Nalcor Energy – Lower Churchill Project

LCP BLACK BEAR PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

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Department	Department Manager Approval	Date
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1 PURPOSE

The purpose of this Black Bear Protection and Environmental Effects Monitoring Plan (BBPEEMP) is to demonstrate how any negative environmental effects on Black Bears will be mitigated, and sets out a program for monitoring the effectiveness of the mitigation measures.

To comply with regulatory requirements and commitments made in the Lower Churchill Hydroelectric Generation Project (the Project) Environmental Impact Statement (EIS), the EEMP approach includes consideration of:

- Mitigation objectives – performance objectives in respect of each negative environmental effect;
- Mitigation – measures planned to achieve the mitigation objectives;
- Metrics and targets – specific, quantifiable, relevant and time constrained;
- Follow-up or Monitoring Programs – how the project will include follow-up or monitoring surveys to ensure that mitigation strategies are meeting the mitigation objectives; and
- Contingency – plan to be implemented should monitoring reveal that mitigation measures have not been successful.

The Project's BBPEEMP builds on existing information (e.g., the Generation and Labrador Transmission Assets Environmental Protection Plan (EPP) [LCP, 2013]), commitments made in the EIS (Nalcor 2009), and conditions of permits and licenses for the Lower Churchill Project (LCP).

2 SCOPE

This plan addresses the required aspects of black bear protection and effects monitoring for the construction and operation phases of the LCP including Muskrat Falls Generation and Labrador Transmission Assets (described in Section 6.0).

3 DEFINITIONS

Environmental Assessment: An evaluation of a project's potential environmental risks and effects before it is carried out and identification of ways to improve project design and

implementation to prevent, minimize, mitigate, or compensate for adverse environmental effects and to enhance positive effects.

Environmental Management: The management of human interactions with the environment (air, water and land and all species that occupy these habitats including humans).

Environmental Management System: Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects.

Environmental Protection Plan: Document outlining the specific mitigation measures, contingency plans and emergency response procedures to be implemented during the construction or operations of a facility.

Environmental Effects Monitoring: Monitoring of overall Project effects to confirm the predictions of EA and to fulfill EA commitments.

Environmental Compliance Monitoring: Monitoring of Project activities to confirm compliance with regulatory requirements and commitments made through the EA process.

Integrated Project Delivery Team: The integration of the Nalcor Energy and SNC Lavalin Inc. Environmental and Regulatory Compliance Teams.

4 ABBREVIATIONS AND ACRONYMS

CEAA	Canadian Environmental Assessment Act
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
C-SEPP	Component-Specific Environmental Protection Plan
CWS	Canadian Wildlife Service
EA	Environmental Assessment
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EMS	Environmental Management System
ERC	Environment and Regulatory Compliance
Gen	Generation
HSE	Heath Safety and Environment
HVac	High voltage alternating current
HVdc	High voltage direct current
IBA	Impacts and Benefits Agreement
IPD	Integrated Project Delivery
LTA	Labrador Transmission Asset
LCP	Lower Churchill Project
NE	Nalcor Energy

NLDEC Newfoundland and Labrador Department of Environment and Conservation
OSEM On-Site Environmental Monitor
PEEMP Protection and Environmental Effects Monitoring Plan
RCP Regulatory Compliance Plan
RP Rehabilitation Plan
SARA Species at Risk Act

5 INTERNAL REFERENCES

LCP-PT-MD-0000-PM-PL-0001-01	LCP Project Execution Plan
LCP-PT-MD-0000-PM-CH-0001-01	LCP Project Charter
LCP-PT-MD-0000-EA-PL-0001-01	LCP Generation Environmental Assessment Commitment Management Plan
LCP-PT-ED-0000-EA-SY-0001-01	Environmental Impact Statement and Supporting Documentation for the Lower Churchill Hydroelectric Generation Project
LCP-PT-ED-0000-EV-RG-0001-01	Lower Churchill Project Permit Registry
LCP-PT-MD-0000-SM-ST-0001-01	Post Environmental Assessment Release
LCP-PT-MD-0000-RT-PL-0001-01	Regulatory Compliance Plan
LCP-PT-ED-000-EN-PH-0031-01	Design Philosophy for Environmental Rehabilitation
LCP-PT-ED-0000-EN-PH-0007-01	Design Philosophy for Environmental Mitigation
LCP-PT-MD-0000-HS-PL-0001-01	Health and Safety Plan
LCP-PT-MD-0000-HS-PL-0004-01.	LCP Emergency Response Plan
LCP-PT-MD-0000-IM-PL-0003-01	Information Management Plan
LCP-PT-MD-0000-CO-PL-0001-01	Communications and Stakeholder Relations Plan
LCP-PT-MD-0000-EV-PL-0002-01	LCP Integrated Environmental Management Plan

