

## 28. SUMMARY AND CONCLUSIONS

### 28.1 INTRODUCTION

Harper Creek Mining Corporation (HCMC) proposes to construct and operate the proposed Harper Creek Project (the Project), a copper mine approximately 10 kilometres (km) southwest of Vavenby, British Columbia (BC). The Project consists of an open pit mine, on-site ore processing facilities, a tailings management facility, waste rock stockpiles, low-grade ore and overburden stockpiles, a temporary construction camp, ancillary facilities, mine haul roads, sewage and waste management facilities, a 24-km access road between the Project Site and a rail load-out facility located on private industrial land owned by HCMC in Vavenby, and a 14-km power line connecting the Project Site to the BC Hydro transmission line corridor in Vavenby. The Project has an estimated 28-year mine life based on a nominal ore throughput of 70,000 tonnes per day (25 million tonnes per year). Chapter 5 provides a detailed description of Project components and activities by Project phase, and Figure 5.7-3 illustrates the general arrangement of the Project at the initiation of Closure (Year 28).

The Project Site has a footprint that covers an area of 1,939 ha at an elevation of approximately 1,800 meters above sea level (masl). The Project Site has been confirmed as non-fish bearing, has been extensively logged in the past, is fragmented by a number of Forest Service Roads that crisscross the Project Site, and has been actively ranched for many decades.

The Project Site sits entirely on provincial Crown Land. No federal lands are anticipated to be affected by the Project. Given the Project's location in the Thompson – Nicola region of the province, the Project will not cause any transboundary changes to any other Canadian province or international jurisdiction.

The proponent of the Project is HCMC, a wholly owned subsidiary of Yellowhead Mining Inc. (YMI). YMI was formed in 2005 as a private BC company specifically to acquire, explore, and, if feasible, develop the Project. YMI is listed on the Toronto Stock Exchange (TSX) in Canada under the trading symbol YMI. HCMC is planning to develop, manage, and operate the Project. YMI and YMI personnel represent HCMC in carrying out these responsibilities.

This Application for an Environmental Assessment Certificate / Environmental Impact Statement (Application/EIS) represents the application made by HCMC under section 16 of the BC *Environmental Assessment Act* (2002a) for an environmental assessment certificate (EA) and the *Canadian Environmental Assessment Act* (CEAA; 1992) for approval to proceed to regulatory permitting for the proposed Project. The Application/EIS has been prepared to meet the requirements of the BC Environmental Assessment Office (BC EAO) and the Canadian Environmental Assessment Agency (CEA Agency).

HCMC has used the EA process as a means to undertake a series of design changes to minimize the potential adverse effects of the Project and maximize the potential benefits. These design changes are more fully described in Section 28.5-1, and include optimization of the mine site footprint and general arrangement of the Project to reduce the spatial extent of the Project, re-design of the open pit to avoid wetland areas near the open pit, changing the water management strategy to achieve no

discharge from the open pit to Baker Creek and to avoid the need for water treatment, relocation of waste rock and low grade stockpiles to reduce potential groundwater seepage, and relocation of potentially acid generating (PAG) waste rock to the lower end of the tailings management facility to ensure it becomes subaqueous within one year, thereby reducing oxidation potential.

Mitigation measures designed to minimize the potential for effects of the Project are described in the Effects Assessment chapters for each of the valued components (VCs). Section 28.5.2 outlines the environmental management plans (EMP) comprising part of these mitigation measures, Section 28.5.3 summarizes in general terms the key mitigation measures proposed for each VC, and Table 28.4.-1 in Section 28.4 includes a summary of both the key EMPs and the key mitigation measures.

For most potential effects, HCMC has been successful in either avoiding adverse effects entirely or reducing them to insignificance. For many potential effects, no residual effects are predicted once proposed mitigation measures are implemented. For many other potential effects, although residual effects are predicted, these residual effects are rated **not significant** (minor), as illustrated by the summary of assessment findings presented in Table 28.4-1. A small number of residual effects were rated as **significant** (major) issues, and a greater number determined to be **not significant** (moderate) residual effects. A summary of residual effects and mitigation measures are presented in Section 28.4.

The following sections summarize the content and conclusions of the Application/EIS.

## 28.2 SUMMARY OF PUBLIC CONSULTATION, ISSUES RAISED, AND HCMC RESPONSE

HCMC's public consultation included engagement with licence and tenure holders and landowners, local governments, and the public, beginning in September 2010. Consultation included meetings, site visits, community events, open houses, telephone conversations, email, and paper correspondence. Detailed summaries of HCMC's communications with these groups are included in Chapter 3 and [Appendices 3-I and 3-K](#). The public has raised issues in the following general areas (see [Appendix 3-L](#) for detailed issues and HCMC's responses):

- access and transportation;
- closure and reclamation;
- employment, training, and economic opportunities;
- fish and fish habitat;
- hydrology;
- infrastructure and services;
- land use;
- Project design;
- socio-economic;
- terrestrial ecosystems and vegetation;

- visual quality;
- water quality and aquatic resources; and
- wildlife and wildlife habitat.

HCMC will, in accordance with the proposed plan for consultation with the public provided in Section 3.7.3 in Chapter 3, continue to consult the public during the Application/EIS review. This consultation will include documenting and providing written responses to issues the public may raise during the remainder of the EA process.

### **28.3 SUMMARY OF ABORIGINAL CONSULTATION, ISSUES RAISED, AND HCMC RESPONSES**

Beginning in June 2006, HCMC has undertaken extensive consultation with the Simpcw First Nation (SFN), Adams Lake Indian Band (ALIB), Neskonlith Indian Band (NIB), and the Little Shuswap Indian Band (LSIB). HCMC first met with the SFN in June 2006 and ALIB, NIB and LSIB in late 2007 to introduce the Project and meet with the leadership of each group. These meetings occurred prior to HCMC formally entering the provincial and federal EA processes on September 18, 2008, when the British BC EAO issued the section 10 Order under the *BC Environmental Assessment Act* (2002a). HCMC will continue to consult with these First Nations during the Application/EIS review stage. Pre-application engagement activities included meetings, site visits, correspondence, information distribution, and First Nations' participation in environmental baseline studies. HCMC also participated in the Project EA Working Group, which includes Simpcw, ALIB, NIB and LSIB representatives, to provide information about the Project and respond to questions. These activities are summarized in Chapter 3 and [Appendix 3-E](#).

To date, the SFN has raised issues in the following general areas (see Table 3-F1 in [Appendix 3-F](#) for detailed issues and responses):

- Aboriginal rights and interests;
- access and transportation;
- accidents and malfunctions;
- air quality;
- archaeology and heritage;
- closure and reclamation;
- consultation;
- cumulative effects;
- EA process and methodology;
- effects of the environment on the Project;
- employment, training, and economic opportunities;
- Environmental Management Plans;

- fish and fish habitat;
- human health and country foods;
- land use;
- Project design;
- socio-economic;
- tailings management;
- terrestrial ecosystems and vegetation;
- traditional knowledge and use;
- water quality and aquatic resources; and
- wildlife and wildlife habitat.

The ALIB has raised issues in the following general areas (see Table 3-F2 in [Appendix 3-F](#) for detailed issues and responses):

- Aboriginal rights and interests;
- archaeology and heritage;
- consultation;
- cumulative effects;
- EA methodology;
- employment, training, and economic opportunities;
- fish and fish habitat;
- terrestrial ecosystems and vegetation;
- water quality and aquatic resources; and
- wildlife and wildlife habitat.

NIB has raised issues in the following general areas (see Table 3-F3 in [Appendix 3-F](#) for detailed issues and responses):

- Aboriginal rights and interests;
- air quality and noise;
- archaeology and heritage;
- consultation;
- EA process and methodology;
- employment, training, and economic opportunities;
- fish and fish habitat;

- land use;
- socio-economic;
- terrestrial ecosystems and vegetation;
- water quality and aquatic resources; and
- wildlife and wildlife habitat.

The LSIB reviewed the Working Tables that HCMC prepared to assist in additional consultation, and identified issues in the following general areas (see Table 3-F4 in [Appendix 3-F](#) for detailed issues and responses):

- air quality and noise;
- archaeology and heritage;
- employment, training, and economic opportunities;
- fish and fish habitat;
- hydrology;
- terrestrial ecosystems and vegetation;
- traditional knowledge and use;
- water quality and aquatic resources; and
- wildlife and wildlife habitat.

Consultation by YMI with the Métis Nation British Columbia (MNBC) has focused on providing opportunities to gather traditional knowledge / traditional use (TK/TU) information, and providing Project updates and information. HCMC is planning further communication with the MNBC during the Application/EIS review stage. MNBC has raised issues in the following general areas (see Chapter 23 and Table 3-F5 in [Appendix 3-F](#) for detailed issues and responses):

- Aboriginal rights and title;
- air quality and noise;
- cumulative effects;
- environmental assessment process and methodology;
- employment, training, and economic opportunities;
- Environmental Management Plans;
- land use;
- terrestrial ecosystems and vegetation;
- traditional knowledge and use; and
- wildlife and wildlife habitat.

HCMC will, in accordance with the proposed plan for consultation with Aboriginal groups provided in Section 3.5.3 in Chapter 3, continue to consult Aboriginal groups during the Application/EIS review. This consultation will include documenting and responding to issues Aboriginal groups may raise during the remainder of the EA process.

## 28.4 SUMMARY OF RESIDUAL EFFECTS AND MITIGATION MEASURES

The residual effects of the Project have been predicted based on the implementation of an extensive array of mitigation measures, many of which are incorporated into the Environmental Management Plans (EMPs) that are outlined in Chapter 24. These EMPs govern a wide range of Project-related activities, including construction, waste and water management, emergency response planning, traffic, and the management of a variety of potential biophysical and socio-economic effects (e.g., for management of air quality, noise, metal leaching/acid rock drainage, groundwater, fish and aquatic habitat, terrestrial ecosystems, wildlife, and heritage resources). Many of these EMPs are identified in Table 28.4-1 and a complete list of EMPs is set out in Section 28.5.2.

Many of the EMPs include monitoring provisions that will provide the basis for any necessary adaptive management to address effects that may require additional mitigation. In addition to these monitoring provisions, HCMC has developed a series of Follow-up Programs to verify the predictions of environmental effects made during the EA of the Project and to confirm whether mitigation measures have achieved the desired outcomes. These Follow-up Programs are described in Section 28.5.4.

Table 28.4-1 presents a summary of HCMC's residual effects findings arising from the Project. For each residual effect, the tables itemize the following information:

- the nature of the residual Project effect;
- the Project phase(s) with which the residual Project effect will be associated;
- mitigation measures proposed to reduce, or eliminate, the residual Project effect;
- the predicted significance of the residual Project effects; and
- the predicted significance of any residual cumulative effects.

Brief summaries of each assessment can be found in the following subsections.

### 28.4.1 Air Quality

Project residual effects on air quality are discussed in Chapter 9, and include the potential for increased criteria air contaminants (CAC) emissions and dust deposition. Dispersion modelling was used to determine the magnitude of the effect of Project operations. The results were then compared to relevant standards and objectives. The effect of increases in CAC concentrations and dust deposition levels on air quality, after implementation of mitigation measures including the Air Quality Management Plan, are assessed as **not significant (moderate)**.

