

Assessment Report: Highland Valley Copper Mine Life Extension

WITH RESPECT TO THE APPLICATION BY TECK HIGHLAND VALLEY COPPER PARTNERSHIP TO EXTEND THE LIFE OF THE HIGHLAND VALLEY COPPER MINE

AND

TO AMEND PROJECT APPROVAL CERTIFICATE #W02-01 FOR THE BASAL AQUIFER DEWATERING PROJECT

WRITTEN BY THE ENVIRONMENTAL ASSESSMENT OFFICE ON BEHALF OF THE PROVINCE OF BRITISH COLUMBIA

MAY 22, 2025



EAO

Environmental
Assessment Office

PREFACE

When a major project that exceeds prescribed thresholds is proposed in British Columbia, it must undergo an environmental assessment. The Environmental Assessment Office is the regulatory agency within the provincial government that carries out responsibilities under the [Environmental Assessment Act](#) (2018) in a manner that meets its purpose to:

1. Promote sustainability by protecting the environment and fostering a sound economy and the well-being of British Columbians and their communities; and
2. Support reconciliation with Indigenous peoples in British Columbia.

In carrying out environmental assessments, the Environmental Assessment Office works with companies proposing major projects (proponents), potentially affected First Nations, federal and provincial agencies, local governments, and the public to identify and assess the potential environmental, economic, social, cultural and health effects that may occur during the lifetime of a major project.

This Assessment Report provides an overview of the combined environmental assessment and the permitting process for the Highland Valley Copper Mine Life Extension Project and describes the Environmental Assessment Office and the Major Mines Office's and permitting agencies' findings, conclusions, and recommendations. A final version of this Report will be provided to provincial Ministers and to permitting Statutory Decision Makers along with a draft Environmental Assessment Certificate, including proposed Conditions, Certified Project Description, and draft permits for their consideration on whether to approve the project.

You can learn more about the British Columbia environmental assessment process [here](#). Information and records relating to environmental assessments are available on the Environmental Assessment Office's website at www.eao.gov.bc.ca. Questions or comments can be directed to:

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PO Box 9426 Stn Prov Govt
Victoria BC V8W 9V1
Email: eaoinfo@gov.bc.ca

Additional information on the Major Mines Office's Coordinated Authorizations Process is located [here](#). Information on the HVC authorizations is located on the British Columbia Mine Information website [British Columbia Mine Information \(gov.bc.ca\)](http://BritishColumbiaMineInformation.gov.bc.ca).

ACKNOWLEDGEMENTS

The Environmental Assessment Office and the Major Mines Office respectfully acknowledge that all representatives of the Province of British Columbia carry out their work on the territories of First Nations throughout British Columbia. For the environmental assessment and permitting process for the Highland Valley Copper Mine Life Extension, provincial government staff held meetings and open houses in the territories of the Nlaka'pamux and Secwépemc Nations.

The Environmental Assessment Office and the Major Mines Office would also like to thank the people who participated in this combined environmental assessment and permitting process (Combined Process). We are grateful to the First Nations in whose traditional territory this assessment took place and who contributed so much to the assessment. We also appreciate the involvement of technical advisors, local and regional government representatives, consultants, Environmental Assessment Office staff and all of those who provided important advice and suggestions that we used to carry out a comprehensive assessment. Thank you for sharing your experiences, expertise and thoughtful considerations throughout the Combined Process.

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ACRONYMS AND ABBREVIATIONS LIST

the Act	<i>Environmental Assessment Act</i> (2018)
Application	Application for an Environmental Assessment Certificate
BASA Amendment	The application for an amendment to Project Approval Certificate #W02-01 for the Basal Aquifer Dewatering Project
Basal Certificate	The Project Approval Certificate for the Basal Aquifer Dewatering Project (#W02-01)
B.C.	British Columbia
BFN	Bonaparte First Nation
Certificate	Environmental Assessment Certificate
CNA	the Citxw Nlaka'pamux Assembly
CO ₂ e	carbon dioxide equivalent
Combined Process	the HVC MLE's combined Environmental Assessment and Permitting Process
dBA	A-weighted decibel
EAO	Environmental Assessment Office
EP	Ministry of Environment and Parks
FOR	Ministry of Forests
ha	hectare
HVC	Teck Highland Valley Copper Partnership
HVC mine	the operating Highland Valley Copper mine
HVC MLE	the Highland Valley Copper Mine Life Extension project
Indigenous interests	Aboriginal rights recognized and affirmed under section 35 of the Canadian <i>Constitution Act</i> as well as other matters of interest to a participating Indigenous nation under section 25(1) of the British Columbia <i>Environmental Assessment Act</i> which may be affected by HVC MLE
Kanaka Bar	Kanaka Bar Indian Band
kg	kilogram
km	kilometre
km ²	square kilometre
LNIB	Lower Nicola Indian Band
m ²	square metre
m ³	cubic metre
MCM	Ministry of Mining and Critical Minerals
mg	milligram
the Ministers	the deciding provincial Ministers: the Minister of Environment and Parks, and the Minister of Mining and Critical Minerals
MMO	Major Mines Office
NNTC	the Nlaka'pamux Nation Tribal Council
the Notice	the EAO's Notice Regarding Application Review
PM ₁₀	Inhalable particulate matter

PM _{2.5}	Particulate matter 2.5 micrometres or smaller in diameter
Report	Assessment Report
SSN	Stk'emlúpsemc te Secwépemc Nation
Teck	Teck Resources Limited
TRAN	Ministry of Transportation and Transit
WLRS	Ministry of Water, Lands, and Resource Stewardship

EXECUTIVE SUMMARY

Teck Highland Valley Copper Partnership seeks approval to extend the life and expand the footprint of the operating Highland Valley Copper mine

Teck Highland Valley Copper Partnership (HVC), a subsidiary of Teck Resources Limited, has proposed to extend the life of the operating Highland Valley Copper mine, located 17 kilometers west of Logan Lake, British Columbia.

The Highland Valley Copper mine has been operating in some form since the 1960s and under current authorizations could continue mining until 2028. The mine life extension project (HVC MLE) would result in an estimated 18 more years of operations by mining about 900 million additional tonnes of ore to produce about 1.95 million tonnes of copper. HVC MLE would also include upgrades and changes to some of the existing components on the Highland Valley Copper mine site. These proposed changes would result in 1,526 hectares (ha) of new land disturbance, 795 ha of which would be in the existing permitted mine area, and 731 ha outside that area. The permitted mine area is currently 11,160 ha.

Teck Highland Valley Copper Partnership seeks to amend the Basal Aquifer Dewatering Project Approval Certificate (#W02-01)

In 2002, after an environmental assessment which assessed the effects of proposed groundwater extraction at the mine site, a Project Approval Certificate was issued for the Basal Aquifer Dewatering Project. This Project Approval Certificate allowed for the extraction of groundwater from the Basal Aquifer located near the Highland Valley Copper Mine's Valley Pit, which is critical for mining the Valley Pit in a safe manner. To continue mining for the duration of the current approved mine life (to 2028), HVC has requested to amend #W02-01 to allow for continued groundwater extraction from the Basal Aquifer for the duration of the currently approved mine life and during Closure and Post-Closure for the period required to maintain geotechnical stability of the Valley Pit.

A combined provincial environmental assessment and permitting process was conducted by the Environmental Assessment Office and the Major Mines Office

When HVC proposed HVC MLE in 2019, the project triggered a provincial environmental assessment under the *Environmental Assessment Act* (2002), as the proposal was for a mineral mine with a production capacity over 75,000 tonnes per year and a footprint expansion of more than 750 hectares. In August 2022, HVC MLE transitioned to the *Environmental Assessment Act* (2018). HVC has pursued a combined regulatory approach for their environmental assessment and permitting applications. The Environmental Assessment Office (EAO) worked with HVC, First Nations, the Major Mines Office in the Ministry of Mining and Critical Minerals and technical advisors to plan the scope, information requirements, and engagement for the environmental assessment.

In October 2023, HVC submitted a Single Application Package (Application), including an application for a new Environmental Assessment Certificate for HVC MLE, a request to amend Project Assessment Certificate #W02-01, and associated new and amended permits under other provincial authorizations. The EAO and Major Mines Office led the review of the Application, working closely with First Nations, provincial technical staff, and local governments, and welcoming input from the public. The EAO compiled the results of the environmental assessment, including proposed mitigations into this Report and the proposed Certificate for consideration by the Honourable Tamara Davidson, Minister of Environment and Parks, and the Honourable Jagrup Brar, Minister of Mining and Critical Minerals, and provincial statutory decision makers.

Consensus was sought with participating Indigenous nations

One of the purposes and goals of the EAO and Major Mines Office is to support reconciliation with First Nations in British Columbia. The EAO and Major Mines Office engaged deeply with First Nations throughout the HVC MLE's combined Environmental Assessment and Permitting Process (Combined Process), using collaborative structures that were unique to each First Nation's preferred approach. Many of the First Nations also worked directly with HVC from the earliest

phases of the Combined Process, sharing Indigenous knowledge and working with HVC to incorporate it into the Application and collaborated with the EAO and other provincial ministry staff on process and decisions. Several First Nations carried out Indigenous-led assessments to provide perspectives on historical uses of the Highland Valley, on how the existing mining operations have affected these uses and have affected Indigenous interests, and how HVC MLE could continue or change these effects.

The EAO and Major Mines Office consulted with First Nations extensively during the Combined Process and consensus was sought with participating Indigenous nations at key milestones: issuance of the Process Order in December 2022, acceptance of the revised application in June 2024, and recommendations and referral to provincial ministers in November 2024. The EAO also participated in two separate dispute resolution processes at the end of the Effects Assessment phase with Stk'emlúpsenc te Secwépemc Nation and Nlaka'pamux Nation Tribal Council, respectively.

Key issues identified during the Combined Process

The EAO, the Ministry of Mining and Critical Minerals, the Ministry of Environment and Parks, the Ministry of Water, Land and Resource Stewardship and the Ministry of Forests assessed identified areas of importance to understand the potential positive and negative effects from HVC MLE. The key themes that emerged during the environmental assessment were:

- Questions and concerns about the historical and ongoing effects of mining in the Highland Valley;
- Apprehension about any additional effects that would come from the proposed continued mining, particularly to water, air, vegetation, wildlife, and human health;
- Uncertainty about the effectiveness of HVC's proposed mitigations for the effects to water;
- Acknowledgement of the existing and continuing irreversible effects to the ability of First Nations to exercise their rights in the Highland Valley; and,
- Recognition of the positive economic benefits to the region from continued mining, and more recent economic benefits to affected First Nations.

Measures to reduce potential effects

In response to key issues and to mitigate potential effects from HVC MLE, HVC proposed a suite of mitigation measures. The EAO, the Ministry of Mining and Critical Minerals, the Ministry of Environment and Parks, the Ministry of Water, Land and Resource Stewardship and the Ministry of Forests worked closely together and with First Nations to evaluate those measures and determine the most effective means to make those mitigations legally binding, through proposed Environmental Assessment Certificate Conditions or through revised and new authorizations under the *Mines Act*, *Environmental Management Act*, *Water Sustainability Act* and *Forest Act*.

These mitigations include the following proposed key requirements on HVC:

- Continuation and enhancement of HVC's monitoring programs to understand the effects of mining to water, air, wildlife, vegetation, and traditional foods;
- Development of a new plan to guide and inform water management and mitigation on the Highland Valley Copper Mine site;
- New permit limits and requirements to manage water quality and quantity at the mine site and mitigate potential additional effects from HVC MLE in the area; and,
- Development of a plan for mine closure to help alleviate the social effects to regional communities from reduced employment following the end of operations in approximately 2043.

In addition to these mitigation measures, revenue sharing agreements between HVC and First Nations and between the Province of British Columbia and First Nations have been in place for the past eleven years to help offset the adverse effects and enhance benefits to communities from the Highland Valley Copper mine.

1.0 PURPOSE OF THIS ASSESSMENT REPORT

The purpose of this Assessment Report (Report) is to summarize the procedures and findings of the combined environmental assessment and permitting process (Combined Process) conducted by the British Columbia (B.C.) Environmental Assessment Office (EAO) and the Major Mines Office (MMO) for the proposed Highland Valley Copper Mine Life Extension Project (HVC MLE).

In British Columbia, environmental assessments of major projects that meet certain thresholds are governed by the *Environmental Assessment Act*. For more information about the environmental assessment thresholds and process, please visit the Environmental Assessment Office's [website](#).

All mines in B.C. are governed by the *Mines Act* and subject to requirements under the *Environmental Management Act*. For more information about the permitting process for mines, please visit the [B.C. Mines Information website](#).

