the proposed Project:

- Columbia Hydro Constructors Agreement
- BC Hydro Contractors Database
- BC Hydro Procurement Strategy
Operations

Two additional employees would be required to operate the Mica Generating Station, creating at least 100 person-years of direct employment. Ongoing maintenance expenditures are expected to increase as the generating unit ages.

Government Revenues: The proposed Project would increase annual water rental payments to the Provincial government by $2.2 million. Based on current tax guidelines, the annual grants-in-lieu that the Proponent pays to the Columbia-Shuswap Regional District, the Regional District of Fraser-Fort George, and the Village of Valemount in lieu of property tax is estimated to increase by $280,000 per year, subject to the Province amending an Order in Council which defines the total amount and percentage allocations to be paid by the Proponent.

First Nations Employment, Income and Business Opportunities: Business opportunities during the operations period would primarily be related to maintenance work and ongoing supply of catering services to the Mica townsite.

Mitigation

The Proponent did not anticipate that there would be any significant adverse effects on the economy or employment due to the proposed Project, and as such does not propose mitigation measures other than potential compensation to the woodlot holder. However, the Proponent would employ the following measures to enhance employment, income and business opportunities associated with proposed Project:

- The Proponent would, through contract language, encourage contractors to adopt the principles of equity hire (as defined in the Columbia Hydro Constructors Agreement) to its non-Columbia Hydro Constructors project hiring;
- The Proponent would work with Project contractors to advertise and inform local employment, Union Halls and interested First Nations Bands in the Columbia Basin about Project job opportunities and the hiring process. The Proponent would also work collaboratively with individual local First Nations and community groups to explore and develop specific Project employment and contracting opportunities;
- The Proponent would allocate a maximum of $60,000 to training programs to be delivered through local post secondary institutions;
- The Proponent would provide advice and notification to community residents (Revelstoke, Golden, Nakusp, Valemount) regarding existing training opportunities (scholarships, apprenticeships, programs etc) available in the region;
- The Proponent would provide information to all First Nations and Tribal councils regarding opportunities related to the proposed Project in order that they may increase their chances of successful participation. The Proponent would also work proactively to identify individuals and businesses interested in working on the
proposed Project and would identify means through which to remove barriers to participation.

- **Unit 5 Only:** Depending upon the exact placement of the capacitor station, encroachment on an existing woodlot could occur. Should an interaction between the station and woodlot be identified, discussions would be held with the license holder and market value compensation would be provided as determined by an independent registered professional forester. The determination of market value would be based on factors including market conditions, productivity of the land, expected yield, and types of trees;

- For the capacitor station, the Proponent would give qualified local community and First Nations businesses an opportunity to bid competitively on all aspects of proposed Project construction and operations requiring labour inputs, including construction and post-construction monitoring programs. The Proponent would also adhere to BCTC’s Aboriginal Business Development Policy which outlines specific mechanisms to support contracting, procurement and business development opportunities for First Nations.

**Potential Benefits**

 Those employed directly or indirectly by the proposed Project would gain experience in their relevant work area that may assist them in securing future employment.

 Further, access to local or regional training opportunities through the proposed Project would enrich the local labour pool. This, in turn, would potentially increase the possibility of local residents finding more regular employment and allow benefits to accrue to the local and regional economies and First Nations communities.

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

During the review of the Application, additional issues were raised by the Okanagan Nation Alliance and Lakes Division of the Secwepemc Nation. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix D.

Key issues identified by the Okanagan Nation Alliance were:

- In section 8.2.5 of the Application there is no discussion of lost opportunities resulting from the proposed Project development (i.e., forgone First Nation economic/development/resource opportunities). How would these be assessed and mitigated/compensated?
  - Proponent Response: The assessment did not identify any lost opportunities related to the proposed Project.

- How many contracts have already gone out to request for proposals and/or have been awarded related to the proposed Project?
Proponent Response: Other than the turbine and generator contract awarded to Andritz in July 2008, no other contracts related to on-site construction have gone out to request for proposals or have been awarded. Several design related contracts have been awarded as part of the Definition phase work on the proposed Project.

- A statement is requested for the commitment table for specific First Nations participation and hiring provisions for the proposed Project and all programs related to the Project.

Proponent response: A commitment was added to the Table of Commitments related to support of employment opportunities provided through the CHC Agreement and First Nations participation in major contracts, through contract language, include provisions to support employment, contracting and subcontracting to competitive, qualified First Nations businesses, if available. To facilitate First Nations participation in work that is not included under the CHC Agreement, the Proponent would adhere to its Aboriginal Procurement and Contracting Policy which outlines specific mechanisms to support contracting, procurement and business development opportunities for First Nations.

These issues were resolved to EAO’s satisfaction as noted in Appendix D.

Significance Analysis for Economy and Regional Economic Benefits Effects

- Magnitude: The proposed Project would provide significant direct, indirect and induced employment/economic benefits as well as significant government revenues in the form of water rentals, grants-in-lieu, and income taxes. Jobs requiring a range of skill levels and business opportunities for a range of services would be created by the proposed Project. A number of initiatives exist to enhance First Nations employment and business opportunities on the proposed Project. One existing woodlot tenure could be impacted due to clearing for the capacitor station footprint; however, the Proponent is prepared to provide market value compensation if there is encroachment (Unit 5 Only);

- Geographic Extent: Employment benefits would be felt locally/regional but as the regional employment pool is not expected to provide enough workers, employment opportunities would also be available to workers from other jurisdictions. Direct, indirect and induced economic benefits would primarily benefit communities in the Columbia-Shuswap area. Revenues would accrue to regional, provincial and federal governments. Initiatives to enhance First Nations employment, income and business opportunities would be targeted to First Nations and Councils that the Proponent was directed to consult with, namely members of the Secwepemc, Okanagan, and Ktunaxa Nations;

- Duration and Frequency: Employment and regional economic benefits as well as income tax revenues to governments would occur primarily during the construction period. Grants-in-lieu and water rental fees would accrue to
• **Reversibility:** Training and experience provided to workers would be irreversible. However, once construction of the proposed Project was complete, the jobs and economic effects created by the proposed Project would cease to exist. **The potential encroachment on the woodlot tenure would be permanent (Unit 5 Only);**

• **Context:** There are likely not enough workers with the appropriate skills residing in the region to meet employment needs for the proposed Project. However with the rapidly changing broader economic conditions, it is difficult to anticipate what the local employment pool would be like at the start of construction. The First Nations and Tribal Councils that the Proponent was directed to consult with are at different stages of economic development with varying skills and businesses that could be offered to the proposed Project. However, unemployment is higher than the provincial average in many communities and employment/business opportunities would be desirable to residents; and,

• **Probability:** The likelihood of the proposed Project having a positive effect on the regional economy as well as First Nations employment, income and business opportunities is probable.

6.1.4 Conclusion

Based on the above analysis and having regard to the Proponent's commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is likely to have positive provincial, regional and local economic benefits including opportunities for positive effects for First Nations employment, income, and business.

7 Social Effects

7.1 Population, demographics and accommodation

7.1.1 Background Information

The primary study area for population and accommodation impacts are those communities which would experience the most direct effects from the proposed Project, namely Mica townsite and immediate vicinity, the City of Revelstoke, and the community of Seymour Arm (Unit 5 Only). These are the areas that could experience population increases as a result of Project construction. There are no First Nations communities in the study area.

**Mica Townsite:** The Mica townsite is designed to support 150 individuals, but it is currently occupied by approximately 50 BC Hydro and townsite operation staff. These staff stay at the townsite during their work week and commute to their homes in the regional/provincial governments through the operational life of the proposed Project (at least 50 years);
region during their time off. The specific demographic makeup of the Mica townsite population varies depending on the workers present on site at any given time. Accommodation consists of modular bunk houses and detached houses. These houses are primarily used by BC Hydro staff and contractors but is sometimes rented to other users (e.g. forestry workers, recreational users) when space is available.

Revelstoke and area: The population of Revelstoke decreased from 7,500 individuals in the 2001 census to 7,230 individuals in the 2006 Census. The population of Electoral Area B (the rural area around Revelstoke Reservoir, including Mica townsite and Mica Generating Station, as illustrated in Figure 5) grew from 625 to 706 individuals over the same period. The population breakdown by age and gender is similar to the rest of the province of BC, with the exception of Electoral Area B where the population in the 45-64 year old age range was 10% higher than the provincial average. BC Stats predicts growth in the area to be slow but steady in the future, with a predicted increase of 9.6% over 28 years.

Revelstoke’s housing market has recently been subject to pressures including a real estate boom (similar to many communities in Alberta and BC) lasting until mid-2008 and high demand for housing by in-migrating workers associated with the Revelstoke Mountain Resort, Revelstoke Unit 5, and other construction projects. These pressures resulted in significant increases to the value of owned dwellings, high rents, and low vacancy rates.

While the housing market stabilized in spring 2008 and prices have dropped, the rental market has remained tight. However, the future status of housing prices and rental vacancies is uncertain and is likely to be dependent upon the pace of development at Revelstoke Mountain Resort. The City of Revelstoke has initiated several measures to address the affordability and vacancy issues noted above, but it will take several years before new units can be built. The Proponent anticipated that the housing situation in Revelstoke may be different once construction starts on the proposed Project.

Unit 5 Only: Seymour Arm: Approximately 70 year round residents live in the community of Seymour Arm, joined by several hundred seasonal residents in the summer. Demographic information specific to this community is not available, but the surrounding area of Columbia-Shuswap Electoral Area F (illustrated in Figure 5) is notably older than the general population of BC. At the time of the 2006 Census, the median age of residents was 12.4 years older than the provincial average, and had 20% more residents older than 45 compared to the provincial age distribution.

All housing stock in Seymour Arm is privately owned. There are no apartments or townhouses in the community. A hotel exists but has not operated in recent years. There is also a 35 site campground near the community at Silver Beach Provincial Park.
7.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Construction

**Mica townsite:** This community would have the most notable population increase during the construction period, with an anticipated peak of **156 workers in September 2012** (136 workers in August 2013). A combined overlap peak of 253 workers for both proposed Projects is anticipated in September 2012. These workers would be in addition to the 50 existing townsite staff. Townsite demographics are expected to be similar to other construction workforces which are mainly males in the 20-55 year age group.

Sufficient accommodation would be available at Mica townsite for all workers on the generating unit installation component of the proposed Projects. The Proponent would develop serviced gravel pads at the Mica townsite and contractors would bring in modular housing units as needed to match housing needs throughout the proposed Project. Construction staff would be housed at Mica townsite during their shift and would return to their home communities during their time off.

**Revelstoke and area:** Experience from the Revelstoke Unit 5 Project suggests that some engineering and management staff may choose to relocate to Revelstoke but that only a small population increase should be expected, perhaps 10 to 15 staff with an unknown proportion bringing families. **Unit 6 Only:** Those workers who relocate to Revelstoke for the proposed Mica Unit 5 Project are anticipated to stay in Revelstoke for the proposed Project; therefore engineering and management staff for the proposed Project would not cause a population increase in Revelstoke.

It is not expected that trade workers would relocate their families to Revelstoke as each specialized trade would only be working on the proposed Project for a small portion of the construction period. Some construction workers may choose to spend their days off in Revelstoke. The Proponent would not be providing construction workers with accommodation in Revelstoke on their days off.

A small population increase may also occur if people move to the area to fill indirect and induced employment opportunities created by the proposed Project. However, it is anticipated that many of these positions would be filled by local residents and some positions would also be created in communities other than Revelstoke. Given the above, any increase to the population of Revelstoke is anticipated to be small, and would also coincide with the population decrease expected with the completion of the Revelstoke 5 Project.

Any demand for housing in Revelstoke created by the construction phase of the proposed Project would likely be offset by workers leaving the city after completion of
the Revelstoke 5 Project. While some of the construction workforce may occasionally secure overnight accommodation in Revelstoke, these staff would not be provided an allowance for living off-site, avoiding the impacts on temporary accommodation experienced during the Revelstoke Unit 5 Project.

**Unit 5 Only: Seymour Arm:** Given the short term nature of the work at the capacitor station site and the type of accommodation that would be available (discussed in section 7.1 of this report), it is not expected that capacitor station workers would relocate their families to the Seymour Arm area. The population increase is therefore expected to equal the number of workers on the proposed Project (peaking at 25).

The capacitor station work crew would be transported from Sicamous and likely housed in the community of Seymour Arm for the duration of their shifts. It is anticipated that workers would return to Sicamous and their home communities on days off. Two potential options exist for housing the construction workers in Seymour Arm. The first is the local hotel, which is currently closed. The hotel co-owner has expressed interest in the possibility of offering accommodation (i.e., room and board) to Project workers. The hotel has capacity for about 30 individuals and the maximum number of workers onsite at any one time is expected to be approximately 25. A second option offered by a local resident would be to use a large vacant building (with kitchen facilities) located on his property.

**Operations:**

No notable population impacts are expected at Mica townsite, Revelstoke, or Seymour Arm during the operations phase of the proposed Project. Only 2 new operators would be required for the proposed Project at Mica Generating Station. These operators would reside at Mica townsite during their shift and would return to their home communities during their time off. As well, any managers who moved to Revelstoke for the construction phase would be leaving once construction is complete. **Unit 5 Only:** The Seymour Arm Capacitor station does not require on site operators; the only activity anticipated at the site during operations phase is temporary maintenance work.

**Mitigation**

The overall impact of the proposed Project on the population, demographics and accommodation of the study area was expected by the Proponent to be insignificant. However, the Proponent proposed the following monitoring and mitigation measures to further avoid negative impacts to accommodation availability in Revelstoke:

- Accommodation availability would be monitored throughout the construction period and if significant negative impacts on cost or availability of rental housing are identified, the Proponent would provide a contribution to a local affordable housing
initiative (commensurate with the magnitude of the identified impact as agreed upon by the Proponent and the City of Revelstoke);

- The Proponent would identify contractors who are interested in selling trailers they bring to the Mica townsite to the City of Revelstoke after they are no longer needed for construction-related housing; and,

- The Proponent would continue to make accommodation units at Mica townsite available for use by people not associated with the proposed Projects, subject to availability and approval of the townsite manager.

**Unit 5 Only:** The capacitor station workforce was expected to have no effect on accommodation currently being used in the community in terms of availability or cost. Therefore the Proponent did not propose any mitigation measures.

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

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

**Significance Analysis for Population, Demographics and Accommodation Effects**

- **Magnitude:** A peak of 156 (136) workers would increase the population of Mica townsite and a peak of 25 workers would increase the population near Seymour Arm (**Unit 5 Only**). Management/engineering staff (perhaps 5-10, some with families) may choose to relocate to Revelstoke (**Unit 5 Only**); Most accommodation would be provided at Mica townsite and near Seymour Arm;

- **Geographic Extent:** Population and accommodation impacts would be greatest at the Mica townsite and wherever workers are housed near Seymour Arm (**Unit 5 Only**). Smaller population and accommodation impacts could occur in Revelstoke and the surrounding area;

- **Duration and Frequency:** Population and accommodation impacts would be confined to the construction phase of the proposed Project;

- **Reversibility:** Population and accommodation effects would be reversible once construction of the proposed Project were completed;

- **Context:** Existing accommodation is available at the Mica townsite and in Seymour Arm; and,

- **Probability:** Population and accommodation effects related to workforce requirements for the proposed Project are probable.

### 7.1.4 Conclusion

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

7.2 Community/Public Services, Emergency Services and Facilities

7.2.1 Background Information

The study area for the proposed Project includes Mica townsite, where most Project workers would be accommodated, and Revelstoke and surrounding area, where there could be a minor increase in population associated with the proposed Project. **Unit 5 Only:** The study area for activities taking place at the capacitor station and passive reflector sites includes the community of Seymour Arm and the two proposed Project sites themselves, since Project-related personnel would be staying and working in these locations.

**Mica townsite:** The townsite offers some recreational facilities, such as a gym, an indoor swimming pool, a curling rink and a small golf course. Mica townsite also has a fire hall, staffed by eight volunteers, which serves the townsite and the Mica Generating Station. A BC Hydro ambulance and Level 3 first aid and emergency rescue team is stationed at the Mica Generating Station Monday through Thursday. There are no other services or facilities available at the townsite.

A priority for the Mica townsite plan is development of a communications and evacuation plan for emergency situations that would be integrated with existing BC Hydro emergency planning and response procedures for the Mica Generating Station. A Wildland Fire Protection Committee has been formed to address concerns with wildfires adjacent to the townsite and support implementation of the Community Wildfire Protection Plan.

**Revelstoke:** Revelstoke offers a full complement of services to its residents and residents of the surrounding area including health and emergency services, recreation, a variety of public and social services and education services. Further detail is provided in section 9.5 of the Proponent’s Application.

**Unit 5 Only: Seymour Arm:** Seymour Arm is a relatively remote community with limited to no services available in the community. Health and emergency services as well as education and social services are generally accessible in one of three surrounding communities: Chase (two hours away), Salmon Arm (three hours away), or Kamloops (three hours away). Recreation opportunities are available in the immediate vicinity of Seymour Arm. Further detail is provided in section 9.5 of the Proponent’s Application.
7.2.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Construction

**Mica townsite:** Project workers would not be allowed access to existing townsite recreation facilities; therefore, they would place no demands on these facilities. Four of BC Hydro’s paramedic staff at the Mica Generating Station have Level 3 First Aid certification and a well-equipped transport vehicle is on site. The Proponent does not anticipate increased demand on existing emergency services. The Proponent has existing plans in place to deal with emergency situations at the Mica Generating Station and Mica townsite.

**Revelstoke:** The Proponent identifies the following potential effects in the Application:

- A small population increase in Revelstoke associated with the proposed Project may occur and create an increase in demand for some services. While most services would be able to handle the small incremental increase in demand, certain services such as child care, fire protection and police could face some challenges depending on the level of other economic activity in the community at the time of construction;

- Availability of child care services would depend on the economic situation and supply of services available at the time of construction as well as the number of children coming to the study area and requiring services. Service providers are aware of the situation created by recent project developments and are better prepared to deal with increases in demand;

- Previously, Revelstoke Fire Rescue Services was under pressure from Revelstoke Mountain Resort to increase planning and review services and activities related to the resort, and this occupied large amounts of staff time. This may or may not be an issue at the time of construction of the proposed Project as the timing of either future development activity at Revelstoke Mountain Resort or construction of a firehall at Revelstoke Mountain Resort is not currently known;

- As Mica townsite has a firehall, Revelstoke Fire Rescue Services would probably not respond to calls at the townsite. However, accidents on Highway 23 could require their attendance and remove resources from the community; and,

- The Revelstoke RCMP does not have dedicated resources to patrol Highway 23 to Mica townsite. Although only a few accidents have occurred on the highway, an increase in traffic, drivers unfamiliar with the Highway, winter driving conditions, the mix of construction and recreational traffic, and animals on the Highway could result in an increase in the number of incidents. However, the number of accidents reported did not increase during the recent stator replacement project at the Mica Generating Station. Given the distance to Mica townsite, any officer sent to patrol or respond to a call in the area would be gone all day, which would reduce resources available to cover Revelstoke and other area highways.
Unit 5 Only: Seymour Arm: Project construction could increase demand for services currently serving the community (e.g., police, ambulance) but any increase is expected to be minimal and would be handled by existing service providers.

Operations

The Proponent does not expect that additional workers associated with the proposed Project or their families would have a significant effect on community services at the Mica townsite, Revelstoke or Seymour Arm during the operations period.

Mitigation

No mitigation measures were proposed during the construction or operation periods for Mica townsite or Seymour Arm as the Proponent did not anticipate significant effects on services at these locations. Although the Proponent did not consider the potential effects at Revelstoke to be significant, the following mitigation measures are proposed based on Proponent’s community consultation through the Core Committee described in section 3.1.2 of this report:

- The Proponent’s Environmental Monitor/Community Liaison staff and Community Relations staff would advise the RCMP and other users of Highway 23 of the times when there would be higher levels of Project-related traffic using the highway; and,
- The Proponent would provide funding for additional patrols of Highway 23 throughout the construction period. This funding would be provided to the City of Revelstoke to cover the costs of an extra overtime shift (at 4 hours) each week for an existing RCMP member required to complete one highway patrol between Revelstoke and Mica. The Proponent would regularly notify the RCMP of Project traffic trends to increase effectiveness of the additional patrol and the RCMP would report on the patrols completed (date, time, patrol reports).

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

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

Significance Analysis for Community/Public Services, Emergency Services and Facilities Effects

- **Magnitude:** An incident requiring RCMP or Fire Rescue Service at a remote location during project construction would place significant demands on local emergency crews. Few project-related emergency incidents would be anticipated and no significant demands on public/community services would be created by the 5-10 workers and their families that could relocate to the area;
• **Geographic Extent:** Demands on Emergency Services would occur primarily in the Highway 23 corridor between Revelstoke (services based in Revelstoke), or near Seymour Arm (services based in Chase). Demand on community/public services could occur in Revelstoke and area.

• **Duration and Frequency:** Demands on community and emergency services would be infrequent and only during the construction phase of the proposed Project;

• **Reversibility:** Project-related demands would be reversible once the construction period was complete;

• **Context:** Public emergency response services are limited in the region and calling a crew to an incident in a remote location on Highway 23 or near Seymour Arm would take emergency response services away from their base community for several hours. The Proponent has emergency management and response procedures in place for the Mica Generating Station and Mica townsite that would not require assistance from public emergency services; and,

• **Probability:** The probability of incidents occurring that would place demand on Community/Public Services or emergency services/facilities is expected to be low.

7.2.4 Conclusion

Based on the above analysis and having regard to the Proponent’s commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse effects on community/public services, emergency services and facilities.

7.3 Traffic

7.3.1 Background Information

The study area for the proposed Project is Highway 23 between Mica townsite and Revelstoke, the route to be used by traffic accessing the proposed Project site. **Unit 5 Only:** The study area for traffic in the vicinity of the capacitor station and passive reflector sites is the community of Seymour Arm and the roads leading to the two proposed Project sites.

**Highway 23:** Highway 23 from Mica townsite to Revelstoke is a two-lane highway traversing a mountainous region. There are some areas of insecure slopes, chronic mudslides and snow avalanches and the highway is closed periodically in the winter due to avalanches. Traffic is relatively light and few motor vehicle collisions occur, with steady logging throughout the year. An increase is observed in summer months of recreational vehicles between Revelstoke Dam and Downie Creek and in the winter, other snowmobilers and heliskiers use the road to access the backcountry near Mica.
Unit 5 Only: Seymour Arm: Capacitor station construction materials would be barged and the workforce transported by boat from Sicamous to Seymour Arm. The wharf in Seymour Arm was formerly a federal facility, but in 2002 it was turned over to the Seymour Arm Community Association, which is responsible for its operation and maintenance. Despite the increased number of local residents during the summer, wharf demand does not exceed capacity. Many community residents moor boats nearby at the marina in Bughouse Bay or on private docks; therefore the number of boats using the wharf to offload or load is minimal.

The Ross Ruckle Forest Service Road links the capacitor station site to the community of Seymour Arm. The road is gravel based and well maintained and would provide suitable construction access. Workers would be transported from the community to the site daily. As the bridge crossing Celista Creek between the dock and the road cannot handle commercial trucks, construction-related commercial trucks would travel a longer route to the site. Not all Forestry Service Roads are plowed in the winter months.

Current traffic in and around Seymour Arm is mainly residential and recreational. There is some industrial traffic, primarily logging trucks, on the forest service roads. Traffic volumes on Forest Service Roads vary based on forestry activity being undertaken in the area at the time.

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

Construction

Highway 23: During the construction phase, increased traffic is expected from transportation of personnel, equipment and supplies to the Mica Generating Station site and Mica townsite. The following traffic generating requirements and associated volumes are anticipated:

- Personnel: Construction workers accommodated in the townsite would be travelling to and from the Mica townsite on their days off. Sufficient workers would be travelling at the same time to make a van or bus service to Revelstoke a practical option. Some private vehicle usage is anticipated in addition to the pre-existing volume from staff and contractors already on site;
- Construction materials and equipment: It is estimated that 769 truckloads of aggregates, cement and fly ash, reinforcing steel, dimension lumber and plywood, major turbine and generator components, and other miscellaneous materials would be delivered to the proposed Project site; and
- Catering: deliveries are anticipated three times per week to the Mica townsite.

Potential effects associated with this increased traffic volume include:
• Wildlife impacts (e.g. Interference with caribou migration, wildlife mortalities due to incidents with Project vehicles and associated increases in predation)

• Increased motor vehicle collisions related to:
  o A rush of traffic leaving the townsite after shift changes; and,
  o A mix of industrial, construction and recreational users, especially in challenging winter driving conditions.

• Potential for damage to road surfaces from the increase in heavy industrial traffic.

The Proponent anticipated potential effects to be minimal for the following reasons:

• Steel and cement would be transported within the same period as the aggregates. The duration of this hauling would be within one year to suit the concrete schedule and would use stockpiling to avoid hauling during the winter months or during caribou migration. Potential for wildlife mortalities are further addressed in section 5.7 of this report. The Proponent does anticipate these effects to be significant; and,

• The potential use of buses to transport workers would reduce traffic volumes associated with the proposed Project and eliminate the shift change issue identified above. Aside from the steel, cement, and aggregate deliveries outlined above, Project-related traffic would be distributed through the construction period, but may be limited at certain times during winter because of bad weather. The Proponent does not anticipate significant increases in traffic incidents as current traffic volume on Highway 23 is light; no increase in accidents or traffic incidents has been reported in relation to recent experiences with traffic associated with the ongoing operation and maintenance of the Mica Generating Station.