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Air Quality (Chapter 9)</i>				
Increase in TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , and dust deposition	Construction, Operations 1, Operations 2	Emission reduction measures, e.g., baghouses. Fugitive dust reduction measures, e.g., road watering. Implementation of: <ul style="list-style-type: none"> <li>Air Quality Management Plan</li> </ul>	Not significant (moderate)	Not significant (moderate)
<i>Noise (Chapter 10)</i>				
Increase in noise level	Construction	Consider noise in equipment selection, adequate maintenance, reduce vehicle speed, avoid idling, and optimize construction design and site layout. Implementation of: <ul style="list-style-type: none"> <li>Noise Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
Increase in noise level	Operations	Consider noise in equipment selection, adequate maintenance, reduce vehicle speed, avoid idling, and optimize construction design and site layout. Implementation of: <ul style="list-style-type: none"> <li>Noise Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
<i>Groundwater (Chapter 11)</i>				
Alteration of groundwater levels and flow patterns (flow directions, hydraulic gradients and flow rates) arising from mine activities, waste rock and water management	Construction, Operations, Closure, Post-Closure	Decommission and removal of open pit water management system during Operations 2, pit refilled with water but elevation controlled, and excess water pumped to tailings management facility. Partial reclamation of non-PAG waste rock stockpile during Operations 2 and final reclamation during Closure; decommission and removal of the Water Management Pond during the final reclamation at Closure. Low-grade ore stockpiles stored in the TMF catchment during Operations 1, processed and removed in Operations 2. For PAG waste rock stockpile, sub-aqueous disposal and management inside the TMF during Operations. For low-grade ore stockpile, ores processed and removed in Operations 2. Progressive reclamation of overburden stockpile during Operations 2. Partial reclamation of topsoil stockpiles during Construction and Operations, and removal during Closure.	Not significant (moderate)	n/a

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Groundwater (Chapter 11; cont'd)</i>				
		<p>Partial reclamation of TMF tailings beaches and embankments during Operations 2, and final reclamation of TMF embankments and beaches during Closure; decommission and reclamation of the Water Management Pond during final reclamation at Closure.</p> <p>Implementation of:</p> <ul style="list-style-type: none"> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> </ul> <p>Site Water Management Plan</p>		
Degradation of groundwater quality due to seepage of contact water	Construction, Operations, Closure, Post-Closure	<p>Open pit refilled with water but elevation controlled and excess water pumped to TMF.</p> <p>At the non-PAG waste rock stockpile, runoff diversion and collection ditches; seepage collection and storage in TMF during Operations; partial reclamation during Operations 2 and final reclamation during Closure; decommission and removal of Water Management Pond during final reclamation at Closure. Low-grade ore stockpiles stored in TMF catchment during Operations 1, processed and removed in Operations 2.</p> <p>At the PAG waste rock stockpile, sub-aqueous disposal and managed inside TMF during Operations, reclaimed with TMF at Closure. For the low-grade ore stockpile, ores processed and removed in Operations 2.</p> <p>Progressive reclamation of the overburden stockpile during Operations 2.</p> <p>Partial reclamation of the topsoil stockpiles during Construction and Operations, and used for reclamation and removal during Closure.</p> <p>Partial reclamation of TMF tailings beaches and embankments during Operations 2, and final reclamation of TMF embankments and beaches during Closure; decommission and reclamation of the Water Management Pond during final reclamation at Closure. Low-permeability embankment materials, seepage collection drains and recovery pond, pumping back.</p> <p>Implementation of:</p> <ul style="list-style-type: none"> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> </ul>	Not significant (moderate)	n/a

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Hydrology (Chapter 12)</i>				
Altered streamflow	Construction, Operations, Closure, Post-Closure	Separating non-contact and contact water, and reusing contact water to minimize the use of freshwater, and therefore to minimize streamflow changes. Implementation of: <ul style="list-style-type: none"> <li>• Sediment and Erosion Control Plan (to avoid morphologic changes)</li> <li>• Site Water Management Plan</li> </ul>	Not significant (moderate)	n/a
<i>Surface Water Quality (Chapter 13)</i>				
Change in surface water quality in P Creek	Operations	Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> <li>• Soil Salvage and Storage Plan</li> </ul>	Not significant (moderate)	n/a
Change in surface water quality in T Creek	Closure and Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Pla;</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> <li>• Soil Salvage and Storage Plan</li> </ul>	Significant (major)	n/a

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Surface Water Quality (Chapter 13)</i>				
Change in surface water quality in upper Harper Creek	Construction, Operations, Closure, and Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> <li>• Soil Salvage and Storage Plan</li> </ul>	Not significant (moderate)	n/a
Change in surface water quality in lower Harper Creek	Closure and Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> <li>• Soil Salvage and Storage Plan</li> </ul>	Not significant (moderate)	n/a
Change in surface water quality at the outlet of North Barrière Lake and Barrière River <sup>1</sup>	Closure, and Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> </ul>	Not significant (moderate)	n/a

*(continued)*

<sup>1</sup> Potential water quality effects in the outlet of North Barrière Lake and Barrière River were qualitatively assessed based on the predications in lower Harper Creek. There is some limited potential for a change in water quality in the outlet of North Barrière Lake and potentially the upper portion of Barrière River, until dilution is sufficient to reduce concentrations below BC Water Quality Guidelines or background conditions.

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Surface Water Quality (Chapter 13; cont'd)</i>				
		<ul style="list-style-type: none"> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> <li>• Soil Salvage and Storage Plan</li> </ul>		
<i>Fish and Fish Habitat (Chapter 14)</i>				
Changes in surface water quantity	Construction, Operations, Closure, Post-Closure	Diverting non-contact and contact water; maintaining natural networks; reusing contact water to minimize the use of freshwater. Implementation of: <ul style="list-style-type: none"> <li>• Sediment and Erosion Control Plan (to avoid morphologic changes)</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Site Water Management Plan</li> <li>• Fish Habitat Offsetting Plan</li> </ul>	Not significant (moderate)	n/a <sup>a</sup>
Potential for toxicity due to changes in water quality in P Creek and Lower Harper Creek	Construction, Operations, Closure, Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Selenium Management Plan</li> <li>• Soil Salvage and Storage Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Explosives Handling Plan</li> </ul>	Not significant (minor)	n/a <sup>a</sup>
Potential for toxicity due to changes in water quality in T Creek and Upper Harper Creek	Construction, Operations, Closure, Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Selenium Management Plan</li> <li>• Soil Salvage and Storage Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Explosives Handling Plan</li> </ul>	Not significant (moderate)	n/a <sup>a</sup>

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Aquatic Resources (Chapter 14)</i>				
Changes in surface water quantity	Construction, Operations, Closure, Post-Closure	Diverting non-contact and contact water; maintaining natural networks; reusing contact water to minimize the use of freshwater. Implementation of: <ul style="list-style-type: none"> <li>• Sediment and Erosion Control Plan (to avoid morphologic changes)</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Fish Habitat Offsetting Plan</li> </ul>	Not significant (moderate)	n/a <sup>a</sup>
Potential for toxicity due to changes in water quality in P Creek and Lower Harper Creek	Construction, Operations, Closure, Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Selenium Management Plan</li> <li>• Soil Salvage and Storage Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Explosives Handling Plan</li> </ul>	Not significant (minor)	n/a <sup>a</sup>
Potential for toxicity due to changes in water quality in T Creek and Upper Harper Creek	Construction, Operations, Closure, Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Selenium Management Plan</li> <li>• Soil Salvage and Storage Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Explosives Handling Plan</li> </ul>	Not significant (moderate)	n/a <sup>a</sup>
Effects due to nutrient loading in T Creek and Upper Harper Creek	Construction, Operations, Closure, Post-Closure	Diverting contact and mine water to TMF; Implementation of: <ul style="list-style-type: none"> <li>• Explosives Handling Plan</li> </ul>	Not significant (moderate)	n/a <sup>a</sup>

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Terrestrial Ecology (Chapter 15)</i>				
<i>Vegetation</i>				
Loss of rare plants	Construction, Operations	Avoidance where possible, protect (dust control), flagged buffers, reclamation of wetlands, regional Howell's quillwort surveys in the ESSFwc2. Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Vegetation Management Plan</li> </ul>	Significant (major)	Unknown
Loss of ecological communities at risk	Construction	Avoidance, flagged buffers, reclamation of ECAR, regional surveys within the ESSFwc2. Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Vegetation Management Plan</li> </ul>	Significant (major)	Not significant (moderate)
Loss of wetlands	Construction, Operations, Closure, Post-Closure	Avoidance where possible. Reclamation during Closure. Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Vegetation Management Plan</li> </ul>	Significant (major)	Not significant (moderate)
Alteration of wetlands	Construction, Operations, Closure, Post-Closure	Appropriate culverts, manage edge effects, dust management, contaminants control measures, invasive plant species control, reclamation Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> <li>• Vegetation Management Plan</li> </ul>	Not significant (minor)	n/a
Loss of old-growth forests	Construction	Avoidance, reclamation of disturbed areas, windthrow management, marking of vegetation clearance boundaries, reclamation	Not significant (moderate)	Not significant (minor)
<i>Wildlife (Chapter 16)</i>				
Western toad: habitat alteration	Construction, Operations	Wetland reclamation and pocket wetland creation. Implementation of: <ul style="list-style-type: none"> <li>• Wildlife Management Plan</li> </ul>	Not significant (moderate)	Not significant (minor)

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Wildlife (Chapter 16; cont'd)</i>				
Western toad: mortality	Construction, Operations	Speed limits, adaptive management along roads, avoid breeding sites during clearing activities.	Not significant (minor)	n/a
Harlequin Duck: habitat alteration	Operations, Closure and Post-Closure	Implementation of: <ul style="list-style-type: none"> <li>• Selenium Management Plan</li> </ul>	Not significant (minor)	n/a
Olive-sided Flycatcher: disturbance and displacement	Construction, Operations	Implementation of: <ul style="list-style-type: none"> <li>• Wildlife Management Plan</li> <li>• Noise Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
Grizzly bear: habitat alteration	Construction, Operations	Re-vegetation, reclamation.	Not significant (minor)	Not significant (moderate)
Moose: habitat alteration	Construction, Operations	Re-vegetation, reclamation.	Not significant (minor)	Not significant (minor)
<i>Socio-economics (Chapter 17)</i>				
Increased competition for skilled workers	Construction, Operations	Practice of no-solicitation at local millworks; participate in regional discussions on labour supply/ demand issues; local employment and supply policies.	Not Significant (moderate)	Not Significant (moderate)
<i>Commercial and Non-commercial Land Use (Chapter 18)</i>				
Change in quality and experience of natural environment for public users	Construction, Operations	Follow visual design principles (e.g., utilizing vegetation screens and feathering forest edges along cleared areas and rights of ways ) Implementation of: <ul style="list-style-type: none"> <li>• Noise Management Plan</li> </ul>	Not significant (minor)	n/a
<i>Visual Quality Assessment (Chapter 19)</i>				
Alteration to the landscape associated with the Project components and infrastructure	Construction, Operations	Re-vegetate disturbed areas	Not significant (moderate)	n/a

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Archaeology and Heritage (Chapter 20)</i>				
Disturbance of Known Archaeological Sites	Construction, Operations	Data recovery under BC <i>Heritage Conservation Act</i> Section 14 Site Investigation Permit and, if necessary, undertake measures in accordance with the cultural practices of the affected community. Implementation of: <ul style="list-style-type: none"> <li>• Archaeology and Heritage Management Plan</li> <li>• Chance Find Procedure</li> </ul>	Not significant (moderate)	n/a
Disturbance of Unknown Archaeological Sites	Construction, Operations	Data recovery under BC <i>Heritage Conservation Act</i> Section 14 Site Investigation Permit and, if necessary, undertake measures in accordance with the cultural practices of the affected community. Implementation of: <ul style="list-style-type: none"> <li>• Archaeology and Heritage Management Plan</li> <li>• Chance Find Procedure</li> </ul>	Not significant (minor)	n/a
<i>Human Health (Chapter 21)</i>				
Decrease in air quality that could affect human health	Construction, Operations	Project design, Implementation of: <ul style="list-style-type: none"> <li>• Air Quality Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
Decrease in country foods quality that could affect human health in consumers of country foods	Construction, Operations, Closure, Post-Closure	No hunting or berry collecting at the Project Site Implementation of: <ul style="list-style-type: none"> <li>• Selenium Management Plan</li> <li>• Vegetation Management Plan</li> <li>• Site Water Management Plan</li> <li>• Air Quality Management Plan</li> <li>• Sediment and Erosion Control Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (continued)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Human Health (Chapter 21; cont'd)</i>				
Decrease in drinking water quality that could affect human health through consumption of water	Closure, Post-Closure	Project design to minimize the changes in water quality. Implementation of: <ul style="list-style-type: none"> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Groundwater Management Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Selenium Management Plan</li> <li>• Site Water Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
Increase in noise levels that could affect human health	Construction, Operations	Consider noise in equipment selection, adequate equipment maintenance, reducing vehicle speed, avoid idling, and optimize construction design and site layout. Implementation of: <ul style="list-style-type: none"> <li>• Noise Management Plan</li> </ul>	Not significant (minor)	Not significant (minor)
<i>Current Use of Land and Resources for Traditional Purposes (Chapter 22)</i>				
Change in access to traditional sites – rock cairns	Construction, Operations, Closure, Post-Closure	Mitigation measures will be developed in consultation with local First Nations, and the BC Archaeology Branch.	Not significant (moderate)	n/a
Change in Quality and Experience of Natural Environment – visual quality	Construction, Operations, Closure, Post-Closure	Follow visual design principles (e.g., utilizing vegetation screens and feathering forest edges along cleared areas and rights of ways); Re-vegetate disturbed areas not directly affected by the Project during construction and operations; Re-vegetate directly disturbed areas following decommissioning and closure.	Not significant (moderate)	n/a
Change in abundance and distribution of resources- fishing	Construction, Operations, Closure	Implementation of: <ul style="list-style-type: none"> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Selenium Management Plan</li> </ul>	Not significant (minor)	n/a