6 PROJECT DESCRIPTION

6.1 MUSKRAT FALLS GENERATION

The Muskrat Falls Generation Project will include the following sub-components which are broken down under the five principal areas of the development:

- 22 km of access roads, including upgrading and new construction, and temporary bridges;
- A 1,500 person accommodations complex (for the construction period); and

- A north roller compacted concrete overflow dam;
- A south rock fill dam;
- River diversion during construction via the spillway;
- 5 vertical gate spillway;
- Reservoir preparation and reservoir clearing;
- Replacement fish and of terrestrial habitat;
- North spur stabilization works;
- A close coupled intake and powerhouse, including:
- 4 intakes with gates and trash racks;
- 4 turbine/generator units at approximately 206 MW each with associated ancillary electrical/mechanical and protection/control equipment;
- 5 power transformers (includes 1 spare), located on the draft tube deck of the powerhouse; and
- 2 overhead cranes each rated at 450 Tonnes

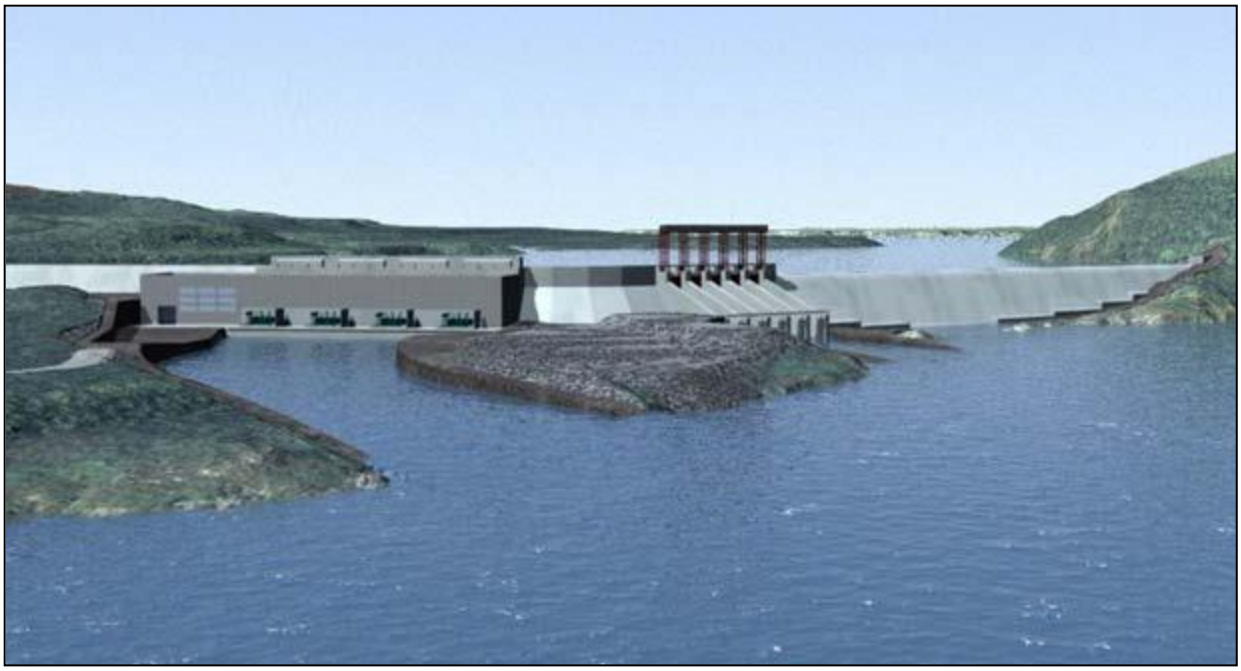

Figure 6-1 Muskrat Falls Generating Facility

6.2 LABRADOR TRANSMISSION ASSET (LTA)

LTA consists of the ac transmission line system form Churchill Falls to Muskrat Falls (see Figure 6-2), specifically:

- Churchill Falls switchyard extension;
- Muskrat Falls switchyard;
- Transmission lines from Muskrat Falls to Churchill Falls: double-circuit 315 kV ac, 3 phase lines, double bundle conductor, Single circuit galvanized lattice steel guyed suspension and rigid angle towers; 247 km long;
- 735 kV Transmission Line at Churchill Falls interconnecting the existing and the new Churchil Falls switchyards; and
- Labrador Fibre Project (Nalcor's participation in Aliant led initiative).