**Unit 5 Only: Seymour Arm:** The wharf in the community of Seymour Arm was built to accommodate barge traffic. No impacts are anticipated from offloading construction materials and supplies at this site. Construction of the capacitor station would add truck traffic to the forest service road between the wharf and proposed Project site during summer months. Information is not available at this time regarding the existing traffic volumes. However, traffic volumes are not expected to be high and this additional traffic is not expected to adversely affect residents' or visitors' use of the road.

Logging trucks and heavy equipment often travel on these forest service roads and use of a dedicated road channel radio could assist with traffic flow.

**Operations**

Volumes of traffic generated during operations would consist primarily of maintenance workers and two additional operations workers accessing the Mica Generating Station site. However, it is likely that maintenance workers already travelling to the site to maintain the existing units would also maintain the proposed unit and, as such, may not increase traffic volumes but may simply stay in the area for a longer period of time.
**Unit 5 Only:** Capacitor station maintenance would result in a small increase in traffic on forest service roads in the area of the site. However, the Proponent does not anticipate that the operation of the capacitor station would have any notable impact on traffic, other road users or public safety.

**Mitigation**

While the Proponent does not anticipate significant impacts on traffic, other road users, or public safety, the following mitigation measures are included in the Application:

- The Proponent would prepare an Information Package which would be issued to all contractors and their staff working on the proposed Project. The package would outline construction commitments relating to the environment, wildlife, traffic, recreation opportunities and safety (e.g. fishing regulations, bear awareness, avalanche awareness, traffic speeds, environmental protection zones, reporting wildlife incidents, etc.);

- The Proponent would also instruct contractors to deliver a driver awareness education or information program, as applicable, to its employees to address concerns for both driver and wildlife safety during its activities at the proposed Project Site. The program shall involve transporting most workers to and from the worksite and Mica townsite by bus;

- Contractors would report any wildlife mortalities or conflicts to the Environmental Monitor, who may in turn report them to a Ministry of Environment Wildlife Officer if required by section 75 of the BC *Wildlife Act*, in collaboration with MOE and Ministry of Transportation and Infrastructure;

- The Proponent would work with the Ministry of Transportation and Infrastructure and seek their approval to provide and install additional signage at high risk wildlife road crossing areas between Revelstoke and Mica townsite;

- The Proponent’s Environmental Monitor/Community Liaison staff and Community Relations staff would advise other users of Highway 23 of the times when there would be higher levels of Project-related traffic using the highway;

- The Proponent would provide dedicated funding for RCMP to patrol Highway 23 as described in section 7.2 of this Assessment Report;

- The contractor would bus workers from Mica townsite to the job site and the Proponent would encourage contractors to reduce the number of vehicle trips between Revelstoke and Mica townsite and to car pool/bus workers from Revelstoke to the townsite; and,

- The Proponent would encourage truck drivers regularly delivering to the townsite to communicate with loggers driving Highway 23 by radio and the Proponent would encourage drivers of Project construction trucks to have access to the same radio band.
7.3.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Columbia Shuswap Regional District. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix B.

Key issues identified by the Columbia Shuswap Regional District were:

- Would the wharf be used in the summer months? Would there any mitigation measures?
  - Proponent response: It would be necessary to use the wharf in the summer months. Planning and scheduling of use would consider potential conflicts with other users and would include measures to avoid unreasonable inconvenience to others. The contractor would be required to develop a traffic management plan, with the objective of providing a safe environment for all road and transportation facility users, while minimizing the disruption, congestion and delays resulting from construction and ensuring that access to private/commercial premises is maintained. Appropriate and sufficient notice would be given, information signs would be installed, routes used by the contractor would be marked, roads and transportation facilities would be free of hazards and all users would be adequately protected from the activities of the contractor.

- How and when would Seymour Arm residents be notified about wharf use by BCTC contractors?
  - Proponent response: In addition to the measures outlined above in the traffic management plan, BCTC would develop a mailing list of Seymour Arm property owners, residents and businesses that could be affected by construction operations or use of local roads and wharf facilities. Notification of scheduled Project activities would be made by both direct mail and publication in local newspapers or bulletin boards.

These issues were resolved to EAO’s satisfaction as noted in Appendix B.

Significance Analysis for Traffic Effects

- **Magnitude:** The number of trips required to transport staff, materials, and support services to the site of the proposed Project would not be significant in comparison to current daily use;

- **Geographic Extent:** Traffic effects would occur primarily on Highway 23, at Seymour Arm wharf, and on the forest service roads between the wharf and the capacitor station site (Unit 5 Only);

- **Duration and Frequency:** Traffic effects would be limited to the construction period of the proposed Project, primarily in the summer months;
• **Reversibility:** Project-related increased traffic volume would be reversible once the construction period was complete. However, traffic incidents resulting from project-related traffic would be permanent;

• **Context:** The proposed Project sites are relatively remote and traffic generated by the proposed Project would be minimal and similar to the type of traffic already using the roads;

• **Probability:** The likelihood of traffic incidents is low.

7.3.4 Conclusion

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

7.4 **Traditional Land Use and Knowledge**

Please see Part C for a detailed discussion on First Nations’ land use and interests assessment.

7.5 **Land Use and Recreation**

7.5.1 Background Information

The land use assessment study area for the proposed Project is the Highway 23 corridor from Mica townsite to Revelstoke. **Unit 5 Only: The study area for activities taking place at the capacitor station and passive reflector sites is the immediate area around these two proposed Project sites.** These areas would be most directly affected by construction and operations.

The recreation assessment study area for the proposed Project is the immediate area around the Mica Generating Station, easily accessible back country areas around Mica townsite, and the area along Highway 23. This includes the areas most affected by fluctuations in water levels due to the operation of the Mica Generating Station (i.e., Mica Dam Tailrace area) and areas potentially accessible by workers.

**Unit 5 Only:** The study area for activities taking place at the capacitor station and passive reflector sites includes these two proposed Project sites, a 100m buffer around each site and the area between the community of Seymour Arm and the capacitor station site.

**Mica townsite to Revelstoke:** The Mica Generating Station is located within the Revelstoke Resource Management Zone of the Revelstoke Higher Level Plan. Under the Official Community Plan for Electoral Area B of the Columbia Shuswap Regional District, much of the land in the study area is designated as Rural/Resource, except the
land around the Mica Generating Station (zoned as Institutional) and the land around Mica townsite and a nearby heli-ski lodge (zoned as Resort/Commercial).

The Mica Generating station is also located within the Revelstoke Timber Supply Area. Two forest licensees have active year-round operations in the area, using Highway 23 to transport workers and logs between harvest sites and Revelstoke. There is no active mining near the Mica Generating Station or the Highway 23 corridor. However, some properties between Revelstoke and Mica Generating Station are in the exploration phase.

The proposed Project study area is located within the asserted traditional territories of the member Bands of the Shuswap Nation Tribal Council; Okanagan Nation Alliance; and, Ktunaxa Nation Council and the Lheidli T’enneh Band. There are no First Nations reserves in the area of the Mica Generating Station.

Land use along the Highway 23 corridor between Mica townsite and Revelstoke Dam is mainly recreational with most use occurring in summer. There are a number of formal recreation sites including Martha Creek Park (18 km north of Revelstoke), forest service sites and boat launches between Revelstoke and the Mica Generating Station. A number of undeveloped camping and boat launch sites also exist along the reservoir and recreationists often stop along Highway 23 to access the reservoir. The Proponent maintains a boat launch north of Mica Dam for use in maintaining log booms. The boat launch is open to public use but boating is restricted to north of the log booms protecting the intakes, outlet works and spillway.

Kinbasket and Revelstoke Reservoirs are used for a wide range of year-round recreational activities, including fishing, boating and camping in summer months, as well as snowmobiling and cross-country skiing in winter months. Hunting is also a popular activity along certain parts of the reservoirs. A mixture of private and public sector recreational facilities are located around the reservoirs including boat launches, picnic and campgrounds and marinas. Highway 23 is the main access road to recreation areas along the reservoir.

There are few developed recreation areas along the portions of the reservoirs in the vicinity of the Mica Generating Station as the area is relatively remote. The upland areas surrounding Kinbasket and Revelstoke Reservoirs in the area of the Mica Generating Station are undeveloped and provide opportunities for wilderness-type recreation activities including hiking and backcountry skiing. Two heli-skiing operations with a total of four guest lodges are active near the Mica Generating station. During the ski season (mid-December to April), these companies use Highway 23 to transport guests between Revelstoke and the ski lodges. Canadian Mountain Holidays’
Monashee Lodge is located near Mica townsite and is the closest developed recreation facility to the proposed Project site at the Mica Generating Station.

**Unit 5 Only: Capacitor Station:** The capacitor station and passive reflector sites are located in the area covered by the Okanagan-Shuswap Land and Resource Management Plan, and are zoned as Rural and Resource Lands in the Official Community Plan for Electoral Area F of the Columbia Shuswap Regional District. The primary capacitor station site is located along the existing transmission lines corridor right-of-way. A second small parcel of land for a reflector is located just above the capacitor station site.

The capacitor station site is also located within the Okanagan Timber Supply Area. There is a registered woodlot on the east side of the transmission line, as well as a registered trapline and a guide-outfitter operation on or near the capacitor station site. There are no range tenures at the capacitor station site, and the closest agricultural activity is near the community of Seymour Arm. Overall, the Application states there is little evidence of use in the area during site visits although hunting and/or other recreational activities may occur.

The capacitor station site is located within the asserted traditional territory of the Shuswap Nation Tribal Council and its member Bands. There are no First Nations reserves in the vicinity of the capacitor site.

In terms of visual aesthetics in the area, a transmission line ROW currently runs through the area where the capacitor station would be sited. Forestry is active and a series of forest service roads exist in the area. The area is not visible from homes and residential areas in Seymour arm but is visible from more distant locales.

The area around Shuswap Lake is a popular tourist destination with many parks and recreation areas. Activities in the North Shuswap include water and land-based recreational activities such as camping, hiking, cycling, swimming, boating, canoeing, fishing, wind surfing, scuba diving, hunting, skiing, snowmobiling, all-terrain vehicle riding, horserback riding, and wildlife viewing. The North Shuswap Chamber of Commerce lists tourism and recreation as a principal source of employment (NSCC, 2009).

Silver Beach Provincial Park is located at the north end of Shuswap Lake adjacent to the community of Seymour Arm. The park is accessible both by road using the same forestry road from Anglemont used to access the community of Seymour Arm and by water. A network of trails suitable for sports such as hiking, cycling, all terrain vehicle riding and horsetack riding exist in the greater North Shuswap region. Recognized hiking trails located in the vicinity of the community of Seymour Arm include the Albas Trail and the Seymour River Falls Trail, located north of Seymour Arm. Neither of these
trails intersects with the boundaries of the local study area. The Crowfoot Mountain snowmobile trails do not intersect with the boundary of the local study area.

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

**Construction**

**Mica townsite to Revelstoke:** All land required for the proposed Project’s construction facilities and activities at the Mica Generating Station facility is owned by the Proponent and has been used for similar activities in the past. As such, construction of the proposed Project would not directly affect existing land use or recreation in the area between Revelstoke and the Mica Generating Station.

Potential effects of the proposed Project on land use and recreation identified in the Application include:

- Project related truck traffic and noise disturbance;
- Project related truck traffic and increased risk to recreationists who park on the shoulder of Highway 23 in areas that do not have off-road parking;
- Changes in availability of accommodation at the Mica townsite to recreational users. Users did note that accommodation is not always available even at present;
- Potential increased use of backcountry by construction workers;
- Potential of workers who first came to the area during the construction period to return and use the area for recreation in the operations period; and,
- Visual aesthetics in the Mica Generating Station area.

The Proponent anticipated these effects to be minimal for the following reasons:

- Potential traffic effects and the means through which they would be mitigated are discussed in section 9.6 of the Application and 7.3 of this Assessment Report. An increase in noise levels may occur during certain periods as a result of the traffic. In particular, batch plant operations and general construction activities may be perceptible at the Monashee Lodge. However, noise levels would be well within allowable levels and would generally be short term in nature;
- The majority of traffic related to aggregate hauling, which comprises the largest component of construction traffic, is expected to occur during times when the roads are free of snow and skiers are not using the lodge;
- Construction workers’ use of the backcountry is expected to be low as it is anticipated that workers would be working 10 hour shifts and would be leaving the townsite on their days off. Also, as discussed in section 7.3 of this report, contractors would be encouraged to provide bus transportation for workers between Revelstoke and Mica townsite. As such, workers would not have private vehicles at site and would not be able to access areas away from the townsite easily during their time off while at Mica townsite; and,
• The Proponent would continue to make accommodation excess to its needs to non-BC Hydro users, with rooms being available at certain times and not others, depending on the Proponent’s operation requirements. Canadian Mountain Holidays noted that their Monashee and Gothics Lodges are empty in the summer months and could provide accommodation for up to 92 individuals;

• The number of construction workers returning to the area is anticipated to be small; and,

• Construction of the proposed Project would have no effect on visual aesthetics in the area of the Mica Generating Station as construction activities would occur on areas currently or previously used for similar activities, and the proposed Project would be housed in the Mica Generating Station.

The Proponent notes in their Application that operation of the unit would help stabilize fluctuations in Revelstoke Reservoir which would be beneficial for users. The area from the Mica Dam to the Blue Bridge, the area of greatest flow regime effects, is currently closed to public use and would continue to be closed upon the completion of the proposed Project.

Given the above, the Proponent does not expect that the proposed Project would have any notable effects on recreation use or activities during construction.

**Unit 5 Only: Capacitor station:** The construction and operation of the capacitor station and passive reflector site would not be considered by the Proponent to have a detrimental effect on land use or recreational areas within the local area or region, or on the ability of any existing recreational activities to occur given the small footprint of the capacitor station compared to the available regional recreational areas as discussed below:

• The capacitor station and reflector sites, including a 100 m buffer, are not located within provincial park boundaries;

• Although the town of Seymour Arm is located within the boundaries of Silver Beach Provincial Park, construction and operation of the capacitor station would not impede access to the park or recreational activities at the park;

• No identified recreational trails exist at the capacitor station site. Two recreational hiking trails exist in the vicinity of the town of Seymour Arm. Given the availability of trails suitable for multiple recreational activities in the region, the impact on recreational trails from the placement of the capacitor station would be negligible;

• The amount of hunting and trapping at the capacitor station site is believed to be minimal due to the lack of old-growth habitat on the site, cleared ROW, presence of high voltage transmission lines, and the proximity of the site to an active forest services road. Generally, the hunting and trapping season is in the fall, winter and/or spring months. Construction activities would take place primarily during the
late spring, summer and early fall. As such, construction and operation of the capacitor station is anticipated to have a negligible impact on hunting and trapping;

- Approximately three to four hectares of land, the majority of which falls in the existing ROW, would be required for the capacitor station, and approximately 0.25 hectares would be required for the passive reflector site; and,

- Because of its relative isolation and the flat terrain, the capacitor station is not expected to have significant aesthetic impacts. There are no residences within viewing distance and the station would be located within an existing ROW in the area of existing transmission towers. Therefore, anyone viewing the area may see a different view than existed previously or see activity at the site during construction. However, the view and associated activities would not be any more noticeable than the existing transmission line.

Operations

The Proponent does not anticipate that the proposed Project would have an effect on land use, recreation or visual aesthetics during operations. The Proponent does not anticipate that the capacitor station and reflector site would have an effect on land use or recreation during operations. The visual effect of the capacitor station and reflector during operations would be similar to that during construction.

Mitigation

The Proponent did not anticipate that any other mitigation measures were required specifically for land use or recreation during operations. Mitigation measures to address potential accommodation, traffic and noise effects are addressed in sections 7.1, 7.3, and 9.1 of this report, respectively.

Nonetheless, the Proponent has committed to the following:

- Develop an information package for construction employees as introduced in section 7.3 of this report. This package would include information regarding recreation regulations, opportunities and safety (e.g., fishing regulations, caribou winter habitat areas, avalanche awareness, etc.);

- Monitor recreational use of the reservoir and forested areas near and adjacent to the Mica Generating Station facilities for the duration of the construction period and provide funding, if necessary, for visits to the area by the local MOE Conservation Officer; and,

- Ensure that any recreation sites near or adjacent to Project facilities are kept clean and free of garbage.
7.5.3 Project Issues and Effects and Proposed Mitigation Identified During Application Review

During the review of the Application, additional issues were raised by the Valemount Permanent Lake Committee. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix C.

- The Valemount Permanent Lake Committee commented on the potential impacts to recreation or tourism opportunities related to altered water use and water levels in the Kinbasket Reservoir.
  - Proponent Response: Based on current environmental assessment hydrology study results, the operation of additional units at the Mica Generating Station is not expected to have a significant impact on recreation opportunities because neither the magnitude nor the frequency of drawdowns of Kinbasket Reservoir is expected to increase.

These issues were resolved to EAO’s satisfaction as noted in Appendix C.

Significance Analysis for Land Use and Recreation Effects

- **Magnitude:** No impacts on regional land use are anticipated as a result of the proposed Project, with the exception of clearing three to four hectares of land for the capacitor station and passive reflector (Unit 5 Only). Potential impacts of noise, traffic and dust on recreation opportunities would be minimal;

- **Geographic Extent:** Project effects would be limited to previously described work sites and traffic corridors only;

- **Duration and Frequency:** Potential impacts of noise, traffic and dust on regional land use and recreation would be intermittent and of short duration during the construction period only,

- **Reversibility:** Potential impacts on regional land use would be reversible once construction of the proposed Project was complete, with the exception of the capacitor station footprint becoming inaccessible on a permanent basis (Unit 5 Only);

- **Context:** The proposed Project is situated in areas that have a history of significant industrial development and disturbance. There are existing land use and recreation activities in the immediate vicinity of the proposed Project; and,

- **Probability:** Despite the loss of accessibility to the capacitor station footprint (Unit 5 Only), the likelihood of proposed Project effects on regional land use and recreation is low.

7.5.4 Conclusion

Based on the above analysis and having regard to the Proponent’s commitments (which would become legally binding as a condition of a certificate), EAO is satisfied that the
proposed Project is not likely to have significant adverse effects on land use or recreation. A small benefit could result from the smaller fluctuations in Revelstoke Reservoir which would be beneficial for boat access.

8  Heritage Effects

8.1  Archaeological Resources

8.1.1  Background Information

In general, the study area extends from the Mica Dam Forebay area of Kinbasket Reservoir along Revelstoke Reservoir to the south end of the Revelstoke Reach of Arrow Lakes Reservoir.

Specific survey areas in the vicinity of the Mica Generating Station were defined by proposed locations of construction activities and facilities. These sites include: Mica Dam Forebay shoreline and uppermost drawdown zone; Mica Dam vicinity; and Mica townsite/Mica Creek Fan. Other areas were also considered for potential effects from changes in reservoir fluctuations according to hydrologic models presented in section 6.1 of the Application, including: Revelstoke Reservoir downstream of Mica Dam; Revelstoke Reservoir shoreline; Columbia River below Revelstoke Dam; and North end of Arrow Lakes Reservoir (Revelstoke Reach). **Unit 5 Only:** Areas considered for activities related to the capacitor station include the proposed sites for the capacitor station and the passive reflector.

The heritage resources investigation conducted by the Proponent for the Application consists of:

- Review and synthesis of information from previous palaeoenvironmental and archaeological studies to identify locations of potential archaeological sensitivity;
- Incorporation of engineering and environmental background information associated with the proposed Project to identify potential effects on sensitive areas;
- Access to the Archaeology Branch’s online site registry to identify recorded sites in the study areas;
- Field reconnaissance guided by the results of this synthesis and targeted locations where potential direct impacts are identified; and,

**Unit 5 Only:** Monitoring of geotechnical excavations at the capacitor site.

Full details of the palaeoenvironment, archaeological setting and archaeological record are provided in sections 6.8 and 7.7 of the Application. This assessment report focuses only on the potential effects to archaeological resources as a result of the proposed Project.
8.1.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

Construction and operation effects

Mica Dam Forebay: This area has low heritage resource potential and has been extensively eroded during previous decades’ drawdown cycles. Hydrologic modelling results show slight changes in Kinbasket Reservoir water as outlined in section 6.1 of the Application and section 5.1 of this Assessment Report. The projected change in variability due to the operation of the proposed additional unit is an order of magnitude smaller than the annual variation in reservoir fluctuation. In addition, the effect of local conditions on reservoir level variation increases with distance from the dam. Because of this variability, the Proponent does not anticipate any significant adverse effects on heritage resources in this area.

Mica Dam Vicinity: This area is a steep-walled glaciated canyon. There is limited heritage resource potential of this area and the proposed construction sites in the dam site area have already been greatly altered with removal of the natural landscape. Therefore, there is no potential for intact archaeological remains and no potential adverse effects to heritage resources in this area.

Revelstoke Reservoir immediately below Mica Dam: The difficulty of boat travel and the limited resource potential of the environment of this part of the Columbia Mountains limits the heritage resource potential in this area. The projected maximum discharge due to the addition of the proposed Project is significantly lower than the Columbia River’s flow prior to regulation and is less than half of the pre-regulation average annual flood discharge (NHC 2006). Furthermore, in this area the river banks have been armoured with riprap and in the areas proposed for construction facilities and activities, disturbance of the mineral soil has been extensive. The potential for intact archaeological deposits or features to be present in the identified areas is minimal. Therefore, any sediments within the section of river downstream from Mica Dam containing pre-contact archaeological deposits would have been removed already by post-1846 natural river erosion. Therefore, the proposed Project is not anticipated to impact archaeological resources in this area.

Mica townsite: Unit 5 Only: An area of potential accommodation expansion in the north part of the existing Mica townsite as part of the proposed Project was surveyed. Surface of this area is either already modified by roads and structures or is vegetated and has been so severely disturbed that the geomorphology is obscure. This landform may be a relict delta with a shallow postglacial fine sediment cap, or it may contain Holocene buried soils and/or palaeosurfaces. If buried surfaces are present, this area has at least moderate potential to contain archaeological remains. Construction activities involving subsurface disturbance in this area associated with the proposed
Project have the potential to disrupt buried pre-contact archaeological deposits and features. However, no extensive sub-surface activities are planned during construction.

**Unit 6 Only:** No construction activities are planned in this area in association with the proposed Project.

**Revelstoke Reservoir:** Landforms and sediments with associated archaeological deposits or features at the edge of Revelstoke Reservoir are potentially vulnerable to erosion from the effects of fluctuating reservoir levels. Sparse possible archaeological deposits were noted in 1994 but no archaeological materials were observed in 2006 or 2007 surveys.

Hydrologic modeling results indicate that the proposed Project would bring the Mica and Revelstoke Generating Stations closer to hydraulic balance. As a result, Revelstoke Reservoir would operate with less daily fluctuation for most of the year with the daily fluctuations being less than 0.2 m. The Revelstoke Reservoir drawdown in the spring would not be affected by the proposed Project. Therefore, no significant impacts to heritage resources in the Revelstoke Reservoir are anticipated as a result of the proposed Projects.

**Columbia River below Revelstoke Dam:** Hydrologic modelling results indicate that the addition of the proposed Project would have no effect on the peak discharge from Revelstoke Generating Station, and that any operational changes of Revelstoke Generating Station are anticipated to be within the variability of operation expected at this facility. The projected Revelstoke Generating Station discharge due to the addition of the proposed Project is significantly lower than the Columbia River’s flow prior to regulation during parts of every year. Any sediment containing pre-contact archaeological resources would have been removed already by post-1846 natural river erosion. Therefore, addition of the proposed Project is not expected to have effects on archaeological resources in the section of the Columbia River directly downstream of Revelstoke Dam.

**Arrow Lakes Reservoir (Revelstoke Reach):** (Unit 5 Only) Archaeological deposits within Arrow Lakes Reservoir are potentially vulnerable to erosion from the effects of fluctuating reservoir levels. Hydrologic modelling results indicate that, in the spring, the proposed Project would cause a change in reservoir levels of 2 orders of magnitude less than the current variability in operations for Arrow Lakes Reservoir. At this time of year, the reservoir level is typically within the lower portion of the drawdown zone where most archaeological remains have long since been eroded away, so no significant adverse effect on heritage resources is anticipated.

Hydraulic modelling predicts two scenarios when changes in water level are within an order of magnitude of the normal operating range. Late summer reservoir levels could
be 0.5 m lower compared to only a 2 m range in annual variability. This is at a time of year when the reservoir is within the upper 10 m of the drawdown zone. Previous archaeological studies associated with the Water Use Planning Process (Choquette 2002, 2008b), document presence of heritage resources within the upper drawdown zone, where there is a high degree of sensitivity to wave erosion. There is a predicted high potential for additional heritage resources in this zone. The effect of the proposed Project on these settings is difficult to predict but it appears possible that the reservoir level could, in some years, be held longer in the sensitive elevation zone, potentially increasing the probability that wave-induced erosion could adversely affect associated archaeological remains.

The same situation could occur in bank erosion sites at the north end of Arrow Lakes Reservoir identified in the Northwest Hydraulics Consultants fluvial geomorphological study carried out as part of the Revelstoke Unit 5 Environmental Assessment (NHC, 2006). During a wet year, a maximum decrease in water levels of 0.55 m is predicted for 14 days following July 30 as a result of the proposed Project. This is within an order of magnitude of the 2 m normal operating range and could have an effect on archaeological resources within the affected elevation band. However, the existing inventory data are not sufficient to establish the status of the sites and any possible effects upon them. A key goal of the Proponent’s Reservoir Archaeology Program is to collect data on archaeological sites that would support long-term management of all effects from reservoir operations. Implementation of this Program in the Columbia Region is planned for the near future.