(continued)

**Table 28.4-1. Summary of Residual Effects, Mitigation Measures, and Significance (completed)**

Key Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Current Use of Land and Resources for Traditional Purposes (Chapter 22; cont'd)</i>				
		<ul style="list-style-type: none"> <li>• Soil Salvage and Storage Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> <li>• Explosives Handling Plan</li> <li>• Fish Habitat Offsetting Plan</li> </ul>		
Change in abundance and distribution of resources- hunting and trapping	Construction, Operations, Closure	Implementation of: <ul style="list-style-type: none"> <li>• Wildlife Management Plan</li> <li>• Noise Management Plan</li> <li>• Selenium Management Plan</li> <li>• Spill Prevention and Response Plan</li> <li>• Air Quality Management Plan</li> <li>• Vegetation Management Plan</li> <li>• Prohibition of hunting by staff within the Project Site.</li> </ul>	Not significant (minor)	Not significant (minor)

A cumulative assessment was carried out in order to assess the combined impacts of the Project with other projects in the area. Three projects and activities are identified as potentially having a cumulative effect: Vavenby Sawmill, the Foghorn Polymetallic Project, and transportation activities related to forestry and mineral exploration; however, they are all considered low risk. The cumulative effect of increases in CACs and dust deposition on air quality are assessed as **not significant (moderate)**.

#### 28.4.2 Noise

Project residual effects on noise are discussed in Chapter 10, and include increased noise levels associated with construction and operation activities, such as blasting, operating machinery, and traffic. Noise modelling was conducted to predict noise levels within the Regional Study Area (RSA) and the residual effects of noise on sensitive receptors, and the results compared to appropriate guidelines, such as World Health Organization recommendations and guidance from Health Canada. The effect of noise level increases due to Project activities, after implementation of mitigation measures, including the Noise Management Plan, are assessed as **not significant (minor)**.

The cumulative effect of Project noise combined with noise associated with the Vavenby Sawmill and the Foghorn Polymetallic Project, as well as with hunting, harvesting, fishing, transportation, and forestry were also assessed. There has been a no registration reserve under the *Mineral Tenure Act* (1996f) Chapter 292 for uranium and thorium since 2008. As a result, there is a high level of uncertainty as to the timing for the development of the Foghorn project and whether the project would be constructed during the life of the Project. Therefore, the potential for it to interact with the Project is unlikely. The noise effects of the rest of the above activities, including the Vavenby Sawmill, are captured in baseline noise monitoring; therefore, the cumulative effect of the Project on noise levels is assessed as **not significant (minor)**.

#### 28.4.3 Groundwater

Quantitative information, including baseline studies and groundwater flow modeling, as detailed in Chapter 11, was conducted to assess the potential for Project-related effects to groundwater quantity and quality. The results of these studies and modelling indicated that the Project will affect groundwater quantity and quality within the Project Site and in the immediate downstream catchments of the P Creek, T Creek, Harper Creek, Baker Creek and Jones Creek. With the implementation of the mitigation measures designed for the key mine components and activities, and adherence to the Groundwater, Mine Waste and ML/ARD, and Site Water management plans, the residual effects of the Project for both groundwater quantity and quality are assessed as **not significant (moderate)** beyond the Local Study Area (LSA).

No cumulative effects are anticipated due to interactions with past, present and future projects and activities located in the hydrogeology study area. The existing supply wells for groundwater use in the downstream of the Open Pit are predicted not to be affected by the Project.

A follow-up groundwater monitoring plan has been developed as part of the Groundwater Management Plan (Chapter 24.8) to monitor the potential effects on groundwater in the catchments in the downstream of the major mine components.

#### 28.4.4 Hydrology

Chapter 12 provides a detailed discussion of the quantitative information, including baseline studies and watershed modelling that was used to assess the potential for Project-related effects to surface water quantity. After considering mitigation measures, residual effects, i.e., altered streamflows, were identified for surface water quantity. Medium and high streamflow changes are anticipated to be confined within the LSA. Predicted effects on the RSA streamflows (i.e., Barrière and North Thompson rivers) are negligible (less than 5% flow reduction). The residual effects on surface water quantity as a result of Project activities are assessed as **not significant (moderate)**.

As noted previously, project-related residual effects on surface water quantity beyond the LSA boundaries are not predicted. Further, no past, present, or reasonably foreseeable future project is expected to affect streamflows within the Project LSA. Thus, no interactions between the Project and other projects are expected with regards to streamflow changes, and therefore no cumulative effects assessment regarding streamflows has been undertaken.

#### 28.4.5 Surface Water Quality

Potential Project-related effects on surface water quality are assessed by qualitative and quantitative studies (e.g., predictive modelling). After considering mitigation measures, predicted adverse effects on water quality due to a change in chemical concentrations (primarily increased concentrations of cadmium, copper, and selenium above guidelines and beyond the range of natural variability) were determined in P Creek, T Creek, and Harper Creek, and in the outlet of North Barrière Lake and Barrière River.

The residual effect on water quality in T Creek, during Closure and Post-Closure, is assessed as **significant (major)**. T Creek receives chemical loading from unrecovered seepage from the Tailings Management Facility (TMF) in all Project phases and discharge of excess water from the TMF during Closure and Post-Closure. Additional water management options to reduce concentrations of water quality parameters and mitigate water quality effects in T Creek continue to be investigated by HCMC through iterative technical and predictive studies. The results of these studies and details of additional mitigation measures will be made available to the Working Group as technically and economically feasible options are identified.

Residual effects on P Creek and Harper Creek, the outlet of North Barrière Lake and Barrière River are assessed as **not significant (moderate)**. Residual effects are partially reversible and affect waterbodies with low resiliency due to the presence of Bull Trout.

Potential water quality effects in the outlet of North Barrière Lake and Barrière River were qualitatively assessed based on the predications in lower Harper Creek. There is some limited potential for a change in water quality in the outlet of North Barrière Lake and potentially the upper portion of Barrière River, until dilution is sufficient to reduce concentrations below BC WQG or background conditions.

No potential spatial interactions with other human actions are identified for Project-related residual effects due to change in water quality in P Creek, T Creek, or Harper Creek, the outlet of North Barrière Lake; therefore, no potential cumulative effects are identified.

#### 28.4.6 Fish, Fish Habitat, and Aquatic Resources

The Project Site has been confirmed as non-fish bearing, therefore the assessment for potential residual effects on fish, fish habitat, and aquatic resources has focused on the environment downstream from the Project Site. The assessment for potential residual effects on fish, fish habitat, and aquatic resources from changes in water quantity and water quality used a combination of quantitative modelling for hydrology and water quality and qualitative analysis to predict the magnitude and extent of residual effects, and is discussed in Chapter 14. None of the three fish VC species, Bull Trout, Rainbow Trout or Coho salmon are listed on Schedule 1 of the federal *Species At Risk Act*. The predicted changes in water quantity in upper Harper Creek between P Creek and T Creek may have adverse effects on fish, fish habitat, and aquatic resources, as these sections of stream are likely to experience prolonged periods of decreased water quantity (through Post-Closure) below established threshold and pre-mine levels. After considering mitigation measures, including the Fish Habitat Offsetting Plan, this residual effect is assessed as **not significant (moderate)** in T Creek, P Creek, and upper Harper Creek, and **not significant (minor)** further downstream from the Project Site.

Residual effects to fish or aquatic resources associated with predicted changes in water quality in P Creek, T Creek, upper Harper Creek, and lower Harper Creek were identified, since predicted concentrations for a number of metals (e.g., cadmium, copper, selenium, and zinc) or ions (e.g., sulphate) are greater than BC water quality guidelines. The change in water quality could potentially affect fish or aquatic resources by affecting health, abundance, or community structure. This residual effect is assessed as **not significant (moderate)** in waterways downstream closest to the TMF (i.e., T Creek and upper Harper Creek), and **not significant (minor)** in waterways that are further away from the TMF (i.e., P Creek and lower Harper Creek). Additional water management options to reduce concentrations of water quality parameters and mitigate water quality effects in T Creek continue to be investigated by HCMC through iterative technical and predictive studies. The results of these studies and details of additional mitigation measures will be made available to the Working Group as technically and economically feasible options are identified.

Predicted changes in water quality from nutrient loading are also predicted to cause observable changes in the primary and secondary producer communities in T Creek and upper Harper Creek. However, all of these predicted effects are restricted to the LSA. Therefore, because of the limited geographic extent and the expected recovery of aquatic resources in the long term, the residual effects are assessed as **not significant (moderate)**.

No cumulative effects are predicted because no spatial overlap between Project residual effects and other projects, activities, or human actions are expected within the cumulative effects assessment boundaries.

### 28.4.7 Terrestrial Ecosystems

Chapter 15 discusses the Project's potential effects on terrestrial ecology (vegetation) that were identified through baseline studies, best management practices, scientific literature, and technical expertise/professional judgment. Despite application of mitigation measures, residual effects of the Project on vegetation are expected. These effects include loss of habitat for rare plants, ecological communities at risk (ECAR), wetlands, and old-growth forests, as well as habitat alteration for wetlands.

The Project will result in the loss of 10 rare plant occurrences which is considered high magnitude and of regional extent, specifically for Howell's quillwort, where five occurrences will be lost and only a few other occurrences have been recorded in the province. Approximately 11% (13.9 ha) of all ECAR mapped in the LSA will be lost/removed as a result of construction and operations, including all 3.4 ha of the tufted clubrush / golden star moss and 9.3 ha or 46% of the Lodgepole pine / dwarf blueberry / peat-mosses ECAR. Loss of ECAR as a result of the Project will be high magnitude. The Project is expected to result in the loss of 140 ha of wetland-meadow areas within the LSA. Reclamation will provide 17.6 ha of wetlands which will mitigate this effect. Effects of habitat loss for rare plants, ECAR and wetlands were assessed as **significant (major)**. Alteration of wetlands and loss of old-growth forests were assessed as being **not significant (minor)** and **not significant (moderate)**, respectively.

The cumulative effects of the Project, when considering several sawmills and the Trans Mountain Pipeline were also assessed. Cumulative effects for all four VCs (rare plants, ECAR, wetlands, and old growth forests) are assessed as being **not significant (minor)** or unknown. A follow-up program including additional field surveys in the ESSFwc2 within the RSA for rare plants specifically for Howell's quillwort are discussed in the Vegetation Management Plan (Section 24.17). Results from follow-up monitoring program may reduce these impacts, and successful high-elevation wetland reclamation could result in a change in the significance rating.