This Report is provided to provincial Ministers under Section 29 of the *Environmental Assessment Act* (2018) (the Act). For proposed or expanding mines, the deciding provincial Ministers are the Minister of Environment and Parks, and the Minister of Mining and Critical Minerals (together referred to as 'the Ministers').

If the Ministers decide to issue an Environmental Assessment Certificate (Certificate), it will include a Certified Project Description and Table of Conditions, pursuant to Section 29(4)(c) of the Act.¹ The Certified Project Description describes what activities are being certified and where project components will be located, including all the components of HVC MLE and their locations, as well as any required constraints and/or conditions.

This Report is also provided to the Chief Permitting Officer of the Ministry of Mining and Critical Minerals and statutory decision makers under the *Mines Act*, *Environmental Management Act* and *Water Sustainability Act* for their understanding of HVC MLE, the Combined Process, consultation and engagement with potentially affected First Nations, key issues raised and how they were resolved, proposed mitigations, and conclusions on the residual effects of HVC MLE.

This Report does not preclude the Ministers and statutory decision makers from using additional information to make their decisions.

In the preparation of this Report, the following information has been considered:

- The Single Application Package (Application) submitted by Teck Highland Valley Copper Partnership (HVC) on October 6, 2023, which included:
 - An application for a Certificate;
 - An application for an amendment to Project Approval Certificate #W02-01 for the Basal Aquifer Dewatering Project (BASA Amendment);
 - A Joint *Mines Act* (M-11)/*Environmental Management Act* (PE-376 and PA-1557) Amendment Applications, and an application for a new land fill permit under the *Environmental Management Act*; and
 - Applications for authorizations under the *Water Sustainability Act* and *Forest Act*.
- HVC's revised Application, submitted on June 7, 2024.
- Indigenous knowledge included in the Application and provided directly to the EAO.

¹ For more information, please see the EAO's website: <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/environmental-assessments/the-environmental-assessment-process/2018-act-environmental-assessment-process#effects-assessment-and-reconciliation>

- Questions, advice and comments provided by participating Indigenous nations, the Technical Advisory Committee, and the public.

1.1. The Purposes of the Environmental Assessment Office

The [purposes of the EAO](#) are to carry out its responsibilities under the Act: to promote sustainability by protecting the environment and fostering a sound economy and the well-being of British Columbians and their communities, and to support reconciliation with Indigenous peoples in B.C.

In November 2019, the B.C. Legislative Assembly passed the [Declaration on the Rights of Indigenous Peoples Act](#), which establishes the [United Nations Declaration on the Rights of Indigenous Peoples](#) as the framework for reconciliation, as called for by the Truth and Reconciliation Commission of Canada's [Calls to Action](#). Through its work with Indigenous peoples, the EAO is committed to advancing reconciliation by implementing the United Nations Declaration on the Rights of Indigenous Peoples.

This Report and the environmental assessment of HVC MLE are intended to support the fulfillment of these purposes of the EAO specific to HVC MLE.

1.2. The Purposes of the Permitting and Authorizations Process

All mining activities in B.C. are regulated by the Ministry of Mining and Critical Minerals (MCM) under the *Mines Act*. The *Mines Act* and the Health, Safety and Reclamation Code for Mines in British Columbia provide the requirements to manage the full lifecycle of mining, including early exploration, development, production, reclamation, closure, and post-closure. In order to construct and operate a mine, authorizations under other enactments (for example, the *Water Sustainability Act*, the *Forest Act* and the *Environmental Management Act*) are also generally required.

The intent of B.C.'s permitting and authorization process is to ensure that the proponent has the necessary information and technical capability to build a mine or amend an operating mine that meets provincial requirements and to minimize any negative environmental effects in the project area.

Depending on the type of mine and the level of regulatory processing required, mine permitting is managed through one of MCM's regional mine offices or the Major Mines Office (MMO). The MMO manages the coordinated authorizations process to reduce time, duplication of effort, expense and effects for major mine projects while supporting durable decisions by decision makers. Streamlining and coordinating the permit application process provides benefits for the proponent, First Nations, the public and government.

2.0 PROPONENT AND PROJECT OVERVIEW

Teck Highland Valley Copper Partnership (HVC) is a subsidiary of Teck Resources Limited (Teck), a Canadian company headquartered in Vancouver, B.C. Contact details for Teck and HVC are included in [section 1.3 of the Application](#).

2.1. Highland Valley Copper Mine

The operating Highland Valley Copper mine (HVC mine), located 17 kilometers west of Logan Lake, B.C., is 100 percent owned by Teck and operated by HVC.

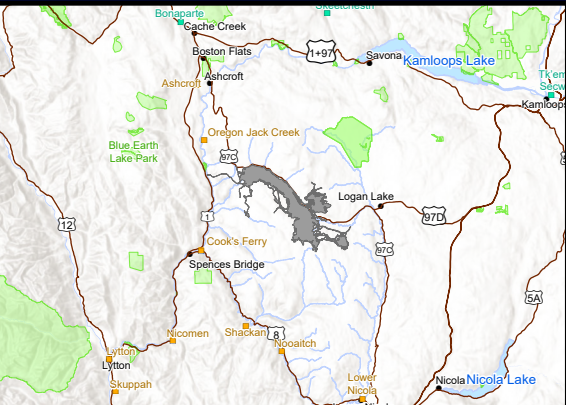
The HVC mine site has been operating in some form since the 1960s and includes four active open pits and four previously mined and inactive pits. The HVC mine is the largest copper mine in Canada and produces approximately 400,000 tonnes of copper concentrate per year, representing 1 percent of the world's copper concentrate, and approximately 2,700 tonnes of molybdenum per year, representing 1.5 percent of the world's molybdenum. The HVC mine employs about 1,320 staff and contractors directly and contributes to indirect employment in the region through procurement and contracting.

Mine operations involve drilling and blasting rock, separating the economically viable ore, and transporting it to mobile crushers and stockpiles for processing in the Highland Mill. Waste rock (i.e., non-economically viable ore), soils and other material (referred to as overburden) are transported from the open mining pits to waste rock dumps. Material that can be used for reclamation, such as higher-quality soil, is stored separately.

The HVC mine has a series of processing steps for recovering the copper and molybdenum sulphide minerals. The material left over after processing (referred to as tailings) is transported to a tailings storage facility. The HVC mine has three active tailings storage facilities, the largest of which is the Highland Tailings Storage Facility at approximately 10 kilometres (km) long and 2 km wide. The site also has three reclaimed tailings storage facilities.

Once processed at the mine site, copper concentrate and molybdenum are trucked to Ashcroft (50 km away) along Highway 97C, then transported to Vancouver (300 km away) via rail, with further distribution from the Port of Vancouver including to offshore smelters. About 30 truckloads of mineral concentrate leave the HVC mine daily.

The currently permitted mine area for the HVC mine is 11,160 ha and includes many components and facilities required to operate the mine. More detail on the activities and components of the existing HVC mine site is outlined in [section 1.5.4 of the Application](#).



- Community
- Highway

Highland Valley / Teck
Copper

Teck Resources Limited
PO Box 1500
Logan Lake, BC, Canada

**Highland Valley Copper
Mine Life Extension**

**Figure 2-1
Existing HVC Mine**

1:25,000

PROJECTION: NAD 1983 UTM Zone 10N

DATE: 11/22/2024

GIS No.: HVCE-15-279-02



2.2. Project Description

2.2.1. HVC Mine Life Extension

Under HVC MLE, HVC proposes to extend the life of the operating HVC mine. Under the current approvals (*Mines Act* M-11 and *Environmental Management Act* Effluent PE-376, Air Emissions PA-1557), the mine is expected to operate until 2028. HVC MLE would extend the life of mine until approximately 2043, by expanding the Highmont and Valley pits, increasing the capacity of the existing Highland Tailings Storage Facility, and upgrading the mine infrastructure. The extension of mining would yield about 1.95 million tonnes of copper by mining approximately 900 million tonnes of additional ore. Amendments to the above-noted permits would be needed for this expansion, and a new Waste Discharge #110832 permit would be needed, along with other new or amended authorizations under the *Water Sustainability Act* and *Forest Act*.

HVC MLE would include the following changes to the mine site:²

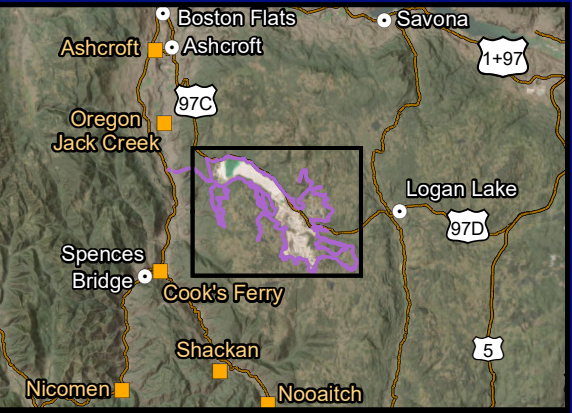
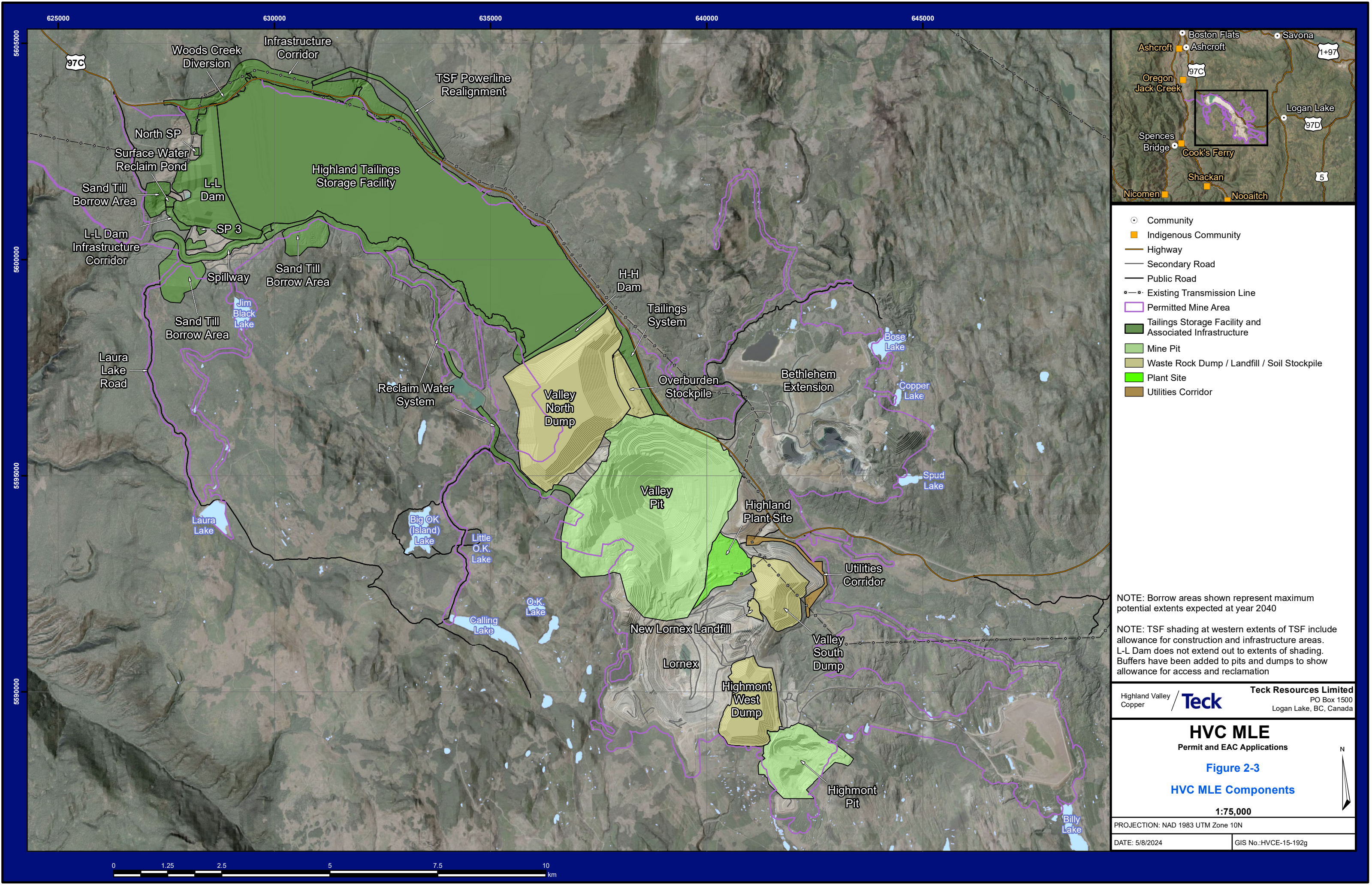
- Extension and expansion of the Valley and Highmont pits and associated waste rock dumps;
- Increasing ore production rate, on an annual average basis, from a maximum of 200,000 tonnes per day to 210,000 tonnes per day;
- Increasing water use for mill production from an annual average volume of 77 to 113.5 million cubic meters;
- Modification to the existing Highland Mill to increase the production rates;
- Extension and expansion of the Highland Tailings Storage facility, which would include raising dam elevations;
- Relocation of the existing landfill to accommodate the expansion of pit and waste rock dumps; and
- Future infrastructure changes near the L-L Dam, including the potential realignment of Highway 97C and an existing B.C. Hydro power transmission line that is part of the on-site power distribution network.