**Unit 6 Only:** Hydrologic modelling for the proposed Project indicates differences in spring and late summer water levels of Arrow Lakes Reservoir at least an order of magnitude less than reservoir fluctuation due to inflows. However, the existing inventory data are not sufficient to establish the status of the sites and any possible effects upon them. A key goal of the Proponent’s Reservoir Archaeology Program is to collect data on archaeological sites that would support long-term management of all effects from reservoir operations. Implementation of this Program in the Columbia Region is planned for the near future.

**Unit 5 Only: Capacitor Station Site:** No pre-contact archaeological deposits or features were observed during excavations and it is highly unlikely that any intact archaeological deposits or features still exist within the ROW.

The terrain south of the ROW still has intact soil cover and remains heavily vegetated with mature coniferous forest. The proposed capacitor station site overlaps an existing clear-cut. This area has moderate archaeological potential related to past use as a travel corridor and also related to possible earlier human occupation adjacent to ancient Celista Creek. The terrace margins have moderate potential for intact significant
archaeological remains and consequently are vulnerable to any actions that will disturb intact mineral soil. If capacitor station construction would disturb the area adjacent to the ROW, archaeological test excavation would be necessary to sample the subsurface to ascertain the presence, condition and significance of any archaeological materials.

There would be no effect on archaeological resources during operations.

**Passive Reflector Site:** The proposed location of the microwave reflector is situated in a clear-cut above a logging road on the easterly-sloping glaciated mountainside above and to the north of the capacitor station site. This heavily disturbed area has low potential for the existence of intact significant archaeological deposits or features.

There would be no effect on archaeological resources during operations.

**Mitigation**

**Unit 5 Only:** As long as potential archaeological impacts related to construction at the Mica Creek fan and the capacitor station are appropriately addressed through the mitigation measures noted below, the Proponent did not anticipate that the proposed Project would have any residual effect on archaeological sites along the Columbia River downstream of Mica and Revelstoke Dams, within Revelstoke Reservoir, or at the capacitor station.

- The Proponent would require that an Archaeological Impact Assessment would be carried out by a qualified professional at the site of any excavations required on previously undisturbed land of medium to high potential. The Archaeological Impact Assessment would be completed in areas of high to moderate archaeological potential; and,

- **Unit 5 Only:** Prior to construction of the capacitor station, the Proponent would require that an Archaeological Impact Assessment be carried out by a qualified professional at the site and ancillary developments associated with the capacitor station where excavation will be required on undisturbed land. The Archaeological Impact Assessment will be completed in areas of high to moderate archaeological potential located outside the right-of-way.

The impact of the proposed Project on as-yet-unrecorded sites in the north end of Arrow Lakes Reservoir is unknown. Until archaeological inventory of the relevant reservoir areas is completed as a planned part of the Reservoir Archaeology Program, it is not possible to assess with any degree of accuracy the potential residual impacts of operations of the proposed Project, if any, on as-yet unrecorded sites in Arrow Lake Reservoir. Further, as noted above, discerning the incremental effects of the proposed Project in this area would be challenging due to the multiple factors influencing variability in the timing of reservoir level elevations.
Potential Residual Effects

- No residual effects were anticipated by the Proponent. However as there could be potential impacts on as-yet-unrecorded sites in the Arrow Lakes Reservoir, it is difficult to assess potential impacts of the proposed Project with certainty. Should this future monitoring identify incremental impacts directly attributable to the proposed Project, the proponent has committed to undertaking future actions appropriate to the severity of the impact using one or more of: mitigation via new or existing programs and budgets; mitigation via new or expanded project(s) within the Columbia Basin Fish and Wildlife Compensation Program; and integration of mitigation into the next review of the Columbia River WUP.

- **Unit 5 Only:** The Proponent did not anticipate residual effects at the capacitor station or reflector sites. In instances where construction could affect undisturbed areas adjacent to the existing right-of-way, identification and assessment of residual effects would depend upon results of more detailed archaeological investigations.

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

During the review of the Application, additional issues were raised by the Okanagan Nation Alliance, the Lakes Division of the Secwepemc Nation, and the Simpcw First Nation. These issues, Proponent responses, and EAO’s assessment of the adequacy of responses are summarized below and detailed in Appendix D.

Key issues identified by the Okanagan Nation Alliance, Lakes Division and Simpcw First Nation were:

- The Okanagan Nation Alliance requires a high level of participation in the protection of archaeological resources. The Okanagan Nation Alliance has a long-standing policy that requires the participation of its qualified members in any archaeological works being conducted on its territory. The Proponent must make itself aware of and respect the detailed archaeological protocols of the Okanagan Nation.
  - Proponent Response: Discussions were undertaken with the Okanagan Nation Alliance regarding archaeology and a representative of the Okanagan Nation Alliance accompanied the Project archaeologist to the site. The Proponent requests a copy of the Archaeological Protocols of the Okanagan Nation.

- How does the historical focus on archaeological studies in valley bottoms bias the Archaeological Overview Assessment’s potential to identify buried deposits?
  - Proponent Response: The Archaeological Overview Assessment does not rely solely on a statistically referenced sample in making predictions of archaeological potential. Instead a broad view of archaeological potential
takes into account the bias inherent in the existing record and applies a more holistic view of a potential archaeological landscape. It is also important to recognize that at some point in the early post-glacial period, the current shorelines (particularly of Upper Arrow Lake) are postulated to have been part of the valley bottom environment and therefore, the modern archaeological bias to these environments may be highly applicable.

- First Nations requested that their respective heritage management policies be respected if any future archaeological work is undertaken related to the proposed Project.
  - Proponent Response: A commitment was added to the table of commitments to consider applicable First Nations’ Heritage Management Policies for future Archaeological work during Mica Unit 5 Project construction.

These issues were resolved to EAO’s satisfaction as noted in Appendix D.

**Significance Analysis for Archaeological Resource Effects**

- **Magnitude:** Reservoir fluctuations (and potential for erosion of archaeological deposits) associated with the proposed Project would be minimal except in Arrow Lakes Reservoir, where incremental fluctuations would be of a similar magnitude to current fluctuations. No impacts to archaeological resources at construction sites are anticipated as long construction proceeds as planned;

- **Geographic Extent:** Potential effects to archaeological resources could occur throughout Kinbasket, Revelstoke, and Arrow Lakes Reservoirs, though the greatest impacts would occur in Arrow Lakes Reservoir;

- **Duration and Frequency:** The proposed Project would have impacts on reservoir fluctuations and shoreline erosion potential on a daily basis for the duration of operations (at least 50 years);

- **Reversibility:** Potential erosion of archaeological resources would be irreversible;

- **Context:** The proposed Project is situated in areas that have a history of significant industrial development and disturbance; and,

- **Probability:** The likelihood of the proposed Project having an impact on archaeological resources is low. The potential impact of the proposed Project on as-yet-unrecorded sites, especially in the Revelstoke Reach of Arrow Lakes Reservoir, is being addressed through the Proponent’s Reservoir Archaeology Program.

8.1.4 Conclusion

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

9 Health Effects

9.1 Noise

9.1.1 Background Information

The study area for the noise assessment proposed Project is the construction area near the Mica Generating Station including work areas and Mica townsite. This is a remote area well removed from commercial and residential communities. The nearest residences are located 100 km away, near Seymour Arm. There are also a small number of properties between Revelstoke and the Mica Generating Station along Highway 23. Mica townsite, a property owned by the Proponent and used for housing the Proponent’s employees and contractors, is located closer to the construction.

Existing noise sources consist of those generated by current activities at the Mica Generating Station, associated work areas and facilities, and Mica townsite. The Proponent concluded that full 24 hour baseline noise monitoring at the proposed Project site was not necessary for the noise assessment since there are no residences located near the powerhouse or construction sites. The Province of BC does not require a baseline noise study when there is no potential noise impact to humans (i.e., residences, communities) from an industrial activity. Potential noise effects on workers at the site would be addressed through adherence to WorkSafe BC regulations.

**Unit 5 Only: Capacitor Station:** The proposed capacitor station site is located in a remote wooded area near the community of Seymour Arm. The nearest residences are located 2.2 km to the southeast and east on the western shore of Shuswap Lake. The noise assessment study area included the site itself and the surrounding area from the fence line to a distance of approximately 1 km from the capacitor station. The highest offsite noise levels would occur at the site fence line.

Ambient noise levels are expected to be very low throughout the day and night due to the rural setting of the study area; a baseline noise level of 35 dBA was used based on the Alberta Energy Resources Conservation Board Noise Control Directive 038 (the Province of BC does not have noise standards for a new energy project and generally defers to this directive or other established noise guidelines or regulations).

The potential noise impacts of the capacitor station on areas outside the site fence line were assessed by modelling the station noise sources to determine the combined noise level of the sources at the station fence line. The combined noise level was then added to the assumed ambient noise level at the fence line (35 dBA) to estimate the composite
noise level. The estimated composite noise level was then compared to a guideline to assess the potential for noise impacts.

Since no residential homes exist within 2.2 km of the station the commercial/industrial noise criteria of composite noise level not exceeding 65 dBA at night was used for the analyses of potential impacts. This is based on the Noise Bylaws adopted by a few cities in B.C., which include an acceptable range from 60 dBA to 65 dBA.

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

Construction

The Proponent anticipated potential noise issues from on-site construction noise as well as transportation noise. Construction noise guidelines to be followed would be outlined in the Environmental Management Plans described in section 13 of the Application. On-site construction noise is not expected to be significant. Construction of the proposed Project would generate approximately 770 truck trips between Revelstoke and the Mica Generating Station over the entire construction period, as described in more detail in section 7.3 of this report. About 500 vehicles per day use Highway 23 near Revelstoke Dam, so the daily increase in vehicle traffic as a result of deliveries to the proposed Project would be small. Trucks would be fitted with legal mufflers and would comply with all Provincial Motor Vehicle Regulations.

Unit 5 Only: Noise at the capacitor station site would be generated from construction equipment and activities. Temporary diesel generators would be the primary source of construction noise and would most likely be equipped with commercial exhaust silencers. The noise level at the fence line was modelled to be 60 dBA, below the 65 dBA threshold established for this study. This noise would likely be attenuated by distance and terrain and would be inaudible at the nearest residences.

Operations

No effect on noise levels is anticipated during operations of the Mica Generating Station upon completion of construction of the proposed Project.

Unit 5 Only: The only noise source at the capacitor station would be a 100 kW stand-by generator which would operate infrequently and only for short periods of time inside the generator building. The generator would produce noise in two ways: generator noise would be audible through the building walls, and noise would be produced from the generator engine exhaust venting outside the generator building. The engine exhaust would be equipped with a silencer providing 10 dBA of noise attenuation. Composite noise of the engine exhaust, generator building, and ambient noise were modelled to be 57.5 dBA at the fence line, below the 65 dBA threshold established for this study.
Noise levels would be safe for workers without hearing protection within the capacitor station site, except inside the generator building. Hearing protection would be mandatory inside the generator building with appropriate signage according to WorkSafe BC regulations.

**Mitigation**

At the Mica Generating Station, on-site construction would comply with WorkSafe BC Regulations. Noise associated with the transportation of personnel and materials to the construction site would comply with all Provincial and Municipal Regulations and By-Laws. The Proponent does not anticipate further noise mitigation to be necessary. The Environmental Management Plans would ensure that steps are taken to ensure noise levels are within allowable levels.

**Unit 5 Only:** At the capacitor station, construction noise guidelines to be followed would be outlined in the Environmental Management Plans. Noise mitigation would be implemented so that the noise level from operation of the generator is no greater than 65 dBA at the property line. This could include installation of the generator inside a sound attenuating enclosure and/or use of a commercial grade muffler on the engine exhaust. The Proponent does not anticipate that further noise mitigation would be necessary during operations.

**Potential Residual Effects**

Noise levels around the Mica Generating Station would increase somewhat at the construction site and as a result of traffic during Project construction. The noise would be intermittent depending on the activity occurring at any given time, and was not considered by the Proponent to be significant.

**Unit 5 Only:** The potential residual impacts of generator noise during capacitor station operations were anticipated to be local in scope, low in magnitude, and short-term in duration (typically 1% of the time in a given year). Noise impacts on residents in the community would be unlikely to occur from operation of the generator, and the Proponent did not anticipate this potential residual impact to be significant.

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

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

**Significance Analysis for Noise Effects**

- **Magnitude:** Noise levels would be within construction noise guidelines and compliant with WorkSafe BC regulations;
- **Geographic Extent:** Construction noise would occur at construction sites near Mica Tailrace/Mica townsite and at the capacitor station and passive reflector sites. Traffic noise would occur in the Highway 23 corridor. **Operations noise would occur at the capacitor station site (Unit 5 Only);**

- **Duration and Frequency:** Construction noise would be intermittent and confined to the construction period. **Operation of the backup generator at the capacitor station would occur infrequently and for short durations, typically less than 88 hours per year on a permanent basis (Unit 5 Only);**

- **Reversibility:** Noise impacts would be reversible once the noise has stopped;

- **Context:** The proposed Project is situated in remote areas, distant from residential or other industrial uses; and

- **Probability:** Noise effects are probable to occur.

### 9.1.4 Conclusion

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

### 9.2 Public Health and Safety

#### 9.2.1 Background Information

The study area for the proposed Project is the construction and operations footprint and Highway 23 from Revelstoke to the Mica Generating Station site. **Unit 5 Only:** The study area for activities related to the capacitor station is the capacitor station site and immediately surrounding area. The study area for electromagnetic fields (EMF) is the existing transmission line right of way from the Mica Generating Station to the capacitor station site. These areas are where the majority of Project-related effects on public health and safety would occur.

The existing public health setting, including facilities, services and emergency services is described in section 7.2 of this report and section 9.5.2 of the Application.

The 5L71/72 transmission line exists and carries electrical energy currently generated by Mica Units 1 to 4, as discussed in more detail in section 9.9.3.3 of the Application and section 9.2.2 of this report.

There are no known baseline factors for public health in the area of the Mica Generating Station or the capacitor station given their relatively remote location and the lack of any permanent population centers or permanent inhabitants in the study area or immediately surrounding areas.
Potential effects on public health were addressed through consideration of Project information related to air quality, noise, water quality and EMF. Proximity of the proposed Project to human receptors was also considered.

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

The closest communities to the Mica Generating Station site are Revelstoke and Seymour Arm, approximately 135 km and 100 km away respectively. **Unit 5 Only:** The closest community to the capacitor station site is Seymour Arm, located approximately 14 km from the site. The closest residence to the site is approximately 2.2 km from the site. Mica townsite, which would house workers for the proposed Project, is located on land owned by the Proponent and currently houses BC Hydro workers and contractors. WorkSafe BC requirements are adhered to at the townsite and on other BC Hydro facilities associated with the Mica Generating Station, including proposed Project construction and operations.

The Proponent notes that the Mica Generating Station has been operating with four units for more than three decades without any identified public health effects, and that health and emergency services serving the area have the capacity to handle an increase in demand. The Proponent does not anticipate a notable increase in demand as a result of the proposed Project’s construction or operations.

**Air Quality**

An air quality assessment was not undertaken for the proposed Project at the Mica Generating Station given the nature of construction and operations activities that would be occurring at the site. However, an increase in dust in the area is possible during construction and this would be managed through Best Management Practices and the Environmental Management Plans referenced in the Applications. Should an increase in dust occur, it would be local, intermittent and any particular incident would be short term in nature and likely low in magnitude.

**Unit 5 Only:** An air quality assessment was undertaken for the capacitor station and the findings are contained in section 7.3 of the Application and section 5.4 of this report. Maximum predicted model results based on “worst-case” meteorology and emissions during construction and operation were compared with the most-stringent provincial and federal air quality objectives. It was determined that maximum predicted model results would still be very low compared to the objectives. Further, the predicted pollutant concentrations at the nearest industrial and residential locations where people would be present were much lower than the maximum predicted concentrations. The assessment concluded that any adverse residual effects on air quality from construction and operations would be insignificant due to their very low frequency and magnitude.
As such, the Proponent does not anticipate an impact on public health from air quality during construction or operation of the proposed Project at this site.

Noise

The noise assessment undertaken for the proposed Project’s construction and operations is contained in section 6.9 of the Application and section 9.1 of this report. The Proponent’s assessment determined that there would be intermittent residual noise during construction from construction activities and transportation but that the effect would be insignificant. During operations, there would be no noise impact at the Mica Generating Station during operations as the units would be housed inside the existing powerhouse.

**Unit 5 Only:** The noise assessment undertaken for the proposed Project’s construction and operations at the Capacitor Station site is contained in section 7.8 of the Application and section 9.1 of this report. During operations at the Capacitor Station, noise would be intermittent and associated with operation of the stand-by generator which is anticipated to operate approximately 1% of the time. The assessment concluded that, at the nearest residences on Shuswap Lake, the generator noise would be inaudible due to distance and terrain attenuation.

As such, the Proponent does not anticipate any effects on public health as a result of noise resulting from construction or operation of the proposed Project.

Water Quality

The water quality assessment undertaken for construction and operations at the Mica Generating Station is contained in section 6.2 of the Application and section 5.2 of this report. The Proponent’s assessment determined that, with implementation of Best Management Practices and the Environmental Management Plans for the proposed Project, potential impacts on water quality during construction would be minimized. Water quality impacts during operations that could affect public health are not anticipated.

**Unit 5 Only:** The water quality assessment undertaken for construction and operations at the Capacitor Station Site is contained in section 7.1 of the Application and section 5.2 of this report. It was also determined that there were no waterways or drainage channels in the footprint of the capacitor or reflector sites, and that the capacitor station site is located over 500 m from Celista Creek. As such, the Proponent determined that construction or operation of the capacitor station would not have an effect on water quality following implementation; however, a number of precautionary measures were identified in section 5.2 and would be implemented.
As such, the Proponent does not anticipate effects on public health as a result of water quality impacts resulting from the construction or operation of the proposed Project.

**Electromagnetic Fields:** Operation of the Mica Generating Station with the proposed Project would result in an increase in electrical energy being transmitted through the 5L71/72 transmission lines at certain times and this would result in an incremental increase in EMF levels along the transmission line ROW at those times. The transmission line runs through a relatively remote area and interaction between human receptors and EMF from the transmission line is rare and when it does occur, is generally for a short duration (i.e., recreationists, hunters).

Magnetic field profiles were calculated for 5L71/72 right-of-way cross section at system normal operating conditions for two scenarios: the existing conditions with four (five) units at Mica, and the addition of the proposed Project. Since the proposed Project is a peaking unit, the average annual current through the transmission lines is not expected to change when the proposed Project is added. However, there would be some increase in the annual peak and winter average loads. Maximum magnetic fields and magnetic field at the ROW edge were calculated for both scenarios in the case of normal loads, annual peak loads, and average winter loads. In all cases the magnetic fields are well below the International Commission on Non-Ionizing Radiation Protection magnetic field guidelines of 833 milligausses.

BCTC has commissioned a number of studies to review the relationship between EMF and health. In the Vancouver Island Transmission Reinforcement Decision, the BCUC directed BCTC to monitor the science and to file an update with the Commission every two years or sooner if there are major developments in the field. During the Interior to Lower Mainland Project EA, Health Canada found that the 2007 report prepared by Exponent was comprehensive, thorough, and systematic in its examination of the recent body of evidence for EMF. The most recent update to BCTC’s evaluation of peer-reviewed research and reviews by scientific panels was prepared by Exponent in January 2009. This report considered studies and information published to January 2009 and concluded that “There is no new evidence to change the conclusion of Exponent’s 2007 report that exposure to EMF from power lines has no known adverse effects on plants or animals” (Exponent 2009).

Further, Health Canada, which monitors the scientific research on EMF and human health as part of its mission to improve the health of Canadians, takes the following position: “At present, there are no Canadian government guidelines for exposure to EMF or extremely low frequency EMF. Health Canada does not consider guidelines necessary because the scientific evidence is not strong enough to conclude that typical exposures cause health problems.” (Health Canada 2004).
Given that the average annual EMF levels associated with additional currents resulting from the proposed Project would not change and the winter average and annual peak levels would still be significantly below existing guidelines both on and at the edge of the ROW, the findings of the studies reviewed in the Exponent reports, and the anticipated limited, short-term exposure of human receptors, the Proponent does not anticipate effects as a result of EMF exposure related to the proposed Project.

Mitigation

The Proponent did not anticipate that mitigation measures were required in addition to that already described in the noise, air quality, water quality and community, public, emergency service sections of this report.

Although potential or residual effects have not been identified relative to EMF, BCTC takes a number of precautionary measures including:

- continuously monitoring research on EMF mitigation techniques and new technologies through participation in various organizations and forums;
- working with the Proponent to provide a variety of public information on EMF, including magnetic field measurement kits and ongoing responses to queries;
- ongoing monitoring of scientific research and developments on EMF; and,
- maintaining a webpage containing current information on electric and magnetic fields and health.

Given that no effects or residual effects were expected as a result of EMF exposure related to the proposed Project and BCTC voluntarily takes further precautionary measures regarding EMFs associated with its facilities, the Proponent did not anticipate further actions to mitigate EMF levels.

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

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

Significance Analysis for Public Health and Safety Effects

- **Magnitude:** Potential public health and safety effects related to noise, air quality, water quality or EMF effects of the proposed Project would be of low magnitude;
- **Geographic Extent:** Public health and safety effects could occur at the proposed Project sites and transportation corridors previously described, as well as the transmission line ROW from the Mica Generating Station to the Nicola Substation;
• **Duration and Frequency:** Most public health and safety effects would be infrequent, of short duration, and confined to the construction period. During operations, average annual EMF levels would not change. However, there would be some increase in the annual peak and winter average loads. In all cases magnetic fields would be below guidelines;

• **Reversibility:** Potential impacts on public health and safety would be reversible once construction of the proposed Project were complete, with the exception of the ongoing increased EMF radiation from the transmission lines;

• **Context:** The proposed Project is situated in remote areas, distant from residential or other industrial uses; and,

• **Probability:** The likelihood of public health and safety effects due to the proposed Project is low.

9.2.4 Conclusion

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

9.3 **Healthy Living**

9.3.1 Background Information

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

Specifically, this section addresses potential implications of the proposed Project, if any, with respect to the continuation and expansion of opportunities for physical activity and various recreational pursuits in the vicinity of the proposed Project. Such opportunities would apply to anyone using or visiting the area in general, as well as workers employed at the proposed Project. Encouraging healthy living lifestyles through education can include provision of information or programs to assist employees to quit smoking address substance abuse or maintain physical fitness.
9.3.2 Project Issues and Effects and Proposed Mitigation Identified in the Application

The Application describes public use of the lands near to the Mica Generating Station site of the proposed Project as including recreational activities such as camping, hiking, boating, fishing, heli-skiing, cross country skiing, hunting, and other wilderness activities. No recreation activities take place on the proposed Project site as they are closed to the public. The area from the Mica Dam to the Blue Bridge, the area of greatest flow regime effects, is currently closed to public use and would continue to be closed upon the completion of the proposed Projects.

**Unit 5 Only:** Public use of the lands near to the capacitor station site of the proposed Project currently include water- and land-based recreational activities such as camping, hiking, cycling, swimming, boating, canoeing, fishing, wind surfing, scuba diving, hunting, skiing, snowmobiling, all-terrain vehicle riding, horseback riding, and wildlife viewing. Although the proposed Project sites are currently accessible by the public, they have been previously disturbed by logging activity and transmission line ROW clearing. Therefore, it is not likely that they are heavily used by the public given the wealth of high quality recreation areas and trail networks in the vicinity.

Consideration was also given to whether there might be opportunities to promote the expansion of existing levels of activities in the region. The Proponent would continue its ongoing practice of renting out accommodation to recreational users at the Mica townsite if/when not required for staff purposes.

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

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

9.3.4 Conclusion

Based on the above analysis, EAO is satisfied that the proposed Project is not likely to have significant adverse effects on healthy living.
PART C – FIRST NATIONS CONSULTATION

10 First Nations Consultation Report

The purpose of this part of the Assessment Report is to:

- identify First Nations potentially affected by the proposed Project;
- summarize the key issues and concerns identified by those First Nations that have established or asserted aboriginal rights, including title, to the area encompassed by the proposed Project;
- identify the asserted aboriginal rights and the *prima facie* strength of those assertions, the degree of potential adverse impact that the proposed Project might have on those asserted rights, and EAO’s view as to where on the *Haida* spectrum the proper consultative procedure should be located;
- describe the process of consultation engaged in by the Proponent, under the direction of EAO, and by EAO itself, on behalf of the Province, both preceding and during the EA of the proposed Project, and the accommodation measures that have been utilized or that are contemplated; and,
- with regard to the overall consultation and accommodation process, to describe EAO’s conclusion as to the reasonableness of the process in the circumstances and EAO’s conclusion as to whether the Crown’s duties have been discharged.