### 28.4.8 Wildlife and Wildlife Habitat

Potential effects on wildlife and wildlife habitat as a result of the Project were identified through baseline studies, best management practices, scientific literature, and technical expertise/professional judgment, as set out in Chapter 15. Application of proposed mitigation programs is anticipated to prevent residual effects to all but five of the fourteen wildlife VCs identified: western toad, Harlequin Ducks, Olive-sided Flycatcher, grizzly bear, and moose. Individual Harlequin Ducks (and their eggs and active nests) are protected under the *Migratory Birds Convention Act* (1994). Olive-sided Flycatchers and western toads are provincially Blue-listed and are listed on Schedule 1 of SARA; flycatchers are also designated as Threatened by COSEWIC (BC CDC 2014). Grizzly bear are provincially Blue-listed, federally listed as a species of Special Concern, and are an identified wildlife species under the *Forest and Range Protection Act* (2002c). The residual effects predicted are habitat alteration (for western toad, Harlequin Ducks, grizzly bear, and moose); habitat disturbance and displacement (for Olive-sided Flycatcher); and mortality (for western toad). These residual effects are all assessed as **not significant (moderate for western toad habitat loss and minor for the rest)**.

An assessment of cumulative effects was also conducted that evaluated the effects of the Project in addition to other mining Projects, forestry, and other land use activities in the area. Four VCs were

identified as potentially having residual cumulative effects: (western toad, Olive-sided Flycatcher, grizzly bear and moose). While all four VCs with residual effects have the potential to be affected by cumulative interactions with other projects and activities in the RSA, cumulative effects are all considered to be **not significant (minor)**.

#### 28.4.9 Socio-economics

Potential socio-economic effects as a result of the Project are assessed in Chapter 17. The assessment concludes that one residual and one cumulative effect are anticipated. The assessment of increased competition for skilled workers within the RSA resulted in a **not significant (moderate)** finding for both a project and a cumulative effect. Mitigation measures include no-solicitation at local millworks, collaborating with employment service agencies, and establishing local employment and supply policies.

#### 28.4.10 Commercial and Non-commercial Land Use

Project-related effects on commercial and non-commercial land use are assessed in Chapter 18. Commercial interests include forestry, agriculture and trapping, and non-commercial interests include public recreation, hunting and fishing. The chapter also assesses potential effects on, navigable waters (portions of lower Harper Creek and the North Thompson River) as well as private land. With the implementation of mitigation measures, no residual effects are anticipated on navigable waters or private land. The effects assessment concludes that one residual effect is anticipated. The assessment of a possible change in the quality and experience of the natural environment for public land users resulted in a finding of **not significant (minor)** and no cumulative effects.

#### 28.4.11 Visual Quality Assessment

Spatial information, including baseline studies, geographic information systems (GIS), enhanced photographic imagery, and recognized tabular assessment methods, as detailed in Chapter 19, were used to assess the potential for the visual quality of the greater area to be affected by the visibility of infrastructure that would comprise the Project. The residual effect of alteration of the landscape associated with construction and operation activities is assessed as **not significant (moderate)**.

Of the three active projects (the Vavenby and Barriere sawmills and the Trans Mountain Pipeline) and the four foreseeable future projects (the Shannon Creek Hydroelectric Project, North Thompson Transmission Project, Trans Mountain Pipeline Extension Project, and Foghorn Polymetallic Project), only the cumulative effects of the Vavenby Sawmill, North Thompson Transmission Project, and Foghorn Polymetallic Project warrant consideration, since the other four projects would fall outside the areas of potential visibility. Given the changed landscape at the Vavenby Sawmill's location and the disparate nature of the vistas from the sawmill, it was excluded from the cumulative effects assessment. Both the North Thompson Transmission Project and the Foghorn Polymetallic Project are greater than 8 km away from the Project, and were also excluded from the cumulative effects assessment. Thus, no cumulative effects on visual quality are anticipated.

### 28.4.12 Archaeology and Heritage

The effects assessment for archaeology and heritage in Chapter 22 concludes there will be a residual effect related to the disturbance of known protected archaeological resources EiQw-2 and EjQw-2 (rock cairns), which was assessed as **not significant (moderate)**, and disturbance of unknown archaeological sites, which was assessed as **not significant (minor)**. No cumulative effects are expected as the two rock cairns identified at the Project Site can only interact with the Project (since it is within the Project Site).

Potential direct effects of the Project on the rock cairns will be managed through mitigation under a BC *Heritage Conservation Act* Section 14 Investigation Permit, followed by a Section 12 Site Alteration Permit.

With respect to indirect environmental effects under CEAA (1992), there are no known structures, sites, or things of historical, paleontological, or architectural significance within the Project Site. Therefore no indirect impacts to known structures, sites, or things of historical, paleontological, or architectural significance from air quality, terrestrial ecology, and accidents and malfunctions are expected.

If there are currently unknown structures, sites, or things of archaeological, historical, paleontological, or architectural significance identified within the Project Site that may be indirectly affected from changes to air quality and terrestrial ecology, or accidents and malfunctions, these will be managed using the mitigation measures provided for unknown archaeological sites.

### 28.4.13 Human Health

The human health assessment outlined in Chapter 21 considers several different pathways through which health can be affected: inhalation of air, ingestion of country foods, ingestion of water, and exposure to noise. The assessment follows a science-based approach recommended by Health Canada, and relies on data measured during baseline studies and modelled predictions of noise levels, air quality, and water quality

#### 28.4.13.1 Human Health Effects due to Air Quality

Residual effects to human health caused by changes in air quality are identified relating to PM<sub>10</sub> concentrations predicted exclusively for the temporary construction camp for workers during the Construction phase and at the upper snowmobile pullout during the Operations phase; no residual effects are predicted in areas further away from the Project. These residual effects are assessed as **not significant (minor)**.

#### 28.4.13.2 Human Health Effects due to Drinking Water Quality

Potential residual effects to human health caused by changes in drinking water quality are identified due to changes in water quality (elevated selenium concentrations) during the Closure and Post-Closure phases. However, there are no regular drinking water users of T Creek (no surface water licenses), and transient use of T Creek as a source of drinking water would not be expected to cause effects to human health. Therefore, the residual effect is assessed as **not significant (minor)**.

#### 28.4.13.3 *Human Health Effects due to Country Foods Quality*

Residual effects to human health due to changes in the quality of country foods are identified for aquatic country foods (i.e., fish). This is associated with the changes in water quality that are predicted in Harper Creek and in the outlet of North Barrière Lake and Barrière River. Although it is possible that the quality of country foods may change as a result of the predicted changes in water quality, it is unlikely that effects will occur to human health and the magnitude of the residual effect to human health was assessed to be negligible. Therefore, the residual effect is assessed as **not significant (minor)**.

#### 28.4.13.4 *Human Health Effects due to Noise*

During the construction, noise levels greater than the speech interference criterion are predicted at the potential upper pullout area for snowmobiles. However, people are only expected to be present at the pullout area for a few minutes while on a (noisy) idling snowmobile as they wait for haul trucks to pass on the road. The significance of the residual effect on noise during the Construction phase is considered to be **not significant (minor)**. During the Operations phase, predicted noise levels from mining activities are predicted to be greater than the criterion for speech interference at the upper and lower potential pullout areas for snowmobiles. The significance of residual effect on human health due to noise during the Operations phase is assessed as be **not significant (minor)**.

Assessment of all four pathways for cumulative effects to human health found few other projects or activities that had spatial or temporal overlap with the Project. It is unlikely that changes due to other projects or activities would interact with residual human health effects of the Project. Therefore, the potential for cumulative effects is considered to be **not significant (minor)**.

#### 28.4.14 **Current Use of Lands and Resources for Traditional Purposes**

The effects assessment for current Aboriginal use of lands and resources in Chapter 22 concludes that four residual and one cumulative residual effect are anticipated. The assessment of a possible decrease in access to potential traditional sites resulted in a **not-significant (moderate)** finding and no cumulative effects. The assessment of possible changes in the quality and experience of the natural environment resulted in a **not-significant (moderate)** finding and no cumulative effects, while the possible change in abundance and distribution of fish resources resulted in a **not-significant (minor)** finding and no cumulative effects. The assessment of possible changes in the abundance and distribution of hunting and trapping resources resulted in a **not-significant (minor)** finding for both project and cumulative effects.

The Project is considered unlikely to result in significant adverse effects on current Aboriginal use.

## 28.5 ENVIRONMENTAL MANAGEMENT

### 28.5.1 Project Design Considerations

HCMC has used the EA process as a project planning mechanism that has enabled changes and refinements to the Project design so as to minimize the potential adverse effects of the Project and maximize the potential benefits. Through discussion with various members of the BC EAO Working Group, Aboriginal groups and the public, HCMC has made the following changes to the Project:

- optimization of the mine site footprint and general arrangement of the Project to reduce spatial disturbance;
- re-designing the pit to avoid impacting wetland in an area north-west of the pit;
- making improvements and updating the Mine Waste and Water Management Design Report ([Appendix 5-D](#)) including:
  - change to the water management strategy to achieve no discharge from the open pit to Baker Creek,
  - change to the water management strategy to avoid need for water treatment
- relocating the waste rock and low grade ore stockpiles in consideration of potential groundwater seepage effects;
- adding a compacted overburden liner beneath the PAG low grade ore stockpile;
- relocating the PAG waste rock to the lower end of the TMF to ensure it is subaqueous within one year, reducing oxidization potential;
- pumping surplus water in the open pit to the TMF on a seasonal basis to minimize seepage during operations;
- pumping open pit water to the TMF in perpetuity post-Closure, rather than discharging to Baker Creek;
- designing a single discharge point from the TMF to spill to T Creek during Post-Closure; and
- designing water management ponds to collect seepage from the TMF and non-PAG waste rock stockpile, including embankments faced with HDPE liners.

### 28.5.2 Environmental Management Plans

Environmental management plans (EMPs) have been proposed to minimize the potential adverse effects of the Project. The EMPs include a description of the plan, purpose, performance objectives, environmental protection or control measures, monitoring (if proposed), and reporting requirements. EMPs are detailed in Chapter 24, and include the following:

- Environmental Management System (Section 24.1);
- Air Quality Management Plan (Section 24.2);
- Archaeology and Heritage Management Plan (Section 24.3);

- Emergency Response Plan (Section 24.4);
- Explosives Handling Plan (Section 24.5);
- Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6);
- Fuel and Hazardous Materials Management Plan (Section 24.7);
- Groundwater Management Plan (Section 24.8);
- Mine Waste and ML/ ARD Management Plan (Section 24.9);
- Noise Management Plan (Section 24.10);
- Sediment and Erosion Control Plan (Section 24.11);
- Selenium Management Plan (Section 24.12);
- Site Water Management Plan (Section 24.13);
- Soil Salvage and Storage Plan (Section 24.14);
- Spill Prevention and Response Plan (Section 24.15);
- Traffic and Access Management Plan (Section 24.16);
- Vegetation Management Plan (Section 24.17);
- Waste Management Plan (Section 24.18); and
- Wildlife Management Plan (Section 24.19).

### 28.5.3 Mitigation Measures

Mitigation and management measures to eliminate or reduce Project effects can include design and planning, engineered structures, the application of control technologies, best management practices, regulatory requirements, and monitoring and adaptive management. Mitigation measures to minimize the potential for adverse effects related to the Project are described in the Effects Assessment chapters for each of the VCs. The following sections summarize in general terms the key mitigation measures proposed for each VC.

#### 28.5.3.1 Air Quality

Mitigation measures to minimize potential effects to the air quality VC are detailed in Section 9.5.3 and Table 9.5-13, as well as in the Air Quality Management Plan (Section 24.2). Key mitigation measures to decrease air emissions include:

- implementation of energy efficiency measures;
- development of procurement policies for fuel and equipment;
- conducting regular inspection of equipment to ensure efficiency;
- minimizing vehicle idling;
- adherence to designated speed limits;

- emission control systems for point source emissions; and
- adopting recycling and waste segregation programs.

Mitigation measures to decrease the generation of fugitive dust include:

- reclamation and re-vegetation of decommissioned areas;
- adherence to designated speed limits;
- watering roadways during dry conditions;
- conditioning materials with water that are likely to generate dust;
- erection of windbreaks where necessary;
- enclosing or covering concentrate loads in vehicles;
- use of dust suppression/collection systems;
- enclosure conveyors or crushers to the extent practicable; and
- timing blasting to coincide with calm weather to the extent possible.