Additional detail on proposed modifications is outlined in [section 1.6 of the Application](#).



Figure 2-2: Existing HVC Mine Pits

² [1 Introduction and Project Overview](#)



- Community
- Indigenous Community
- Highway
- Secondary Road
- Public Road
- - - Existing Transmission Line
- Permitted Mine Area
- Tailings Storage Facility and Associated Infrastructure
- Mine Pit
- Waste Rock Dump / Landfill / Soil Stockpile
- Plant Site
- Utilities Corridor

NOTE: Borrow areas shown represent maximum potential extents expected at year 2040

NOTE: TSF shading at western extents of TSF include allowance for construction and infrastructure areas. L-L Dam does not extend out to extents of shading. Buffers have been added to pits and dumps to show allowance for access and reclamation

Highland Valley /
Copper

Teck

Teck Resources Limited
 PO Box 1500
 Logan Lake, BC, Canada

HVC MLE

Permit and EAC Applications

Figure 2-3

HVC MLE Components

1:75,000

PROJECTION: NAD 1983 UTM Zone 10N

DATE: 5/8/2024

GIS No.: HVCE-15-192g



2.2.2. Basal Aquifer Dewatering Project Amendment

HVC has also requested to amend the existing Project Approval Certificate for the Basal Aquifer Dewatering Project (Basal Certificate, #W02-01) to support the continuation of safe mining to the current approved life of mine and during Closure for the period required to maintain geotechnical stability of the Valley Pit. In 2002, the Ministers of Water, Land and Air Protection and Sustainable Resource Management issued the Basal Certificate approving the extraction of groundwater from the Basal Aquifer for the life of the HVC mine, which was projected to be 2009 at the time. In 2019, an inspection of the Basal Certificate by the EAO resulted in two findings of non-compliance:

1. Continuation of water extraction past the timeline proposed; and
2. Lack of discharge of excess water to Witches' Brook.³

Following the EAO's compliance inspections and enforcement actions in 2019, HVC initiated an amendment to the Basal Certificate in December 2019. In June 2022, after discussions with HVC and First Nations, the EAO decided to incorporate the information requirements and procedures for the Basal Certificate Amendment into the environmental assessment for HVC MLE. This alignment reflected that the two projects are on the same mine site, that dewatering the Basal Aquifer is required to support safe mining in current Operations, and that dewatering would continue if the life of the mine is extended through HVC MLE.

In the Application, HVC requested to amend the Basal Certificate to extend the extraction of water from the Basal Aquifer for the duration of HVC mine site operations and for the period during Closure and Post-Closure that is required to maintain geotechnical stability in the Valley Pit. HVC indicated that groundwater extraction under the Basal Certificate will be required until such a time when HVC can transition to passive water management.

The EAO's assessment presented in this Report takes into consideration the proposed amendment for the Basal Certificate and provides conclusions for the valued component assessments where effects are expected related to the Basal Certificate. Members of the Technical Advisory Committee were able to comment on the information presented in the Application for the BASA Amendment in the same way that they were able to comment on the information presented for HVC MLE.

2.3. Project Schedule

HVC has provided the following project schedule for HVC MLE as shown in Table 1 below.

Table 1: Project Activities and Anticipated Schedule

Phase	Activities	Anticipated Timing
Construction/ Development	- Surface site preparation – clearing vegetation and removing topsoil, stockpiling overburden, and topsoil - Sediment and erosion control - Vegetation management and dust control - Infrastructure construction, relocation, and upgrades - Cultural heritage assessments prior to land disturbance	2025 - 2027

³ On January 17, 2023, the compliance order related to Witches' Brook was withdrawn by the EAO. More information on the Basal Certificate is available on the [EAO's website](#).

Phase	Activities	Anticipated Timing
Operations	• Mining of Valley and Highmont Pits • Ore processing and shipping concentrate off-site • Water management • Stockpile and waste rock management • Highland Tailings Storage Facility development and tailings management • Progressive reclamation • Environmental and geotechnical monitoring	2026 - approximately 2043
Closure	• Shutting down, decommissioning • Remediation and reclamation • Water management • Monitoring and maintenance	2044 - 2053
Post-Closure	• Monitoring and maintenance as required • Water treatment	2054 - 2154 +

2.4. Project Anticipated Expenditures

The HVC mine's annual operating expenditures were \$655 million in 2021. HVC MLE is projected to cost \$741 million in construction, \$690 million in annual operating expenditures and \$786 million in ongoing capital costs over a six-year period. See [section 7.9.5 of the Application](#) for more information.

Mines in B.C. pay mineral taxes, provincial income taxes, federal income taxes and property taxes. As well, MCM requires mines to pay financial securities to the Province in the event that the mine owner/operator is unable to pay for reclamation of the mine.⁴

3.0 REGIONAL CONTEXT

The Highland Valley is located on the Thomson Plateau, between the Lower Thompson River south of Ashcroft and Guichon Creek, a south-flowing tributary of the Nicola River. The HVC MLE project area occupies much of the Highland Valley, which comprises the drainage area of Pukaist Creek, flowing westward into the Thompson River south of Spatsum, and Witches Brook, flowing eastward into Guichon Creek near Logan Lake.

The terrestrial landscape in the Highland Valley includes plants adapted to the very dry environment, including species of bunchgrass, ponderosa pine, Interior Douglas-fir, and others. The climate is characterized by hot, dry summers and prolonged periods of drought. Where irrigation is available, the area supports hay production, vineyards, orchard crops and cattle grazing.⁵ The Highland Valley has been irreversibly affected by mining and other activity, including forestry and agriculture, since the 1960s. Before mining began in the Valley, forestry and agriculture over the last century also resulted in extensive land disturbance.

The HVC mine is in the Thompson-Nicola Regional District, close to the communities of Logan Lake, Ashcroft, Merritt, and Kamloops. The HVC mine site and associated infrastructure are in the northern area of Nlaka'pamux Nation territory and along the southwest edge of Secwépemc Nation territory.

⁴ For more information, please see the [Ministry of Mining and Critical Minerals' website](#)

⁵ Source: [1 Introduction and Project Overview](#)

3.1. First Nations⁶

3.1.1. Historical Use and Occupation in the Highland Valley⁷

The Highland Valley is an area of importance to Indigenous peoples. Archaeological evidence documents more than five millennia of use of the Highland Valley by small hunting parties, who were most likely operating from seasonal settlements in the nearby Thompson, Guichon and Nicola valleys. These groups appear to have been hunting deer, elk, small game and possibly waterfowl, as well as harvesting plants. There is no archaeological evidence of fishing in the Highland Valley, and no evidence of permanent or seasonal villages.

Published ethnographic maps and descriptions of the project area in texts indicate that the Highland Valley was very close to the 19th century boundary between the Nlaka'pamux and Secwépemc Nations, both Interior Salish groups. An Athapaskan group, the Stuwí'x, or Nicola-Similkameen, also occupied territory in the Nicola Valley and Guichon Creek watershed until around the middle of the 19th century, when their surviving population and territories were absorbed by the Nlaka'pamux and Syilx Nations in the 18th and 19th centuries.

The Nlaka'pamux, Secwépemc, and Syilx Nations are all speakers of Interior Salish languages, and share many cultural traits, including technologies and food production practices adapted to the environment of the Interior Plateau. The Nlaka'pamux and Secwépemc are particularly closely related, their former common language having diverged into Nlaka'pamuxcin and Secwépemtsín only about 2,000 years ago.

The 19th century was a period of territorial change in this region, as the Nlaka'pamux expanded their territory up the Thompson and Nicola Valleys, absorbing territory formerly occupied by Secwépemc and Stuwí'x groups. By 1858 at the latest, and likely as early as 1846, the Highland Valley was entirely within the documented territory of Nlaka'pamux, extending up the Thompson River as far as Ashcroft, as well as up the Nicola and its tributary, Guichon Creek. The boundary with Secwépemc territory appears to have followed the divide between the Highland Valley and Barnes Creek watersheds.

3.1.2. First Nations' Involvement in the HVC MLE Environmental Assessment

A critical part of environmental assessments in B.C. is understanding the potential of a major project to affect the Indigenous interests of First Nations in and around the project area. To make sure this done in a way that is inclusive and respectful of First Nations' perspectives and preferences, the EAO engages with all potentially affected First Nations.

At the beginning of an environmental assessment, the EAO reaches out to First Nations that have asserted territorial boundaries that overlap with a project and have the potential to affect Indigenous interests. For HVC MLE, a total of 24 Indian Bands from the three First Nations in the region have asserted territory that overlaps the HVC mine or associated infrastructure.

Nlaka'pamux Nation – the Nl̓eʔkepm̓xc⁸ Nation (pronounced ng-khla-kap-muhx) is one of the Interior Salish first peoples in the southern interior of B.C. Extending across the southern interior of B.C. and into part of northern Washington state, the traditional territory of the Nl̓eʔkepm̓x people includes significant river systems such as the Fraser, Thompson, Nicola and Coldwater rivers and their tributaries. The HVC mine site is located entirely within the traditional territory of the Nlaka'pamux Nation.

⁶ A note on writing style: In this Report, the EAO predominantly uses the English alphabet. The EAO acknowledges the diversity of languages among B.C. First Nations. For example, there are different spellings for the Nlaka'pamux – nl̓eʔképm̓x in the nl̓eʔkepm̓xcin (Nlaka'pamux language) and ɪŋkl̓ə'kæpm̓ə in the International Phonetic Alphabet. Where a section in this report has been authored by First Nations or preferences were stated to the EAO, the Report reflects those preferences.

⁷ Note that the description of the historical use and occupation of the Highland Valley represents the Province of B.C.'s understanding of the ethnohistory of the area, based on publicly available sources. This does not represent all ethnohistoric information held by B.C.

⁸ The EAO has used the anglicized spelling of 'Nlaka'pamux' in this Report.

The EAO contacted all 15 bands within the Nlaka'pamux Nation about participating in the environmental assessment.

Secwépemc Nation – the traditional territory of Secwépemc (pronounced suh-Wep-muhc) people stretches from the Columbia River valley along the Rocky Mountains, west to the Fraser River, and south to the Arrow Lakes. Most Secwépemc people live in the river valleys. The HVC mine site is in the southwest edge of the Secwépemc Nation's asserted territory.⁹

The EAO contacted Bonaparte First Nation (BFN) and Stk'emlúpsmc te Secwépemc Nation (Tk'emlúps te Secwépemc and Skeetchestn Indian Band, SSN) about participating in the environmental assessment, as their asserted traditional territories overlap with portions of the existing mine site and with some HVC MLE components.

Syilx Nation – the Syilx Nation's territory covers over approximately 69,000 square kilometers (km²). The northern area of this territory was close to the area of Mica Creek, just north of modern-day Revelstoke, B.C., and the eastern boundary was between Kaslo and Kootenay Lakes. The southern boundary extended to the vicinity of Wilbur, Washington and the western border extended into the Nicola Valley. The HVC mine site is western edge of the territories of the Syilx Nation.

The EAO contacted Lower Similkameen Indian Band, Okanagan Nation Alliance, Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Upper Nicola Band, Upper Similkameen Indian Band, and Westbank First Nation during the early stage of HVC MLE when a component of the project included twinning a transmission line that overlaps with their asserted territories. The transmission line was removed from HVC MLE in 2021. The current mine site layout overlaps a small amount with Syilx Nation's traditional territory, but HVC MLE would not result in an increase in this area of overlap.

⁹ Source: [Our Land - Tk'emlúps te Secwépemc \(tkemlups.ca\)](https://www.tkemlups.ca/our-land)

3.2. Community Information

3.2.1. Thompson-Nicola Regional District

The Thompson-Nicola Regional District is in south-central B.C. and includes more than 65 unincorporated communities within 10 electoral areas, as well as 11 member municipalities and 25 First Nations. It is the sixth-largest regional district by population of the 27 regional districts in B.C.