10.1 First Nations setting overview

The Proponent was directed to consult with the following First Nations and any corresponding tribal councils or associations potentially affected by the proposed Project, as stated in the procedural Orders issued for the proposed Projects in October 2008 and amended in December 2008 under section 11 and 13 of the Act:

1. Adams Lake Indian Band
2. ¿akisq’nuq First Nation
3. Bonaparte Indian Band
4. Kamloops Indian Band
5. Ktunaxa Nation Council
6. Lheidli-T’enneh Band
7. Little Shuswap Indian Band
8. Lower Kootenay Band
9. Lower Similkameen Indian Band
10. Neskonlith Indian Band
11. Okanagan Indian Band
12. Okanagan Nation Alliance
In addition to those First Nations and corresponding tribal councils or associations that the Proponent was directed to consult with, EAO also engaged with 7 Secwepemc First Nations and 1 tribal council:

1. Canim Lake Indian Band (Northern Shuswap Tribal Council)
2. Canoe Creek Indian Band (Northern Shuswap Tribal Council)
3. Esketemc First Nation
4. High Bar First Nation
5. Northern Shuswap Tribal Council
6. Ts’kw’aylaxw First Nation
7. Williams Lake Indian Band (Northern Shuswap Tribal Council)
8. Xats’ull First Nation (Northern Shuswap Tribal Council)

In finalising this list and subsequently creating this report, EAO evaluated a number of sources of information:

- any relevant information provided by First Nations to EAO (or information provided to the Proponent and passed on to EAO), through personal communications, meetings, correspondence, or involvement in the environmental assessment process (including comments received through EAO’s Working Group or public comment periods);
- treaty negotiations and other available related information from within the provincial government, such as the Ministry of Aboriginal Relations and Reconciliation and BC Treaty Commission websites, Statement of Intent maps, status (if applicable) within the treaty negotiations process, and other information on First Nation communities in B.C;
- information on the Indian and Northern Affairs Canada website, including locations of First Nation reserves/communities and statistical information on those populations;
- available individual websites of First Nation communities or tribal councils/associations;
the Proponent’s Application and supporting materials (including archaeological and traditional use/knowledge overviews commissioned by the Proponent in the proposed Project vicinity) and knowledge of the proposed Project alignment in relation to First Nations reserves or traditional territories;

available ethnographic data; and,

any traditional use-type information provided by First Nations to the Proponent and EAO, including:

a) Lakes Division - Tult: Transformation of Energy into Matter;

b) Ktunaxa Nation Traditional Use in the Upper Columbia River Watershed: A Review of the 1996 –akis”nuk Traditional Use Study Documenting Ktunaxa Activities in the Columbia River Watershed;

c) Ktunaxa Creation Story;

d) Ktunaxa First Nation and the Upper Columbia Valley from Revelstoke to Columbia Lakes: A Comprehensive Survey of Historical Documentation Relating to Aboriginal Use and Interest;

e) Little Shuswap Indian Band – Draft Mica 5 and 6 Land Use and Occupation Study; and,

f) Okanagan Nation Alliance – Draft Aboriginal Interest and Use Study prepared for the BC Hydro Mica Generating Units 5 & 6.

The EAO also determined that the proposed Project would not occupy Indian Reserve lands.

A broad inclusive approach was taken in identifying these 29 First Nations and corresponding political/tribal organizations. A detailed description of the identification process is included in section 2 (p. 2.1 – 2.6) of the Proponent’s Application. The EAO took the approach of including all First Nations with any potential for Project impacts upon their interests. The EAO is of the understanding that there are currently no cases of proven or established aboriginal rights in the proposed Project area, but that aboriginal rights have been or are likely to be claimed within the proposed Project area.

For the organizational purposes of this report, the First Nations identified above are grouped by cultural group and/or tribal council or association as listed below. First Nations who requested to be consulted through their association, or those who did not engage directly with EAO, are generally discussed as a group under their cultural group first (if applicable), or name of their tribal council or association, with any specific individual information noted when available. First Nations who are not members of a broader association (labeled below as “independent”) are considered individually.
First Nations by Nation/cultural group (including any affiliations with political organizations) or Tribal Council/Association:

**Ktunaxa Nation Council**
- ?akis?nu?k First Nation
- Lower Kootenay Band
- St. Mary’s Indian Band
- Tobacco Plains Indian Band

**Okanagan Nation Alliance**
- Lower Similkameen Indian Band
- Okanagan Indian Band
- Osoyoos Indian Band
- Penticton Indian Band
- Upper Nicola Band
- Upper Similkameen Indian Band
- Westbank First Nation

**Secwepemc Nation**
- Shuswap Nation Tribal Council
  - Adams lake Indian Band
  - Bonaparte Indian Band
  - Kamloops Indian Band
  - Little Shuswap Indian Band
  - Neskonlith Indian Band
  - Shuswap Indian Band
  - Simpcw First Nation
  - Skeetchestn Indian Band
  - Splats’in First Nation
  - Whispering Pines/Clinton Band

- Northern Shuswap Tribal Council
  - Canim Lake Band
  - Canoe Creek Indian Band
  - Williams Lake Indian Band
  - Xats’ull First Nation

- Esketemc First Nation (unaffiliated)
- High Bar First Nation (unaffiliated)
- Ts’kw’aylaxw First Nation (Lilooet Tribal Council)

**Independent Band**
- Lheidli-T’enneh Band
Some of the Secwepemc Nation bands have also been represented at various stages of the EA process by the self-described Lakes Division.

**Lakes Division**
Adams Lake Indian Band
Neskonlith Indian Band
Splats’in First Nation

**General Overview**

The EAO’s research indicates that the Plateau culture area is one of six native culture areas, in Canada, distinguished at the time of European contact. The Plateau lies between the Rocky Mountains to the east and the Coast Mountains to the west. It is a vast territory divided by the Canada/USA border. Secwepemc, Ktunaxa and Okanagan Nations are all classified as belonging to the Plateau culture area, named after the Columbia Plateau region.

Unlike the three Nations, the Lheidli-T’enneh Band is classified as belonging to the Western Subarctic culture area, an area situated just north of and adjacent to the Plateau and Plains areas.

**Ktunaxa Nation Overview**

The proposed Project is within the asserted traditional territory of the Ktunaxa Nation (see Ktunaxa traditional territory map – Application: Figure 8.1 p. 8-3). The proposed Seymour Arm capacitor station is outside Ktunaxa territory.

As a part of its Statement of Intent submission to the BC Treaty Commission in May 1993, the Ktunaxa Kinbasket Treaty Council included a map that indicates the territorial boundaries claimed by the Ktunaxa Nation Council. According to the Statement of Intent, “[t]he traditional territory of the Ktunaxa people extends from Columbia River south to Missoula, Montana, west to Bonner’s Ferry Idaho, north up to the Upper Arrow Lakes area of British Columbia and east to the Rocky Mountains.” The Statement of Intent was amended in 2000, “[t]he territory of the Ktunaxa people extends from the Big bend of the Columbia River north of Donald Station then south including all of the Kootenay sinuosities to Missoula, Montana then west to Bonner’s Ferry, Idaho then north to the Upper Arrow Lakes area of British Columbia then east across the Big Bend of the Columbia River to the eastern slopes of the Rocky Mountains.” The Ktunaxa Nation maintain on their website that traditional Ktunaxa territory spans 70,000 square kilometers located in south eastern British Columbia and included parts of Alberta, Montana, Washington and Idaho.
Various spellings are found in ethnographic sources, including Kootenay, Kootenai, Kutenai, Ktunaxa, and Ktunaha. The spelling Ktunaxa was adopted around 1990, but Kootenai or Kutenai are most widely accepted in an ethnographic context.

The Kutenai are divided into two divisions, the Upper Kutenai and the Lower Kutenai. Each division speaks a different dialect of the Kutenai language. The Kutenai language is considered by linguists to be a language isolate.

**Canadian Ktunaxa Bands (Location/Total Population)**

?akisq’nuk First Nation (Windermere/255)
Lower Kootenay Indian Band (Creston/210)
St. Mary’s Indian Band (Cranbrook/340)
Tobacco Plains Indian Band (Grasmere near Rooseville Border Crossing /173)

The Ktunaxa Nation Council is the political body that originated in 1970 as the “Kootenay Indian District Council” to promote the political and social development of Ktunaxa Nation. In 1991, the name was changed to “Ktunaxa/Kinbasket Tribal Council” to recognize the two language groups of the First Nations people living in the traditional territory (Ktunaxa and Shuswap-Kinbasket). In 2005, the Council’s name was changed to the “Ktunaxa Nation Council” following the departure of the Shuswap Indian Band (descendents of the Kinbaskets). The Shuswap Indian Band joined the Shuswap Nation Tribal Council in 2006.

As of November 2007, Indian and Northern Affairs Canada reports that the total population of registered Ktunaxa is over 1,000. There is presently no Indian Reserve in the vicinity of the proposed Projects’ study area within the Ktunaxa traditional territory. The closest Ktunaxa community to the Mica Generating Station is the ?akisq’nuk situated approximately 414 km away, by road, with a combined population of 255. The reserves associated with the ?akisq’nuk community are the closest Ktunaxa reserves to the Mica Generating Station. However, the proposed Project’s study area does include the Kinbasket Reservoir and the ?akisq’nuk reserves are approximately 144 km from the Kinbasket Reservoir.

The Ktunaxa Nation Council noted that a reference to the location of reserves is not an accurate method for defining a First Nation’s traditional use and occupancy of lands and resources or its traditional territory. In addition, the Ktunaxa Nation Council believes the study area should include the Columbia River watershed, including all tributaries from Columbia Lake to Mica Creek. On this basis the Ktunaxa Nation Council argue the community of ?akisq’nuk is within the study area.

The Ktunaxa Kinbasket Treaty Council was created by the citizens of the Ktunaxa Nation to negotiate a treaty with the governments of Canada and British Columbia. The
Ktunaxa Kinbasket Treaty Council and the governments of Canada and BC are now in Stage 4 of the treaty process to negotiate an Agreement-In-Principle.

**Okanagan Nation Overview**

The proposed Project is within the asserted traditional territory of the Okanagan Nation. The **proposed Seymour Arm Capacitor Station is outside Okanagan territory**.

The asserted traditional territory of the Okanagans (also spelled Okanogans), or “Syilx” in their indigenous language, spans an area of approximately 69,000 square kilometers in BC from Mica Creek north of Revelstoke and the upper end of the Arrow Lakes area, to the eastern boundary of Kootenay Lake, to south of Wilbur in Washington State and west to the Nicola Valley near Nicola Lake in BC (see Okanagan traditional territory map – Application: Figure 8.2 p. 8-5).

Various Okanagan communities form the Okanagan Nation Alliance, based in Westbank. The Okanagan Nation Alliance provides governance to the seven Canadian member bands in BC which are located throughout the Okanagan Valley in BC.

The seven Canadian member bands of Okanagan Nation have a combined membership of approximately 5,000 registered members.

**Okanagan Nation Bands (Location/Total Population)**

- Lower Similkameen Indian Band (Keremeos/461)
- Okanagan Indian Band (Vernon/1,735)
- Osoyoos Indian Band (Osoyoos/459)
- Penticton Indian Band (Penticton/922)
- Upper Nicola Band (Merritt/866)
- Upper Similkameen Indian Band (Keremeos/68)
- Westbank First Nation (Kelowna/664)

Currently, the Westbank First Nation is the only member band of the Okanagan Nation Alliance involved in the treaty process. The Westbank First Nation, although affiliated with the ONA, entered into bilateral treaty negotiations in 1990 with Canada, independent of the ONA. The Westbank First Nation now has a self-government agreement under the federal Inherent Right to Self-Government Policy. The **Westbank First Nation Self-Government Act**, which implements the Westbank Self-Government Agreement, was passed by Parliament and became law on May 6, 2004 and came into force on April 1, 2005. BC is not a party to the agreement. In January 1994, the Westbank First Nation entered the tripartite treaty process with Canada and BC. Negotiations were suspended in 2001 but resumed in 2003. The parties are in Stage 4 of the process, negotiating an Agreement-in-Principle, however, negotiations were suspended by the Westbank First Nation in November 2009.
All seven of the Canadian Okanagan member bands, and their reserve communities, are situated in the southcentral region of BC in the Okanagan Valley, outside the vicinity of the study area for the proposed Projects. Communities of the Okanagan Indian Band and Westbank First Nation are situated closest of the Okanagan Bands to the proposed Project study area:

- Okanagan Indian Band has six reserves in total and the main community is the Okanagan Indian Reserve #1, situated north of Vernon, between the north end of Okanagan Lake and the Salmon River, approximately 300 km from the Mica Generating Station, by road; and
- Westbank First Nation has five reserves in total, all situated near Kelowna, on the west side of Okanagan Lake, approximately 340 km from the Mica Generating Station, by road.

Secwepemc (Shuswap) Nation Overview

The site of the proposed Project is within the asserted traditional territory of the Secwepemc Nation. The Seymour Arm Capacitor Station would be exclusively within Secwepemc territory ("Secwepemcull’uw") and situated near three Secwepemc bands: Adams Lake, Little Shuswap and Neskonlith.

“Shuswap” is the anglicized word for “Secwepemc” meaning “the spread-out people”. Anthropologists classify the Secwepemc as Interior Salish. Their language, Secwepmeectsin (Secwepemc/Shuswap), has two dialects, eastern and western. According to many sources the eastern dialect is spoken east of Kamloops, and the western dialect is spoken by the remaining Secwepemc people.\(^9\)

The Secwepemc boundaries are said to encompass 145,000 square kilometers of land lying between the Fraser River and the Rocky Mountains, and extending from the Upper Fraser River in the north to approximately the Arrow Lakes in the south (see Secwepemc traditional territory map - Application: Figure 8.3, p.8-6).\(^10\)

Secwepemc Nation is made up of the indigenous peoples of 17 Indian Act bands. The collective interests of 14 bands are today represented by either the Shuswap Nation Tribal Council, based in Kamloops, or the Northern Shuswap Tribal Council, formerly known as the Cariboo Tribal Council, based in Williams Lake. The Shuswap Nation

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Tribal Council was formed in 1980 and represents the interests of ten bands; the Northern Shuswap Tribal Council represents the interests of four other bands. The Shuswap Nation Tribal Council and Northern Shuswap Tribal Council are non-profit political organizations established to act on behalf of their First Nations membership to facilitate collective consultations and negotiations between the member First Nations and other governments in all areas including self-government, aboriginal rights, land claims and economic, social, cultural and educational development. Pavilion Band is represented by the Lilooet Tribal Council. The two remaining First Nations, Esketemc First Nation and High Bar First Nation, are independent of any tribal council or association. The following tables identify the approximate locations and populations of each Secwepemc member band:

**Shuswap Nation Tribal Council Secwepemc Member Bands (Location/Total Population):**

- Adams Lake Indian Band (Chase/728)
- Bonaparte Indian Band (Cache Creek/794)
- Little Shuswap Indian Band (Chase /309)
- Kamloops Indian Band (Kamloops/1,050)
- Neskonlith Indian Band (Chase/591)
- Shuswap Indian Band (Invermere/231)
- Simpcw First Nation (Barriere/640)
- Skeetchestn Indian Band (Kamloops/484)
- Splats’in First Nation (Enderby/757)
- Whispering Pines/Clinton Band (Kamloops/130)

**Northern Shuswap Tribal Council Secwepemc Member Bands (Location/Population):**

- Canim Lake Indian Band (100 Mile House/560)
- Canoe Creek Indian Band (Dog Creek/671)
- Williams Lake Indian Band (Williams Lake/539)
- Xats’ull First Nation (Williams Lake/354)

**Lilooet Tribal Council Secwepemc Member Bands (Location/Population):**

- Ts’kw’aylawx First Nation (Lilooet/502)

**Independent Secwepemc Member Bands (Location/Population):**

- Esketemc First Nation (Williams Lake/495)
- High Bar First Nation (Clinton/72)

Early in the pre-Application phase of the EA, EAO was advised that various Secwepemc bands have formed additional affiliations within Secwepemc Nation and that it is the preference of those bands involved that EAO also consults with their other affiliations, in

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Mica Generating Station Unit 5 (Unit 6) Project – March 1, 2010
addition to the Shuswap Nation Tribal Council, on a separate government-to-government basis.

Within Secwepemc Nation, some but not all Bands are engaged in the BC Treaty Commission six-stage treaty process. The Northern Shuswap Tribal Council and Esetkemc First Nation entered the treaty process in, respectively, June 1994 and December 1993, and both sets of negotiations are now in stage 4, working toward an Agreement-in-Principle. No Shuswap Nation Tribal Council member band is currently engaged in negotiations with Canada and BC with regards to a treaty. Until this past summer, when it received approval from the BC Treaty Commission to withdraw from the BC Treaty process, the Shuswap Indian Band continued to engage in treaty negotiations, under its historical and ongoing affiliation with the Ktunaxa/Kinbasket Treaty Council. The Ts'kw'a'yelaxw First Nation and High Bar First Nation are not currently engaged in the treaty process.

The total population of on-reserve Shuswap Nation Tribal Council members is approximately 934. Presently, the closest Shuswap Nation Tribal Council communities to the study area, by road, are Enderby Reserve #2, Neskonlith Indian Reserve #2, Quaaout Indian Reserve #1 and Sahkatlkum Indian Reserve #4; by road, each of these Shuswap Nation Tribal Council communities is at least 250 km from the Mica generating Station. The latter three reserves are situated near Chase, about 100 km from Seymour Arm, the general location of the capacitor station associated with the proposed Mica Generating Station Unit 5 Project:

- Enderby Reserve #2 is the main community of three reserves of the Splats’in (Spallumcheen) First Nation, located on the Shuswap River at the mouth of Fortune Creek, in Enderby, about 256 km from the Mica Generating Station. Enderby Reserve #2 has a population of 353 (Statistics Canada);
- Neskonlith Indian Reserve #1 is the main community of three reserves of the Neskonlith Indian Band, located on the South Thompson River just below Little Shuswap Lake, near Chase. Neskonlith Indian Reserve #1 has a population of 85 (Statistics Canada);
- Quaaout Indian Reserve #1 is the main community of five reserves of the Little Shuswap Indian Band, located between Shuswap and Little Shuswap lakes, near Chase. Quaaout Indian Reserve #1 has a population of 186 (Statistics Canada); and
- Sahkatlkum Indian Reserve #4, of the Adams Lake Indian Band, is situated on the Thompson River, near Chase. It has a population of 310 (Statistics Canada).
Lheidli-T'enneh Band Overview

The Lheidli-T'enneh Band’s asserted traditional territory covers an area of approximately 4.3 million ha in the Rocky Mountains in the interior of BC and includes the northern portion of Kinbasket Reservoir. The Statement of Intent area for the Lheidli T’enneh band is shown in the Application as Figure 8.4 (p. 8-7). The traditional territory of the Lheidli T’enneh Band covers the north end of Kinbasket Reservoir which is part of the proposed Project study area.

The Lheidli-T'enneh is a Carrier-speaking First Nation. They were “the people from the confluence of two rivers [a reference to the Nechako and Fraser rivers]”, who traditionally occupied and used the land around Prince George, west of the Alberta border. Today, Lheidli territory encompasses several forestry districts and it is an area that supports many activities of the forestry industry.

The Lheidli-T’enneh Band has approximately 320 members (2006), 100 of whom live in Shelley. The majority of the members now live in Prince George (Lheidli-T’enneh Final Agreement), once the site of a Lheidli village.

The Lheidli-T’enneh Band was affiliated with the Carrier Sekani Tribal Council until 1993. Since then, it has been politically independent. The Lheidli-T’enneh Band was one of the first to file with the BC Treaty Commission. Treaty negotiations began with the filing of their Statement of Intent on December 16, 1993 by the Lheidli-T’enneh Community Treaty Council. The Council submitted recommendations in 2006 but ratification of the proposed final agreement was unsuccessful.

10.2 Key issues and concerns

Table 2-25 (page 2-71 to 2-73) and section 8 of the Proponent’s Application summarize issues and interests raised by First Nations during pre-EA and pre-Application phase consultation activities (which commenced in January 2008). During all stages of the EA, which commenced in March 2008, issues raised by First Nations to EAO were forwarded to the Proponent for tracking and response. Issues raised by First Nations during the EA process are therefore included in the Proponent’s First Nations issues tracking tables, attached to the Assessment Report as Appendix D.

Fairly early in the EA process two groups of Shuswap Nation bands informed EAO that they would like to be consulted on a government to government basis instead of through the EAO Working Group. One group consisted of the Little Shuswap, Simpcw First Nation, Whispering Pines/Clinton and Shuswap Indian Band and was represented by legal counsel. The other group referred to itself as the Lakes Division and consisted of the Adams Lake Indian Band, Neskoniith Indian Band and the Splats’in First Nation. A number of communications and meetings have occurred between these two groups and
EAO separately over the course of the EA process. The issues raised in these letters and meetings have been broad in scope and generally have been related to perceptions as to the inadequacy of the EA process. The EAO has responded to letters and attended meetings, and in doing so it clarified aspects of the EA process, including its flexibility to work with First Nations to address all relevant concerns (whether in the Working Group forum or through additional government-to-government meetings), and stated the Province’s position that the EA process is consistent with the Crown’s duty to consult about and accommodate (as required) aboriginal rights.

The Lakes Division in commenting on this report has stated that it does not see the separate discussion between the EAO and the Lakes Division regarding the Project outside of the Working Group to be government to government consultation since the federal or provincial government are not engaged. The federal government was engaged in the EA process until they determined there would be no federal trigger under the Canadian Environmental Assessment Act. The Project Assessment Director as a representative of the provincial government and a delegated statutory authority under the BC Environmental Assessment Act agreed to consult with the Lakes Division on a government to government basis. As previously mentioned to the Lakes Division, if it disagrees with this draft assessment report it has the opportunity to submit a separate submission to EAO to be included in the package of materials sent to the Ministers when the Projects are referred for decision.

Existing Infrastructure

One issue raised by a number of First Nations is related to what has been described by First Nations as alleged past infringements. Before construction of the dams built under the Columbia River Treaty (Mica, Duncan, and Hugh L. Keenleyside), many First Nations communities had built their societies and ways of life around the Columbia River. These First Nations assert that the original construction of the Columbia River Treaty dams and subsequent creation of associated reservoirs constitute a significant infringement of aboriginal rights and title. Several First Nations are of the view that the proposed Projects constitute an expansion of the existing Mica Generating Station and that the original construction of Mica Dam and creation of Kinbasket Reservoir should be included in the EA process. The EAO informed these First Nations that claims for damages and other redress in relation to the original construction of the Mica Dam and Kinbasket Reservoir are not part of EAO’s assessment of the potential adverse impacts of the proposed Projects.

Adequacy of EA timelines and consultation processes

Some First Nations expressed the view that EAO did not provide sufficient time during the pre-Application phase to support a fulsome review and provision of comments on
key documents such as the draft section 11 Order and draft TOR. There were several
invitations to comment on the draft section 11 Order between August and October 2008,
including two extensions to the original deadline of September 2, 2008 (to September
11, 2008 then September 24, 2008, with a final notification on September 29, 2008 that
comments must be in by mid-October) before they were issued to the Proponent on
October 28, 2008. The intent was to ensure that First Nations had reasonable
opportunity to provide comments on the proposed Project procedural Order and the EA
itself.

There were also several invitations to comment on the draft Terms of Reference for the
Application to ensure that the Proponent would address all relevant issues in its
Application. Specifically: on June 24, 2008, a request was made for comments by July
25, 2008; deadline was extended to October 3, 2008; further notification in October
2008 that comments could be provided within the public comment period time frame of
October 29, 2008 to November 28, 2009; final notification was made on December 3,
2008 that the documents would be approved by December 19, 2008, unless EAO had
heard that there needs to be further discussion on the draft Terms of Reference; as no
further comments were received prior to that date the Approved Terms of Reference
were issued on December 19, 2008.

The Proponent also took steps to encourage further engagement with First Nations in
January, 2009, by delaying submission of the Application for an EA Certificate by
approximately three months (March 15, 2009 to June 15, 2009) for the following
reasons:

- First Nations and Tribal Councils had requested more time to review Project
  information and to engage in consultation;
- the Proponent was making important progress with a number of First Nations
  who had not engaged early on in the process, and decided that it was important
to provide more time to facilitate the participation of these First Nations;
- additional time would be available for First Nations and/or Tribal Councils to
  complete work towards submitting traditional or aboriginal interest and use
  Information; and
- Project studies were nearing completion and it was important to provide First
  Nations and Tribal Councils an opportunity to identify specific aboriginal interest
  which may be potentially affected by the proposed Project, and incorporate their
  comments into the Applications.

The Proponent then further delayed its submission of the Application until July 27, 2009.

Similarly, several First Nations expressed the view that the consultation process offered
by EAO is not adequate, and that negotiation of shared management arrangements,
consultation protocols and formal participation in the decision-making process is
required before the Crown’s duty to consult can be discharged. The EAO is of the view that many means of participation and input are offered that meet the Crown’s duty to consult.

Federal participation in EA process

An issue identified by several First Nations is the absence of Fisheries and Oceans Canada in a decision-making role in the EA process. Due to the presence of *Species at Risk Act*-listed fish (e.g. white sturgeon and Columbia sculpin) in the Columbia watershed and the potential impact of the proposed Project on those fish through entrainment or altered hydrologic regimes, these First Nations feel that Fisheries and Oceans Canada must be involved as a decision-making authority in the EA.

The EAO invited federal participation from agencies including Fisheries and Oceans Canada early in the review process. Following a review of the description of the proposed Project and field survey data, Fisheries and Oceans Canada concluded that the proposed Project would not result in any harmful alteration, disruption or destruction (HADD) of fish habitat and would therefore not require an authorization under the *Fisheries Act* that would trigger a federal EA under CEAA.

Fish Entrainment: First Nations identified concerns related to fish entrainment (fish passing through turbines of the generating units in Mica Dam), for both the four existing generating units and the two proposed generating units. The Proponent's Mica-Revelstoke Fish Entrainment Strategy Action Plan (MRFESAP) is intended to address First Nations concerns related to entrainment of both existing and proposed generating units and forms the basis for a section 32 authorization that the Proponent is seeking under the federal *Fisheries Act* for all twelve generating units at Mica and Revelstoke Generating Stations. The Proponent has completed the Preliminary Assessment Phase of the MRFESAP (first of four phases). First Nations have highlighted several uncertainties within the action plan process that were identified in the first phase of the MRFESAP as well as uncertainties as to whether the plan will be completed and whether it will adequately mitigate and/or compensate fish entrainment through Mica Dam. First Nations contend that entrainment constitutes a significant infringement on aboriginal rights. The Mica-Revelstoke Fish Entrainment technical committee reviewed modelled representations of incremental impacts on fish entrainment of additional unit capacity at Mica Dam and found them to be negligible, although there were several uncertainties identified.