#### 28.5.3.2 *Noise*

Mitigation measures to minimize the potential for effects to the noise VC are detailed in Section 10.5.3 and Table 10.5-14, as well as in the Noise Management Plan (Section 24.10). Key mitigation measures include:

- Controlling noise at the source through management such as:
  - considering noise levels in equipment selection;
  - maintenance of equipment to minimize noise;
  - optimization of equipment operation to minimize noise;
  - optimization of site layout and use of site procedures to minimize noise (e.g., keeping doors closed);
  - use of enclosures, berms, acoustic screening and shrouding of stationary sources;
  - turning off equipment when not in use;
  - having mufflers on vehicles; and
  - controlling blasting to minimize noise.
- Controlling the noise pathway (i.e., transmission of noise from the source to a receptor) such as the use of barriers or land-use controls.
- Controlling noise at the receptor, if necessary, if all other methods of noise control have been evaluated, implemented if practical, and further improvements are still required.

### 28.5.3.3 *Groundwater*

Mitigation measures to minimize the potential for effects to the groundwater VC are detailed in Section 11.5.2 and Tables 11.5-2a and 11.5-2b, as well as in the Groundwater Management Plan (Section 24.8). Key mitigation measures include:

- design of Project so that stockpiles (non-PAG waste rock, PAG waste rock, Non-PAG low-grade ore, and PAG low-grade ore) are either located within the footprint of the TMF or seepage is collected and directed to the TMF;
- use of a low-permeability overburden liner for the PAG low grade ore stockpile, with a water management pond to collect the seepage;
- refilling of the open pit (elevation controlled), with excess water pumped to the TMF at Closure;
- decommissioning and removing the open pit water management system during the Operations 2 phase;
- undertaking progressive reclamation of various Project components (e.g., non-PAG waste rock stockpile, overburden stockpile, etc.); and
- implementation of management plans such as the Groundwater Management Plan (Section 24.8), Mine Waste and ML/ARD Management Plan (Section 24.9), and the Site Water Management Plan (Section 24.13).

### 28.5.3.4 *Hydrology*

Mitigation measures to minimize the potential for effects to the surface water quantity VC are detailed in Section 12.5.2 and Table 12.5-2, as well as in the Site Water Management Plan (Section 24.13). Key mitigation measures include:

- construction of water management structures (e.g., non-contact water diversion and sediment control) to maintain natural drainage networks to the extent possible;
- collection of contact water and diversion of contact water to the TMF;
- reclaim and reuse of contact water for use in the process plant; and
- implementation of management plans such as the Site Water Management Plan (Section 24.13), Groundwater Management Plan (Section 24.8), and the Sediment and Erosion Control Plan (Section 24.11).

### 28.5.3.5 *Surface Water Quality*

Mitigation measures to minimize the potential for effects to the surface water quality VC are detailed in Section 13.5.3 and Table 13.5-4. Mitigation measures for water quality rely on multiple management plans, which will directly or indirectly eliminate or reduce the potential for effects to water quality due to changes in water chemistry or total suspended solid (TSS) content. Key mitigation measures are described in the management plans as follows:

- implementation of management plans to control changes in water quality due to sediment and erosion such as the Sediment and Erosion Control Plan (Section 24.11), Site Water Management Plan (Section 24.13), and the Soil Salvage and Storage Plan (Section 24.14);
- implementation of the Air Quality Management Plan (Section 24.2) to prevent changes in water quality due to deposition of fugitive dust onto surface water; and
- implementation of management plans to minimize the potential for effects to water quality due to changes in chemical concentrations such as the Explosives Handling Plan (Section 24.5); Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6); Groundwater Management Plan (Section 24.8); Mine Waste and ML/ARD Management Plan (Section 24.9); Selenium Management Plan (Section 24.12); and Site Water Management Plan (Section 24.13).

#### 28.5.3.6 *Fish, Fish Habitat, and Aquatic Resources*

Mitigation measures to minimize the potential for effects to the fish, fish habitat, and aquatic resources VCs are detailed in Section 14.5.2 and Table 14.5-2. Key mitigation measures are described in the management plans as follows:

- implementation of various plans to minimize the potential for effects to fish, fish habitat, or aquatic resources due to changes in water quality due to sedimentation and erosion such as the Site Water Management Plan (Section 24.13), Sediment and Erosion Control Plan (Section 24.11), Soil Salvage and Storage Plan (Section 24.14), and the Fish and Aquatics Effects Monitoring and Management Plan (Section 24.6);
- implementation of various plans to minimize to the potential for effects to fish, fish habitat, or aquatic resources due to changes in water quality from atmospheric deposition of fugitive dust such as the Air Quality Management Plan (Section 24.2) and the Site Water Management Plan (Section 24.13);
- implementation of the Traffic and Access Management Plan (Section 24.16) to minimize fish direct mortality effect;
- implementation of various plans to minimize the potential effects of fish, fish habitat, or aquatic resources due to changes in water quantity such as the Site Water Management Plan (Section 24.13), Sediment and Erosion Control Plan (Section 24.11), Fish Habitat Offsetting Plan ([Appendix 14-E](#)), and the Fish and Aquatics Effects Monitoring and Management Plan (Section 24.6);
- implementation of various plans to minimize the potential effects on fish and aquatic resources due to changes in water quality such as the Site Water Management Plan (Section 24.13), Sediment and Erosion Control Plan (Section 24.11), Soil Salvage and Storage Plan (Section 24.14), Groundwater Management Plan (Section 24.8), Mine Waste and ML/ARD Management Plan (Section 24.9), the Fish and Aquatics Effects Monitoring and Management Plan (Section 24.6),
- implementation of the Selenium Management Plan (Section 24.12) to minimize the potential effects on fish and aquatic resources due to changes in water quality; and

- implementation of the Explosives Handling Plan (Section 24.5) and the Site Water Management Plan (Section 24.13) to minimize the potential for changes in water quality to affect aquatic resources due to introduction of nutrients.

As discussed in the Selenium Management Plan (Section 24.12), the preliminary environmental target for selenium in receiving waters for the Project is 10 µg/L, which is the more conservative, lower value that is protective of both fish and birds. This environmental target is considered preliminary since it was and will be refined over time as Project-specific information comes available. Once Project-specific data and bioaccumulation models are available (see Section 24.12.8) a science based environmental benchmark (SBEB) for selenium will be formally developed for the Project. The SBEB will be developed based on guidance provided by the BC MOE (BC MOE 2013b), with additional guidance currently under development.

#### 28.5.3.7 *Terrestrial Ecosystems*

Mitigation measures to minimize the potential for effects to rare plants, wetlands, old-growth forests and ecological communities at risk (ECAR) VCs are detailed in Section 15.5.2 and Tables 15.5-3 to 15.5-6, as well as in the Vegetation Management Plan (Section 24.17). Mitigation measures are organized into three categories: impact avoidance, impact reduction and technical mitigation, and reclamation. Key mitigation measures are as follows:

- Impact avoidance measures to reduce loss of VCs such as:
  - Project re-design to avoid sensitive locations (e.g., rare plant occurrences, old-growth forests, and wetlands) wherever possible;
  - flagging or signage of sensitive locations to discourage accidental encroachment with machines;
  - personnel training; and
  - maintenance of a spatial database and maps of rare plant locations to avoid impacts during operational and maintenance activities.
- Impact reduction and technical mitigation to reduce alteration effects to VC, such as:
  - minimizing vegetation loss during Project construction and operation;
  - design of roads and transmission lines to minimize the number of water crossings and to avoid running parallel in close proximity to watercourses;
  - inclusion of low impact clearing techniques (e.g., hand clearing and topping);
  - erosion prevention and bank stabilization to minimize secondary loss after initial clearing efforts; and
  - implementation of various management plans to reduce the potential for effects to VCs by decreasing fugitive dust emissions (Air Quality Management Plan, Section 24.2), minimizing contaminant effects (e.g., plans to protect surface water quality, see Section 28.1.3.5), development of an invasive plant species plan (Vegetation Management Plan, Section 24.17), and minimizing edge effects (Vegetation Management Plan, Section 24.17 and the Closure and Reclamation Plan, Chapter 7).
- Progressive reclamation, as described in the Closure and Reclamation Plan (Chapter 7).

### 28.5.3.8 *Wildlife and Wildlife Habitat*

A number of wildlife VCs were included in the effects assessment including: western toad, barn swallow, common nighthawk, harlequin duck, olive-sided flycatcher, bald eagle, northern goshawk, bat species at risk, wolverine, fisher, grizzly bear, moose, mountain caribou, and mule deer. Mitigation measures to minimize the potential for effects to the various wildlife VCs are detailed in Section 16.5.2 and the Wildlife Management Plan (Section 24.19). Mitigation measures are organized into three categories: mitigation measures for habitat loss and alteration, mitigation for disturbance and displacement, and mitigation for mortality. Key mitigation measures are as follows:

- Mitigation measures for habitat loss and alteration include:
  - re-design of the Project to minimize alteration to sensitive locations such as old-growth forest and wetlands that provide habitat for wildlife VCs;
  - avoidance of important habitat where practicable alternatives are available;
  - re-vegetation/reclamation of some Project components during the Closure phase;
  - if adverse effects on wildlife are observed associated with use of the TMF or pit areas, adaptive management will be initiated to discourage wildlife from accessing these facilities;
  - implementation of various management plans such as the Air Quality Management Plan (Section 24.2), Emergency Response Plan (Section 24.4), Explosives Handling Plan (Section 24.5), Fuel and Hazardous Materials Management Plan (Section 24.7); Selenium Management Plan (Section 24.12), Site Water Management Plan (Section 24.13), Spill Prevention and Response Plan (Section 24.15); and Waste Management Plan (Section 24.18); and
  - minimizing habitat alteration due to dust deposition through implementation of the Air Quality Management Plan (Section 24.2) and Vegetation Management Plan (Section 24.17).
- Mitigation measures for disturbance and displacement include:
  - mitigation measures for noise, as described in the Noise Management Plan (Section 24.10) and in Section 28.1.3.2; and
  - mitigation measures to minimize effects on wildlife VCs due to light such as the use of directed or focused lighting, shielding lights and minimizing use of lighting in non-essential areas, where practical and without compromising the safety of employees.
- Mitigation for mortality includes:
  - mitigation measures for vegetation clearing and building demolition;
  - mitigation measures to decrease wildlife-vehicle collisions;
  - mitigation measures along power lines; and
  - mitigation of attractants to prevent mortality of nuisance animals.

### 28.5.3.9 *Socio-economics*

Mitigation measures to minimize the potential for effects to the community growth and community health and well-being VCs are detailed in Section 17.5.2 and Table 17.5-2. Key mitigation for the community growth VC is as follows:

- mitigation measures for increased competition of skilled labour include working collaboratively with local sawmills and the Clearwater and Barriere Employment Services Centre-WorkBC on recruitment needs, implementation of a local hiring and training policy, and a policy on procurement of materials and services from BC and regional suppliers;
- mitigation measures for increased housing demand including accommodation of workers at the Project Site during Construction and public announcement of the decision to proceed with the Project;
- mitigation measures for community infrastructure and services include compliance with the Health, Safety and Reclamation Code for Mines in BC (BC MEMPR 2008), implementation of an Emergency Response Plan (Section 24.4), communication strategies, and working with local mills, government officials, and Interior Health Authority; and
- mitigation measures for mine closure include consultation with affected communities and government agencies to prepare an adjustment strategy in readiness for mine closure.

With respect to potential changes in family life (community health and well-being VC), this effect is expected to be outweighed by the positive aspects of local employment, and no mitigation is identified. Mitigation measures for the community health and well-being VC include:

- measures to mitigate potential effects on public safety due to increased traffic on Highway 5 and local roads, as detailed in the Traffic and Access Management Plan (Section 24.16), and
- HCMC will maintain a dialogue with Aboriginal and local governments, service providers and major employers in the region to review socio-economic effects, including the communication of key information on project activities, schedule and workforce requirements to facilitate planning for changes that may occur in the communities.