The Thompson-Nicola Regional District describes the region as “a diverse geography [that] includes a portion of the world’s only inland temperate rainforest in the upper North Thompson Valley and the famous Wells Gray Park, the vast wilderness of the Bonaparte Plateau, the rolling grasslands of the Nicola Valley, the incredible depths of Adams Lake, the desert and semi-arid climates at the shores of the Thompson River and Kamloops Lake, and portions of the historic Fraser Canyon”.¹⁰

3.2.2. District Municipality of Logan Lake

The closest population center to the HVC mine is the District Municipality of Logan Lake, located 17 km east of the HVC mine site along Highway 97D. In 2021, the population of Logan Lake was 2,255.¹¹

Logan Lake’s history is connected to the HVC mine. The Village of Logan Lake was first established as a company town by the Lornex Mining Corporation Ltd., the mining company operating a portion of the HVC mine at the time.¹² Logan Lake was incorporated as a Village in 1970 and then as a District municipality in 1983.¹³



Figure 3-2: Logan Lake Fire Hall

Logan Lake is still connected to the HVC mine, with property taxes from HVC representing approximately 46 percent of total municipal property taxes in 2021.¹⁴

3.2.3. Other Communities

The village of Ashcroft is located approximately 34 km from the HVC mine. The history of Ashcroft is associated with the European fur trade with Nlaka’pamux people, dating back to the mid-1800s. The community served as a transportation hub in the 1800s. Ashcroft was incorporated in 1952 and had a population of 1,670 in 2021.¹⁵

The City of Merritt is located approximately 60 km from the HVC mine, in the Nicola Valley at the confluence of the Nicola and Coldwater Rivers. Merritt is at the junction of the Coquihalla Highway system, making it a modern gateway to Interior B.C.¹⁶ Merritt was incorporated as a city in 1911, with a history based in mining, forestry, and agriculture and ranching. In 2021, Merritt had a population of 7,051.¹⁷

¹⁰ Source: Thompson-Nicola Regional District [About the TNRD - Thompson-Nicola Regional District](#)

¹¹ Source: Statistics Canada [Census Profile, 2021 Census of Population](#)

¹² Source: HVC MLE Application Section [1 Introduction and Project Overview](#)

¹³ Source: District of Logan Lake <https://loganlake.ca/your-municipality/>

¹⁴ Source: HVC MLE Application Section [7.10 Infrastructure and Services Effects Assessment](#)

¹⁵ Source: Statistics Canada [Census Profile, 2021 Census of Population](#)

¹⁶ Source: City of Merritt [Introduction to Merritt - City of Merritt](#)

¹⁷ Source: Statistics Canada [Census Profile, 2021 Census of Population](#)

The City of Kamloops is the largest municipality in the Thompson-Nicola Regional District, located approximately 75 km from the HVC mine. The word Kamloops is the English translation of the Shuswap word Tk'emlúps, which means “where the rivers meet”.

Like other communities in the area, Kamloops developed as a population center out of the fur trade and the gold rush. Construction of the railway in 1883 established Kamloops as a regional transportation hub. Kamloops was incorporated in 1893. In 2021, Kamloops had a population of 90,902.¹⁸

4.0 REGULATORY CONTEXT

4.1. Highland Valley Copper Regulatory History and Current Status

The Highland Valley has a long history of mineral and mining activity. Documented mineral exploration in the area dates to 1896¹⁹ and it is possible that Indigenous people mined and used copper from the Highland Valley, as the EAO understands happened at other sites in the region.

Mining activity and operations on the HVC mine started in 1962 with the Bethlehem mine and associated open pits, tailings, waste rock and processing. Three separate mining operations in the Highland Valley ran concurrently until they were merged to form Highland Valley Copper in 1986.

When the Bethlehem mine began operating in 1962, there was little environmental regulation and oversight. The first provincial permit for HVC was issued in January 1970, authorizing surface work at the Bethlehem mine. Permit number 11 in B.C. (now referred to as the M-11 permit) was one page and included requirements for the preservation of topsoil for future reclamation, investigation for location of waste rock stockpiles, tailings storage facility, protection and reclamation of water courses and reclamation of all disturbed areas.

Since then, *Mines Act* and *Environment Management Act* permits for HVC have been amended many times, reflecting enhancements in provincial regulatory requirements and changes to mine operations at HVC. More information on permit authorizations for HVC, can be found on the [B.C. Mine Information website](#).

4.2. Regulatory Coordination on HVC MLE

To proceed as proposed, HVC MLE requires both a Certificate and new or amended authorizations under the *Mines Act*, *Environmental Management Act*, *Water Sustainability Act* and *Forest Act*. No federal environmental assessment was required for HVC MLE.

Beginning in early 2020, the EAO, the MMO within MCM, HVC, and First Nations discussed ways to coordinate and align processes for the environmental assessment and permitting to improve efficiency. Aligning processes and information also provided the benefit of creating linkages between provincial ministries and subject matter experts, and collectively identifying solutions with First Nations.

The environmental assessment and permitting processes were carried out in tandem, with joint coordination between the EAO and MMO on project management, combined consultation and engagement with First Nations, a Combined Technical Advisory Committee and Mine Review Committee, and a Single Application Package from HVC for the environmental assessment and permitting. The EAO and MMO used the HVC MLE [Regulatory Coordination Plan](#) to identify all the required permits for HVC MLE, and which of those permits were applied for in the Application. The Regulatory Coordination Plan was updated three times during the environmental assessment.

¹⁸ Source: Statistics Canada [Census Profile, 2021 Census of Population](#)

¹⁹ Source: HVC MLE Application Section [1 Introduction and Project Overview](#)

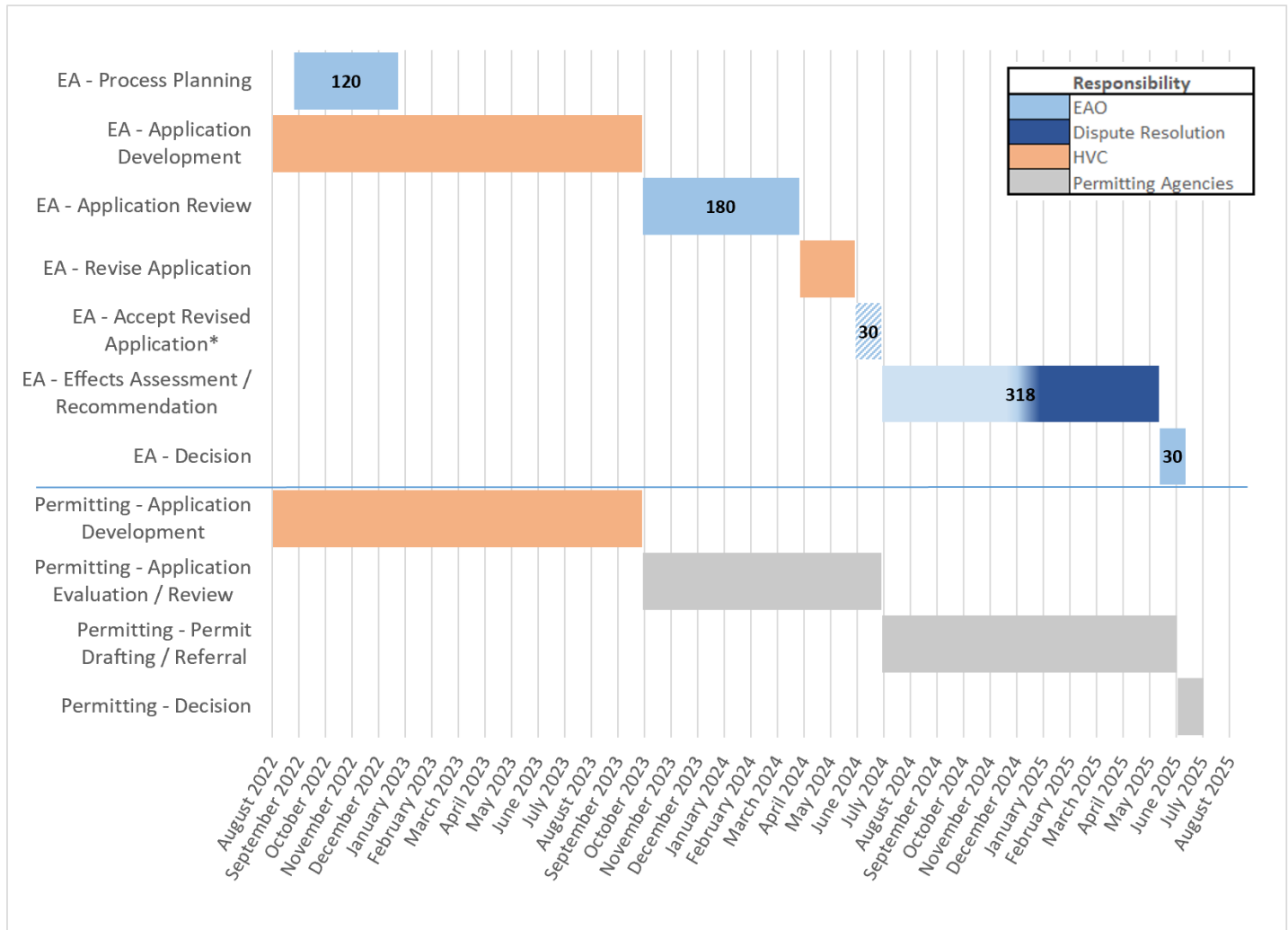


Figure 4-1: Timeline for HVC MLE Combined Environmental Assessment and Permitting

4.3. The Combined Environmental Assessment and Permitting Process

4.3.1. Early Engagement and Planning

HVC began engagement on HVC MLE in 2015, with early discussion on baseline data collection and consideration of project components, including the location and options for tailings management. Between 2016 and 2019, HVC engaged First Nations and technical representatives from provincial ministries in the development of proposed programs to assess existing conditions both in the Highland Valley and across the region. HVC also engaged the public and First Nation communities through open houses, informal public sessions, and meetings to discuss the project and plans.

The environmental assessment was formally initiated on September 6, 2019, following HVC's submission of the project description and the EAO's confirmation that the proposed expansion of the mine met the threshold for the modification of an existing project under the Reviewable Projects Regulation of the *Environmental Assessment Act* (2002).

As a result of delays due to the COVID-19 pandemic and from the severe forest fires and widespread flooding in the region in 2021, the environmental assessment was slowed. On August 19, 2022, HVC sent a letter to the EAO requesting to transition the HVC MLE environmental assessment to the *Environmental Assessment Act* (2018) (the Act). On August

23, 2022, the EAO's Chief Executive Assessment Officer issued an order under Section 78 of the Act to continue the HVC MLE environmental assessment under the Act, beginning in the Process Planning phase.

Transitioning the HVC MLE environmental assessment into Process Planning initiated the 120-day Process Planning legislated timeline under the Act. During this phase, five First Nations governments or organizations identified as participating Indigenous nations, as defined by the Act (see [section 5.1](#) of this Report for more detail).

During Process Planning, the following documents that set the scope, procedures, methods, and timelines for the combined environmental assessment and permitting process for HVC MLE:

- Process Order, including the project scope, Assessment Plan and Application Information Requirements; and,
- The Regulatory Coordination Plan.

The EAO sought feedback on these draft process planning documents from participating Indigenous nations, the Technical Advisory Committee, and the public, and sought consensus on the materials with participating Indigenous nations. The EAO issued the final [Process Order](#) on December 16, 2022. More detail on the Process Planning phase is described in the EAO's [Summary of Engagement – Process Planning Phase](#).

During the process planning phase, MCM and ENV sought feedback from First Nations on the *Mines Act* and *Environmental Management Act* Joint Information Requirements Table, which outlines the information requirements for the MCM and ENV permits. The final Joint Information Requirements Table was issued on May 4, 2023.

4.3.2. Review of the Application and Effects Assessment

During Application Development, the Technical Advisory Committee, including participating Indigenous nations, had the opportunity to review early information that would be included in the Application, including HVC's existing conditions reports, technical reports and modelling plans. HVC provided early drafts of the Application to First Nations and worked to collaboratively draft sections relating to Indigenous knowledge. Through an authorship process developed by the Citxw Nlaka'pamux Assembly (CNA) and HVC, the CNA directly authored sections of the Application to include Indigenous knowledge and the perspectives of its eight Participating Bands.