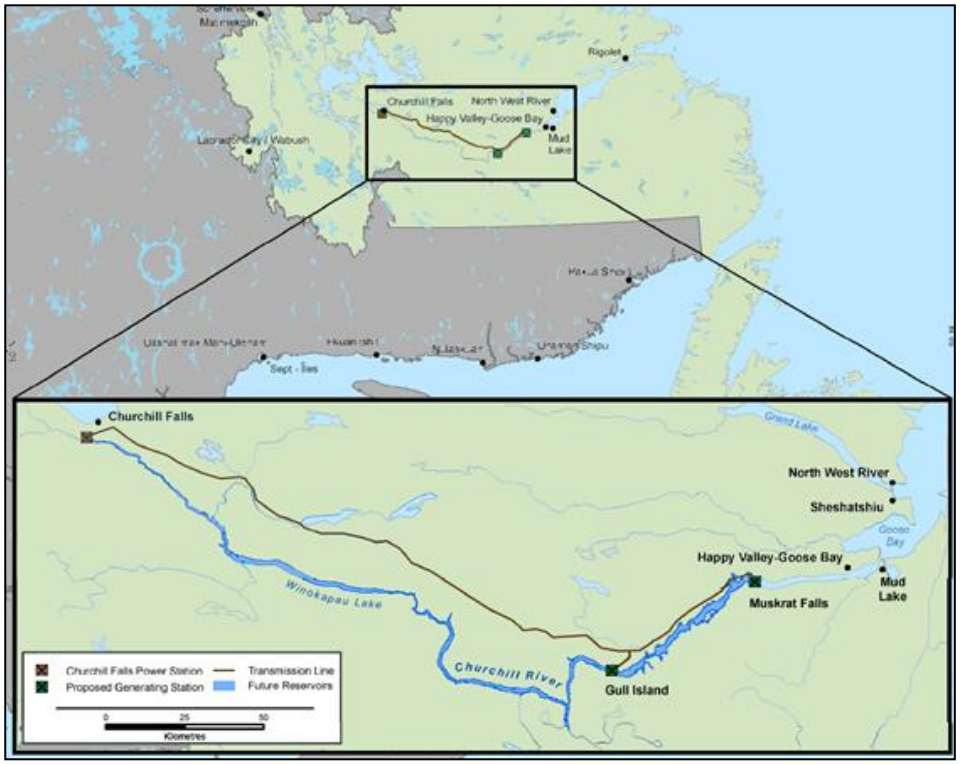

Figure 6-2 Labrador Transmission Asset

7 EXISTING INFORMATION

As outlined in the EIS (Nalcor 2009), the black bear in Labrador is a forest-dwelling animal; however, its presence has been confirmed throughout the Quebec-Labrador peninsula, including forest, sea ice, coastal islands and barrens, reflecting their opportunistic foraging on any edible material (Veitch and Krizan 1996; VBNC 1997; Chaulk et al. 2005). Forest, barren and sea-ice habitats are commonly used areas during spring, while forest, barrens and river habitats are important during the summer and fall. Bears were not found in recent burns but did occur in other open habitat areas (Jacques Whitford 1997).

Estimates of black bear density in Labrador vary dramatically in forested regions (0.45 to 0.52 bears/km^2), or non-forested regions (0.05 bears/km^2) (VBNC 1997). The provincial population of black bear is estimated at 6,000 to 10,000 (NLDEC 2013, internet site) and is considered to be stable.

In Labrador, the primary food source during spring (from April to June) is the residual berry crops of *Vaccinium* spp. and *Empetrum* spp. from the previous year, combined with the occasional hunt and scavenge for caribou, moose or other prey. Veitch and Krizan (1996) and Chaulk et al. (2005) reported observations of black bear predation on large vertebrates (e.g., caribou and/or moose). During summer, the primary food source is fresh vegetation such as sedges and grasses, until the new crops of berries emerge during August (Jacques Whitford 1997d; VBNC 1997). Fish is not a primary component of the black bear diet in Labrador, and observations of black bear obtaining fish from river systems are rare (Veitch and Krizan 1996).