### 28.5.3.10 *Commercial and Non-commercial Land Use*

The VCs identified under the land use subject area include private land, commercial interests (forestry, agriculture, and trapping), public use, and navigable waters VCs. Mitigation measures to minimize the potential for effects to the land use VCs are detailed in Section 18.5.2 and Table 18.5-2. Key mitigation for each of the commercial and non-commercial land use VCs are described below:

- Private land VC - HCMC will work with private landowners on the powerline route to identify potential mitigation measures to enable power line construction and secure necessary approval from the Agricultural Land Commission for the powerline right of way (if it crosses ALR-zoned land);
- Commercial interests VC (forestry) - Mitigation measures include implementation of a Traffic and Access Management Plan (Section 24.16), consulting with forest licensees who use the Vavenby Mountain, Saskum Plateau and Vavenby-Saskum FSRs before deciding whether to establish additional gates (aside from the gate at the Project Site), installation of

cattle guards if necessary to prevent livestock drift, along the mine access road, upgrading the FSRs to improve overall road condition and safety for users.

- Commercial interests VC (range tenures) – Mitigation measures include an agreement with range tenure holder (RAN077435) for potential impacts of the Project on use of this tenure, installation of a cattle guard to control livestock drift if needed (in consultation with MFLNRO along the mine access road), installation of wing fencing at appropriate locations along the Mine Access Road to prevent cattle drift, if required, upgrading the FSRs to improve overall road condition and safety for users, monitoring of livestock movement along mine access road and implementation of the Site Water Management Plan (Section 24.13); and Sediment and Erosion Control Plan (Section 24.11);
- Commercial interests VC (trapping) – HCMC has concluded agreements with trapline holders TR0337T001 and TR0341T003;
- Public use VC – Mitigation measures include implementation of a Traffic and Access Management Plan (Section 24.16); possible construction of two pullouts (lower and upper pullouts; Figure 18.4-15) on Vavenby Mountain and Saskum Plateau FSRs; communications with local recreation clubs; and upgrading and maintenance of the FSRs for safety, implementation of a Noise Management Plan (Section 24.10) and visual quality mitigation measures described in Section 19.5.4 of Chapter 19 (Visual Quality Effects Assessment).
- Navigable waters VC – Mitigation measures include constructing the power line to meet Transport Canada standards and criteria for aerial cables (power and communication; Transport Canada 2009) and signage as required.

#### 28.5.3.11 *Visual Quality*

Mitigation measures to minimize the potential for effects to the visual quality VC are detailed in Section 19.5.2 and Table 19.5-12. Key mitigation to minimize the effect of alteration to the landscape associated with the Project components on the visual quality VC is as follows:

- take into account good visual design principles during Project design and construction;
- re-vegetate disturbed areas not directly affected by the Project during the Construction and Operations phases; and
- re-vegetate directly disturbed areas following decommissioning and Closure.

#### 28.5.3.12 *Archaeology and Heritage*

Mitigation measures to minimize the potential for effects to the archaeology VC are detailed in Section 20.5.2 and Table 20.5-2. There are no known structures, sites, or things of historical, paleontological, or architectural significance within the Project Site. Key mitigation to minimize the effect of disturbance to known or unknown archaeological and heritage sites include:

- for known sites, avoidance or additional work under a HCA Section 14 Investigation Permit followed by a Section 12 Site Alteration Permit if required; and
- for unknown sites, Archaeology and Heritage Management Plan, and Chance Find Procedure, and education of Project personnel regarding protections afforded archaeological sites.

### 28.5.3.13 *Human Health*

Mitigation measures to minimize the potential for effects to the human health VC are detailed in Section 21.5.2 and Table 21.5-2. Key mitigation measures include:

- mitigation measures to reduce the potential for effects to human health due to changes to air quality (see Section 28.5.3.1 and the Air Quality Management Plan, Section 24.2);
- mitigation measures to reduce the potential for effects to human health due to changes in country foods quality such as implementation of a no hunting, fishing, or berry collecting at the Project Site and measures to protect air quality (Section 28.5.3.1), water quality (Section 28.5.3.5), soil and vegetation quality (Section 28.5.3.7), fish and aquatic resources (Section 28.5.3.6), and wildlife (Section 28.5.3.8);
- mitigation measures to reduce the potential for effects to human health due to changes in drinking water quality including the implementation of various management plans such as Mine Waste and ML/ARD Management Plan (Section 24.9); Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6); Groundwater Monitoring and Management Plan (Section 24.8); Selenium Management Plan (Section 24.12); Soil Salvage and Storage Plan (Section 24.14); Site Water Management Plan (Section 24.13); Sediment and Erosion Control Plan (Section 24.11); Air Quality Management Plan (Section 24.2); and
- mitigation measures to reduce the potential for effects to human health due to changes in noise levels (see Section 28.5.3.2 and the Noise Management Plan, Section 24.10).

### 28.5.3.14 *Current Use of Lands and Resources for Traditional Purposes*

The effects assessment for current use of lands and resources for traditional purposes VC included consideration of potential effects to fishing opportunities and practices, hunting and trapping opportunities and practices, gathering opportunities and practices, and use of habitations, trails, cultural and spiritual sites. Mitigation measures to minimize the potential for effects to the current use of lands and resources for traditional purposes VC are detailed in Section 22.5.3 and Table 22.5-2. Key mitigation measures include:

- mitigation measures to reduce the potential for change in quality and experience of the natural environment such as visual design principles, re-vegetating disturbed areas not directly affected by the Project during construction and operations, re-vegetating directly disturbed areas following decommissioning and Closure, and the Noise Management Plan (Section 24.10);
- mitigation measures to minimize effects to harvesting success (fishing) such as the implementation of various management plans including the Mine Waste and ML/ARD Management Plan (Section 24.9), Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6), Selenium Management Plan (Section 24.12), Soil Salvage and Storage Plan (Section 24.14), Site Water Management Plan (Section 24.13), Sediment and Erosion Control Plan (Section 24.11), and Explosives Handling Plan (Section 24.5);
- mitigation measures to minimize effects to harvesting success (hunting and trapping) such as implementing various management plans including the Wildlife Management Plan (Section 24.19), Noise Management Plan (Section 24.10), Selenium Management Plan

(Section 24.11), Spill Prevention and Response Plan (Section 24.15), Air Quality Management Plan (Section 24.2), and Vegetation Management Plan (Section 24.17), other best management practices, and prohibition of hunting by staff;

- mitigation measures to minimize effects to harvesting success (gathering) such as avoidance, flagged buffers, creation of pocket wetlands, reclamation of ECAR, appropriate culverts, manage edge effects, dust management, contaminants control measures, invasive plant species control, and reclamation; and
- mitigation measures to minimize the effects due to changes in perceived quality of resources such as sharing of results of proposed environmental monitoring programs, and including Aboriginal group members in ongoing monitoring.

#### 28.5.4 Follow-up Programs and Adaptive Management

The *Operational Policy Statement for Follow-Up Programs under the Canadian Environmental Assessment Act* (CEA Agency 2011) provides the following definition for follow-up programs from the *Canadian Environmental Assessment Act* (1992):

- to verify the accuracy of the conclusions of the EA process for a designated project; and
- to determine the effectiveness of any measures taken to mitigate the adverse effects of the project.

As per the policy, the results of the follow-up programs will be used to adaptively manage for any previously unanticipated adverse environmental effects of the Project, and/or to modify necessary mitigation measures as needed. Adaptive management is a planned, systematic process for continuously improving environmental management practices by learning about their outcomes (CEA Agency 2009). Following the *Operational Policy Statement Adaptive Management Measures under the Canadian Environmental Assessment Act* (CEA Agency 2009), decisions to adopt specific adaptive management measures can be identified later during the project life-cycle as a result of the analysis of data generated by a follow up or monitoring program.

Indicators, action thresholds, predictions and triggers for adaptive management will be developed for each of the proposed follow-up programs in consultation with appropriate government agencies. Adaptive management options will also be identified if mitigation measures do not function as intended. If needed, once adaptive management measures have been implemented, monitoring will continue in order to verify the effectiveness of the follow-up program and learn from its results.

The following sections provide overviews of the follow-up programs proposed for the Project. In most cases, the follow-up programs are designed to rely on established management and monitoring programs to provide the necessary data for the follow-up program.

##### 28.5.4.1 Groundwater Quality Follow-up Program

**Groundwater Management Plan.** A follow-up long-term groundwater monitoring plan has been developed as a routine part of the Groundwater Management Plan (Section 24.8) to monitor the potential effects on groundwater in the catchments downstream of the major mine components. An

adaptive management plan can be initiated if the monitoring results show that the effect in the receiving groundwater environment is significant enough to warrant further attention.

#### 28.5.4.2 *Fish and Aquatic Resources Follow-up Programs*

**Selenium Management Plan.** The Selenium Management Plan is proposed as a follow-up program to proactively mitigate risks due to selenium in the aquatic environment. The objective of the Selenium Management Plan (detailed in Section 24.12) is to identify, characterize, and address potential environmental risks that selenium may pose to the receiving environment of the Project, and to adaptively manage these risks based on monitoring results. The framework of the Selenium Management Plan is designed to meet best practices for environmental and technical performance objectives for the Project, in addition to ensuring statutory requirements are considered and addressed. The Selenium Management Plan is supported by four aspects: prediction, prevention, mitigation, and monitoring, that together form an effective strategy to achieve environmental protection, and allow an effective follow-up program to be implemented. Monitoring of water quality, sediment quality, and tissue residues in biota is included as part of the Selenium Management Plan.

**Fish Habitat Offsetting Plan.** The development of the TMF and waste rock storage infrastructure will take place in non-fish bearing portions of T Creek and P Creek, but will trigger a need to acquire an authorization to cause “serious harm” to fish pursuant to the Fisheries Act in the form of habitat loss due to water quantity reductions predicted to occur in upper Harper Creek (between P Creek and T Creek), P Creek, and T Creek. A Fish Habitat Offsetting Plan (FHOP; [Appendix 14-E](#)) was developed for the Project to meet *Fisheries Act* requirements and DFO’s Fisheries Protection Policy Statement (DFO 2013). The FHOP is concerned exclusively with the design of two offsetting options – Lion Creek and gravel placement in lower Harper Creek – to offset for fisheries loss caused by project infrastructure. The FHOP was developed with input from the Department of Fisheries and Oceans (DFO) and the British Columbia Ministry of Environment (MOE). A follow-up program that monitors the environmental performance of the fish habitat offsetting plan (i.e., success at enhancing fish productivity) will be undertaken.

#### 28.5.4.3 *Terrestrial Ecology Follow-up Programs*

**Rare Plants and Ecosystems at Risk Surveys.** The confidence in the characterization of the residual Project effects to rare plants was considered to be low. Based on the current information, rare plants will experience significant adverse cumulative effects. However, this is the artifact of a lack of regional knowledge. Although general predictions of adverse rare plant effects are sound, the distribution of rare plants outside of the survey areas is unknown. As such, it is difficult to determine the scale of the effect of the Project on rare plant abundance and distribution. Establishing the distribution and extent of additional rare plant occurrences within the ESSFwc2 could help better characterise the regional impacts of the project and verify the conclusions reached in the Application/EIS.

Similarly, knowledge of the presence and distribution of ECAR in the RSA is limited. Establishing the distribution and extent of additional ECAR occurrences within the ESSFwc2 would help better characterize the effects of the Project and enable a determination of significance.

Additional field surveys in the ESSFwc2 within the RSA for rare plants, specifically for Howell's quillwort, should be conducted as part of a Follow-up Program, the details of which are discussed in the Vegetation Management Plan (Section 24.17).