Following the submission of the Application on October 6, 2023, the EAO, MMO, participating Indigenous nations, and the Technical Advisory Committee reviewed the Application, and the EAO made the Application available for public comment. Following the end of the 180-day legislated time period for Application Review on April 3, 2024, the EAO issued a [Notice Regarding Application Review](#) (the Notice), which included an overview of the issues and concerns raised during Application Review and provided direction to HVC on additional information or revisions to include in the revised Application. During this time, the EAO and MMO also updated the [Regulatory Coordination Plan](#) to reflect the outstanding issues related to the permit applications.

HVC worked with the EAO, the MMO, participating Indigenous nations and the Technical Advisory Committee to resolve remaining issues identified in the Notice and the Regulatory Coordination Plan. On June 7, 2024, HVC submitted the revised Application. The EAO sought consensus with the participating Indigenous nations on the sufficiency of the revised Application, and on July 8, 2024, the [EAO accepted the Revised Application for assessment](#). This decision reflected the EAO's determination that the revised Application met the requirements outlined in the Application Information Requirements and responded to the matters set out in the Notice.

The EAO and MMO worked with the Technical Advisory Committee and participating Indigenous nations to assess the effects of HVC MLE on identified valued components and Indigenous interests. The EAO, MCM, ENV and the Ministry of Water, Lands, and Resource Stewardship (WLRS) developed a draft Certificate with Conditions, draft amended and new permits and authorizations, and this Report. A list of the factors assessed and where to find more detailed information is provided in Table 2 below.

The EAO would also like to highlight that CNA and Lower Nicola Indian Band (LNIB) conducted their own assessments regarding the effects of HVC MLE on their Indigenous interests under Section 19(4) of the Act. Each of these assessments had a different scope and focus than the EAO’s valued components methods, including a greater focus on understanding changes from pre-mining to the end of HVC MLE. The Nlaka’pamux Nation Tribal Council (NNTC) identified as a participating Indigenous nation during this phase.

The EAO held a public comment period on the draft Assessment Report and draft Certificate. The EAO sought consensus with the participating Indigenous nations on this Report, with a focus on the conclusions of the assessment and the draft Certificate.

Participating Indigenous nations had the opportunity to provide notice of their consent or lack of consent on these recommendations to provincial decision-makers prior to their decision. The results of the consensus-seeking and participating Indigenous nations’ provision of consent or lack of consent is described in [Section 9.1](#) of this Report.

Table 2: Valued Components, Indigenous Interests, and Other Assessment Factors Assessed by the EAO

Environmental and Health Effects Air Quality Fish and Aquatic Resources Greenhouse Gas Emissions Groundwater Human Health Surface Water Noise Vegetation and Ecosystems Wildlife and Wildlife Habitat Biophysical Factors that Support Ecosystem Function Effects of the Environment on the Project Economic and Social Effects Economy, Infrastructure and Services Land and Resource Use Consistency with Land Use Plans Disproportionate Effects on Distinct Human Populations Effects on Current and Future Generations	Cultural Effects Heritage Resources Culture ²⁰ Effects to Indigenous Interests Citxw Nlaka’pamux Assembly Kanaka Bar Indian Band Lower Nicola Indian Band Nlaka’pamux Nation Tribal Council Spuzzum First Nation Bonaparte First Nation Stk’emlúpsenc te Secwépemc Nation Syilx Nation Other Assessment Factors Risks of Accidents and Malfunctions Risk and Uncertainty Alternative Means of Carrying out the HVC MLE
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4.4. Decisions and Follow-up Activities

This Report, the draft Certificate, the recommendations of the EAO’s Chief Executive Assessment Officer, and any notices of consent or lack of consent received from participating Indigenous nations, will be referred to the Ministers for decision. The Ministers must consider these materials and any other public interest considerations and decide to issue a Certificate (with Conditions), refuse a Certificate or require more information. The Ministers must then publish reasons for their decision.

²⁰ The EAO did not carry out an assessment of the effects to the culture valued component, instead choosing to consider the effects of HVC MLE to Indigenous culture in the assessment of effects to Indigenous interests.

If a Certificate is issued and permits approved, HVC MLE will be subject to the Conditions in the Certificate and permits, and any follow-up activities. The EAO and other regulatory agencies conduct compliance inspections and, where required, use enforcement to ensure that projects are compliant with requirements.

5.0 ENGAGEMENT DURING THE COMBINED PROCESS

The EAO and MMO carried out broad engagement during the Combined Process with HVC, First Nations, provincial and federal subject matter experts, local governments, and the public. This section summarizes engagement with key participants in the Combined Process.

HVC also carried out engagement directly with First Nations, provincial and federal representatives and local communities. HVC's engagement with First Nations communities included: regular weekly, biweekly and/or monthly meetings, on-request technical meetings, community open houses, providing information and data, creating and hosting a virtual open house website, creating a past, current and future mapping program for sharing with community members and providing site visits for leadership, elders and youth. For more information on HVC's engagement, see [Chapter 3](#) and [Chapter 4](#) of the Application.

5.1. Participating Indigenous Nations

The Act defines the term 'participating Indigenous nation' for the purpose of establishing a role with specific procedural rights in the environmental assessment. First Nations can also be involved in an environmental assessment without being a participating Indigenous nation, if they prefer.

Under the Act, the EAO is required to seek to reach consensus with participating Indigenous nations at key milestones during the environmental assessment. Participating Indigenous nations also have an opportunity to provide notification of consent or non consent and can access dispute resolution facilitation at five key decision points.

Six First Nations governments or organizations chose to identify as participating Indigenous nations for HVC MLE. More detail on EAO and MMO engagement with participating Indigenous nations is included in [section 10.0](#) and [section 11.0](#) of this Report – Effects to Nlaka'pamux Nation's and Bonaparte First Nation and Stk'emlúpsenc te Secwépemc Nation Indigenous Interests.

5.1.1. Citxw Nlaka'pamux Assembly



"The CNA is a not-for-profit organization that was formed in 2013 to manage and administer the agreements relating to Teck Highland Valley Copper Mine on behalf of Ashcroft Indian Band, Boston Bar First Nation, Coldwater Indian Band, Cook's Ferry Indian Band, Nicomen Indian Band, Nooaitch Indian Band, Shackan Indian Band and Siska Indian Band (the Participating Bands).

Although the CNA was created only 10 years ago, its work is rooted in hundreds of years of history and a legacy of protecting the nłeʔképmx people and culture, values, and territory."²¹

5.1.2. Kanaka Bar Indian Band



"Located 14 kilometers south of Lytton, British Columbia, Kanaka Bar Indian Band is one of 15 indigenous communities that make up the Nlaka'pamux Nation today.

Originally known as T'eqt'aqtn (the crossing place) and the residents T'eqt'aqtn'mux (the crossing place people), the community was renamed Kanaka Bar by colonial officials just after James Douglas declared the mainland colony in 1858.

²¹ Source: Citxw Nlaka'pamux Assembly [CITXW NLAKE'PAMUX ASSEMBLY - Citxw Nlaka'pamux Assembly \(cna-trust.ca\)](https://cna-trust.ca)

Today, the community and its residents choose to self-identify as Kanaka Bar, while never forgetting their indigenous history, their connection to the land and their responsibility to care for it.”²²

5.1.3. Lower Nicola Indian Band



“The LNIB are Nl̓eʔkepmx people who along with several neighbouring Nl̓eʔkepmx communities, are part of the Scw̓exmx branch of the Nl̓eʔkepmx Nation, primarily using the lands and waters within the Nicola Valley.”²³

“The LNIB maintain a wide range of political, socio-cultural, and economic ties, including occupation, use and management of the land and resources within tm̓x̓ulax̓ or asserted territory. Taught by their ancestors, the LNIB continue to rely on hunting, fishing and plant gathering, and the share/barter economy that arises from these activities.”²⁴

5.1.4. Nlaka’pamux Nation Tribal Council



“The Nlaka’pamux Nation Tribal Council (NNTC) is a governing body of the Nlaka’pamux Nation. Carrying out its mandate for over 40 years, NNTC exists to protect and advance Nlaka’pamux title and rights and is involved with cultural and natural resources, environmental sustainability, economic independence, health and well-being. Protection of Nlaka’pamux title means protection of the boundaries of our Nation.”²⁵

NNTC represents the Boothroyd Indian Band, Lytton First Nation, Oregon Jack Creek Band, and Skuppah Indian Band.

5.1.5. Bonaparte First Nation



“St’uxwtéws (Bonaparte First Nation, formerly known as Bonaparte Indian Band), is a member band of the Shuswap Nation Tribal Council of the Secwépemc (Shuswap) people. The Band is located west of Cache Creek on about 1,878 hectares of land. The band is separated into nine sections and has a membership of about 900.”²⁶

5.1.6. Stk’emlúpsenc te Secwépemc Nation



“The SSN consists of the Tk’emlúps te Secwépemc and Skeetchestn Indian Band, one of the seven historic “Divisions” of Secwépemc Nation. The Stk’emlúpsenc te Secwépemc Nation are responsible for Aboriginal Title and Rights on their Territory. In 2007 a Resource Sharing Protocol [Memorandum of Understanding] was created to manage the conservation, negotiations and management of resources on Tk’emlúps te Secwépemc and Skeetchestn Indian Band’s shared territory forming SSN.”²⁷

5.2. First Nations Notification

The EAO provided key milestone notifications to Spuzzum First Nation, a member of the Nlaka’pamux Nation located just north of Yale, B.C., and did not receive any comments or concerns from Spuzzum First Nation. The EAO also notified four

²² Source: Kanaka Bar Indian Band [Home — Kanaka Bar Band 2024](#)

²³ Source: Lower Nicola Indian Band [LNIB Tmixw Assessment First Version.pdf \(gov.bc.ca\)](#)

²⁴ Source: Lower Nicola Indian Band [LNIB Tmixw Assessment First Version.pdf \(gov.bc.ca\)](#)

²⁵ Source: Nlaka’pamux Nation Tribal Council [Who We Are - NNTC](#)

²⁶ Source: Bonaparte First Nation [Bonaparte First Nation - Unified & Empowered by A Foundation of Tradition, Culture, and Language.](#)

²⁷ Source: Stk’emlúpsenc te Secwépemc Nation [stkemlups.ca/about/](#)

members of the Syilx Nation (Lower Similkameen Indian Band, Okanagan Nation Alliance, Penticton Indian Band, and Upper Nicola Band) at key milestones of the HVC MLE environmental assessment. The EAO did not receive any responses to those notifications.

5.3. Technical Advisory Committee

In 2020, the EAO and MMO established a combined Working Group for the environmental assessment and permitting processes, made up of provincial government subject matter experts, First Nations representatives, and local government representatives. In 2022, the Working Group was established as the [Technical Advisory Committee](#) under the Act to be the forum for these representatives' engagement and discussion during the Combined Process.

The purpose of the Technical Advisory Committee is to advise the EAO, MMO and participating Indigenous nations on technical matters related to the environmental assessment and review the Application and any supplemental materials.

The EAO and MMO worked closely with and considered advice from the Technical Advisory Committee to understand and assess the potential effects from HVC MLE. During the Combined Process, approximately 30 meetings were held with Technical Advisory Committee members, for information and discussion on the environmental assessment process, specific topic areas, HVC's Application, and Conditions development.

5.4. Public Engagement

Public engagement is an important aspect of the environmental assessment process. Public participation helps ensure that community values and public goals are considered in project planning, assessment, and decision-making. Public comments also help the EAO ensure that all potential effects of a project are captured and appropriately assessed.

In environmental assessments, the EAO conducts its own public engagement activities and may require proponents to participate or carry out other engagement activities. HVC began its public and local government engagement in 2017, before the start of the environmental assessment, informing local communities about HVC MLE online and in person.

The EAO held three public comment periods for HVC MLE, including three open houses and a virtual information session as shown in Table 3 below. The open houses and virtual information session provided an opportunity for the public to learn about HVC MLE and the environmental assessment, as well as meet and ask questions of HVC and provincial government representatives. The public comment period on HVC's application was extended from an initial 30 days to 92 days to support public engagement on the permit applications, submitted as part of a Single Application Package for HVC MLE.