Home ranges are difficult to delineate and require several years of continuous data on movement and habitat selection. Resource abundance and gender are likely to have the greatest effect on black bear dispersal patterns (e.g., Lee and Vaughan 2003; Moyer et al. 2006). Although home ranges may overlap in Labrador (Jacques Whitford 1997), perhaps related to resource availability, there is often temporal separation in such cases (Moyer et al. 2006).

Habitat use by black bear in the lower Churchill River watershed varies by season. During winter, from approximately early November to late April, black bears are in dens. From late summer through early fall, black spruce and mixed fir and spruce forests are suitable areas for foraging, finding shelter and building up fat reserves in preparation for winter denning (Nalcor 2009).

Primary habitats are relatively mature, contiguous forests with openings and abundant understory vegetation, especially berry-producing shrubs. Also, in spring and early summer riparian habitat is primary habitat because it provides early access to fresh vegetation, while in

late summer and fall mixed wood and hardwood forests provide enough food resources to qualify as primary habitat (Nalcor 2009).

Secondary habitat differs from primary habitat in that it provides an abundance of one or two of the three elements (or marginal amounts of all) for black bear habitat, which are food, protection, or resting and denning habitat. Essentially, all forested and riparian areas that are not primary habitat are secondary habitat (Nalcor 2009).

Due to the omnivorous diet of black bear and its adaptability to a wide variety of physical and structural environments, most natural terrestrial environments are primary or secondary. Only gravel bars and areas of anthropogenic disturbance are considered tertiary. Tertiary habitat occupies more than 35.6 km^2 (2.2 percent) of the lower Churchill River valley both in spring and early summer and late summer and fall (Nalcor 2009).

Black bear have few natural predators in Labrador and generally die of old age. Bears have parasites and diseases, but rarely die from them (Kolenosky 1992, internet site). However, McBurney et al. (2000) documented bacterial valvular endocarditis caused by *Staphylococcus aureus* in a collared black bear from northern Labrador in 1991.

8 REGULATORY COMPLIANCE

Black bear are a common species throughout Labrador and are not managed provincially under the Newfoundland and Labrador Endangered Species Act, 2004 (NLESA) or the Species at Risk Act, 2002 (SARA) (SARA 2012, internet site). Black bear are identified as “Not at Risk” by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and last examined in April 1999 (COSEWIC 2013, internet site).

Black bear in Labrador are managed by the Wildlife Division of the NLDEC under the Newfoundland and Labrador Regulation 69/12 Open Season Big Game Black Bear Hunting and Snaring Order, Labrador, 2012-2013 under the Wild Life Regulations and the Wild Life Act.

To comply with provincial legislation and regulations the LCP has, or will:

- identified primary and secondary black bear habitat in the Project area;
- designed and employed appropriate best management mitigation to avoid disturbance and mortality of black bears;
- conduct monitoring or follow-up, as appropriate, to determine success of the mitigation; and
- If required, address contingency plans if the mitigation is found to be unsuccessful.

The intent of the BBPEEMP would be to allow the LCP to evaluate, and to respond appropriately to the findings of, the Project effects during construction and operations on:

- disturbance to black bears and their residences (i.e., dens); and
- mortality of black bears.

NL Reg. 18/12, also referred to as the *Lower Churchill Hydroelectric Generation Project Undertaking Order* releases the Project from environmental assessment and sets conditions for this release that LCP must meet. The release of the Project from environmental assessment under section 3 is subject to the following conditions:

(a) Nalcor Energy shall abide by all commitments made by it in the Environmental Impact Statement dated February 2009, and all the Environmental Impact Statement Additional Information Requests made by the Lower Churchill Hydroelectric Generation Project Environmental Assessment Panel and consequently submitted by Nalcor Energy, and the submissions made by Nalcor Energy during the panel hearings and, subsequent to the hearings, to the panel, unless one or more of the commitments, or a part of a commitment is specifically waived by the minister;

(e) Nalcor Energy shall prepare and abide by the requirements of environmental effects monitoring plans for all phases of the project, and those plans shall be submitted to and approved by the Minister of Environment and Conservation or the appropriate minister of the Crown before the commencement of an activity which is associated with or may affect one or more of the following matters:

(xvi) black bears

Submission of this BBPEEMP satisfies the condition/requirement in NL Reg. 18/12 that Nalcor Energy prepare and submit to the Minister of Environment and Conservation or the appropriate minister of the Crown, an environmental effects monitoring plan for all phases of the project, before the commencement of an activity which is associated with or may affect the following matters:

(xvi) black bears

9 ENVIRONMENTAL EFFECTS MANAGEMENT

The effects management plans (i.e., mitigation measures outlined in the EIS [Nalcor 2009] and the Generation and LTA EPP (LCP 2013) and the commitments made by the LCP during the

Information Request responses and the hearing to ensure regulatory compliance of the above discussed Acts and regulations include:

- Critical habitats shall be identified on site plans or plan profiles for roads and transmission lines for C-SEPP.
- Construction activities shall be scheduled considering any sensitive areas of fish and wildlife habitat and critical periods in fish and wildlife cycles, and considering additional mitigation measures that may be required. Annual timing of migration, spawning and calving in the vicinity of the site shall be considered at all times.
- Personal pets shall not be brought to the construction site to prevent harassment of wildlife;
- Buffer zones shall be implemented to protect wildlife at the site, see Section 8.18 (of the EPP) for the buffer zones for helicopter traffic at the site;
- Fishing and hunting are prohibited at or near the construction site. All project participants shall be prohibited from fishing and hunting at or near the construction site while working on the project.
- Antifreeze will not be used as a form of pest control near camps, as it attracts other wildlife in addition to the targeted animals;
- Under no circumstances are wildlife to be fed and all measures shall be taken to avoid inadvertent feeding;
- Wildlife shall not be chased, caught, diverted, followed or otherwise harassed by project participants;
- All Wildlife sightings and nuisance wildlife shall be reported to the On-Site Environmental Monitor (OSEM);
- The Forestry Branch shall be contacted and updated with regards to nuisance wildlife and wildlife encounters;
- Equipment and vehicles shall yield the right-of-way to wildlife and adhere to construction site speed limits;
- Environmental awareness training, with regular briefings, shall be implemented for all personnel.
- All persons on site shall be made aware of the potential for encounters with black bears and instructed to report all sightings the OSEM.
- Black bear deterrent measures such as bear bangers, bear spray, and electric fencing may be used, and translocation of bears shall be undertaken before any lethal means

are considered. Firearms shall not be permitted on site, with exception of approved bear monitors.

- Black bear protection permits shall be obtained for each black bear monitor. Permits shall be signed by the individual that the permit is issued to.
- The OSEM will survey the immediate area of a blast site within one hour of the blast and curtailed if wildlife (e.g., black bear den) is identified within 500 m of the blast site.
- Proper waste management procedures such as use of bear-proof containers and proper food and storage practices will be adhered to.
- When Project construction ends, all roads not essential to long-term maintenance must be decommissioned, and habitat must be restored and access shall be restricted.

10 ENVIRONMENTAL EFFECTS MONITORING

This BBPEEMP contains both:

Follow-up Programs – studies or surveys designed and completed to confirm the predictions of the environmental assessment (EA) and to determine the effectiveness of any measure taken to mitigate the adverse environmental effects of the Project; and

Monitoring Programs – studies or surveys designed and completed to determine whether the Project is implemented as proposed, and that mitigation and compensation measures to minimize the Project's environmental effects are implemented.

10.1 SURVEY PROTOCOLS

The LCP has committed to conduct baseline, follow-up and monitoring surveys to determine their current state, apply the appropriate mitigation, and to determine if expansion or reduction or deletion of the indicated programs is appropriate (with justification).

This would apply to the following, as appropriate:

- Baseline data collection (i.e., data collected prior to construction);
- Data collection during construction; and
- Data collection during operations.

Protocols for the various surveys are discussed below. Data collection includes metrics that are species specific, as appropriate, quantifiable, repeatable, relevant and time constrained. The goal would be to collect meaningful data in a focused, defendable, repeatable approach, within a timeline that is reasonable, to ensure that the mitigation is appropriate. Where it is determined that the mitigation is not appropriate, a contingency plan would be presented that the LCP could incorporate as per their adaptive management approach.

10.1.1 Data Collection during Construction

The LCP will compile the results of the daily environmental reports that reference sightings, interactions and consequences that relate to black bear encounters, as well as results of relocation efforts by the Department of Natural Resources (DNR), during construction, and will include regulatory compliance tracking. These data will be presented in Excel, or similar format, with the following information:

- date;
- time;
- location (UTM or lats/longs);
- interaction type – brief description of the type of interaction: sighting, human/bear conflict, vehicle/bear conflict);
- bear details – sex, age, behavior at the time of the interaction;
- interaction details - explanation of the nature of the interaction;
- issue resolution - explanation of the action(s) undertaken to resolve the interaction;
- interaction consequence – description of the outcome (bear was scared away; bear was trapped and relocated; bear was euthanized); and
- additional actions undertaken – details of actions undertaken by the LCP (e.g., no additional actions required; report sent to Wildlife Division) and notes on regulatory compliance.