**Wetland Mapping.** Due to the complex mosaic of wetlands and upland terrestrial ecosystems located in the proposed TMF area, accurate mapping of these areas on hardcopy photos is challenging and potential overestimates of wetland extent can occur. Use of new technologies such as new high resolution imagery and light detection and ranging (LIDAR) provide much greater resolution and allow for more accurate delineation and interpretation of ecosystem boundaries and types. During final Project design, new imagery, LIDAR, or other high resolution remote sensing data may be required. A Follow-up Program to re-map the wetlands in and directly adjacent to the TMF should be conducted to more accurately characterize wetland extent and type, the details of which are discussed in the Vegetation Management Plan (Section 24.17). This information would refine the total loss of wetland extent caused by the project, verify the conclusions in the Application/EIS, and inform reclamation.

## 28.6 ABORIGINAL RIGHTS AND RELATED INTERESTS

The proposed Project is located within the traditional territory of the Secwepemc (Shuswap) Nation (Figure 23.1-1; Shuswap Cultural Education Society 2007). The Secwepemc Nation asserts interests to Secwepemcul'ecw territory, an area that encompasses approximately 145,000 km<sup>2</sup> of the central interior region of the province. The Simpcw First Nation (SFN), Adams Lake Indian (ALIB), Neskonlith Indian Band (NIB), and Little Shuswap Indian Band (LSIB) are members of the Secwepemc Nation. The Secwepemc Nation was composed of historic divisions with stewardship responsibilities for areas within the Nation (Figure 23.1-2).

The Project Site is located within the asserted and historic territory of the North Thompson (Simpawl'ecw) Division (Teit 1909), which today is recognized as SFN territory (Figure 23.1-3; SFN 2010). For ALIB, NIB, and LSIB, Figure 23.1-2 shows the boundaries of the historical Shuswap Lakes Division. The Project Site is outside of the historical Lakes Division boundary. The Lakes Division members also assert interests in the Neskonlith Douglas Claim Reserve area, a few kilometers south of the Project Site (Figure 23.5-1). The northwest corner of the reserve claim area overlaps with the downstream receiving environment of the Project Site (i.e., Harper Creek and North Barrière Lake watershed).

YMI initiated consultations with Aboriginal groups in 2006 and 2007<sup>2</sup>, prior to formally entering the environmental assessment (EA) process in September 2008<sup>3</sup>. YMI engagement activities with Aboriginal groups during the pre-Application stage have included meetings, site visits, correspondence, information distribution, and First Nations' participation in environmental baseline studies. The purpose of YMI's engagement activities was to provide Aboriginal groups with the information they require to determine if and how the Project may affect their Aboriginal rights and related interests, and to provide

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<sup>2</sup> The exception is consultation with the Métis Nation BC (MNBC), whom YMI first engaged in early 2012.

<sup>3</sup> Consultation was suspended between early 2009 until late 2010 when the Project was put on hold. Consultation activities resumed in early 2011 when the BC Environmental Assessment Office (BC EAO) and Canadian Environmental Assessment Agency (CEA Agency) accepted the updated Project Description.

Aboriginal groups with the opportunity to share information about their Aboriginal rights and related interests as they relate to the Project. Engagement activities were also intended to provide First Nations with the opportunity to identify issues and concerns about the Project, and discuss potential mitigation and accommodation measures. Since the beginning of the EA process, YMI has adapted its consultation efforts in accordance with provincial section 11 and 13 Orders, the strength of claim assessments completed by the provincial and federal governments, and the stated preferences of the First Nations involved. Consultation is an on-going process and will continue throughout the life of the Project.

Consultation with the MNBC by YMI has focused on opportunities to provide information on traditional knowledge and traditional use in relation to the Project, and providing Project updates and information. YMI will continue to communicate and provide opportunities for the MNBC to provide information regarding concerns or potential impacts on their interests during the Application/EIS review stage.

Details on YMI's consultation efforts are described in Chapter 3, section 3.5, and issues raised during consultations are summarized in [Appendix 3-F](#). These issues have led to improvements in Project layout and design.

Issues raised by Aboriginal groups around effects on a number of VCs included the following issues summarized as:

- **Surface water quantity:** changes to water quantity on fish and aquatic habitat, due to a reduction in flows on Harper Creek, Baker Creek, and Jones Creek;
- **Fish and fish habitat:** effects of construction of the TMF on downstream fish and aquatic habitat resulting in a loss of fish habitat and reduced Bull trout productivity;
- **Air quality:** effects of fugitive dust deposition on aquatic and plant habitat, and possible contamination of country foods;
- **Wildlife:** habitat alteration and potential displacement of wildlife due to sensory disturbance (noise; traffic);
- **Cultural heritage:** potential for impacts on access to, and practices within, culturally important areas impacted by mining operations; and
- **Current use of lands and resources for traditional purposes:** potential impacts on fishing, hunting and trapping, gathering and other traditional use sites located within the Project Site.

Chapter 22 assesses the potential effects of the Project on current use of lands and resources for traditional purposes. Chapter 23 assesses the potential for Project residual effects to impact Aboriginal rights including fishing, hunting, trapping, gathering, and cultural use. There is a potential for adverse effects on Aboriginal rights when there is a negative interaction between the Project and resources (i.e., fish, wildlife, plants, traditional sites) that are essential to the exercise of the Aboriginal right. An impact on Aboriginal rights may also be experienced if access to a rights-based resource is affected. Table 28.6-1 details the residual effects that may link to an Aboriginal right. However, identification of residual effects to a specific VC (e.g., fish, wildlife, etc.) does not necessarily mean that an Aboriginal right will be affected. It is necessary to consider how the residual effect for a specific VC (e.g., fish, wildlife, etc.) could interact with an Aboriginal right or interest.

**Table 28.6-1. Summary of Potential Interactions between VCs and Aboriginal Rights and Interests**

Valued Component	Potential Effect	Mitigation / Accommodation	Residual Effects		Type of Aboriginal Right
			Project-specific	Cumulative	
Fish (Bull Trout, Rainbow Trout, Coho Salmon)	Direct Mortality	Traffic and Access Management Plan (Section 24.16), Policy to prohibit employees from fishing while working or travelling on Project roads.	n/a	n/a	Fishing
Fish and Fish Habitat	Change in Water Quantity	Site Water Management Plan (Section 24.13); Sediment and Erosion Control Plan (Section 24.11); Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6) Fish Habitat Offsetting Plan.	Not significant (moderate)	n/a	Fishing
	Change in Water Quality: Erosion and Sedimentation	Sediment and Erosion Management Plan (Section 24.11); Soil Salvage and Storage Plan (Section 24.14); Site Water Management Plan (Section 24.13.)	n/a	n/a	Fishing
Fish (Bull Trout, Rainbow Trout, Coho Salmon)	Potential for adverse effects due to Change in Water Quality	Mine Waste and ML/ARD Management Plan (Section 24.9); Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6); Selenium Management Plan (Section 24.12); Soil Salvage and Storage Plan (Section 24.14); Site Water Management Plan (Section 24.13); Sediment and Erosion Management Plan (Section 24.11).	Not significant (minor in P Creek and Lower Harper Creek; moderate in T Creek and Upper Harper Creek)	n/a	Fishing
	Changes in Water Quality: Atmospheric Deposition	Air Quality Management Plan (Section 24.2); Site Water Management Plan (Section 24.13).	n/a	n/a	Fishing
Grizzly bear	Habitat alteration and loss, disturbance and displacement, mortality	Waste Management Plan (Section 24.18), Wildlife Management Plan (Section 24.19), reclamation of habitats; reclamation of Project Site roads Post-Closure.	Habitat alteration: Not significant (minor)	Habitat alteration Not significant (moderate)	Hunting
		Reclamation of wetlands; reclamation of mine site roads Post-Closure.	Not significant (minor)	Not significant (minor)	Hunting

(continued)

**Table 28.6-1. Summary of Potential Interactions between VCs and Aboriginal Rights and Interests (continued)**

Valued Component	Potential Effect	Mitigation / Accommodation	Residual Effects		Type of Aboriginal Right
			Project-specific	Cumulative	
Mountain caribou	Habitat alteration, disturbance and displacement, mortality	Reclamation of Project Site; reclamation of Project Site roads Post-Closure.	n/a	n/a	Hunting
Mule deer	Habitat alteration, disturbance and displacement, mortality	Reclamation of wetlands; reclamation of mine site roads post closure; Traffic and Access Management Plan (24.16).	n/a	n/a	Hunting
Rare plants	Habitat alteration and loss	Avoidance where possible; reclamation during closure	Significant (major)	Unknown	Gathering
Human Health (Country Foods Quality)	Change in country foods quality	No hunting or berry collecting at the Project Site. Mitigation measures to protect air, water, soil, and vegetation quality.	Not significant (minor)	Not significant (minor)	Fishing, Hunting, Gathering
Current Aboriginal Use	Change in access to traditional sites - rock cairns	Mitigation measures will be developed in consultation with local First Nations and the BC Archaeology Branch	Not significant (moderate)	n/a	Traditional site
	Change in quality and experience of natural environment - visual (impact of the Project in the Harp Mountain area)	Visual design principles, Re-vegetate disturbed areas not directly affected by the Project during construction and operations; Re-vegetate directly disturbed areas following decommissioning and closure	Not significant (moderate)	n/a	Fishing, hunting, trapping, gathering, cultural and spiritual uses
	Change in Quality and Experience of the Natural Environment - noise	Noise Management Plan (Section 24.10)	n/a	n/a	

(continued)

**Table 28.6-1. Summary of Potential Interactions between VCs and Aboriginal Rights and Interests (completed)**

Valued Component	Potential Effect	Mitigation / Accommodation	Residual Effects		Type of Aboriginal Right
			Project-specific	Cumulative	
	Change in abundance and distribution - Fish (as a result of changes in surface water quantity and country foods quality)	Diverting non-contact and contact water; maintaining natural networks; reusing contact water to minimize the use of freshwater. Implementing the Fish and Aquatic Effects Monitoring and Management Plan (Section 24.6), Selenium Management Plan (Section 24.12), Site Water Management Plan (Section 24.13), and Sediment and Erosion Control Plan (Section 24.11); Fish Habitat Offsetting Plan ( <a href="#">Appendix 14-E</a> )	Not significant (minor)	n/a	Fishing, cultural and spiritual uses
	Change in abundance and distribution - Wildlife (as a result of habitat alteration for moose)	Wildlife Management Plan (Section 24.19), Noise Management Plan (24.10), Spill Prevention and Response Plan; Air Quality Management Plan, Vegetation Management Plan; Prohibition of hunting by staff.	Not significant (minor)	Not significant (minor)	Hunting, trapping, cultural and spiritual use
	Change in abundance and distribution of resources _ Plants (SFN)	Vegetation Management Plan (Section 24.17); Site reclamation	n/a	n/a	Gathering, cultural and spiritual uses

There is a lack of detailed, site-specific information related to where First Nations’ currently use lands and resources within the Project Site and local area. For this reason, a conservative approach was taken on the assessment of the impacts on Aboriginal rights. It was assumed that rights can be exercised anywhere in a First Nations asserted traditional territory regardless of whether ethno-historical data supports site-specific use or not. The assessment of Current Aboriginal Use and impacts on Aboriginal rights resulted in the following conclusions (Table 28.6-2):

- Change in the ability to access or use traditional cultural sites related to potential impacts to the rock cairns currently situated in the area of the proposed TMF; this was determined to be a **not significant (moderate)** impact on cultural use rights for the SFN, and a **not significant (negligible)** impact on cultural use rights for the historical Lakes Division members and MNBC;
- Changes in the quality and experience of the natural environment in the Harp Mountain area due to changes in visual quality; assessed as having a **not significant (minor to moderate)** impact on cultural use rights for the SFN, and a **not significant (negligible)** impact on cultural use rights for the historical Shuswap Lakes Division members and MNBC;
- Change in the abundance and distribution of fish (Bull Trout) resources due to changes in surface water quantity in P Creek, T Creek and upper Harper Creek (between P Creek and T Creek) and country foods quality in the lower Harper Creek and North Barrière River watershed; this effect was assessed as **not significant (minor)** for impacts on SFN and historical Lakes Division fishing rights, and a **not significant (negligible)** impact on MNBC fishing rights;
- Change in the abundance and distribution of wildlife resources (moose) as a result of habitat alteration; assessed as having a **not significant (negligible)** impact on hunting rights for all Aboriginal groups; and
- Change in access to gathering resources (wetlands, rare plants) as a result of habitat loss across the Project Site; this effect was considered to be **not significant (minor)** on SFN gathering rights, and a **not significant (negligible)** impact on the historical Shuswap Lakes Division member bands and MNBC gathering rights.