The Proponent’s MRFESAP is currently in the Detailed Assessment Phase (the second phase of four). The Proponent has committed to implementing the objectives of the Detailed Assessment Phase of the action plan for Mica and Revelstoke, with an approval of $1.1 million funding (including contingency) scheduled to be spent by
December, 2013 (commitment 37, commitment 36). First Nations have requested that the Proponent commit to carrying out the third phase of the MRFESAP (the feasibility phase) as part of the Mica Units 5 and 6 EA Certificates. The Proponent has stated that it prefers not to make commitments related to all twelve generating units at Mica and Revelstoke Generating Stations in EA Certificates that apply only to Mica Units 5 or 6. However, the Proponent has written a letter to EAO to reiterate their commitments already stated in the MRFESAP and outline its intentions to execute all phases of the MRFESAP as warranted by the results of the process. The Proponent has stated that they are committed to completing the MRFESAP through the federal regulatory process in which they intend to obtain a section 32 Fisheries Act authorization. The Proponent will consider additional funding to support First Nations through the remaining phases of the MRFESAP to be included as a component of benefit agreement discussions in support of the Projects.

Cumulative impacts

Some First Nations also called for an expansion of the scope of the EA to require a study of the cumulative impacts of changes to the overall Columbia watershed due to the Proponent’s operations. This request was based on the view that the EA of the incremental impacts of the proposed Projects in isolation from other operations in the Columbia watershed is not adequate to evaluate potential heritage impacts or infringements to aboriginal rights and title.

Cumulative effects assessments were completed generally following CEA Agency methods as set out in the Terms of Reference, which were approved in December, 2008, before EAO’s cumulative impacts approach was developed. The Terms of Reference state that the following items must be addressed in the Application:

- describe the approach, methods and information, used to identify and assess the cumulative environmental effects of the proposed Project;
- identify existing and foreseeable future projects considered for inclusion in the cumulative effects assessment;
- describe the combined effects of the proposed Project and other projects for the assessment areas being considered; and
- provide a summary of the cumulative effects assessment and of commitments to ongoing monitoring and adaptive management.

The EAO is of the view that these requirements were adequately addressed in the Application.
Employment opportunities

Several First Nations expressed concerns relating to First Nations involvement in potential economic opportunities and social benefits that would result from the construction and operation of the proposed Project. The Proponent was requested to include a description of the economic conditions in affected First Nations communities in the Applications and means by which the proposed Project could contribute to the improvement of such conditions. First Nations also indicated interest in becoming involved in sub-contracting opportunities and bids as well as direct participation in the labour force and associated training opportunities. In particular, First Nations highlighted their professional capacity to be involved in proposed Project fieldwork and monitoring studies.

Details of the Proponent’s approach to facilitating employment, income and business benefits to First Nations are provided in section 8.3 of the Applications. The Proponent commits to advertising and informing interested First Nations Bands in the Columbia Region about proposed Project job opportunities and the hiring process in advance of construction, as well as allocating a maximum of $60,000 to training programs for each proposed Project (however, this training funding would not be exclusive to First Nations). In support of First Nations participation in major contracts, the Proponent will, through contract language, include provisions to support employment, contracting and subcontracting to competitive, qualified First Nations businesses, if available (commitments 26-29, 44) (commitments 17-19, 30, 38).

Additional key issues raised by First Nations through involvement in the EA process were:

- management of information regarding heritage resources
- further detail requested to assess the adequacy of hydrologic models used to define the area of potential impacts;
- methodologies for obtaining baseline data;
- potential downstream impacts of the additional 3000 cfs water license associated with the proposed Mica Unit 6 Project;
- potential impacts to fish and fish habitat; and
- potential impacts to vegetation, wildlife and terrestrial habitat.

These issues and other First Nation concerns were addressed in more detail in Working Group meetings held in the Application review stage. Details of specific comments, the Proponent’s responses, and EAO’s assessment of the adequacy of those responses are attached to the Assessment Report in Appendix D.
As noted above, all 33 First Nations and organizations that the Proponent was directed to consult with and that EAO dealt with directly were kept informed and given opportunities to provide input throughout all stages of the EA process (see below, section 10.4, for more detail). The EAO is confident that the issues that were raised have been appropriately addressed within the EA process and are accurately summarized above and in the attached or referenced tracking tables.

10.3 Discussion of Aboriginal Rights (Including Title)

10.3.1 Ktunaxa Nation Council

Member First Nations: ?akisq’nuk
   Lower Kootenay Band
   St. Mary’s Indian Band
   Tobacco Plains Indian Band

The Ktunaxa Nation Council has been involved with the proposed Project from the start and has participated in the Proponent’s Core Committee process and the EA process attending Working Group meetings and the Mica Dam site tour. Ktunaxa Nation Council provided comments on the section 11 Order and the draft Terms of Reference for the proposed Project in the pre-Application stage and on the archaeological, socio-economic and terrestrial components of the Application during the Application Review stage.

The Ktunaxa Nation Council stated in a December 18, 2009 letter to EAO that the Ktunaxa Nation has Aboriginal rights and title to the proposed Project area.

The EAO has offered to the Ktunaxa Nation Council to be consulted on a government-to-government basis, and the Ktunaxa Nation Council expressed some interest at the September 9, 2009 Working Group meeting. A government to government meeting was held with the Ktunaxa Nation Council on November 6, 2009 and January 7, 2010 to discuss its issues with the proposed Projects.

The Ktunaxa Nation Council in commenting on a draft of this report do not agree with the EAO assessment of the proposed Project’s minimal impacts and state that there is a significant potential for adverse effects on Ktunaxa aboriginal rights. “The Ktunaxa Nation Council Lands and Resources Council has determined that the proposed MRFESAP is an appropriate way to begin to address entrainment impacts on fish populations harvested in Ktunaxa Nation fisheries, it is clear that there is a high degree of uncertainty that these impacts will be fully mitigated and/or compensated.” The Ktunaxa Nation Council do acknowledge that “Based on the modeling approaches and assumptions used, the assessment also indicated that the proportion of upstream bull trout, kokanee, and burbot populations entrained annually may be less with the addition
of the fifth and sixth units that is currently with four units. However, this conclusion is highly uncertain.”

The Ktunaxa Nation Council provided a report on ‘Ktunaxa Nation Traditional Use in the Upper Columbia River Watershed: A Review of the 1996 –akis”nuk Traditional Use Study Documenting Ktunaxa Activities in the Columbia Watershed.’ The report notes the high degree of Ktunaxa fishing use of the study area, which included the Columbia River watershed upstream of Mica Dam. Key finding include that of the 102 ATUS interviewees, 45 (44.1%) identified fishing places within the Upper Columbia watershed. Four sites were specifically identified by interviewees as places for salmon fishing. These sites include the Columbia Lake, Dunbar Creek, Windermere Lake, and Kicking Horse River.

**History/Ethnography Overview**

The first record of the Kutenai having contact with Europeans was made in 1792 when Peter Fidler met a small party of Kutenai east of the Rocky Mountains. However, two indirect aspects of contact had transformed Kutenai culture in the preceding decades. Firstly, smallpox arrived in Kutenai territory in the 1780s killing between one third and two thirds of the population according to various estimates. Secondly, the introduction of the horse, which arrived on the Interior Plateau from Mexico via aboriginal trade networks, had a significant impact on Plateau cultures. It allowed the Upper Kutenai greater access to the foothills on the east side of the Rocky Mountains, where they came increasingly under the influence of the Plains culture.

David Thompson’s expedition arrived in Kutenai territory in 1807, and for the next five years they used Kootenay House near Lake Windermere as their trading post. Father De Smet began ministering to the Kutenai in the 1840s, and is often credited with improving the Kutenai relations with the Lakes and other neighbouring nations. A mission was briefly established at St. Mary’s in the 1850s. However, it was not until the 1860’s that the geographically isolated Kutenai country felt the impact of colonization. The area was explored by the Palliser expedition in the late 1850s and by Walter Moberly and James Turnbull in 1860, leading to the construction of a road and the arrival of settlers.

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16 Palliser, Captain John. *Further Papers Relative to the Exploration by the Expedition under Captain*
Allan Smith believed that Kutenai culture was not greatly altered by the effects of contact until the last quarter of the 19th century,\textsuperscript{17} and Brunton claimed that their traditional life ways remained intact at least up to the 1860s.\textsuperscript{18}

Traditionally, the Kutenai consisted of two fairly clearly defined divisions with their own dialects: the Upper Kutenai and the Lower Kutenai.\textsuperscript{19} These designations refer to their relative location on the Kootenay River. Despite some separation in culture and dialect between the Upper and Lower Kutenai, and the political independence of the bands, Turney-High found that “Kutenai think of themselves as one people”.\textsuperscript{20}

One often repeated observation about the Kutenai, and particularly the Lower Kutenai, is that they were a riverine culture, oriented to the flat bottoms of river valleys.\textsuperscript{21} The river was a transportation corridor for both canoe and snowshoe travel, and according to Schaeffer, seasonal fluctuations in the river were markers for shifts in economic activity as well.\textsuperscript{22} Nevertheless, the ethnographic record also shows that the uplands were extensively used for a variety of purposes.

Schaffer reported on the importance of fishing among the Lower Kutenai in comparison to the supplementary component that fish provided among the Upper Kutenai.\textsuperscript{23} Fish was a staple food among the Lower Kutenai. According to Bouchard and Kennedy, the Lower Kutenai did obtain salmon from friendly neighbouring territories, however, it was not a significant part of the Lower Kutenai diet.\textsuperscript{24} Apart from spearing salmon at Columbia Lakes, the Upper Kutenai fished largely for variety in a meat-based diet.\textsuperscript{25}

\textsuperscript{18}Brunton 1998:233.
\textsuperscript{19}Sometimes also referred to as the East Kutenai and West Kutenai.
\textsuperscript{22}Brunton 1998:223.
\textsuperscript{24}Bouchard and Kennedy 2000:295. Further to this, Chance concluded that: “a few of the lower Kutenai did move seasonally to the salmon fisheries on the lower river between the lake and the Columbia, and also to Kettle Falls, at any rate after the Hudson’s Bay Company established itself there. But to fish and
According to Turney-High, the Kutenai employed traps and weirs when engaging in “really serious… economic fishing.” Upper Kutenai weirs, built only after receiving permission from the chief, were owned by the individual and operated non-communally. Likewise, according to Turney-High, the fish were the property of the man who built the weir, but such property was infected with a public utility aspect. This aspect, with its recognition of public ownership of natural resources, and hence public interest in the results of the catch, was strong among the Upper Kutenai, but much weaker than among the Lower bands.

Where the Lower Kutenai were known more for fishing with weirs and traps, the Upper Kutenai were known to be specialists in line and spear fishing.

Schaffer reported on the use of canoes by the old Columbia Lakes people and the importance of fish to them.

Barnaby and Stanley state that...these Kutenai were known as Krtna from fact that they stretched a holelegging over the nose of their canoe made of bark, when river was full of ice, in order to prevent damaging it... They lived more on fish than on game and travelled down the Columbia to Golden and beyond in canoes. They were frequently visited by Kutenai to the south, if the latter wished to trade or secure fish.

According to Turney-High, the Kutenai fished the following species: bull trout (Dolly Varden Char); pea mouth; salmon; squaw fish; sturgeon; sucker; trout; and whitefish. Schaeffer added ling and sucker to this list.

Hunting was very important to Kutenai survival, both for food and for skins. Allan Smith describes four distinct patterns of Kootenay subsistence: a pre-contact, pre-horse period, when hunting, fishing, and gathering took place year-round within the Kootenay territory; followed by a pre-horse (pre-eighteenth century) period when certain Kootenay near the mountains began venturing east of the Rockies in winter to hunt bison on foot; a late prehistoric horse period, when horses were used to hunt bison on the plains in summer; and an early post-contact period when horses and firearms were used in hunting bison.

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25 Schaeffer 1940:30.
26 Turney-High 1941:46-49.
27 Turney-High 1941:47.
28 Turney-High 1941:45; Chamberlain 1892:21.
30 Turney-High 1941:45; Schaeffer 1940:31.
31 Schaeffer 1940:31.
Before bison hunting became a priority, the deer was the most important animal hunted by the Kootenay. Once bison hunting became a priority, deer remained the next most important animal to the bison. Elk and caribou were hunted individually and were important sources of food and hides. According to Turney-High, mountain goat and moose were hunted occasionally, but weren’t a major part of the economy, as they were difficult to hunt. Schaeffer notes that antelope also were of little importance to Kutenai but were occasionally hunted for their flesh. Bighorn sheep and mountain goat were found in the Rockies and were therefore available only to the Upper Kutenai, according to Schaeffer. Other animals that were hunted include otter, weasel, wolf, coyote, skunk and grizzly bear. Bear ceremonialism was also practiced, particularly with grizzly. A wide variety of birds were also hunted, including ducks, geese, gulls, eagles and grouse. Sea gulls were abundant on the Kootenay lakes and rivers.

Information about Ktunaxa gathering practices is limited. Teit recorded in 1930 that the Lakes people gathered huckleberry, an important lakes plant food, along the north side of the Kootenay River. In the 1980s, the Chief of the Creston Band, Chris Luke, provided information that tiger lily, wild onion, wild carrots, wild potatoes, bracken root, wild clover, flowering raspberries, salmonberry, Saskatoon berry and hazel nuts were traditionally harvested in the Creston Valley. Turney-High included service berry, huckleberry and choke berry among those berries significant to the Ktunaxa economy, as well as bitter root and black moss. Schaeffer also included elderberry, Oregon grape, thimbleberry, gooseberries, strawberry, blueberries, blackberries, willow berries, silver berries, rose hips and bull berries.

According to many sources the Kutenai were a semi-nomadic people who travelled across their traditional territory on a seasonal basis. During the spring and summer the bands would split into smaller family-based groups and travel to fishing, hunting and resource gathering grounds. In the fall large groups of Upper Kutenai travelled east to hunt bison in the foothills of the Rockies and on the Plains. Similarly the Lower Kutenai

33 Turney-High 1941:39-40. The Kutenai did not like elk meat, according to Turney-High’s informants, but they hunted them more for their hides than for meat.
34 Turney-High 1941:40-41.
35 Schaeffer 1940:26.
36 Schaeffer 1940:29.
39 Turney-High 1941:41-42.
42 According to Schaeffer, service berries were often dried in the sun and stored. Less often “the Tobacco Plans women pounded them in coiled baskets traded from the Lower Kutenai” (1940:44).
43 Turney-High 1941:34; Schaeffer 1940:43.
44 Schaeffer 1940:44.
participated in communal deer drives in the fall. The Kutenai returned to their winter village sites before the first snowfall. The Upper Kutenai also participated in a smaller mid-winter bison hunt travelling on foot using snowshoes.

The Upper Kutenai traded mainly with the Lower Kutenai. Teit mentions there was a small amount of trade between the Shuswap and Kutenai; this was mainly with the Lower Kutenai.

Kutenai traditional territory is documented in a number of historical and ethnographic texts and maps. However, there are differences regarding the northern boundary of the Ktunaxa territory and there appears to be no consensus amongst historians and ethnographers regarding whether the proposed Project’s study area lies within Ktunaxa territory.

Dawson and Tolmie’s map of 1884 is the first to show the broader traditional territories of aboriginal groups. In this map the Kutenai territory is bound on the west by the Selkirk Rang and on the east by the Rocky Mountains. It extends south into the United States and as far north as Boat Encampment on the Big Bend in the Columbia River.

In 1941, Turney-High published what is known to be the most complete ethnography on the Kutenai. Turney-High reported that the Kutenai thought of themselves as one people. Chief Paul of Tobacco Plains provided Turney-High with the description of the Kutenai territory. Turney-High found that the Tobacco Plains considered their own band territory, which straddles the BC-Montana border, “the center of ‘real Kutenai country’”. Turney-High concluded that this was most likely the case at one time. Turney-High described the general Kutenai territory boundaries: on the north the Kutenai consider their land to be marked by a small stream which runs into the Columbia on the other side of Golden or at about Donald, B.C.; the eastern boundary was clearly marked by the Rocky Mountains; the southern boundary in Montana according to the Tobacco Plains and Elmo people, was as far south of the bend of the Kootenay as the forest region went; the extreme southern edge is Bonner’s Ferry; westward face of the range extended to the western shore of Arrow Lake but Turney-High received conflicting information about the status of the land between Kootenay Lake and Arrow Lakes.

Reserves were officially allotted in 1884 to the Ktunaxa and Kinbaskets by Reserve Commissioner Peter O’Reilly who noted Chief Isidore’s assertion regarding how far north the Ktunaxa reserve should extend to:

45 Turney-High 1941:196.
47 Turney-High 1941:23.
The Chief stated, again and again, that he would not accept any limits to his reservations, unless they included the whole valley of the Kootenay, and Columbia rivers (from the International boundary line) and followed the base of the Rocky Mountains to the Boat landing on the Columbia river.

Kutenai were a physically and culturally isolated group whose relations with neighbouring culture groups were generally hostile. The Upper Kutenai hunted bison and other large game on the eastern slope of the foothills, but were strongly resisted by the Blackfoot. This territorial conflict was exacerbated by the introduction of horses, which allowed Kutenai easier access to the foothills. On the western side of their territory, the Kutenai experienced conflict with the Lakes people who lived on the Arrow Lakes. A number of altercations occurred over a disputed fishing site near the mouth of the Slocan River on the West Arm of Kootenay Lake. There is also some evidence that the Kutenai were in territorial conflict with the Secwepemc, as well as with the Stoney Indians of the Plains. When the Shuswap-Kinbasket group migrated to the Upper Columbia in 1840s, they encountered resistance from the local Kutenai. The Shuswap-Kinbasket allied themselves with the Stoney Indians who had been asserting a right to use the Upper Columbia but who had also been resisted by the Kutenai.

The Kutenai evidently attempted to assert exclusive territorial rights to at least a portion of the upper reaches of the Columbia River. Most ethnographers understood Ktunaxa territory to extend along the upper reaches of the Columbia as far north as Donald at the south end of Kinbasket Lake. However, Teit’s map of Secwepemc territory completely overlaps this area between Kinbasket Lake and Lake Windermere. In the second half of the 19th century, relations between the Shuswap-Kinbasket and the Ktunaxa improved and intermarriages occurred, leading to an affiliation of the Kinbasket with Ktunaxa society and less so with their Shuswap relatives.

According to the Ktunaxa Nation Council, ethnographer Claude Schaffer’s notes include the observation that “the Columbia Lakes would move as far north as Golden and even to Yellowhead Pass” (which is approx. 88 km north of the Mica dam) and that “The Columbia Lakes were never attacked by Shuswap shamans” [Vol. VI, p.52]. This indicates according to the Ktunaxa Nation Council an amicable sharing of territory began after the Ktunaxa agreed to the Shuswap-Kinbasket settling in the Windermere area.

The Ktunaxa Nation Council also note the repeated references by Shelagh Dehart in her book, *The Kinbasket Migration and Other Indian History* to the fact that the Kinbasket Shuswap were scared to travel into the Columbia River and Valley area.

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49 Turney-High 1941:23, 35; Brunton 1998:225
51 Teit 1909:467.
52 Teit 1909:467.
which she refers to as “Kootenay County”, even fearing for their lives.\textsuperscript{53} She further suggests that such journeys were undertaken against the express wishes of the Shuswap elders, who had forbidden travel into “Kootenay Country”. According to the Ktunaxa this clearly shows the Ktunaxa were both willing and able to defend their territory.

Shelagh Dehart’s book also describes in some detail the nature of the Kinbasket Shuswap migration into the Ktunaxa territory in the upper Columbia. The Ktunaxa note that relevant extracts from this book indicate (i) that the Columbia River area was not their (Kinbasket Shuswap) traditional territory; (ii) that the Columbia River area was actively defended Kootenay territory; and (iii) that the Kootenay took careful note of the incursions of the Kinbasket Shuswap.

The overlap with the Shuswap Nation in the Upper Columbia region as well as reports of conflict with the Shuswap in this area suggests that this was a shared resource gathering area pre-contact. Dawson noted the Kinbasket people as living near the head of the Columbia River and identified this location as being “in the midst of Kooteny country.”\textsuperscript{54} However, James Teit, in his study of the Shuswap, reported that the migration of the Kinbasket Shuswap (Shuswap Indian Band) into the Lake Windermere area in the 1840s did not extend Shuswap territory, as that region was used by the Shuswap for hunting and resource gathering “as far back as tradition goes.”\textsuperscript{55} In addition Dawson noted that the Stoney were in the habit of fishing and gathering berries on the upper Columbia at the time of the Kinbasket migration, likely in the early 1840’s.\textsuperscript{56} In addition, although the Ktunaxa claim the upper reaches of the Columbia to the northern end of Kinbasket Reservoir, it appears this region was also used as a resource gathering area by the Shuswap and Stoneys. This suggests that the Ktunaxa would not likely be able to demonstrate exclusive pre-sovereignty occupation of the Kinbasket Reservoir area which is a critical criterion for establishing aboriginal title.

Conclusions

It is likely that the Ktunaxa would be able to support a claim to aboriginal resource-gathering rights in the Upper Columbia watershed up to and including the Kinbasket Reservoir. Specifically, EAO is of the view that there is a strong \textit{prima facie} case in support of the assertion that the proposed Project area was part of the broader territory used by the Ktunaxa people at the time of contact.

\textsuperscript{53} Dehart, Shelagh Palmer Kinbasket, and Dehart, Dusty. The \textit{Kinbasket Migration and Other Indian History}, Palliser Printing, Invermere, B.C., 2006.
\textsuperscript{55} Teit, 1909:462
\textsuperscript{56} Dawson, 1892:5
In terms of the *prima facie* case in support of the Ktunaxa title claim in relation to the Mica Dam and Kinbasket Reservoir area, EAO assesses the strength of that case as being weak. As noted, EAO is not aware of any historical evidence which shows that the proposed Project area was exclusively used and occupied by the Ktunaxa people; it appears that the proposed Project area was utilized by a number of different groups at the time of sovereignty; and the proposed Project area is located at a considerable distance from the core of Ktunaxa territory to the south, such that it is unlikely that the Ktunaxa had an intention and capacity to retain exclusive control of the proposed Project area at the time of sovereignty.

In any case given the proposed Projects’ minimal impacts there is very low potential for adverse impacts on those Ktunaxa aboriginal rights. The EAO concludes that the required duty to consult with the Ktunaxa Nation falls on the low to middle end of the *Haida* spectrum.

Notwithstanding the above, EAO has engaged in deep consultation by providing all information and opportunities for comment, by affording opportunities for involvement with all stages of the EA to all 33 First Nations/organizations (including the Ktunaxa Nation Council and member bands), by offering to meet individually with elected representatives of any First Nation that requires specific discussions of asserted aboriginal rights and title outside of the Working Group forum, and by providing this report to show that First Nations’ concerns were considered. The EAO continues to work to engage the Ktunaxa Nation Council and member bands and all other potentially affected or interested First Nations in this EA.

Through the EA of these proposed Projects, EAO has considered the potential aboriginal rights (including title) of the Ktunaxa people in the area of the proposed Projects and the information available to support the strength of claim to those rights. The EAO has also considered the potential for the proposed Projects to adversely impact such aboriginal rights, based on the proposed Projects being implemented in accordance with the Project Description in the Application, and on the avoidance and mitigation measures and commitments made by the Proponent. The EAO and the Proponent have been engaged in consultation efforts with the Ktunaxa Nation Council and its member bands, through their political/tribal organization and directly, from the early stages of the EA of the proposed Projects. The goal was to jointly discuss asserted aboriginal rights (including title), potential for adverse impacts, and the development measures to mitigate or appropriately accommodate those rights. The Ktunaxa Nation Council and its member bands have been given an opportunity to review and comment on this consultation report and to specify the nature and scope of their aboriginal rights from their point of view.
With reference to the above, EAO concludes that the process of consultation has been carried out in good faith, and that it was appropriate and reasonable in the circumstances. The EAO also concludes that the potential for adverse effects on potential aboriginal rights has been or will be avoided, mitigated or otherwise accommodated to an appropriate level such that the proposed Projects should not significantly adversely impact the members of the Ktunaxa Nation in exercising these aboriginal rights. The EAO believes the process of consultation and accommodation has reasonably balanced consideration of potential impacts on aboriginal rights with consideration of the necessity for the proposed Projects as well as consideration of the other areas mandated by the Act (health, heritage, economic, environmental, and social impacts).

10.3.2 Okanagan Nation Alliance

Member First Nations:  Lower Similkameen Indian Band
                        Okanagan Indian Band
                        Osoyoos Indian Band
                        Penticton Indian Band
                        Upper Nicola Band
                        Upper Similkameen Indian Band
                        Westbank First Nation

In a letter to EAO date October 17, 2008 the Okanagan Nation Alliance makes reference to the “...established and recognized Okanagan Aboriginal rights, including our right to hunt, fish and harvest.” The Okanagan Nation Alliance also referred to “other” recognized rights. The EAO in a letter dated October 24, 2008 to the Okanagan Nation Alliance requested that the Okanagan Nation Alliance identify these other recognized rights. The Okanagan Nation Alliance responded on December 5, 2008 that “As for other rights which may be adversely affected through the development of the Mica Project, we expect that this information will come to light as the information gathering process continues.” The EAO did not receive any further information from the Okanagan Nation Alliance with respect to these “other” recognized rights so in a letter dated July 24, 2009 EAO wrote to Okanagan Nation Alliance asking if the information regarding these “other” recognized rights are now available and to date EAO has not received any response. The EAO is aware that the Province has admitted that the Okanagan have an aboriginal right to harvest timber, for domestic purposes, in the traditional territory of the Okanagan.