Table 3: Public Comment Periods and Open Houses

Phase	Comment Period Dates	Number of Comments	Date and Location of Open Houses	Number of Attendees
Process Planning	October 13 – November 14, 2022	8	October 25, 2022 – Logan Lake	32
			October 27, 2022 – Virtual	5
Application Review	October 23, 2023 – January 23, 2024	15	November 8, 2023 – Merritt	32
			November 9, 2023 – Logan Lake	106
Effects Assessment	October 23, 2024 – November 22, 2024	16 written comments and 20 survey responses ²⁸	No open houses were held during Effects Assessment	n/a

Public comments on HVC MLE largely indicated support for the continuation of the mine due to economic benefits and the production of copper supporting the global energy transition to cleaner energy sources. Some concerns were raised

²⁸ Source: EAO [EPIC.engage](#)

about greenhouse gas (GHG) emissions and the effects of climate change, dust production and the need for dust suppression, availability of affordable housing, automation on and operation of the HVC mine site, potential effects to First Nations, safety of the Highland Tailings Storage Facility, and the feasibility of long-term remediation of the site. The full text of all public comments received during public comment periods are available on the [EAO's Project Information Centre website](#).

The EAO also wishes to acknowledge the substantial community engagement carried out directly by HVC and participating Indigenous nations to seek feedback and views, collect information, and update community members on the progress of the environmental assessment and permitting process.

6.0 SUMMARY OF EFFECTS AND KEY ISSUES

This section summarizes the EAO's key findings on the potential effects of HVC MLE to identified areas of importance (referred to as valued components) and Indigenous interests. The EAO's detailed assessment of effects on all valued components and other required matters are found in [sections 13](#) and [14](#) of this Report, including a description of what was considered, key issues raised during the review of HVC's application, any proposed mitigation measures, and the EAO's conclusions on the significance of residual and cumulative effects.

6.1. Effects to Valued Components

The EAO's assessment of each valued component and other matters under Section 25(2) of the Act incorporates information included in HVC's Application, advice from the Technical Advisory Committee, comments raised by the public, and Indigenous knowledge provided by the participating Indigenous nations. The EAO's [Effects Assessment Policy](#) guides the consideration of these assessment matters, including how to identify, assess and manage potential environmental, economic, social, cultural and health effects.

The EAO notes that the methods used by HVC to assess effects to valued components were slightly different from the methods used by the EAO to assess residual and cumulative effects to valued components. Methods used in HVC's Application were in alignment with the requirements of the Application Information Requirements. Some of the differences in definitions and methodology for assessing residual and cumulative effects are described below.

6.1.1. Residual Effects

The EAO assessed the potential effects of the incremental changes from HVC MLE, referred to as residual effects. Residual effects are the potential effects that remain after the application of mitigation measures, when considering the changes from current conditions to the extension of the HVC mine site and operations.

The EAO identified HVC MLE project-specific (residual) adverse effects for 11 of the 13 valued components²⁹ after proposed and existing mitigations are applied. The EAO concluded that there would not be a significant adverse residual effect from the incremental changes for any of the valued components as a result of HVC MLE. The EAO's conclusions for each valued component are outlined in Table 4, and more detail on each is included in [section 13 – Detailed Assessment – Effects to Valued Components](#).

The EAO notes that there are differences in the definitions used by HVC in their Application to characterize residual effects and in the EAO's assessment. For example, in describing an effect as 'short-term', HVC and the EAO differed slightly in the definition of short-term. The EAO acknowledges this difference and accepts variation between proponents, understanding there is professional judgement applied. Where possible, the EAO seeks to use consistent definitions

²⁹ Note that the culture valued component was included as a consideration under Indigenous Interests, described in sections 10-12 of this Report, and the economy valued component had positive residual effects.

across EAO assessment reports; the EAO's residual effects characterization definitions are included in [Appendix 1](#) of this Report.

6.1.2. Cumulative Effects

HVC assessed cumulative effects as required by the HVC MLE Application Information Requirements, and where possible included historical information desired by First Nations which was not required by the Application Information Requirements. The EAO considered HVC's assessment and the historical information provided as part of its cumulative effects analysis and also considered other industrial and resource extraction activities in the region and how these activities have resulted in cumulative effects on the health, social, cultural, economic and environmental conditions in the Highland Valley and surrounding communities, and to First Nations and their Indigenous interests. For those valued components with residual adverse effects, the EAO also considered existing and potential future effects from past, present and reasonably foreseeable projects and activities that would interact with HVC MLE, to understand the cumulative effects.

The EAO concluded that the incremental changes from HVC MLE would contribute to cumulative effects in the Highland Valley when considering the effects of the combined effect of past, present, and future human activities. The EAO concluded that HVC MLE will contribute to existing significant adverse cumulative effects to the Nlaka'pamux Nation's Indigenous interests and cultural heritage, and to the availability of water (groundwater and surface water quantity) in the watersheds around the Highland Valley. The EAO's conclusions for each valued component are outlined in Table 4 below, and more detail on each is included in [section 13 – Detailed Assessment – Effects to Valued Components](#).

The EAO based its conclusions on cumulative effects on the information presented in HVC's Application, in consultation and discussion with the Technical Advisory Committee and participating Indigenous nations. The EAO deeply considered the perspectives shared and conclusions from assessments carried out by CNA, LNIB, NNTC and SSN that highlighted significant cumulative effects in the Highland Valley.

As with residual effects, the EAO notes that there are differences in the methodology used by HVC in their application to consider cumulative effects. HVC considered effects on valued components in their existing conditions analysis, to reach conclusions on residual effects. The EAO placed greater weight on the consideration of past and present activities in the determination of cumulative effects. The EAO acknowledges and accepts this variation in methodology and conclusions.

Table 4: Summary of EAO Findings of Residual and Cumulative Adverse Effects from HVC MLE

Valued Component*	Conclusions on residual and cumulative adverse effects			
	HVC MLE project related (residual)	HVC MLE will contribute to existing effect (cumulative)	Uncertainty**	Significance
Air quality	Adverse effect	Yes	Moderate	Not significant
Noise	Adverse effect	No	Moderate	Not significant
Groundwater	Adverse effect	Yes	Moderate to High	Contributes to existing significant cumulative effect for water quantity
Surface water	Adverse effect	Yes	Moderate to High	Contributes to existing significant cumulative effect for water quantity
Fish and aquatic resources	Adverse effect	Yes	Low to moderate	Not significant
Wildlife and wildlife habitat	Adverse effect	Yes	Low to moderate	Not significant

Valued Component*	Conclusions on residual and cumulative adverse effects			
	HVC MLE project related (residual)	HVC MLE will contribute to existing effect (cumulative)	Uncertainty**	Significance
Vegetation and ecosystems	Adverse effect	Yes	Low to Moderate	Not significant
Human health	Adverse effect	Yes, for environmental determinants of health	Low to Moderate	Not significant
Economics	Positive effect	No	Low	Not significant
Infrastructure and services	Adverse effect	No	Low to Moderate	Not significant
Land and resource use	Adverse effect	Yes	Low	Not significant
Heritage resources	Adverse effect	Yes	Moderate	Contributes to existing significant cumulative effect to cultural heritage resources

* Note that effects to the culture valued component were considered as part of the assessment of effects to Indigenous interests.

** Uncertainty is a measure of the EAO's understanding of the cause-effect relationship between HVC MLE and each valued component.

6.2. Effects to Indigenous Interests

Indigenous Interests are defined by the EAO as section 35 rights as well as other matters of interest to a participating Indigenous nation under section 25(1) of the Act that may be affected by a proposed project. The EAO's [Assessment Plan](#) outlined how the assessment of effects to Indigenous Interests would be conducted for the HVC MLE environmental assessment. The EAO worked with all First Nations to understand their interests and to discuss how the EAO would carry out its responsibility under Section 25 of the Act to assess the effects of HVC MLE on First Nations and their Indigenous interests.

Early in the HVC MLE process, the EAO sought information from experts in the provincial government about the historical use of the Highland Valley by First Nations, to inform its understanding and approach to the environmental assessment. First Nations also provided further information to the EAO, which the EAO and provincial experts considered.

Publicly available ethnographic information suggests that Interior Salish nations had legal traditions which governed the ownership and stewardship of land, and that there were different types of access rights arising from membership in a nation and from personal kinship networks. Ethnographers documented that both the Nlaka'pamux and Secwépemc Nations were comprised of multiple villages or local area-based communities, which have been described by ethnographers as "divisions". For the Nlaka'pamux, the evidence suggests that while these "divisions" were associated with areas, territories were held in common by the whole nations and the "divisions" were not owners of territory. Local communities had customary hunting, fishing and harvesting areas, over which they exercised a degree of stewardship, they did not (and could not) stop people from other communities of the same nation from accessing those resources.³⁰ For the Secwépemc, ownership of resources was similar. In current engagement with Secwépemc groups, however, the

³⁰ The Nlaka'pamux Nation Tribal Council (NNTC) requested the following disclaimer be included:

NNTC does not agree with non-Nlaka'pamux presenting or interpreting information in relation to the Nlaka'pamux including through the use of Nlaka'pamux quotes and statements. Inaccuracies from the Nlaka'pamux perspective exist in this report as a result. NNTC and HVC are party to the bilateral "NNTC Recognition Based Environmental Assessment Agreement" ("RBEA Process"). The RBEA Process is based on Nlaka'pamux jurisdiction. NNTC has shared accurate Nlaka'pamux information through the RBEA process.

Province understands that divisions play a central role in stewardship, and as such the view is that Secwépemc Aboriginal rights are held by the divisions rather than the nation as a whole³¹.

At the time of contact (1808 – 1811), the Nlaka’pamux Nation territory extended up the Thompson River to a point somewhere between Spences Bridge and Ashcroft, and a short distance up the Nicola River to around Clapperton. This territory included most of the Highland Valley, particularly on the Pukaist Creek side.

Stuwí’x Nation territory included much of the Nicola Valley up to the head of Nicola Lake, as well as Guichon Creek up to at least Mamit Lake. This territory may have included the Witches Brook portion of the Highland Valley; the Stuwí’x were eventually incorporated into the Nlaka’pamux Nation

The Province’s ethnographic information indicates that by 1858 at the latest, and possibly as early as 1846 (the year of the Oregon Treaty when British sovereignty was asserted), the Highland Valley was entirely within the documented territory of Nlaka’pamux.

Secwépemc Nation territory extended down the South Thompson River to an undetermined location below Ashcroft. It also extended up Cherry Creek, Durand Creek and Barnes Creek, accessing Tunkwa Lake, Guichon Creek, Logan Lake, Face Lake, Lac La Jeune, Meadow Creek and other places in the highlands of the Thompson Plateau south and southwest of Kamloops and Skeetchestn. There is no clear evidence that the Secwépemc territories included any part of the Highland Valley at the time of contact, but they may have. The following sections provide high-level summaries of the assessment of effects to the Indigenous interests for the Nlaka’pamux Nation, Bonaparte First Nation and Stk’emlúpsenc te Secwépemc Nation and Syilx Okanagan Nation. The EAO and MMO collaborated with First Nations to develop the summaries and the EAO sought to achieve consensus on conclusions. More detail can be found in [section 10](#), [section 11](#) and [section 12](#) of this Report.

6.2.1. Nlaka’pamux Nation

Today the Nlaka’pamux Nation comprises 15 bands, and multiple Nlaka’pamux organizations have been formed to represent these groups’ Indigenous Interests, for different purposes and projects. For the HVC MLE environmental assessment, Nlaka’pamux bands were either representing themselves (Kanaka Bar Indian Band, Lower Nicola Indian Band, Spuzzum First Nation) or were represented as a collective by the Citxw Nlaka’pamux Assembly or the Nlaka’pamux Nation Tribal Council.

Citxw Nlaka’pamux Assembly (CNA) and Lower Nicola Indian Band (LNIB) conducted assessments under section 19(4) of the Act, which supports a participating Indigenous nation to carry out an assessment on that nation’s Indigenous interests. Those assessments are summarized below, and more detail, including assessment summaries authored by CNA and LNIB are in [section 10 Effects to Nlaka’pamux Nation Indigenous Interests](#).

The CNA's assessment found that HVC MLE would have a number of highly negative impacts to Participating Bands’ Indigenous interests, including to the land, water, health and well-being of their members, cultural heritage resources, and ability to share knowledge, teaching and language. HVC MLE would also have some moderate negative impacts to food sovereignty and some low positive impacts to business and contracting opportunities.

The CNA's assessment also concluded that HVC MLE would result in the additional loss of and effects to tmíxʷ, cultural heritage resources, additional negative effects to qʷúʔ (water), to members’ Balance, and that these effects would be long-term, at times lasting more than seven generations. CNA’s assessment highlighted that cumulative effects already exist to the CNA's indigenous interests, and that HVC MLE would expand those effects. Residual effects from HVC MLE to tmíxʷ, balance, governance, teachings, and title and rights, would last longer than seven generations and would combine with previous effects from past mining and other post-colonial land uses in the Highland Valley.

³¹ A final determination of Aboriginal rights and title can only be established through litigation or treaty negotiation processes.