A compilation of daily reports will be submitted to NLDEC-WD on a weekly basis which will document any wildlife encounters. In addition, these data will be compiled once each year (December) and the data evaluated to determine if the observed effects of the Project on black bears would require changes to the mitigation through LCP's adaptive management approach. Any proposed changes would be communicated with the Wildlife Division prior to implementation. In addition, bear sightings, interactions and consequences will be reported in a timely manner to the OSEM and the information distributed to crews to increase their level of awareness and caution when bears are in the Project vicinity.

In addition to data from relocation, sightings or interactions, a protocol has been established to deal with an immediate bear encounter; this protocol will include the following:

- Clear area to ensure safety of personnel;
- Do not approach bear;
- Contact DNR immediately;
- Close area off until DNR personnel arrives or bear moves out.

Following a bear encounter, an inspection of the camp or encounter area must be conducted to attempt to determine the cause of the occurrence and subsequent elimination of that cause.

10.1.2 Data Collection during Operations

The data collected during operations of the Project will be the same as collected during the construction period, but will be collected by the LCP's Inspection Crews, Maintenance Crews and other operations staff during the first five years of operation.

These data will be compiled once each year (December) and the data evaluated to determine if the observed effects of the Project on black bears would require changes to the mitigation through the LCP's adaptive management approach. Any proposed changes would be communicated with the Wildlife Division prior to implementation. As during construction, bear sightings, interactions and consequences will be reported in a timely manner to the OSEM and the information distributed to crews to increase their level of awareness and caution when bears are in the Project vicinity.

10.2 FOLLOW-UP AND MONITORING

A final Follow-up and Monitoring Report will be generated that contains a section that compiles the information collected on Project interactions with black bears as outlined above to address Follow-up (i.e., verification of EIS predictions) and a section to address Monitoring (i.e., regulatory compliance), as discussed in the following subsections.

10.2.1 Follow-up

The Follow-up portion of the Follow-up and Monitoring Report, within the BBPEEMP, will include a comparison to baseline data to ensure a quantitative assessment.

It will present the pre-construction black bear baseline information, consider the data as a description of the effects collected on interactions with bears during the Project construction

and operations time periods, and discuss the effects observed in relation to the effects predictions made in the EIS (i.e., no significant adverse residual effects on bears).

This comparison will also include such aspects as the area of prime black bear habitat created during the construction and operations phases, and the amount successfully utilized. A review will also be conducted to analyze any habitat not utilized and why, as well as activities that can occur to redirect efforts. Monitoring may be complete following the first 5 years of operations, in which an evaluation can be completed to determine the effectiveness of current management practices.

10.2.2 Monitoring

The Monitoring portion of the Follow-up and Monitoring Report will summarize the OSEM's observations and efforts related to the interactions of the Project components and activities with black bears to show that the Project was implemented as proposed, and that mitigation and compensation measures to minimize the Project's environmental effects were implemented appropriately. This will include a subsection to address Compliance Monitoring, also undertaken by the OSEM's to ensure Project compliance with regulatory requirements and other environmental commitments made in the EIS, the responses the LCP provided to the Information Requests, and conditions of EA release.

11 SUMMARY

Table 11-1 Summary of the Black Bear Protection and Environmental Effects Monitoring Plan

	Survey Type	Objective	Location	Timing	Frequency	Contingency
Data Collection During Construction						
	Black Bear Interaction Observation	To determine black bear responses with Project components and activities during construction	All Project construction locations	Throughout the construction period	On-going	Communication with the Wildlife Division
Data Collection During Operations						
	Black Bear Interaction Observation	To determine black bear responses with Project components and activities during operations	All Project components and activities during operations	Throughout the first five years of operations	On-going	Communication with the Wildlife Division

	Survey Type	Objective	Location	Timing	Frequency	Contingency
Follow-up						
		Verify EIS predictions on the Project effects on black bears	Project area	Interim Report following construction; Final Report after first five years of operations	One report post-construction; one report following five years of operations	Communication with the Wildlife Division
Monitoring						
		Verify regulatory compliance during Project construction and operations	Project area	Environmental Monitor through construction and by Inspection crews through operations; Interim Report following construction; Final Report after first five years of operations; other reports as per incident, as required	On-going	Communication with the Wildlife Division

12 EXTERNAL REFERENCES

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