Regarding aboriginal title, EAO previously requested any information from the Okanagan Nation Alliance of exclusive pre-sovereignty occupation of Mica Dam and the reservoir area by the Okanagan people. In a December 5, 2008 letter Okanagan Nation Alliance stated that the evidence of their title is the subject of a preliminary assessment and subsequent information gathering. The EAO requested again in a July 24, 2009
letter whether the Okanagan Nation Alliance is now able to share this information. As of February 17, 2010, EAO has not received any information from the Okanagan Nation Alliance on this matter.

The EAO is aware of historical records and accounts describing the Okanagan culture and society in which individual bands had greater autonomy and a sense of defined territories. Further, the Okanagan Nation Alliance is not currently participating in the BC Treaty Commission process, although one member nation, Westbank First Nation, is negotiating independently within the treaty process. The Westbank First Nation’s Statement of Intent map, setting out its asserted traditional territory, is far from the area of the proposed Project alignment, in the vicinity of Lake Country, Summerland, New Denver and Slocan. Due to this information, EAO is unable to conclude whether aboriginal rights are likely to be claimed on a collective or individual band basis and has therefore attempted to consider both possibilities in determining the consultation duty to the Okanagan First Nations.

The ONA’s comments centered on the alleged inadequacies of the EA process to fully discharge the Crown’s duties of consultation and accommodation. The EAO has responded by stating the Province’s position that the EA process is equipped to appropriately address and accommodate aboriginal interests or rights and fully discharge the duty to consult and uphold the honor of the Crown. The EAO did provide capacity funding to the Okanagan Nation Alliance in the 2008/09 fiscal year for the proposed Project. The Okanagan Nation Alliance has participated in the Proponent’s Core Committee process and the EA process attending Working Group meetings and the Mica Dam site tour. Okanagan Nation Alliance provided comments on the section 11 Order and the draft Terms of Reference for the proposed Project in the pre-Application stage and on the Application during the Application Review stage. The Okanagan Nation Alliance territorial map, noted in section 10.1 does not include the Seymour Capacitor Station.

In commenting on a draft of this report the Okanagan Nation Alliance through their legal counsel requested that the EA be delayed until their AIUS work for these proposed Projects has been completed. The EAO did receive a draft AIUS from the Okanagan Nation Alliance on February 5, 2010 that has been considered in drafting this section. In addition the Okanagan Nation Alliance commented that the EAO has relied on irrelevant and unacceptable criteria to assess the Okanagan’s strength of claim. As an example the Okanagan Nation Alliance state that EAO has relied on the physical distance of the proposed Project area from Okanagan Nation Alliance member communities as a measure of strength of claim (However, in fact the EAO has not relied on the physical distance of the proposed Project area from Okanagan Nation Alliance member communities to determine the Okanagan’s strength of claim).
ONA’s legal counsel also state that EAO relied on ONA’s shortage of resources and insufficient time to gather information in order to underestimate the Okanagan Nation’s strength of claim. The EAO does not accept this argument and takes the view that it has acted honourably and that all of its timelines and requirements have been clearly announced and reasonable timelines have been used.

Further the ONA’s legal counsel assert that this report is fundamentally flawed since the EAO did not consider the effects of the original construction of the Mica Dam and Kinbasket Reservoir. The EAO has considered this submission and has informed First Nations that it is of the view that claims for damages and other redress in relation to the original construction of the Mica Dam and Kinbasket reservoir are not part of EAO’s assessment of the potential adverse impacts of the proposed Project.

History/Ethnography Overview:

The following is an excerpt from the ONA’s website57 (copied on December 22, 2009):

Traditionally, Okanagans (syilx) occupied an area which extended over approximately 69,000 square kilometres. The northern area of this territory was close to the area of Mica Creek, just north of modern day Revelstoke, BC, and the eastern boundary was Kootenay Lake. The southern boundary extended to the vicinity of Wilbur, Washington and the western border extended into the Nicola Valley.

"S-Ookanhkchinx" in the Okanagan language translates to mean "transport toward the head or top end this refers to the people traveling from the head of the Okanagan Lake to where the Okanagan river meet the Columbia river. In other words Okanagan Lake and Okanagan River as well as other water systems were the traditional transportation routes of the syilx.

The Okanagan people were hunters and gatherers, and were noted to be semi-nomadic. Their staple diet consisted of deer, salmon, rabbit and other wild game. The Okanagans were also gatherers of roots, berries and various other plants.

The first contact with the Okanagans was probably made in the late 1700’s through the Hudson’s Bay Company. One of the first actual contact dates was recorded in 1805 at Fort Kamloops. The Hudson’s Bay “brigade trail” led right through the Okanagan’s territory, from Fort

57 http://www.syilx.org
Kamloops to Fort Colville, presently know as Colville, Washington, U.S.A.

The Okanagan Nation Alliance Aboriginal Interest and Use Study (AIUS), Draft January 2010, was completed for the Mica Generating Station Unit 5 and Unit 6 Projects. The document notes that the study gives a broad historical overview of how the Syilx used the land, water systems, and resources in the upper Columbia River from south of the US border to north of Mica Dam. The AIUS states the impacts of the Mica Dam must also be understood within the context of cumulative impacts of the Columbia dam system. For example, the various dams along the Columbia River caused extensive flooding that destroyed aquatic diversity and prime wildlife habitats, in addition to submerging First Nation cultural sites.

The AIUS states that the Syilx are one nation united by the Nsyilxcen language and that based on linguistic research, the different dialect groups occupying the Columbia River Basin include:

- Northern Okanagan, who occupy the land in the Okanagan Valley north of Oroville and include the Douglas Lake area;
- Colville/Kettle, who occupy the Kettle Valley to the Great Kettle Falls;
- Arrow Lakes, who occupy the Arrow Lakes down to Kettle Falls. This group is also known as Sinxt;
- Slocan, who occupy the Slocan down to Chewelah;
- Similkameen/Methow, who occupy the Similkameen Valley from Princeton to the south, bordered by Methow;
- San Poil, who occupy the San Poil River to where it meets with the Columbia River;
- Southern Okanagan, who occupy the lands surrounding the Okanagan River to where it meets with the Columbia.

A number of critical interests of the Okanagan people are stated in the AIUS including:

- Environment: water quality (erosion), water quantity (fish habitat), soils, vegetation, terrestrial habitats;
- Socio-economy and culture: title and rights, travel routes, village sites, oral tradition;
- Resource use: gathering, hunting, and wildlife, fishing; and
- Archaeology

The AIUS states that in addition to the numerous Syilx trails throughout the Columbia region, there were also many Syilx camps, villages, and settlements along the Columbia River from Kettle Falls up to Big Bend and into the headwater of the Columbia River.
According to Bouchard (2000), James Teit’s field notes contain a lengthy discussion of Syilx occupancy of the Columbia area. An excerpt of Teit’s field notes reproduced in Bouchard (2000:119) illustrate this. He notes:

Abt 1850 they occupied at least 28 main camps inside of B.C. along Columbia River and Arrow Lakes from the Boundary Line up to Revelstoke, Kootenay River up to a little above Nelson, & in the Slocan, and Trout Lake districts etc. These camps (in some cases they may be called villages) had each a [?] number of families made their head quarters, some having many more people than others. They themselves & all the tribes bordering them claim the tribe has occupied the [?] [this?] country from time immemorial & there is no signs of their having arrived in the country at any later date than other tribes, and everything points to their long occupancy.

The AIUS further states “that the area at the mouth of Tonkawatla Creek was named skxikntn, and is a known village site near where the present day Revelstoke is located. This area was used for trading, trapping, hunting, fishing, and gathering plants for food and medicine. This village was accessed by northern Okanagan people way of the Tonkawatla Creek and the Three Valley Gap. Today, many families from the Okanagan Indian Band continue to go to Revelstoke to gather resources, especially medicinal plants and berries.”

Syilx place names in the Columbia River are noted in the draft AIUS including K’lsnxtl’utlhxtn a place for Big Bend/Boat Encampment north of Mica. The draft AIUS notes the critical importance of this Syilx site and additional information is expected to be forthcoming in subsequent drafts as final research continues.

In addition there is a list of plants that were traditionally used and continue to be a part of contemporary life of the Syilx people. It is noted that the Syilx people have a keen interest in protecting and maintaining the populations of these plant species in their territory.

Regarding hunting the draft AIUS states “The eastern part of Syilx territory sustains animal life that was traditionally used and continues to be a part of contemporary life of the Syilx people. Just like plants, animals are used for food and materials. Seasonal hunting has offered an abundance of food sources for the Syilx people since pre-historic times. Today, the Syilx people still travel to the Arrow Lakes area to hunt in the autumn of each year. The animals hunted in this area include mountain caribou, mule deer, moose, whitetail deer and elk. Furbearers were plentiful in the past, including mink, beaver, lynx, bobcat, cougar, marten, weasel, and badgers. However, populations of many previously abundant species have declined due to hunting and habitat loss in post-contact times. “

The draft AIUS notes the importance of archaeological sites and that they are a cultural resource of great significance to the Syilx people and that they are committed to ensuring that all archaeological sites within the area are protected.
The draft AIUS states “Fishing in the Syilx territory provides a productive resource of many different species. The most valued and prized are the various species of salmon due to their great abundance in the many rivers and streams that flow through the Syilx territory. Syilx people have always travelled to reach productive fishing grounds... According to the Syilx legend, Coyote punished the Syilx people by damming the Similkameen River from the fish that could have sustained their simple diet. As a result, Syilx people have had to travel to fill their winter storage of fish. Today, the Syilx people trade with their neighbours or take time out from their regular livelihoods to prepare fishing camps at the Thompson River, Nicola Lake, Okanagan Lake and its tributaries, Arrow Lake, the Columbia River, and Kootenay Lake water systems to exercise their traditional fishing.

Elders speak about the abundance of salmon that existed on the Columbia River prior to the extensive damming projects that have occurred along this waterway. The plentiful and immense size of the salmon was well known and they were considered to be a major food source to the Syilx People. Fishing camps were established at many locations with target species including salmon, Bull Trout, Dally Varden, white fish, Kokanee, and squaw fish. In the late 1920s anthropologists Franz Boas and James Teit documented fishing camps at various locations along the Columbia River and other waterways. Today, the Okanagan Nation Fisheries Commission is playing an active role in the restoration of fish species in the Okanagan and Columbia River Basins.”

The AIUS further states “Water is essential for the exercising of Syilx aboriginal rights. As with the land, the water of the Columbia basin has never been ceded or surrendered to any entity. Furthermore, the dams on the Columbia River system are operating in the absence of approval from the Okanagan Nation and without the recognition and reconciliation of aboriginal title to the water.”

In the written evidence of the Okanagan Nation Alliance provided to the BC Utilities Commission on November 13, 2009 it notes that the northern extent of Okanagan territory is near Revelstoke. In addition it notes that the Okanagan used and occupied the Columbia River valley and its tributaries from near present-day Revelstoke in the north, south into present-day Washington State.

The Okanagan Nation Alliance has indicated that the Arrow Lakes Band also known as the Sinixt or Lakes Peoples among other names, are part of the Okanagan Nation and share Syilx culture, social structure and laws, and that they are not extinct and their descendants are members of the various Okanagan Bands represented by the Okanagan Nation Alliance. A report prepared in 1985 by ethnographic scholars Randy Bouchard and Dorothy Kennedy states that the Sinixt are culturally distinct from the Okanagan Nation Alliance.
The Mica Generating Station is located 135 km north of Revelstoke. Revelstoke is situated within a territory that appears to have been historically used by the Sinixt or Lakes people before the onset of the 20th Century. It would appear today most Sinixt people reside on the Colville Reservation in Washington State, and are registered members of the Colville Confederated tribes. In 1956 the federal government declared the Sinixt to no longer exist in Canada. The province lacks information regarding the Sinixt as to the basis for any claim that there is a communal group in British Columbia which would qualify as an “Aboriginal peoples of Canada” within the meaning of section 35(1) of the Constitution Act, 1982.

Conclusions

The Okanagan Nation Alliance draft AIUS notes that Big Bend/Boat Encampment near Mica was a Syilx site of critical importance, however, EAO is not aware at this time of any references in the ethnographic and historical sources in support of the assertion that the proposed Project area was part of the territory used by the Okanagan people at the time of contact. Also given the proposed Project’s minimal impacts there would be a very low potential for adverse impacts on any aboriginal rights. The EAO concludes that the required duty to consult with the Okanagan Nation falls on the low end of the Haida spectrum.

Notwithstanding the above, EAO has engaged in deep consultation by providing all information and opportunities for comment, by affording opportunities for involvement with all stages of the EA to all 33 First Nations/organizations (including the Okanagan Nation Alliance and member bands), by offering to meet individually with elected representatives of any First Nation that requires specific discussions of asserted aboriginal rights and title outside of the Working Group forum, and by providing this report to show that First Nations’ concerns were considered. The EAO continues to work to engage the Okanagan Nation Alliance and member bands and all other potentially affected or interested First Nations in this EA.

Through the EA of these proposed Projects, EAO has considered the potential aboriginal rights (including title) of the Okanagan people in the area of the proposed Projects and the information available to support the strength of claim to those rights. The EAO has also considered the potential for the proposed Projects to adversely impact such aboriginal rights, based on the proposed Projects being implemented in accordance with the Project Description in the Application, and on the avoidance and mitigation measures and commitments made by the Proponent. The EAO and the Proponent have been engaged in consultation efforts with the Okanagan Nation Alliance and its member bands, through their political/tribal organization and directly, from the early stages of the EA of the proposed Projects. The goal was to jointly discuss asserted aboriginal rights (including title), potential for adverse impacts, and the
development measures to mitigate or appropriately accommodate those rights. The Okanagan Nation Alliance and its member bands have been given an opportunity to review and comment on this consultation report and to specify the nature and scope of their aboriginal rights from their point of view.

With reference to the above, EAO concludes that the process of consultation has been carried out in good faith, and that it was appropriate and reasonable in the circumstances. The EAO also concludes that the potential for adverse effects on potential aboriginal rights has been or will be avoided, mitigated or otherwise accommodated to an appropriate level such that the proposed Projects should not significantly adversely impact the Okanagan Nation Alliance bands in exercising these aboriginal rights. The EAO believes the process of consultation and accommodation has reasonably balanced consideration of potential impacts on aboriginal rights with consideration of the necessity for the proposed Projects as well as consideration of the other areas mandated by the Act (health, heritage, economic, environmental, and social impacts).

10.3.3 Secwepemc Nation

Member First Nations

Shuswap Nation Tribal Council:
- Adams Lake Indian Band
- Bonaparte Indian Band
- Kamloops Indian Band
- Little Shuswap Indian Band
- Neskonlith Indian Band
- Shuswap Indian Band
- Simpcw First Nation
- Skeetchestn Indian Band
- Splats’in First Nation
- Whispering Pines/Clinton Band

Member First Nations

Northern Shuswap Tribal Council:
- Canim Lake Band
- Canoe Creek Indian Band
- Williams Lake Indian Band
- Xats’ull First Nation

Member First Nations

Esketemc First Nation (unaffiliated)
- High Bar First Nation (unaffiliated)
- Ts’kw’aylaxw First Nation

The Shuswap Nation Tribal Council provided a letter in response to EAO correspondence that “The Shuswap Nation Tribal Council, unless otherwise directed by

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58 Affiliated with the Lilooet Tribal Council
the Council of Chiefs, is not considered a consulting body for the purposes of discussing, negotiating, or entering into agreements or contracts as accommodation measures in relation to the infringement of the rights and title of the community members of Secwepemc Nation. For consultation purposes, we ask that you contact the Chief and Council of the individual Band to begin the consultation process.”

It is EAO’s understanding that, from the Secwepemc Nation perspective, aboriginal rights including title is held by the Nation as a whole, with individual communities being recognized as the appropriate representatives of the Nation relative to certain areas. The Shuswap Nation Tribal Council and its member bands are not currently participating in the BC Treaty Commission process. The EAO is not aware of the existence of any maps delineating the specific asserted traditional territory of its member nations with one exception (Simpcw First Nation). Further, it is EAO’s understanding that the proposed Seymour Arm Capacitor Station is in the traditional area of the Little Shuswap, Neskonlith and Adams Lake First Nations.

In correspondence with EAO dated November 17, 2008, four Secwepemc bands (Shuswap Indian Band, Simpcw First Nation, Little Shuswap Indian Band, Whispering Pines/Clinton Band) represented by legal counsel state that they, and in fact, “all Secwepemc Peoples … each asserts unique and distinct aboriginal rights and aboriginal title”. The nature of the claim of “unique and distinct” aboriginal rights and title was not clarified. The EAO has requested clarity regarding the aboriginal rights and title asserted in the proposed Project area at the meeting with these four bands on Feb 3, 2009 and in a letter dated September 1, 2009.

The Simpcw First Nation provided information to EAO on September 28, 2009 on its asserted traditional territory within the broader Secwepemc asserted traditional territory. This information indicated that Simpcw asserts aboriginal title to a large area that includes the Mica Dam and a large portion of the Kinbasket Reservoir but not the proposed Seymour Arm Capacitor Station site.

In correspondence with EAO dated September 29, 2008, three First Nations referring to themselves as the Lakes Division asserted rights on behalf of the Lakes Division; however, the rights were not stated. The EAO followed up with a letter dated October 17, 2008 requesting an explicit identification of asserted rights. On July 14, 2009 the Lakes Division submitted two documents to EAO: “A Drop of Rain and Coyote”, and “Tult – Transformation of Energy into Matter”. This latter submission reviews the history of the Secwepemc Nation and refers to the Lakes Division. An updated submission of “A Drop of Rain and Coyote” dated October 24, 2009 was submitted to EAO. In commenting on this draft report the Lakes Division state it has utilized the proposed Projects’ area for activities such as hunting, fishing and gathering and that the Secwepemc have aboriginal rights and title to the Project area.
The Lakes Division, in correspondence dated August 19, 2009, stated its view that the environmental assessment should be re-commenced. The EAO responded to the Lakes Division on August 29, 2009, stating that EAO will continue to carry out the environmental assessment for the proposed Projects. The EAO also requested that the Lakes Division confirm that it is regarded within the Nation as the representative of Secwepemc interests in the area of the proposed Project. In commenting on this report the Lakes Division state that it is a representative of the Secwepemc as described in government reports concerning recognition of divisions of the Secwepemc. The Lakes Division also state that in addition to its traditional use study that was completed and submitted to EAO, it would be necessary for government to provide additional time and funding to transcribe their oral histories and the Lakes Division has not had the time or money to undertake this work.

Further the Lakes Division, in commenting on this report, state that there are three main flaws with EAO’s process and approach to consultation: the ability to influence the EA process; a lack of consideration of issues relevant to section 35 rights and cumulative effects; and delaying the timing of consultation and failure to meaningfully integrate consultation into the EA process. In EAO’s view these issues have been meaningfully addressed in meetings and correspondence with the Lakes Division and have also been commented on in section 10.2 of this report. The EAO takes the view that it has on behalf of the Province acted honourably and that all of its timelines and requirements have been clearly announced and that reasonable timelines have been used.

The Lakes Division also state that the Sexqeltkemc Lakes Division is one of seven divisions within the Secwepemc Nation that is recognized by the Ministry of Attorney General’s report on the Secwepemc dated October 28, 2009. However, the Ministry of Attorney General’s Report citing the work of James Teit does not make reference to the Lakes Division as described (Splats’in, Neskonlith and Adams Lake) but does recognize a Shuswap Lake Division consisting of the Splats’in (Spallumcheen), Neskonlith, Adams Lake and Little Shuswap.

The proposed Projects are in, or near, asserted territories of additional groups noted below, but appear to be outside core areas of interest. The Northern Shuswap Tribal Council, also known as Northern Secwepemc te Qelmucw (NSTQ) or Cariboo Tribal Council, is based in Williams Lake, representing four member bands in treaty negotiations with the provincial and federal Governments. These four bands are part of the larger Secwepemc Nation, sharing a traditional territory described in section 10.1. A Statement of Intent submitted to the BC Treaty Commission indicates asserted territories in the area bounded approximately by the communities of Quesnel, Clinton, Alexis Creek, Clearwater, and Valemount. All material for the proposed Projects has been forwarded to the NSTQ and member bands. Two member bands of the NSTQ have
communicated to EAO that that the proposed Project lies within the Secwepemc territory covered by the Shuswap Nation Tribal Council member bands.

The independent or unaffiliated Secwepemc bands have been forwarded all proposed Project materials to date and have not engaged in the proposed Project EA.

Since no specific aboriginal rights claims or current uses in the proposed Project area have been identified by the Shuswap Nation Tribal Council or member bands, by the Northern Shuswap Tribal Council or member bands, or by the independent Secwepemc member bands, it is assumed for the purposes of this report that asserted aboriginal rights relative to the proposed Project area include hunting, fishing and gathering as well as title.

History/Ethnography Overview:

The Secwepemc maintain that the boundaries of their territory enclose 145, 000 square kilometres of land, from the Fraser River in the west to the Rocky Mountains in the east, and from the Upper Fraser in the north to approximately the Arrow Lakes in the south.59 Ignace accords the Shuswap 180,000 square kilometres of land in the same area, and describes it as stretching "from near the Alberta border west of Jasper to the plateau west of the Fraser River, and southeast to the Arrow Lakes and the Columbia River."60

James Teit located the Shuswap between 50º 30’ and 53º north, and between the Fraser River in the west and the Rocky Mountains in the east. He mentioned that the territory was crossed by three major rivers, the North and South Thompson and the Fraser and observed that most Shuswap people lived in the valleys of those rivers and their main tributaries.61

In a brief review of the territories and hunting grounds of interior peoples, Teit included the following, slightly more detailed description of Shuswap territory:

East bank of Fraser river from Alexandria to Lillooet, Williams Lake and country east to Rocky mountains, North and South Thompson Rivers Shuswap (sic) & Kamloops Lakes. Spallumcheen and headwaters of Columbia and Big Bend.62

Teit also delineates the territories occupied by each of the Shuswap divisions. He stated that the people of the North Thompson region were known as "people of the upper reaches or top". He described their hunting territory as “part of the big bend of

59 www.secwepemc.org
60 www.secwepemc.org; Ignace, Shuswap p. 203; Ignace and Ignace, Traditional, p 380.
62 Teit, James, Hunting Grounds and Territories of Interior Indian Tribes, n.d., n.p. (BCA, MS-1425, Reel A-246)
the Columbia, part of the Rocky Mountain region (around the head of the Athabasca), and the Upper Fraser country north towards the head of Smoky River nearly to latitude 54º.\textsuperscript{63} The North Thompson Division currently includes the Shuswap (Kinbaskets) Band and the Simpew or North Thompson Band.

For the Shuswap Lakes Division Teit wrote that this group included people on the Upper South Thompson River, at Shuswap Lake and on the Spallumcheen River. They hunted

South along the Salmon River, north on Adams Lake to the Columbia above Revelstoke, and east around Mabel and Sugar Lakes to Upper Arrow Lake. Sometimes they hunted even beyond the latter in the mountains east of Lardeau and Nakusp.\textsuperscript{64}

In 1909 Teit noted in a letter to Franz Boas that about 15 miles north of Revelstoke the territory belonged to the Shuswap.

There has been a fair amount of archaeology done within the boundaries of the traditional territory claimed by the Secwepemc. Within this territory archaeologists have found evidence of human occupation dating to more than 8000 BP. Similarities between cultural artifacts and items described ethnographically are recognized from 1200 BP.

The Secwepemc were subdivided into territorial divisions, and further organized into bands. Ignace defines the bands as:

\begin{quote}
...loosely knit networks of extended families and households centered around the habitual use and occupation of camping grounds, winter village sites and hunting, fishing and gathering grounds.\textsuperscript{65}
\end{quote}

In their discussion of Shuswap villages Ignace and Ignace remarked that by the mid-1800’s disease had reduced the number of main villages from thirty to seventeen.\textsuperscript{66}

Teit provides a list of Shuswap bands and principal villages. One of those was the Kinbaskets: No main village is identified for this group and Teit records that they were once “more or less nomadic”. Their territory where they spent winters, is given as between Golden and Windermere in the Columbia valley. The Kinbaskets took their name from their first chief but according to Teit were originally from more than one

\begin{footnotesize}
\begin{enumerate}
\item Teit, Shuswap, p.454.
\item Ibid, p.455.
\item Ignace, Marianne and Ron Ignace., The Secwepemc: Traditional Resource use and Rights to Land in Bruce Morrison and C. Roderick Wilson eds., Native Peoples, the Canadian Experience, Don Mills: Oxford University Press, 2004., p. 382.
\end{enumerate}
\end{footnotesize}
band: Upper and Lower North Thompson bands, the Adams Lake band and the Shuswap Lake band. These people are now known as the Shuswap band.

Teit states that Kenpe’sket and “fifty or sixty friends” from the same division migrated to the head of the Columbia River via Canoe River. They were familiar with that territory having previously used it for hunting, although it was a territory that belonged to the Kootenay. Once settled the Kinbaskets formed an alliance with the Stony people, some of whom, Teit noted, “were in the habit of going to the Columbia River in the fall to fish for Salmon”. Through this alliance the Kinbasket gained the assistance of the Stony against the Kootenay, should the Kootenay try to force them out of their territory, and the Stony would receive assistance from the Kinbasket should the Kootenai interfere with their customary access to resources in the area. Teit put the date of the Kinbaskets’ move at about the early 1840s. Teit also wrote

Neither did the settlement of the Kinbaskets on the Upper Columbia really mark any change or extension of the tribal boundaries, as that region was hunted over more or less by Shuswap parties as far back as tradition goes.