LNIB's assessment was conducted holistically for the whole mine from start of mining in 1961 to the proposed end of HVC MLE. LNIB's assessment found that the HVC mine currently impacts all levels of indicators for the expression of Rights and Title and Tmíxw, through affecting LNIB's historic and contemporary sites and opportunities for hunting, gathering, fishing, and cultural continuity. LNIB's assessment concluded that a total of 33,025 ha are considered as lost for the expression of Rights and Title. LNIB noted that the decisions that led to the current negative outcomes for LNIB were made entirely without incorporating Indigenous governance systems, protocols, laws, or stewardship plans. Reclamation efforts are expected to progress slowly and are not expected to restore the land to a reusable state, limiting future authority and stewardship by Nlaka'pamux communities. The LNIB Tmíxw Assessment concluded that water, air, fish and culture valued components (including LNIB's expression of Rights and Title), have been significantly affected by the HVC mine and would be affected by HVC MLE. Many effects are irreversible unless there is restitution, reparation, and significant clean-up or rectification.

The EAO also carried out an assessment of potential residual and cumulative effects to the entire Nlaka'pamux Nation, including for Kanaka Bar Indian Band and Spuzzum First Nation. The EAO concluded that HVC MLE would have a residual effect on the Nlaka'pamux Nation's Indigenous interests.

To assess cumulative effects to Nlaka'pamux Nation's Indigenous Interests, the EAO considered HVC's Application, the existing effects on the ability of the Nlaka'pamux Nation to exercise their Aboriginal rights in the area, and effects on their Indigenous interests, other past, present and reasonably foreseeable projects in the area and the views and conclusions of Nlaka'pamux communities and assessments. The EAO concludes that HVC MLE would contribute to existing significant adverse cumulative effects on Nlaka'pamux Nation's Indigenous interests.

6.2.2. Bonaparte First Nation and Stk'emlúpsenc te Secwépemc Nation

To assess the potential effects of HVC MLE on the Bonaparte First Nation (BFN) and Stk'emlúpsenc te Secwépemc Nation (SSN), the EAO considered the key areas of interest outlined in [section 11.5](#) and [section 11.6](#) of this Report, the information provided in [section 7.12](#) and [section 11](#) of the Application, engagement with Secwépemc Nation representatives from SSN and BFN, and issues raised by SSN during the environmental assessment.

The EAO also considered the ethnohistoric information that provides the background on the historical use and occupation of the Highland Valley and rights with associated historical use by Nlaka'pamux and Secwépemc groups. The EAO acknowledges that the SSN prepared a Cultural Heritage Study for the Highland Valley and continues to disagree with the Province's understanding of historical Indigenous use and occupation of the Highland Valley.

After considering the historical background, HVC MLE-specific information and analysis, the EAO characterized the expected residual effects of HVC MLE on BFN and SSN, taking into account proposed mitigation measures and draft Certificate and permit Conditions, as well as the EAO's own analysis and information regarding the historical use and occupation of the Highland Valley. The EAO concludes that the residual effects from HVC MLE on BFN and SSN's Indigenous interests are negligible to minor.

For cumulative effects, the EAO considered information provided in HVC's Application, the views provided by SSN, the existing effects on BFN and SSN's to exercise their Aboriginal rights, effects to other Indigenous interests, other past, present and reasonably foreseeable projects in the area and the concerns raised during the environmental assessment, as well as the EAO's own analysis related to residual effects and information regarding the historical use and occupation of the Highland Valley. Considering these factors, the EAO concludes that HVC MLE would have a negligible to minor effect cumulative effect on BFN and SSN's Indigenous interests.

6.2.3. Syilx Okanagan Nation

The EAO considered potential effects to Syilx Nation's Indigenous interests from potential changes to water quality and quantity through surface and groundwater related to HVC MLE and the BASA Amendment, a potential failure of the H-H Dam, potential air quality residual effects from modelled increases in criteria air contaminants and potential effects to

wildlife and ecosystems from HVC MLE, including effects to wildlife habitat and movement patterns, increased risk of wildlife mortality and effects on wildlife health. For each of these topics, the EAO did not predict effects to Syilx Nation's Indigenous interests as a result of HVC MLE.

Considering the lack of anticipated physical effects on Syilx Nation's traditional territory and lack of comments or concerns from Syilx Nation, the information in HVC's Application, the information and analysis outlined above, the existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions, the EAO concludes that HVC MLE and the proposed BASA Amendment would have a negligible effect on Syilx Nation's Indigenous interests.

6.3. Key Issues Raised in the Combined Process

This section summarizes the key themes that, due to their complexity and the level of concern from the Technical Advisory Committee, participating Indigenous nations and/or the public, became the primary focus of the HVC MLE environmental assessment.

6.3.1. Historical and Ongoing Effects of Mining in the Highland Valley

A key issue raised by First Nations is the historical effects from mining operations in the Highland Valley going back to the 1960s. Although practices have changed significantly since mining started in the Highland Valley, First Nations raised concerns about the existing conditions, cumulative effects, and an environment with a low threshold for recovery from further disturbance. LNIB, for example, stated there was a lack of acknowledgment of the existing and extensive effects to the environment and practices of traditional activities by Indigenous people. Any additional impact from HVC MLE would be an extension to what has already been lost through HVC Operations.

Although not required by the Application Information Requirements, where feasible HVC included historical data and summarized their current understanding of pre-mining conditions in the application to support greater understanding of the long-term effects of mining, to provide context for the characterization of effects and to inform the approach to closure and reclamation. As well, to address an outstanding commitment from HVC and ensure that effects to the Nlaka'pamux Nation are adequately considered, the CNA carried out a study of historical water conditions in the Highland Valley. HVC included a summary of findings from that study in the revised Application through the CNA Nlaka'pamux Authorship Process.

The EAO acknowledges the views expressed by environmental assessment participants regarding the challenges and limitations of an environmental assessment focused on the incremental effects of extending the life of an existing mine, and not on assessment of effects since mining started in the Highland Valley. Through the Combined Process, the EAO and MMO worked with environmental assessment participants to ensure that continued monitoring mandated by the *Mines Act* and *Environmental Management Act* permits, along with enhanced programs proposed for the Certificate and adjustments to permits, will improve understanding of the effects of HVC MLE and inform the long-term reclamation strategies.

6.3.2. Additional Effects of HVC MLE on Water, Air, Vegetation, Fish, Wildlife, and Human Health

During the review of HVC's Application, members of the Technical Advisory Committee, including representatives of participating Indigenous nations, raised questions about the predicted effects from HVC MLE to groundwater and surface water, air quality, vegetation, wildlife, fish, and to human health. Questions about predicted effects are common in environmental assessments because these predictions rely on modelling, which can be complex and contains an inherent level of uncertainty which varies depending on the model used.

HVC responded to all questions submitted on the Application and attended targeted meetings with Technical Advisory Committee members to discuss questions and concerns about predicted effects and the results of HVC's modelling. Compared to many projects going through an environmental assessment, HVC has access to significantly more data and

information from their operating site; however, there is still some uncertainty about the additional effects of HVC MLE, particularly related to air quality, groundwater and surface water.

To address questions about the uncertainty of effects from HVC MLE, provincial regulatory agencies, including the EAO, MCM, Ministry of Environment and Parks (EP) and Ministry of Water, Lands and Resource Stewardship (WLRS), have proposed Certificate and/or permit Conditions. HVC would be required to continue existing water and air monitoring and ENV and WLRS have proposed additional monitoring and limitations to mitigate potential effects. For example, proposed permits from ENV set requirements for surface water quality and monitoring for air quality and proposed permits from WLRS establish requirements to address additional groundwater extracted from the aquifers around the mine site. With these additional regulatory requirements applied, the EAO and MMO expect that effects from HVC MLE to valued components can be identified and managed effectively.

6.3.3. Proposed Mitigations for Water Quality and Quantity

Another key issue that was raised by Technical Advisory Committee members and participating Indigenous nations was uncertainty about the effectiveness of some of the mitigations proposed by HVC. The EAO believes that mitigations proposed to address the effects of the HVC mine and HVC MLE on water quality and quantity are best managed by the permitting agencies and acknowledges that the detailed mitigations are under development during the environmental assessment, in collaboration with permitting agencies.

For water quality, at the direction of ENV, HVC is currently developing an expanded discharge limit proposal for identified discharge points, including an additional discharge to Witches Brook, and site performance objectives for Pukaist Creek that will be protective of these receiving environments. The current ENV permit requires the development of discharge limits for six discharges which include discharges to Witches Brook, Pukaist Creek, Billy Lake and Bose Lake. HVC is currently required to submit these proposals after the end of the environmental assessment, which leaves some uncertainty about the effects of HVC MLE on water quality.

For water quantity, in recognition of the very dry environment and lack of water available on-site, HVC has proposed changes to on-site water management to reduce water usage. HVC has also proposed to develop an attenuation pond in the Witches Brook watershed, related to plans which were initiated under the Basal Certificate and EAO compliance inspections in 2019 that led to direction for HVC to develop a plan to establish, maintain and adaptively manage discharge of Basal Aquifer water to Witches Brook.³²

HVC proposed a Water Stewardship Strategy to provide an overarching approach to watershed-based management that considers the overall health of connected systems and works towards addressing long-standing concerns in the affected communities in the region. The EAO has proposed Condition 13 Watershed Management and Mitigation Plan to guide and inform water management and mitigation on the HVC mine site. As well, draft *Water Sustainability Act* licenses include mitigations for extracting groundwater, including minimum flow requirements, diverting a creek that is currently draining into the Tailings Storage Facility, and a proposed attenuation pond to retain more water in the Witches Brook watershed.

Further, to address the issue of water usage at the HVC mine during periods of drought, HVC has started to draft a drought management plan, with staged approaches for different levels of drought. This work will support WLRS-led regional water planning, particularly considering the potential for climate change to increase the intensity and duration of droughts. The EAO has included the requirement that drought management be considered in the development of the Plan proposed under Condition 13 Watershed Management and Mitigation Plan.

Advancing these proposed mitigations for water in the Highland Valley will help address one of the key concerns about the project – the effects of HVC MLE on surface water and groundwater. The EAO notes that, because these plans are

³² Source: [EAO Compliance and Enforcement Section 34 Order](#). Note that this order was rescinded January 17, 2023, however, HVC continued to advance the work to address its commitments to First Nations.

under development, there remains some uncertainty about their effectiveness. To address uncertainty, the proposed Condition 13 Watershed Management and Mitigation Plan includes requirements for evaluating the effectiveness of the Plan, including implementing adaptive management if activities are not working as intended.

6.3.4. Effects to First Nations' Rights

Throughout the Combined Process, the EAO and MMO heard strongly from the most affected First Nations communities that decades of mining in the Highland Valley have disconnected communities from the area and the ability to exercise their rights. Although First Nations communities were consulted on past decisions by the Province in accordance with statutory requirements and case law, and HVC has made efforts to meaningfully involve First Nations communities in mining activities and developments at the HVC mine site, First Nations' view is that there has not been sufficient Indigenous involvement in decision-making in the development of mining in the Highland Valley. These views and details regarding the effects to First Nations' Indigenous interests were reflected in the assessments under section 19(4) of the Act completed by [Citxw Nlaka'pamux Assembly](#) and [Lower Nicola Indian Band](#), and the assessments in this Report regarding the effects of HVC MLE on the Nlaka'pamux Nation, BFN and SSN, and Syilx Nation and their Indigenous interests. The EAO acknowledges the irreversible effects of mining in the Highland Valley on First Nations communities and the lack of First Nations knowledge, voices, and perspectives in historical decisions made by B.C. in the Highland Valley compared to current practices.

In the spirit of reconciliation and through the commitments in the *Declaration Act*, passed in 2019, the Province of B.C. seeks to advance consent-based decision-making with First Nations. The EAO and MMO have attempted to work in the spirit of deep engagement and consensus seeking with First Nations throughout the Combined Process on HVC MLE, and First Nations may provide notifications of consent or non-consent to the Ministers prior to a decision.

HVC also acknowledged these historical effects in the Application, in particular in [Section 1.2.2. HVC Learnings from Indigenous Governments and Organizations](#).

6.3.5. Economic Benefits of Continued Mining

Another key theme that was raised throughout the Combined Process for HVC MLE was the regional economic benefits of extending the life of the HVC mine. During public comment periods and at open houses, the EAO and MMO heard from members of the public that were supportive of HVC MLE, considering the benefits that the mine and HVC has to the surrounding communities. The EAO considered the continued economic benefits to the region and the province as part of the overall assessment of effects of HVC MLE.