**Table 28.6-2. Summary of Residual Effects, Impacts on Aboriginal Groups Rights, and Accommodation Measures**

Residual Effect	Rights Potentially Affected	Mitigation/Accommodation Measures	Impact on Aboriginal Right
Change in abundance and distribution - Fish (Bull Trout) as a result of changes in surface water quantity and country foods quality	Fishing	Diverting non-contact and contact water; maintaining natural networks; reusing contact water to minimize the use of freshwater. Implementation of: <ul style="list-style-type: none"> <li>• Fish Habitat Offsetting Plan</li> <li>• Fish and Aquatic Effects Monitoring and Management Plan</li> <li>• Site Water Management Plan</li> <li>• Sediment and Erosion Control Plan</li> </ul>	<b>Simpcw (minor)</b> <b>Lakes Division (minor)</b> <b>MNBC (negligible)</b>

*(continued)*

**Table 28.6-2. Summary of Residual Effects, Impacts on Aboriginal Groups Rights, and Accommodation Measures (completed)**

Residual Effect	Rights Potentially Affected	Mitigation/Accommodation Measures	Impact on Aboriginal Right
Change in abundance and distribution of wildlife resources (moose) as a result of habitat alteration	Hunting and trapping	Prohibition of hunting by staff within the Project Site Implementation of : <ul style="list-style-type: none"> <li>• Wildlife Management Plan)</li> <li>• Noise Management Plan (24.10)</li> <li>• Spill Prevention and Response Plan</li> <li>• Air Quality Management Plan</li> <li>• , Vegetation Management Plan</li> <li>• Closure and Reclamation Plan</li> </ul>	<b>Simpcw</b> (negligible) <b>Lakes Division</b> (negligible) <b>MNBC</b> (negligible)
Change in access to gathering resources (e.g., wetlands) as a result of habitat loss	Gathering	Implementation of: <ul style="list-style-type: none"> <li>• Vegetation Management Plan</li> <li>• Air Quality Management Plan</li> <li>• Spill Prevention and Response Plan</li> <li>• Fuel Handling Plan</li> <li>• Mine Waste and ML/ARD Management Plan</li> <li>• Sediment Erosion and Control Plan</li> </ul>	<b>Simpcw</b> (minor) <b>Lakes Division</b> (negligible) <b>MNBC</b> (negligible)
- Change in ability to access or use cultural sites (rock cairns) - Change in quality and experience of the natural environment in the Harp Mountain area due to visual quality	Cultural Use	Visual Design Principles Implementation of: <ul style="list-style-type: none"> <li>• Noise Management Plan</li> <li>• Closure &amp; Reclamation Plan</li> </ul>	<b>Simpcw</b> (minor to moderate) <b>Lakes Division</b> (negligible) <b>MNBC</b> (negligible)
See above	Overall impact on Rights	See above	<b>Simpcw</b> (minor) <b>Lakes Division</b> (negligible) <b>MNBC</b> (negligible)

Impacts on other Aboriginal interests, issues and concerns that do not have a rights based component were also assessed. Based on the issues identified in [Appendix 3-F](#), key concerns and their association with Aboriginal peoples included:

- Employment and training opportunities, and barriers to such (e.g., community capacities and skills levels);
- Impacts to community socio-economic development;
- Concern regarding impacts of the mine operation on culture, health and social well-being;
- Socio-economic and cultural effects; and
- Job and income stability for community members employed with the Project

Potential effects to human health and socio-economic and cultural impacts on First Nations communities were also considered in Chapter 23 (Section 23.6). Based on the assessment of effects to human health, which took into consideration air quality, drinking water quality, country foods quality, and noise, residual effects to human health had a negligible magnitude and **were not significant (minor)**. This means that human health would not be expected to change noticeably from baseline conditions.

Potential effects on socio-economic and cultural impacts took into consideration economic, social, and cultural well-being. Generally, positive effects would be expected due to increased opportunity for First Nations employment and income, and business capacity and investment throughout the Project until the Closure or Post-Closure phases. The potential for some effects on economic well-being may occur during Project closure (i.e., ending of employment or business opportunities), or due to competition for skilled workers during Project operation. The potential for some effects were noted for social well-being such as an increased demand for housing, increased pressure on community infrastructure or social services, and social risks due to increased income levels and stress on families. The potential for effects on cultural well-being may include cultural effects related to shift work, increased income, or changes in the frequency of traditional land use. However, with mitigation, residual effects to economic, social, or cultural well-being are not expected.

## 28.7 ACCIDENTS AND MALFUNCTIONS

### 28.7.1 Accidents and Malfunctions

Four categories of accidents and malfunctions were considered in the Application/EIS:

- spills and leaks, including fuel, concentrate, or other hazardous material spills;
- fires or explosions;
- failure of sediment and erosion control measures; and
- failure of the TMF containment dam.

Mitigation measures considered included various environmental management plans, Project design measures to minimize risk, and emergency response procedures. With mitigation, and depending on the scenario considered, residual effects may occur to several VCs. The accidents and malfunction scenarios that emerge as possibly having a moderately-low to moderate environmental risk are a fire or explosion causing a wildfire, a fuel spill in water, and a catastrophic TMF dam failure. None of these are believed to pose constraints on the decision-making process regarding the proposed Project.

### 28.7.2 Tailings Management Facility

The tailing management facility (TMF) for the Project has been designed in accordance with all applicable Canadian Dam Association (CDA) standards. It has been assigned a classification of “very high” and has been designed using the highest possible flood and seismic criteria based on maximum probable events, including a maximum probable flood, and a maximum credible earthquake. These maximum events represent 1 in 10,000 year events. In conjunction with the detailed design of the TMF for mine permitting, HCMC will prepare a Dam Breach Inundation Study by qualified design engineers.

## 28.8 TABLE OF COMMITMENTS

Table 28.8-1 identifies commitments that have been derived from the Application/EIS to address adverse effects on environmental, economic, social, health, and heritage VCs, and impacts on Aboriginal rights and related interests.

**Table 28.8-1. Table of Commitments**

No.	Commitment
<i>Mine Engineering</i>	
1.	HCMC will, in conjunction with the detailed design of the Tailing Management Facility (TMF) for mine permitting, prepare a Dam Breach Inundation Study by qualified design engineers.
2.	If mine operations cease prior to the completion of the milling of the potentially acid generating (PAG) low grade ore (LGO) stockpile, HCMC will place the PAG LGO into either the TMF or the open pit for subaqueous deposition.
<i>Air Quality</i>	
3.	HCMC will, in conjunction with mine permitting, prepare and submit a dustfall monitoring plan, including a monitoring and reporting protocol, to the Ministry of Environment. HCMC will implement the approved plan.
<i>Surface Water and Groundwater</i>	
4.	HCMC will, in conjunction with mine permitting, prepare and submit a Mine Waste and Metal Leaching (ML)/Acid Rock Drainage (ARD) Management Plan to the Ministry of Energy and Mines. HCMC will implement the approved Mine Waste and ML/ARD Plan.
5.	HCMC will, in conjunction with mine permitting, prepare and submit a Groundwater Management Plan (GMP), including a monitoring and reporting protocol, to the Ministry of Environment. HCMC will implement the approved GMP, which will constitute the Follow-up Program described under Section 28.6.4.1.
6.	HCMC will, in conjunction with mine permitting, prepare and submit a Site Water Management Plan (SWMP) to the Ministry of Environment. HCMC will implement the approved SWMP.
7.	HCMC will, in conjunction with mine permitting, prepare and submit a Fish and Aquatic Effects Monitoring and Management Plan (FAEMP), including a monitoring and reporting protocol, to the Ministry of Environment and Environment Canada. HCMC will implement the approved FAEMP.
<i>Fish and Aquatic Resources</i>	
8.	HCMC will, in conjunction with mine permitting, prepare and submit a Fish Habitat Offsetting Plan (FOP), including a monitoring and reporting protocol, to the Department of Fisheries and Oceans. HCMC will implement the approved FOP, which will constitute the Follow-up Program described under Section 28.6.4.2.
9.	HCMC will, in conjunction with mine permitting, prepare and submit a Selenium Management Plan (SMP), including a monitoring and reporting protocol, to the Ministry of Environment, Environment Canada and the Ministry of Energy and Mines. HCMC will implement the approved SMP, which will constitute the Follow-up Program described under Section 28.6.4.2.

(continued)

**Table 28.8-1. Table of Commitments (completed)**

No.	Commitment
<i>Vegetation</i>	
10.	HCMC will, in conjunction with mine permitting, prepare and submit a Vegetation Management Plan (VMP), including a monitoring and reporting protocol, to Ministry of Forests, Lands and Natural Resources Operations and Environment Canada. HCMC will implement the approved VMP.
11.	HCMC will develop, fund, and implement field surveys in the ESSFwc2 within the RSA for rare plants, specifically for Howell's quillwort, which will constitute the Follow-up Program described under Section 28.6.4.3, the details of which are discussed in the Vegetation Management Plan.
12.	HCMC will, in conjunction with mine permitting, design and implement a program to re-map the wetlands within and directly adjacent to the TMF to more accurately characterize wetland extent and type, which will constitute the Follow-up Program described under Section 28.6.4.3, the details of which are discussed in the Vegetation Management Plan..
<i>Wildlife</i>	
13.	HCMC will, in conjunction with mine permitting, prepare and submit a Wildlife Management Plan (WMP), including a monitoring and reporting protocol, to the Ministry of Forests, Lands and Natural Resource Operations for review and comment. HCMC will implement the approved WMP.
14.	HCMC will develop “pocket wetlands” as part of reclamation activities on the Project Site, and a monitoring program for the pocket wetlands will be designed and implemented, the details of which are discussed in the Vegetation Management Plan.
<i>Closure and Reclamation</i>	
15.	HCMC will, in conjunction with mine permitting, prepare and submit a Closure and Reclamation Plan (CRP) to the Ministry of Energy and Mines. HCMC will implement the approved CRP.
<i>Aboriginal Consultation</i>	
16.	HCMC will consult the Simpwc First Nation, the Adams Lake Indian Band, Neskonlith Indian Band, and Little Shuswap Indian Band on the implementation of the management plans referred to in the commitments above.

## 28.9 CONCLUSIONS

As noted previously, this document is HCMC’s Application for an Environmental Assessment Certificate in BC’s EA process under the BC *Environmental Assessment Act* (2002a) and the Environmental Impact Statement in the federal process under CEAA (1992).

HCMC is dedicated to minimizing the long-term environmental impacts of the Project, while ensuring that lasting benefits accrue to local communities, and economic and social advantage is generated for shareholders, employees, and the community at large. To this end, HCMC is committed to the development of resources in a sustainable manner that achieves a balance between the environment, society, and the economy. HCMC has demonstrated that the Project can be implemented as proposed in an environmentally responsible manner that avoids or otherwise responds to significant adverse effects to biophysical, economic, social, heritage, and health components. In addition, the Application/EIS has shown that the Project will result in substantial benefits to the region, province, and country through direct and indirect employment and business opportunities to supply goods and services directly and indirectly to the Project, as well as other

spin-off economic benefits. In addition, the Project will contribute tax revenues to local, provincial, and federal governments.

The Application/EIS has been prepared in accordance with the requirements laid out in the approved AIR. HCMC believes that these requirements have been met, and accordingly requests that the Government of British Columbia issue an Environmental Assessment Certificate and that the federal Minister of the Environment issue a positive decision for the Project.

## REFERENCES

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1994. *Migratory Birds Convention Act*, SC. C. 22.
- 2002a. *BC Environmental Assessment Act*, C. 43.
- 2002b. *Environmental Assessment Act*, RSBC. C. 43.
- 2002c. *Forest and Range Practices Act*, SBC. C. 69. s. 149.1.
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