Dawson also noted the Kinbasket people, who he described as an isolated group of Shuswap living near the head of the Columbia River. Dawson identified this location as being “in the midst of Kooteny country”. Today the Ktunaxa state that the Kinbasket were given permission to stay in their territory.

Walter Moberly, the Surveyor General of British Columbia and Dominion Government Engineer-in-Charge of Exploratory Surveys of the Rocky Mountain district visited the area in the early-to-mid 1860s and had extensive contact with Chief Peter Kinbasket. On September 1, 1866, Moberly wrote:

…reached Kinbaskit’s [sic] crossing at 10:40 a.m. …I…ran down to Kinbaskit’s [sic] fishing station, …where we found about 15 Indians employed drying salmon… These Indians are a portion of the Shuswap tribe (from Little Shuswap Lake), and settled here about 20 years ago.

Moberly identified several geographic features by the chief’s name: Kinbasket Lake, Kinbasket’s Crossing, Kinbasket’s trail and Kinbasket’s Fishing Station.

67 Teit, Shuswap, p. 460.
69 Ibid, p. 462.
70 Dawson, 1892. p. 6.
71 www.ktunaxa.org
72 Moberly, W., Journal of the second year’s work and Exploration in the Country between the 49º and 58º Parallels of N. Latitude and the 115º and 120º Meridians of W. Longitude in Columbia River Exploration, Reports and Journals relating to the Government Exploration for the Country lying between the Shuswap and Okanagan Lakes and the Rocky Mountains, Victoria: Government Printing Office, 1866:17-18. The date of settlement, using Moberly’s dates, would have been around 1846.
73 Moberly 1866:4, 20.
Moberly described “Kinbaskit” as the Chief of the Shuswaps and noted that he had a thorough knowledge of the country from Wild Horse creek to Boat Encampment and thence to Colville…He has taken horses down the right bank of the Columbia River, to the southerly end of Kinbasket Lake, and thence over the mountains to Jordan Creek from which point he followed the Indian trail (described by me last year) to Seymour…”

Moberly, and Turnbull, who was also investigating the surrounding territory, appear to have relied on Kinbasket’s local knowledge. In his journal Turnbull wrote that on September 12th he

travelled up the Columbia and about 9 a.m. came across an Indian on horseback, who directed me to where the Indians were encamped. On reaching where I found about 30 Kootenay Indians engaged fishing…Hired a horse from one of them, and started downstream in order to find Kinbaskit and see if I could get any provisions from him, and also information respecting the different routes. Had not gone far when I met with his two sons, who informed me that he had gone down the Columbia with Mr. Moberly.

In regard to land Teit stated that all Shuswap land and hunting territories were considered tribal property, “all parts of which were open to every member of the tribe”. Within the tribal territory each band had “its common recognized hunting, trapping and fishing places”, but access to those areas would not be denied at any time to any other Shuswap individual. This was also true of fishing places, including salmon fishing locations, and of root-digging grounds.

Berry patches were tribal property and harvesting was controlled. Teit stated that the chief of the local band looked after all of the large berry patches in his district. The chief would determine when the berries were ripe enough for each patch to be harvested.

Ignace and Ignace maintain that the “…collective and joint sense of ownership of Secwepemc territory and its resources continues to exist” to the present time.

Like other aboriginal peoples, the Secwepemc followed a yearly round for the exploitation of seasonally available resources. As outlined by Ignace and Ignace, this round began in early spring when families moved to highland areas to participate in the cutthroat and rainbow trout fisheries which proceeded on the lakes as soon as the ice broke. These fisheries drew families from different villages, and were social and

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75 Teit, Shuswap, pp. 572-3.
76 Ibid, p. 573.
77 Ignace and Ignace, Traditional, p. 384.
political as well as resource gathering events. In early spring, as early as February, the Shuswap fished the Thompson River for steelhead.\textsuperscript{78}

Early spring and summer, beginning in April and May were times for gathering a variety of shoots and roots and edible bulbs. In late May cambium was stripped from lodgepole pine and between early July and September a wide variety of berries was harvested. Many of these, gathered from specific locations at different elevations, were processed through drying, sun-curing and pit-cooking, and stored for later use.\textsuperscript{79}

In “Tult: Transformation of Energy into Matter”, the Lakes Division asserts that approximately 135 species of plants were used by the Plateau peoples as sources of foods, flavourings and beverage plants (p.4).

In the late spring Chinook salmon became available in the Fraser and Thompson rivers, and the Sockeye runs took place in the summer and early fall. The Coho runs took place in mid to late fall. All those species provided large quantities of food for the Shuswap, some of which they preserved and stored for winter consumption.\textsuperscript{80}

Some of the fish other than salmon harvested by the Secwepemc were rainbow trout, steelhead, peamouth and chiselmouth, and bridgelip sucker.\textsuperscript{81} White fish are also mentioned as a species taken by the Shuswap. Dawson specifically mentions that fish being abundant in a lake known as “White fish Lake” which he located between Adams Lake and Seymour.\textsuperscript{82}

The TUS, “Land Traditions of the Neskonlith and Adams Lake Shuswap” (Secwepemc, 1999), indicates that for the people of Neskonlith and Adams Lake, salmon and other species of fish including sturgeon, steelhead, sucker, dolly varden and burbot were main resources accessed along the large rivers. The Secwepemc’s reliance on fish is consistent with the Lakes Division’s report, “Tult: Transformation of Energy into Matter”, in which this statement was made: “Five species of anadromous salmons spawn in the Plateau Rivers, including Sockeye, Spring or Chinook, Pink, Coho, and Steelhead. During the spring months, trout and Kokanee were fished out of the lakes and were consumed fresh. The river valley was used for salmon fishing throughout the summer with the largest salmon runs beginning in July… A man could catch up to 300 fish per day…” (p.4).

\textsuperscript{78} Ignace and Ignace, Traditional, p. 382.
\textsuperscript{79} Ibid.
\textsuperscript{80} Ignace and Ignace, Traditional, p. 383.
\textsuperscript{81} Bouchard, Fish, pp. 4-7.
Hunting was an important part of the seasonal round. The main hunting season generally ran from August to October, although hunting could occur at anytime. Late summer and fall was the time when animals such as deer were fat and their offspring had matured. Ignace and Ignace state that “groups of related men, their parents, wives and children would travel to base camps in or below the montane parklands”. These were identified as “task groups”. The men of those groups would hunt the mule deer, caribou and elk found at higher elevations while the women and children remained at the base camp where they trapped smaller game and processed the hunters’ catch.\(^{83}\)

Having spent approximately eight months travelling and camping in order to harvest and process food, the Shuswap returned to their village sites in the late fall. In about October or early November they moved into their semi-subterranean houses, where they spent the winter months, subsisting on preserved foods, small animals caught in snares and fish caught through holes in the ice.\(^{84}\)

Trade was an important aspect of the Shuswap economy. Ignace stated that prior to contact the Shuswap traded with their immediate neighbours, with peoples from the coast, and with others located east of the Rockies. Articles from the coast were made available to the Shuswap through the Lillooet and the Chilcotin. For some time the Canyon division of the Shuswap controlled that trade, acting as middlemen between the Chilcotin and the other Shuswap divisions.\(^{85}\)

The Little Shuswap Indian Band submitted a draft Mica 5 and 6 Occupation and Land Use Study. The study focuses on the importance of trails as a vital form of infrastructure to facilitate resource acquisition, hunting and gathering, social activities and trade. The main stem of this trail network was the Ratchford – Pettipiece Trail. According to the Little Shuswap the trail occupies a pivotal position in the history and pre-history of the eastern Secwepemc, and their ties to the Columbia valley and beyond. Essentially the trail leads north-east from the head of Shuswap Lake at Seymour Arm, it splits and one section runs east for thirty-four and a half miles and drops down the eastern slopes of the Selkirks, just above the outflow of Seymour Creek into the Columbia at Downie Creek. The other section proceeds for seventy miles higher into alpine country and falls down near Gold Creek. This trail section was originally named the “Indian Trail” during early contact. According to the study TUS and ethnographic information indicates that this trail was used by generations of Secwepemc people and played a significant role in the trade and commerce regimes of the eastern Secwepemc. The Little Shuswap Indian Band states that the study area, in particular the trail network to the Columbia and up the Columbia watershed was and still is, integral to Little Shuswap Indian Band resource control and management.

\(^{83}\) Ignace and Ignace, Traditional, p. 382.
\(^{84}\) Teit, Shuswap, p. 383.
\(^{85}\) Ignace, Shuswap, p. 205; Teit, Shuswap p. 536.
Conclusions:

The EAO is of the view that there is a strong *prima facie* case in support of the assertion that the proposed Project area was part of the broader territory used by the Secwepemc people at the time of contact. However, in terms of the *prima facie* case in support of Secwepemc title claim to the Mica Generating Station area, EAO is not aware of any historical evidence which shows that the area was exclusively used and occupied at the time of sovereignty. In any case, given the proposed Projects’ minimal impacts there would be a very low potential for adverse impacts on those aboriginal rights.

The proposed Seymour Arm Capacitor Station is in the area of the Little Shuswap, Neskonlith and Adam Lake First Nations of the Secwepemc Nation. The EAO is of the view that the Secwpemc Nation or these three bands have a strong *prima facie* case in support of a claim for aboriginal title in the vicinity of the Seymour Arm Capacitor Station and passive reflector. Again, however, given the proposed Projects’ minimal impacts in the area of the capacitor station and passive reflector there is a very low potential for adverse impacts on aboriginal title were it to be proven.

Taking account of the above assessments, EAO concludes that the required duty to consult with the Secwepemc Nation falls in the middle of the *Haida* spectrum.

The EAO concludes that the required duty to consult with the Secwepemc Nation falls on the low to middle end of the *Haida* spectrum.

Notwithstanding the above, EAO has engaged in deep consultation by providing all information and opportunities for comment, by affording opportunities for involvement with all stages of the EA to all 33 First Nations/organizations (including the Secwepemc bands), by offering to meet individually with elected representatives of any First Nation that requires specific discussions of asserted aboriginal rights and title outside of the Working Group forum, and by providing this report to show that First Nations’ concerns were considered. The EAO continues to work to engage the Secwepemc bands and all other potentially affected or interested First Nations in this EA.

Through the EA of these proposed Projects, EAO has considered the potential aboriginal rights (including title) of the Secwepemc people in the area of the proposed Projects and the information available to support the strength of claim to those rights. The EAO has also considered the potential for the proposed Projects to adversely impact such aboriginal rights, based on the proposed Projects being implemented in accordance with the Project Description in the Application, and on the avoidance and mitigation measures and commitments made by the Proponent. The EAO and the Proponent have been engaged in consultation efforts with the Secwepemc bands, through their political/tribal organization and directly, from the early stages of the EA review of the proposed Projects. The goal was to jointly discuss asserted aboriginal rights.
rights (including title), potential for adverse impacts, and the development measures to mitigate or appropriately accommodate those rights. The Secwepemc bands have been given an opportunity to review and comment on this consultation report and to specify the nature and scope of their aboriginal rights from their point of view.

With reference to the above, EAO concludes that the process of consultation has been carried out in good faith, and that it was appropriate and reasonable in the circumstances. The EAO also concludes that the potential for adverse effects on potential aboriginal rights has been or will be avoided, mitigated or otherwise accommodated to an appropriate level such that the proposed Projects should not significantly adversely impact the Secwepemc bands in exercising these aboriginal rights. The EAO believes the process of consultation and accommodation has reasonably balanced consideration of potential impacts on aboriginal rights with consideration of the necessity for the proposed Projects as well as consideration of the other areas mandated by the Act (health, heritage, economic, environmental, and social impacts).

Communities located further from the proposed Projects

According to the Northern Shuswap Tribal Council website the Northern Shuswap Tribal Council traditional territory covers roughly an area between Quesnel and Clinton from north to south, and Alexis Creek and Clearwater from west to east. The Northern Shuswap Tribal Council entered the treaty process in June, 1994 and are now in Stage 4, working toward an Agreement-in-Principle. The proposed Projects are within the collective Secwepemc Nation traditional territory but out of the NSStQ traditional Territory. Of the four communities, (Canim Lake Band, Canoe Creek Indian Band, Xats’ull First Nation, Williams Lake Indian Band) the Canim Lake Band is the closest community to the proposed Projects. The EAO has had several communications with the Canim Lake Band in determining their interests with the proposed Projects. In correspondence written on September 16, 2009, Canim Lake stated that the proposal is in the Shuswap territory but not in the Canim Lake Territory. The EAO also heard from the Williams Lake Indian Band that the proposal is outside of their consultative boundary but the area is within the traditional territories of the Shuswap Indian Band, Splats’in First Nation, Neskonlith Indian Band and the Adams Lake Indian Band.

There are Secwepemc member Bands with no Secwepemc tribal council affiliation: Esketemc First Nation, located south of Williams Lake; High Bar First Nation, located west of Clinton, Ts’kw’aylaxw First Nation located southwest of Clinton. The proposed Projects are within the Secwepemc Nation asserted traditional territory but outside of these bands core areas of interest.
10.3.4 Lheidli-T’enneh Band

The EAO offered the Lheidli-T’enneh Band capacity funding to attend the July 3, 2008 Working Group meeting, however, they did not take the offer nor attend the meeting and have not participated in the EA of the proposed Projects. Nevertheless, they have been forwarded all the Working Group materials and communications throughout the EA process. According to the Proponent’s Applications on June 25, 2008 the Lheidli-T’enneh sent a letter to the Proponent indicating that they did not have any concerns and that neither proposed Projects would impact their traditional territory.

10.4 The process of consultation

Efforts were made by EAO to contact all 29 First Nations and four tribal councils/associations throughout all stages of the EA process, starting with initial notifications when the proposed Project was determined reviewable under the Act. The EAO notified all 33 bands and tribal councils and requested confirmation of their interest in participating in the EA process. An inclusive approach was taken with the goal of ensuring that all potentially affected First Nations were consulted. First Nations who declined to participate in Working Group meetings but requested to be kept informed were sent all key documents for review and comment throughout the EA process as if they were a member of the Working Group. First Nations who did not engage directly in the EA process were sent all correspondence, meeting invitations, and materials for review and comment. This process resulted in the identification of 25 First Nations and tribal councils that were specifically identified under the section 11 Orders issued to the Proponent.

On June 5, 2008, EAO e-mailed all 29 First Nations and four Tribal Councils to provide additional information related to the proposed Project and to invite First Nations to participate as a member of EAO’s Working Group and to attend the inaugural meeting scheduled for July 3, 2008 in Revelstoke. The Working Group was made up of representatives from the federal, provincial, regional and local governments, and First Nations. The purpose of the Working Group meeting was for the Proponent to introduce its plans for the proposed Project to assist participants to gain an early understanding of the potential effects of the proposed Project and for agencies and First Nations to raise any concerns and particular interests directly to EAO and the Proponent. Representatives of the Okanagan Nation Alliance and the Ktunaxa Nation Council attended the meeting. There was no Secwepemc Nation representation at the July 3, 2008 meeting. While Lheidli-T’enneh Band indicated interest in attending the July 3, 2008 meeting, the Chief stated in an email to EAO that financial capacity is an obstacle to attending the meeting in Revelstoke. The EAO responded with an offer of financial assistance to support Lheidli-T’enneh participation at the Working Group meeting but, Lheidli-T’enneh did not accept the offer. In any event, as noted above, the...
Lheidli-T’enneh eventually sent a letter to the Proponent indicating that they did not have any concerns and that neither proposed Project would impact their traditional territory.

The EAO also remained open to discussing the provision of available capacity funding, intended to assist the First Nations to participate in the EA process. Grant funding was provided to the Okanagan Nation Alliance in fiscal year 2008/09. There was no EAO funding available in the last quarter of fiscal year 2008/09 and in fiscal 2009/10 has not been available; however, any requests for funding have been made known to the Proponent which has provided capacity funding.

Two groups of Secwepemc member bands confirmed that they would like to engage separately with EAO, in a government-to-government basis to discuss potential impacts on their aboriginal rights and title outside of the EAO Working Group process. As a result, EAO established two government-to-government consultation tables at the request of the two groups of interested Secwepemc member bands. The two groups are the “Lakes Division”, made up of the Adams Lake Indian Band, Neskonlith Indian Band and Splats’in First Nation, and a group, represented by legal counsel, made up of the Whispering Pines/Clinton Indian Band, Simpcw First Nation, Shuswap Indian Band and Little Shuswap Indian Band. The EAO also clearly indicated to both groups that EAO is willing and available to meet with interested communities of the two First Nations groups to provide clarification on the provincial EA process. Representatives of both groups also attended the EAO Working Group Mica Dam site tour on September 17, 2008 and the Working Group meetings on September 9, 2009, November 24, 2009, December 16, 2009 and January 15, 2009.

The EAO remained willing, during all stages of the EA process, to meet individually with First Nations on a government-to-government basis if any First Nations believed their concerns, interests, or asserted aboriginal rights should be addressed outside of the Working Group structure and associated communication processes. As a result meetings were scheduled during the Pre-Application stage as follows:

**July 17, 2008**: The EAO met with Shuswap Indian Band, Whispering Pines/Clinton Band, Simpcw First Nation and the Little Shuswap Indian Band.

**September 19, 2008**: The EAO met with the Lakes Division (Splats’in First Nation, Neskonlith Indian Band and Adams Lake Indian Band).

**September 23, 2008**: The EAO met with Don Ryan, Negotiator, Lakes Division.

**January 30, 2009**: The EAO met with the Lakes Division.
February 3, 2009: The EAO met with the Simpcw First Nation, Shuswap Indian Band, Little Shuswap Indian Band, and Whispering Pines/Clinton Band.

May 27, 2009: The EAO met with the Lakes Division.

August 19, 2009: The EAO met with the Lakes Division.

August 21, 2009: The EAO met with the Okanagan Nation Alliance in Westbank.

The EAO also remained willing to meet with First Nations at their convenience, to discuss the proposed Projects and their potential impacts on asserted aboriginal rights and title, throughout the Application Review stage of the EA. The following meetings were held:

September 8, 2009: The EAO met with the Little Shuswap Indian Band and Whispering Pines/Clinton Band.

September 28, 2009: The EAO met with Simpcw First Nation.

October 1, 2009: The EAO met with the Little Shuswap First Nation.

October 2, 2009: The EAO met with the Whispering Pines/Clinton Band.

October 3, 2009: The EAO met with the Lakes Division.

November 6, 2009: The EAO met with the Ktunaxa Nation Council.

January 7, 2010: The EAO met with the Ktunaxa Nation Council.

February 19, 2010: The EAO had a teleconference meeting with the Okanagan Nation Alliance.

The Proponent began to engage First Nations in the fall of 2007 with a formal site visit to the Mica Dam and Generating Station for First Nations and interested stakeholders on October 2, 2007. Representatives of the Ktunaxa Nation Council and the Okanagan Nation Alliance attended the site visit. A Core Committee (with associated Environment and Community Sub-Committees) and Transmission Committee process was initiated by the Proponent in January, 2008, to integrate First Nations and stakeholder values into the EA and WUP decisions related to potential incremental impacts of the proposed Project.

The purpose of the Core Committee was to help identify and review:

- incremental impacts of the proposed Project;
- potential mitigation and compensation strategies to address proposed Project impacts; and
• the Columbia River WUP and recommend revisions, if needed, to address incremental Project impacts.

Each First Nation and tribal council received telephone calls and a letter of invitation dated January 4, 2008 to participate on an advisory Core Committee to discuss Mica Generating Units 5 and 6 with the Proponent. The letter invited representatives to participate as members of an advisory Core Committee to consider issues related to the proposed installation and operation of additional generation units at Mica Generating Station as well as the construction of the capacitor station. The letter further explained that the Core Committee process would supplement the Proponent’s consultation efforts with First Nations and Tribal Councils and also provide a forum to integrate interests and input related to water flow management and EA decisions related to potential incremental impacts arising from the proposed Projects, including revisions to the Columbia River Water Use Plan.

Responses from First Nations and tribal councils varied. Ktunaxa Nation Council and Okanagan Nation Alliance expressed interest in participating, and sent technical representatives throughout the entire process. No member First Nations of the Northern Shuswap Tribal Council expressed interest in participating. The Little Shuswap and Adams Lake First Nations expressed interest and sent technical representatives to specific meetings. The Simpcw, Splats’in, Whispering Pines Indian Bands and Shuswap Nation Tribal Council indicated they would not attend the inaugural meeting but were interested in meeting with the Proponent in their communities for the purpose of establishing a consultation protocol with respect to the proposed Project. None of the Shuswap Nation Tribal Council member First Nations responded to the Proponent’s offer of capacity funding. BC Hydro agreed to a meeting with Simpcw, Splats’in, Whispering Pines Indian Bands and Shuswap Nation Tribal Council, as requested. The Proponent also sent to the First Nations and Shuswap Nation Tribal Council all materials presented at the Jan 21-22, 2008 Core Committee meeting.

Between Jan 2008 and May 2009, the Proponent hosted four Core Committee meetings (one in Golden), six Environment Sub-Committee meetings in Revelstoke and one in Nakusp, and three Community sub-committee meetings in Revelstoke. The Ktunaxa Nation Council and Okanagan Nation Alliance attended the Core Committee meetings.

The Proponent hosted five Environmental Sub-Committee meetings, between February 2008 and December 2008. Ktunaxa Nation Council attended all five meetings; Okanagan Nation Alliance attended all but one meeting; Splats’in First Nation attended two meetings; Little Shuswap Indian Band attended one meeting. The Proponent hosted three Community Sub-Committee meetings, between March 2008 and December 2008. The Ktunaxa Nation Council, Okanagan Nation Alliance and Splats’in First Nation each attended two of the three scheduled meetings. All members of the
Core Committee and Sub-Committees, as well as First Nations, had access to a committee website that contained information relating to committee news and events, and materials relating to the proposed Projects.

Early in the Core Committee process, Environment and Community Sub-Committees were established to work at a more detailed and technical level to inform deliberations at the Core Committee level, and to support the development of the recommendations. Key issues identified by the Core Committee for the proposed Projects are:

- fish entrainment;
- reservoir fish productivity;
- Kinbasket Reservoir vegetation and wildlife;
- aquatic or terrestrial impacts in the Mica tailrace;
- employment and training;
- accommodation;
- traffic;
- recreation;
- archaeology and heritage sites; and
- mitigation and compensation response.

All items were addressed by the Proponent and the responses are included as Appendix Q in the Proponent’s final Core Committee Report. A detailed description of the process, committees, recommendations and results is contained in the Core Committee’s Report: Mica Unit 5 and 6 Engagement Process (June 2009). Each First Nation and Tribal Council was also sent a copy of the final Core Committee Report. The Core Committee Report is in Appendix 2-I of the Applications.

The Proponent also established a Transmission Committee to provide First Nations, government agencies, the public, and other interested parties from the Shuswap region an opportunity to participate in a locally based committee to focus specifically on issues and concerns relating to the selection of a site for the capacitor station component of the proposed Mica Unit 5 Project. The Transmission Committee held two meetings (April 21, 2008 and June 16, 2008) in Squilax near Chase, BC. At the second meeting, there was unanimous agreement on Site 76 as the preferred location for the Unit 5 capacitor station. The facility would be named the “Seymour Arm Capacitor Station and the Celista Creek Reflector”. The Little Shuswap Indian Band attended the Proponent’s two Transmission Committee meetings. The Proponent also offered interested individuals several opportunities to visit the potential capacitor station and passive microwave reflector tower sites being considered during the site selection process.
Representatives of the Little Shuswap First Nation participated in the site visit to learn more about potential site options for the capacitor station.

In addition to scheduled meetings, the Proponent invited First Nations to also participate in various Project studies such as the Capacitor Station Assessment, Mica Dam Site Assessment, Archaeology Overview and Impact Assessment, and Geotechnical Studies. The Little Shuswap Indian Band participated in the Capacitor Station Assessment, and the Okanagan Nation Alliance, Ktunaxa Nation Council and Adams Lake First Nation participated in the Mica Dam Site Assessment.

The Proponent offered First Nations two streams of funding designed to facilitate the participation of First Nations in meaningful consultation and proposed Project activities. The Proponent offered initial capacity funding and comprehensive capacity funding. During the pre-Application phase, the Proponent offered each First Nation identified in the amended section 11 Order initial capacity funding to encourage First Nations participation in the proposed Project and facilitate information sharing. For those First Nations that indicated interest in receiving initial capacity funding, the Proponent provided a Letter of Agreement that specifically states that the Proponent is committed to working cooperatively with First Nations to establish a consultation process that is effective, informative, participatory and respectful. Following the provision of initial capacity funding, the Proponent advised all affected First Nations that additional capacity funding, in the form of confidential Comprehensive Capacity Funding Agreements (CCFAs) would be available. First Nations that show a demonstrated need for reasonable funds to participate in the review could approach the Proponent and a budget would be determined. Each First Nation and tribal council was offered capacity funding to facilitate their participation of technical staff or representative at meetings or to review and provide comments on information material or reports.

In addition, the Proponent accepted all expenses for any First Nation or Tribal Council representation to participate in any baseline assessment work or site visits. The Little Shuswap Indian Band participated in studies affecting the Capacitor Station Assessment (i.e. Archaeology Overview Assessment (AOA), geophysical and geotechnical tests, grounding tests, microwave studies, terrestrial habitat studies and wildlife and vegetation studies). For the Mica Dam Site Assessment, the ONA, Ktunaxa Nation Council and Adams Lake Indian Band participated in number of studies (i.e. Archaeology Overview Assessment, terrestrial habitat studies, wildlife and vegetation studies and winter wildlife tracking survey).

The Proponent also undertook to meet with all 29 First Nations and four associations to solicit information on those First Nations and their interests in and concerns about the proposed Projects. All First Nations concerns and issues raised during the review were considered and tracked by the Proponent in a table (attached to the Assessment Report.
as Appendix D). The Proponent held workshops in First Nation communities throughout the EA process, as requested, to present the proposed Projects. These workshops, dates of other meetings between First Nations and the Proponent, as well as other efforts to provide information to all section 11 and 13 Order First Nations and organizations, are summarized within the Application and Proponent’s consultation record. This includes the interim report on consultation activities, submitted to EAO on November 16, 2009 and the most recent final report on consultation activities submitted on December 5, 2009 (and posted on EAO’s website) for the proposed Project.

The EAO also attempted to maintain contact with all 29 First Nations and four associations throughout the review, through letters, phone calls, e-mails, and mail outs/courier. The First Nations were given many opportunities to be involved throughout all stages of the review, including the following:

- Several invitations to comment on the draft section 11 Order between August and October 2008, including two extensions to the original deadline of September 2, 2008 (to September 11, 2008 then September 24, 2008, with a final notification on September 29, 2008 that comments must be in by mid-October) before they were issued to the Proponent on October 28, 2008. The intent was to ensure that First Nations had every opportunity to provide comments on the proposed Project’s procedural order and the EA itself;

- Several invitations to comment on the draft Terms of Reference for the Application (June 24, 2008 request made for comments by July 25, 2008; deadline extended to October 3, 2008, and further notification in October 2008 that comments could be provided within the public comment period time frame of October 29, 2008, to November 28, 2008; final notification on December 3, 2008, that the documents would be approved by December 19, 2008, unless EAO had heard that there needs to be further discussion on the draft Terms of Reference; as no comments were received prior to that date the Approved Terms of Reference were issued on December 19, 2008) to ensure that the Proponent would address all issues in its Application;


- Site visit of the Mica Generating Station on September 17, 2008 attended by representatives of Ktunaxa Nation Council, Little Shuswap Indian Band, Splats’in First Nation and Okanagan Nation Alliance;

- Public comment period from October 29, 2008 to November 28, 2008 on the draft Terms of Reference. Four public open houses were held during this time in Chase, Revelstoke, Golden and Valemount. The public as well as First Nations were encouraged to submit written comments for EAO’s consideration, prior to
the finalization of the Terms of Reference for the Application of the proposed Project;

- Invitation (June, 2009) to all First Nations and Tribal Councils to assist EAO in initial screening of the Applications to determine if it satisfied the requirements of the Terms of Reference and should be accepted for review;

- Public comment period on the Application, from September 9, 2009, to October 24, 2009. Four public meetings/open houses were held during this time in Seymour Arm, Revelstoke, Golden, and Valemount;

- First Nation community meetings were offered by EAO and there were four meetings with the Simpcw First Nation, Little Shuswap Indian Band, Whispering Pines/Clinton Band, and with the three Lakes Division communities (Splats’in First Nation, Neskonlith Indian Band, Adams Lake Indian Band); and

- Requests for comments on EAO’s draft Assessment Report and draft Consultation Report (November 2009 and December 2009) to ensure inclusion of First Nation concerns and interest, since these documents will inform ministers in making the decision whether or not to issue an EA certificate.

The Proponent has also included information on additional engagement measures, including funding provided to First Nations for capacity. For additional information refer to the Application, section 2.1 and 2.2 and table 2.8 (page 2-37 – 2-38).

The Lakes Division in commenting on a draft of this report stated that the commitments made by the Proponent are insufficient:

- Employment and Business Opportunities – The Lakes Division want a specific Aboriginal Procurement Policy and Memorandum of Understanding with the Proponent to address how jobs, contracts, training funding and other opportunities will be differentiated for the Lakes Division and its members.
  - In support of First Nations participation in major contracts for the Project, the Proponent has committed that it will through contract language, include provisions to support employment, contracting and subcontracting to competitive, qualified First Nations businesses if available. In addition to facilitate First Nations participation in the Projects that is not included under the Columbia Hydro Constructors Allied Hydro Council Agreement, the Proponent will adhere to the Aboriginal Procurement and Contracting policy which outlines specific mechanisms to support contracting, procurement and business development opportunities for First Nations.

- Management of Information Regarding Heritage Resources – The Lakes Division want a Heritage Management Plan developed for the Project before construction or other activities are started.
  - The Proponent will require that an Archaeological Impact Assessment (AIA) be carried out by a qualified professional at the site of any excavations required on previously undisturbed land of medium to high
potential. The AIA will be completed in areas of high to moderate archaeological potential. In addition the Proponent has committed to consider applicable First Nations’ heritage management policies for future archaeological work during Mica Unit 5 construction.

- Revenue Sharing – The Lakes Division want revenue sharing and co-management of the Project to be properly compensated from the wealth that is generated.
  - The Lakes Division is in discussion with the Ministry of Energy, Mines and Petroleum Resources regarding revenue sharing in a separate process from the EA process.

In commenting on a draft of this report the Ktunaxa Nation Council noted that the following accommodation measures should be a condition of EAO approval of the proposed Project in order to maximize the probability that the Action Plan will address fish entrainment impacts on Ktunaxa Nation fishing rights:

- The Proponent should be required to make a commitment, through a Ktunaxa Nation Council-BC Hydro ‘Impact Management and Benefits Agreement’ to fully fund Ktunaxa Nation Council participation in the implementation of the MRFESAP;
  - Ktunaxa Nation Council noted at the January 15, 2010 working group meeting that this would be implemented as part of an agreed upon Impact Management and Benefits Agreement.

- The Proponent should be required to complete the MRFESAP process and initiate agreed-upon mitigation and/or compensation strategies within a five year period, prior to March 31, 2015, and report to the Ktunaxa Nation Council and the EAO on the fulfillment of this commitment; and
  - The Proponent stated at the January 15, 2010 working group meeting that they cannot commit beyond the Detailed Assessment Phase at this time, as this is the only funding that is approved by senior management.

- The Proponent should be required to implement a scientifically sound monitoring program to evaluate the effectiveness of the mitigation and/or compensation strategies developed through implementation of the Action Plan.
  - The Proponent noted at the January 15, 2010 working group meeting that entrainment monitoring would be delivered through the Fish Entrainment Strategy.

In addition the Ktunaxa Nation Council commented that to accommodate the footprint impacts of the Mica Dam and Generating Station and Kinbasket Reservoir on Ktunaxa Nation title and rights, the EAO should:

- Require the Proponent, as a condition of the Environmental Assessment Certificate for the Project to negotiate funding and Terms of Reference for a
process to identify and redress the footprint impact grievances of the Ktunaxa Nation.

- The EAO has written the Ktunaxa Nation noting that those damages and other redress in relation to the original footprint issues are not part of the potential adverse impacts of the proposed Project; and as such, these matters are outside of the Haida duty to consult and accommodate as to contemplated Crown conduct.

- To accommodate the incremental impacts of the Mica Unit 5 and Unit 6 Project on Ktunaxa Nation title and rights, the EAO should ask the responsible Ministers (Environment and Energy, Mines and Petroleum Resources) to direct their staff to negotiate with the Ktunaxa Nation Council appropriate sharing of the revenues received by the Province from the Proponent resulting from the addition of these two units.

- EAO’s preliminary assessment was that the proposed Projects would have very minimal potential impacts on aboriginal rights and title. Through the EA process, the Proponent has made a number of commitments related to First Nation’s interests to mitigate potential effects due to the Project. These efforts would in EAO’s opinion, contribute to accommodation to accommodation of potential effects by the proposed Project on First Nations interests.

A number of commitments have been made by the Proponent in the Table of Commitments which serves to mitigate or otherwise accommodate potential adverse effects on First Nations’ aboriginal rights. These commitments/accommodation measures can be viewed in their entirety in the Table of Commitments. Key commitments include the following:

- The Proponent will consider applicable First Nations’ Heritage Management Policies for future archaeological work during the proposed Project’s construction (Mica 5 commitment 38);

- A registered biologist and the appropriate Shuswap member First Nation will undertake a survey to assess and relocate key rare plants of First Nations food, spiritual, cultural and medicinal use, prior to clearing and preparation as per the construction schedule. BCTC will assess relocated vegetation at one year and report their status (capacitor station commitment 8);

- The Proponent will provide interested First Nations with an opportunity to review final assessment reports prepared under WUP items included in the Table of Commitments (Mica 5 commitment 39, Mica 6 commitment 33);

- The Proponent will send copies of the draft environmental management plan to interested First Nations and offer appropriate funding (Mica 5 and 6 commitment 2, capacitor station commitment 1).
• The Proponent will attempt to negotiate and conclude Impact Management and Benefits Agreements with First Nations where supported by specific strength of claim and impact assessments (Mica 5 commitment 41);

• The Proponent will discuss with applicable First Nations a spiritual ceremony related to construction and/or commissioning of the Project (Mica 5 commitment 40, Mica 6 commitment 32);

• During construction of the proposed Project the Proponent will provide MOE and interested First Nations with the bi-weekly environmental reports prepared by the Environmental Monitor (Mica 5 and 6 commitment 7b);

• First Nations will be invited to provide input into reclamation related activities (Mica 5 commitment 43, Mica 6 commitment 13);

• The Proponent commits to undertaking future actions appropriate to the severity of the impact should future monitoring programs uncover incremental impacts directly applicable to the proposed Project (Mica 5 and 6 commitment 8);

• The Proponent will retain Environmental Monitor(s) during construction to inspect, evaluate, and report on compliance with these commitments, requirements set out in the environmental management plan, terms and conditions of environmental regulatory approvals, and provincial best management practices. The monitors will have authority to suspend work if terms and conditions of the commitments, BMPs, regulatory approvals and/or applicable legislation are not being met. The BMPs will be discussed with MOE to ensure they are the most current BMPs (Mica 5 and 6 commitment 7a);

• The Proponent will advertise and inform local employment centers and interested First Nations Bands in the Columbia region about proposed Project job opportunities and the hiring process in advance of proposed Project construction (Mica 5 commitment 27, Mica 6 commitment 18);

• The Proponent will undertake a rare plant (red and/or blue listed) field reconnaissance prior to finalizing the relevant Environmental Management Plans (Mica 5 commitment 20, Mica 6 commitment 28);

• In support of employment opportunities provided through the Columbia Hydro Constructors (CHC) Allied Hydro Council (AHC) Agreement, BC Hydro will:
  o Prepare information that summarizes the types of CHC jobs available, outline skills/experience required, explain the CHC hiring process, and provide contact information to interested First Nations
  o Prepare information of other non-CHC job opportunities, skills and experience required and contractor contact information.
  o Notify and provide information to local employment centres and interested First Nation communities in the Columbia Region.
  o Place advertisements in local newspapers as major contracts are awarded to inform residents of potential job opportunities and direct candidates to their local employment centres, the CHC, and project contractors.
In support of First Nations participation in major contracts, BC Hydro will, through contract language, include provisions to support employment, contracting and subcontracting to competitive, qualified First Nations businesses, if available. To facilitate First Nations participation in Mica Unit 5 Project work that is not included under the CHC AHC Agreement, BC Hydro will adhere to its Aboriginal Procurement and Contracting Policy which outlines specific mechanisms to support contracting, procurement and business development opportunities for First Nations. (Mica 5 commitment 44, Mica 6 commitment 38)

Separate submission by First Nations

All First Nations were informed that, if they were not satisfied with the final version of the First Nations Consultation Reports, they may provide separate submissions regarding the proposed Projects. The Ktunaxa Nation and the Secwepemc Nation Lakes Division provided EAO with separate submissions, and this material has been included in the referral material to Ministers. The EAO is of the view that these submissions do not raise any First Nations issues or concerns that have not been already addressed in the Assessment Reports.

10.5 Conclusions

It is EAO’s assessment that the Crown’s duty to consult and accommodate has been honourably upheld through a process of consultation and accommodation that included flexibility, accountability, inclusiveness, and responsiveness to issues raised by First Nations. The EAO further concludes that it, on behalf of the Province, acted in good faith at all times to consult with potentially affected or interested First Nations and engaged in deep consultation that ensured that all concerns of First Nations potentially affected by the proposed Projects were considered. The EAO made every effort to engage all First Nations regardless of strength of claim in the proposed Project area, and remained open at all times to engaging in government-to-government discussions outside of the Working Group forum, if requested. The EAO also concludes that it was reasonable in consulting with First Nations, accommodating issues through being flexible with timelines whenever possible, traveling to meet directly with First Nations in their communities, and provided some capacity funding when available to help assist First Nation participation in the EA process or requested the Proponent to provide funding (in addition to the Proponent’s capacity funding program).

For the reasons discussed in detail in sections 10.2, 10.3, and 10.4, EAO also concludes that avoidance, mitigation, and accommodation measures identified during the EA process will result in no significant potential adverse effects on First Nations with interests or asserted aboriginal rights in the proposed Project vicinity. More specifically, potential for adverse effects on asserted aboriginal rights has been or will be avoided, mitigated or otherwise appropriately accommodated, such that the proposed Project
should not significantly impact First Nations, or Nations, from exercising these rights. This determination of significance also included consideration of broader societal interests and the necessity for the proposed Project. The EAO also notes that the Proponent has made specific commitments in its Table of Commitments and for ongoing consultation and other work with First Nations that should help to address any further potential adverse impacts to First Nations as they are raised.

With reference to all of the above, EAO concludes that the process of consultation for the proposed Project has been carried out in good faith, and that it was appropriate and reasonable in the circumstances. The EAO believes the process of consultation and accommodation has reasonably balanced consideration of potential impacts on aboriginal rights with consideration of the necessity for the proposed Project as well as consideration of the other areas mandated by the Act (health, heritage, economic, environmental, and social impacts).

The EAO is therefore satisfied that the Crown’s duty to consult pursuant to a decision under the Act has been fully discharged for the proposed Project.
PART D – OTHER TERMS OF REFERENCE REQUIREMENTS

Although no federal review under the Canadian Environmental Assessment Act was triggered for the proposed Project, the following sections were included in the Terms of Reference and in the Proponent’s Application in anticipation of a potential CEAA trigger and also at the request of the Proponent’s Core Committee.

11 Alternative Means of Undertaking the Proposed Project

11.1 Alternatives to the proposed Project

The Proponent is required to have sufficient dependable capacity resources available to meet peak system demand. In the 2008 Long Term Acquisition Plan, the Proponent identified the need for additional capacity resources to be developed to ensure that future peak demand could be met. The Long Term Acquisition Plan undertook a resource options analysis that considered various sources of energy and capacity. In the Application section 3, the Proponent provides detail on resource options capable of providing dependable capacity (thereby, considered as alternatives to the proposed Project) as well as those resource options considered but not able to provide the required capacity. Following is the rationale for the proposed Project, as well as alternative means to undertaking the project.

The proposed Project would provide the dependable capacity needed, based on the Proponent’s reliability planning criteria, to ensure reliable supply to the Proponent’s customers during times of peak load, as confirmed in the 2008 Long Term Acquisition Plan. The proposed Project would have an installed capacity of about 500 MW and dependable capacity of approximately 465 MW. Because of the large storage available in Kinbasket Reservoir, the dependable capacity could be sustained over the daily 15 heavy load hours during the peak load period, not just the 3 hours of maximum daily peak. In general, the proposed Project would be able to provide daily capacity shaping (higher day time generation with lower night time generation) during most of the year and seasonal shaping (higher winter generation with lower spring and fall generation).

Finally, the installation of the proposed Project is the Proponent’s preferred means to add system capacity as increasing generation at existing facilities is generally more cost-effective and has fewer environmental impacts than developing new projects.

Detailed consideration and rationale for selecting the Mica Generating Station Unit 5 and Unit 6 project proposals over other potential alternatives to the proposed Project (in order to meet the future public requirements for electrical capacity) is summarized in section 3 of the Proponent’s Applications.
Unit 5 Only: The Proponent performed a System Impact Study for the Revelstoke/Mica peaking unit additions and determined that the Mica to Nicola transmission system is not adequate to support the addition of the proposed Project and the proposed Mica Unit 6 Project should one of the two transmission lines fail. The amount of power that could be delivered on these lines is currently limited by voltage stability, which is a common occurrence on long transmission lines. Two transmission reinforcement alternatives were developed, each involving upgrades that would occur in stages, corresponding to the installation of the additional generation units. Both alternatives would require a series capacitor station on the existing Mica to Nicola 500 kV transmission lines to coincide with the addition of the proposed Project.

A series capacitor station would increase the capacity of the existing transmission lines by increasing the voltage stability of the line, thus allowing more power to flow from the generator to the load centre. An option to increase the capacity between Mica and Nicola would be to add an additional transmission line; however, given the significant lead time, cost, lands and right of way issues, First Nations, and environmental issues of a new transmission line in comparison to a capacitor station, this option was not considered in detail at this time. The Proponent could not identify a reasonable alternative to constructing a series capacitor station to support the addition of the proposed Project and the proposed Mica Unit 6 Project.

11.2 Alternative Means of Carrying out the Project
As the Mica Generating Station was originally designed as a six-unit facility, there is no requirement to develop additional bays to accommodate the proposed Project. The proposed Project would involve the installation of a new generating unit into an existing bay of the powerhouse and, as such, there are no alternative construction methodologies for the proposed Project.

Unit 5 Only: The capacitor station is technically specific in nature and the primary alternative for the capacitor station is the station location:

- The capacitor station would require approximately 3 ha to 4 ha, and would be located under and adjacent to an existing transmission line ROW. The station fenced area would contain the electrical equipment plus additional land for drainage and a buffer zone.
- The station must be located near the mid-point of the transmission line and it is preferable for it to be near an existing access road, such as a public or forest service road.
- Depending on the specific location selected for a capacitor station, additional site(s) may be required for communication equipment (repeater and/or passive reflector). These sites are smaller than the capacitor site, approximately 0.25 ha or less.
Microwave radio is used to communicate between BCTC’s main control centre in the Lower Mainland and the Capacitor Station.

Given the station requirements, the general area investigated for potential sites for the capacitor station was the portion of the 5L71/72 transmission lines located north of Shuswap Lake (Figure 3.1 and Figure 3.2 of the Applications). Seven potential sites and associated communication sites (reflectors/repeaters) were identified for consideration. A desktop review of each site was performed, and included a preliminary review of the following attributes:

- general site description;
- distance from midpoint;
- snow cover;
- geotechnical;
- access;
- telecommunications;
- First Nations interests;
- environmental; and
- other considerations (e.g., site visibility, archaeological potential).

Following site visits by the project team, including engineers, an archaeologist and a biologist, four sites were eliminated by the Transmission Committee from further consideration. These sites were eliminated for various reasons including high archaeological potential, difficult access, excessive site slope and erosion potential, potential site visibility, and proximity to community watersheds.

Three sites were shortlisted and, although any of these sites would likely be suitable for the capacitor station, the Seymour Arm Capacitor Station site was selected by the Transmission Committee as the preferred site as it offered better topography, more secure access options for construction and operations, fewer communication infrastructure requirements, and possible community benefits (e.g., possibility that a cell phone company could share the communications tower). Further environmental and engineering investigations of the three shortlisted sites were undertaken in the summer and fall of 2008. The Seymour Arm Capacitor Station remains the preferred site, primarily because of its flat topography and the reduced risk of access difficulties.

11.3 Summary
The information provided in the Application is consistent with requirements set out in the Terms of Reference. EAO is satisfied that the Proponent has adequately considered alternatives to the proposed Project and that the most reasonable alternative was selected as the proposed Project.
12 Environmental Effects of Accidents and Malfunctions

Section 11 of the Proponent’s Application identifies the environmental impacts that may occur in the event of an accident or malfunction during the proposed Project’s construction and operations and provides an overview of existing contingency measures to avoid and/or minimize adverse environmental impacts.

12.1 Potential effects during construction

Accidents and malfunctions identified in the Application that could occur during construction include, but are not limited to:

- Accidental encroachment on designated protected or conservation area(s):
- Vehicle-wildlife collision(s), principally on highways and access roads;
- Human-wildlife encounter(s), usually within or close to the worksite;
- Wildlife disturbance or harassment;
- Watercraft incident;
- Major sewage leak or spill;
- Major leak or spill of hazardous substances;
- Failure of containment system(s) for hazardous substances (e.g., equipment operating fluids); and,
- Accidental fire.

Further detail is provided in section 11 of the Proponent’s Application. The Proponent anticipated that any potential adverse effects arising through an accident or malfunction in the construction period would be managed through procedures put in place in the Environmental Management Plans.

12.2 Potential effects during operation

Accidents and malfunctions identified in the Application that could occur during operations include (but are not limited to):

- Plant forced outage of the Mica Generating Station
- Major leak or spill of hazardous material; and
- Fire

Further detail is provided in section 11 of the Proponent’s Application. The Proponent has the following comprehensive procedures currently in place to address accidents and malfunctions during operations:

- BC Hydro and BCTC Emergency Management System;
- BC Hydro Emergency Preparedness Plan and associated plans and procedures;
• **Unit 5 Only**: BCTC Emergency Preparedness Plan and associated plans and procedures;
• Mica Generating Station Spill Prevention and Response Plan;
• **Unit 5 Only**: BCTC Spill Contingency Plans for Substations and Capacitor Station;
• **Unit 5 Only**: BCTC Spill Response Procedures; and
• **Unit 5 Only**: BCTC Emergency Response Procedures.

12.3 Potential effects during decommissioning

**Unit 5 Only**: Decommissioning of temporary facilities associated with the capacitor site would occur as part of the construction phase and are covered in section 12.1 of this assessment report. Temporary facilities at the Mica Generating Station Site would be re-used for the proposed Mica Unit 6 Project.

**Unit 6 Only**: Decommissioning of temporary facilities constructed during the proposed Mica Unit 5 Project and used for the proposed Project would occur as part of the construction phase and are covered in section 12.1 of this assessment report.

A decommissioning plan, including means through which to address potential accidents and malfunctions, would be developed at the time of decommissioning of major project components.

12.4 Summary

The information provided in the Application is consistent with requirements set out in the Terms of Reference. EAO is satisfied that the Proponent has adequately considered responses to potential accidents or malfunctions of the proposed Project.

13 Climate Change

13.1 Potential Effects of Climate Change

The Proponent has funded the Pacific Climate Impacts Consortium and the Western Canadian Cryospheric Network to undertake studies regarding the potential implications of climate change to reservoir inflows. This work will start with general circulation models and emissions scenarios that make long-term climate predictions for the entire earth. These models will be downscaled to regional and local levels to generate long-term climate predictions for the area of interest. Additional watershed modelling and glacier dynamical modelling will fine-tune these general climate predictions to generate long-term projections for reservoir inflow sequences and potential Project impacts. Results from both studies should be available in 2010.
Based on existing general circulation models and preliminary internal modelling using the UBC Watershed Model, the Proponent anticipated that the stream flow impacts for the proposed Project are likely to include:

- Earlier spring freshet, due to warmer spring temperatures;
- Lower late-summer flows, due to earlier depletion of the seasonal snowpack and continued loss of upstream glaciated area; and
- Perhaps, an increase in annual flow volume due to potentially increased precipitation, although if it occurs this effect could conceivably be counteracted by increased evapotranspiration losses under warmer temperatures.

13.2 Summary
The information provided in the Application is consistent with requirements set out in the Terms of Reference. Given that preliminary results indicate that the timing of inflows is more likely to be affected than overall annual flow volumes, the Proponent anticipated that the proposed Project would continue to operate as a peaking unit. As a result of climate change, there could potentially be changes in inflow timing and/or peak electricity demand periods that would affect reservoir operations and result in changes to the annual water surface elevation curves for the Columbia system presented in section 6.1 of the Application. These changes in the timing of minimum and maximum water surface elevations could have impacts on a number of VCs considered in this Assessment Report, but specific impacts are uncertain until the ongoing research described above is completed.

14 Cumulative Effects
Cumulative environmental effects are changes to the biophysical environment or socio-economic setting (only from a biophysical change) caused by an activity in association with other, past, present and future human activities. Cumulative effects assessment is done to ensure that the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant. Cumulative effects assessment includes effects that are likely to result from the proposed Project in combination with other projects or activities that have been or would likely be present in a reasonable temporal and spatial scale.

Cumulative effects assessments were undertaken with methods generally consistent with the CEA Agency’s Cumulative Effects Practitioners Guide (1999) as set out in the Terms of Reference, which were approved in December, 2008, before EAO’s cumulative impacts approach was developed. Cumulative effects analysis was

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86 The sum of evaporation and plant transpiration from the earth's land surface to the atmosphere.
Cumulative effects scope and background are presented in section 4.4. In this section, three VCs were identified by the Proponent as having potential residual impacts that could interact with other existing projects or reasonably foreseeable projects in the region to cause cumulative impacts.

Results of the cumulative effects analysis of these three VCs that could potentially interact to cause cumulative impacts are presented in the Hydrology section (5.1), Water Quality section (5.2), and Fish and Aquatic Habitat section (5.5).
PART E – CONCLUSIONS

Based on:

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

the EAO is satisfied that:

- the environmental assessment process has adequately identified and assessed the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- consultation with First Nations, government agencies, and the public, and the distribution of information about the proposed Project have been adequately carried out by the Proponent and that efforts to consult with First Nations would continue on an ongoing basis;
- issues identified by First Nations, government agencies and the public, which were within the scope of the environmental assessment, were adequately and reasonably addressed by the Proponent during the review of the Application;
- practical means have been identified to prevent or reduce any potential negative environmental, social, economic, heritage or health impacts of the proposed Project such that no direct or indirect significant adverse effect is predicted or expected;
- The potential for adverse effects on the rights of the Ktunaxa Nation, the Okanagan Nation, and the Secwepemc Nation have been avoided, mitigated or otherwise accommodated to an appropriate level such that implementation of the proposed Project should not prevent these First Nations from exercising their rights; and
the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an Environmental Assessment Certificate for the proposed Project.

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