The HVC mine currently employs about 1,320 people, and HVC MLE would add an average of 500 construction jobs and 350 more permanent jobs. The current mine also provides nearly \$200 million annually in taxes to municipal, provincial and federal governments that support public programs and services. HVC also regularly directly supports activities and programs in the surrounding communities through charitable donations; for example, by donating \$2.5 million dollars to help renovate the Emergency Department at the Royal Inland Hospital in Kamloops. Direct employment at the HVC mine and HVC's spending on contracting, goods and services also support indirect economic benefits in the region.

As well as supporting provincial public programs and services, provincial tax revenue from the HVC mine is shared with the member bands of the Nlaka'pamux Nation through four Economic and Community Development Agreements, signed in 2013 and 2016. The intent of those agreements was to support Nlaka'pamux Nation governing bodies to pursue socio-economic goals that enhance the well-being of their communities.

During the review of HVC's Application, members of the Technical Advisory Committee and the public raised questions about the potential effects of the construction of HVC MLE and the required additional workforce on the availability of housing in the region. To address any adverse effects on the regional housing market, HVC committed to carrying out a temporary construction workforce accommodation strategy for the short-term peak in construction workforce if it is determined that there is a temporary accommodation shortage during the period when peak construction would occur.

The EAO proposes to include Condition 10 Construction Workforce Accommodation Plan to require that HVC develop a plan to reduce the effects of the construction workforce on the availability of accommodations in affected local communities, including Ashcroft, Kamloops, Logan Lake and Merritt.

Finally, to address the socio-economic effects of mine closure on nearby communities, HVC proposed a Social Closure Plan be developed to manage the socio-economic effects of the closure process when the mine winds down. The EAO has proposed Condition 16 Social Closure Plan to require HVC to prepare a plan to minimize the socio-economic effects of the Closure process and its impact on nearby communities.

7.0 MITIGATIONS OF EFFECTS AND PROPOSED CONDITIONS

The EAO and MMO worked closely with the provincial permitting agencies and participating Indigenous nations to develop appropriate and enforceable requirements (or, Conditions) for the draft Certificate and permits that would address the key issues identified during the Combined Process and align with existing permits for the HVC mine. As a result of engagement with participating Indigenous nations, the EAO also revised its standard Conditions consultation requirements to require collaboration between the Nlaka’pamux Nation and HVC on key plans.

The EAO and MMO sought to make sure proposed conditions were managed by the best placed regulatory agency (i.e., Ministry or sub-group within a Ministry) to provide proper oversight and reduce duplication with the authorizations.

7.1. Proposed Environmental Assessment Certificate Conditions

The Certificate sets out legally binding Conditions to which the holder of a Certificate must adhere throughout the life of the HVC MLE Project. Some of the Conditions are procedural requirements common to all certified projects; others are project-specific and intended to prevent or reduce adverse effects. A description of how Conditions are developed is available in the [EAO’s Certificate Policy](#).

For HVC MLE, the EAO has proposed the seven standard Conditions which are common to all certified projects and ten project-specific Conditions to prevent or reduce adverse effects identified through the environmental assessment. The following are the ten project-specific Conditions developed to address specific effects and mitigations for HVC MLE.

- **Watershed Management and Mitigation Plan** – would require HVC to develop a plan to guide and inform watershed management and mitigation on the mine site.
- **Wetlands and Riparian Mitigation and Offsetting Plan** – would require HVC develop a plan to mitigate and offset the loss of wetlands and riparian ecosystems caused by HVC MLE.
- **Nlaka’pamux Foods Monitoring Plan** – would require HVC to develop a plan to monitor and mitigate effects of HVC MLE on Nlaka’pamux food sovereignty that supports food, social, and ceremonial needs, including carrying out a follow-up to the Dust Mapping and Traditional Plant Study carried out in 2016.
- **Health and Medical Services Plan** – would require HVC to develop a plan for the delivery of health and medical services to employees to alleviate effects to the health services in the region from HVC MLE.
- **Social Closure Plan** – would require HVC to plan for the social and economic effects of mine closure on nearby communities and to update the plan every five years.
- **Greenhouse Gas Emissions and Net-Zero Plan** – would require HVC to develop a plan to have net zero GHG emissions in 2050 and work toward reducing emissions leading up to that date. The plan needs to consider best available technology related to GHGs every five years.
- **Construction Workforce Accommodation Plan** – would require HVC to develop a plan to reduce the effects of the HVC MLE construction workforce on the availability of accommodation in surrounding communities.

- **Regulatory Information System** – would require HVC to maintain a regulatory information system to track the delivery schedule for regulatory submissions required by the Certificate.
- **Light Scatter Management Plan** – would require HVC to implement the Light Scatter Management Plan proposed in the Application to mitigate effects from light produced at the mine site.
- **Cumulative Effects** – would require HVC to participate in any cumulative effects assessment that includes the Highland Valley carried out jointly by First Nations and B.C.

7.2. Proposed Permit Conditions

As part of the recommendations to the Provincial Statutory Decision Makers, MCM, ENV, WLRS and the Ministry of Forests (FOR) have developed draft permits, which set out requirements for HVC MLE.

- **Air quality monitoring** - ENV's Air permit, PA-1557, requires HVC to manage the discharge of fugitive dust and the draft recommends requiring HVC to install a continuous monitoring network that provides real time particulate matter less than 10 microns in diameter to implement dust mitigation measures when triggered. In addition, the draft requires ambient air quality monitoring of sensitive receptors outside the mine area that will be compared to federal and provincial ambient air quality standards and objectives.
- **Groundwater monitoring** - Groundwater is managed onsite with MCM's M-11 permit and in the receiving environment with ENV's PE-376 effluent permit. MCM requires a surface water and groundwater management plan that includes surface water, seep and groundwater monitoring on the mine site. The program must provide early warning about the onset of acid rock drainage or an increase in contaminant loading. ENV's draft revised effluent permit, PE-376, recommends the requirement of numeric groundwater modelling and an updated groundwater monitoring plan to track mine seepage and confirm groundwater flow paths.
- **Surface water quality improvement** - ENV's PE-376 permit currently requires HVC to develop a Discharge Limit Proposal and Site Performance Objectives for parameters of concern for identified discharge points and impacted watercourses. The ENV draft permit also recommends the development of a discharge limit proposal for the discharge from the Lower Trojan Pond and the establishment of Site Performance Objectives in Pukaist Creek for the existing mine. Additional future changes to PE-376 will be discussed with First Nations.
- **Water management** - The draft *Water Sustainability Act* permits include mitigations for extracting groundwater, including minimum flow requirements downstream, diverting a stream that is currently flowing into the HVC mine Tailings Storage Facility, and proposed attenuation pond to keep more water in the Witches Brook watershed.
- **Waste management** – ENV recommends a new permit to move the existing landfill to a new location, with a new set of requirements and improved waste management.
- **Returning End Land Use Plan** - The existing M-11 permit conditions require HVC to use the End Land Use objectives. Reclamation Research programs are required to fill in gaps in reclamation understanding, including new requirements to research landforming techniques on tailings facilities.
- **Reclamation and Closure Plan** - HVC is required to have an updated Five Year Mine Plan and Reclamation Program Update submitted to the Chief Permitting Officer by December 31, 2026. Three years prior to closure of the mine, HVC is required to submit their closure plan.
- **Wildlife Management Plan** - HVC must implement the Wildlife Management Plan detailed in the M-11 permit.
- **Vegetation Management Plan** – HVC must implement the Vegetation and Invasive Management Plans detailed in the M-11 permit.

8.0 HVC MLE'S CONTRIBUTION TO SUSTAINABILITY

8.1. HVC MLE's Contribution to Sustainability

8.1.1. Introduction

Under Section 29 of the Act, and as part of every environmental assessment in B.C., the EAO must consider whether a project is consistent with the promotion of sustainability and include a recommendation to Ministers on this topic. This analysis supports the EAO in meeting its purpose under Section 2 of the Act to 'promote sustainability through protecting the environment and foster a sound economy and the well-being of British Columbians and their communities'.

To achieve this purpose under the Act, the EAO works with proponents, First Nations, technical advisors, and the public to identify and mitigate potential adverse environmental effects of a proposed project, such as HVC MLE, through:

- Requiring proponents to study the potential effects and propose mitigations for a broad range of environmental subject areas. For HVC MLE that included effects to air quality, fish and aquatic resources, groundwater and surface water, vegetation and ecosystems, and wildlife and wildlife habitat, and greenhouse gas emissions.
- Requiring proponents to study the potential effects and propose mitigation and management measures for the economic effects of their project.
- Requiring proponents to study and propose mitigations for the effects of a project on matters that affect the well-being of British Columbians and their communities. For HVC MLE that included an assessment of effects to the heritage resources, human health, economics, infrastructure and services, land and resources use, noise, to current and future generations and disproportionate effects on distinct human populations.
- Supporting the Technical Advisory Committee to review the proponent's assessments of effects to resolve questions and issues and to ensure the potential project effects are understood.
- Considering the legal requirements that would mitigate adverse effects if a project does proceed and proposing Certificate Conditions where necessary to help mitigate and manage potential project effects.

In considering whether the HVC MLE project is consistent with the promotion of sustainability, the EAO considered:

- HVC's Application and Teck's corporate sustainability and Indigenous peoples policies and documents;
- Relevant regional land use plans;
- Comments provided by Technical Advisory Committee members, including participating Indigenous nations, and responses to these comments by HVC,
- Feedback received during public comment periods;
- The EAO's assessment of effects to valued components and to Indigenous interests, as well as the views of participating Indigenous nations on the EAO's assessments, including the views set out in the Indigenous-led assessments, and
- The assessments conducted by the CNA and LNIB under Section 19(4) of the Act.

The EAO also considered the objectives set out in the developing provincial and completed federal Critical Minerals Strategies, the CleanBC Roadmap to 2030, B.C.'s Clean Energy Strategy, the Stronger BC Economic Plan, and B.C.'s commitments to reconciliation with First Nations as set out in the Act and in the *Declaration on the Rights of Indigenous Peoples Act*.

8.1.2. Sustainability analysis

8.1.2.1. Principle 1: Protecting the environment

To understand how HVC MLE would contribute to protecting the environment, the EAO considered the incremental (residual) and cumulative effects of continued mining on environmental valued components and the provincial

requirements that are in place or proposed to mitigate negative environmental effects. The EAO also considered HVC MLE's contribution to global environmental priorities and sustainability.

After considering information in HVC's Application and advice from the Technical Advisory Committee, the EAO concluded that there are no significant residual adverse effects to environmental valued components from HVC MLE. The EAO also concluded, however, that because of existing conditions, HVC MLE would contribute to existing adverse cumulative effects to water quality and significant adverse cumulative effects to water availability (quantity). The EAO also acknowledged uncertainty related to some proposed mitigations for air and water quality and noted that effects from HVC MLE would continue until after the mine is closed and reclamation activities have been completed in the far future.

To manage and mitigate environmental effects, current operations at the HVC mine are subject to a suite of regulatory requirements, which underwent substantial review and revision through the Combined Process. If HVC MLE is approved, new provincial requirements would manage effects to the environment, including to water quality and quantity, air quality, vegetation and wildlife. New and amended licences prepared under the *Water Sustainability Act* would allow for more detailed management of scarce water resources in relation to mine operations.

The EAO is also proposing several Certificate Conditions to help manage effects to the environment, including Condition 13 Watershed Management and Mitigation Plan, Condition 14 Wetlands Mitigation and Offsetting Plan, Condition 15 Greenhouse Gas Emissions and Net-Zero Plan, Condition 9 Light Scatter Management Plan, and Condition 17 Cumulative Effects which combined would help reduce effects from HVC MLE to watersheds, watercourses and wetlands, and require HVC to manage GHG emissions and light scatter, and participate in any cumulative effects study planned jointly by First Nations and B.C.

Considering the promotion of sustainability at a global scale and global environmental priorities, the EAO notes that critical minerals like copper and molybdenum³³ support the transition to a sustainable energy economy. HVC MLE aligns with the first phase of B.C.'s Critical Minerals Strategy, which emphasizes the importance of minerals like copper, cobalt, and nickel in decarbonizing the provincial economy and achieving net-zero provincial emissions by 2050. As B.C.'s largest copper-producing mine, HVC MLE would play a significant role in this effort and would increase the amount of critical minerals currently produced. Importantly, while HVC MLE would result in an increase in ore milling capacity and as a result, power use, this need would be met by using sustainable electricity, with the increased demand being met by B.C. Hydro reconductoring the current transmission line from the mine site to the Nicola substation.

The EAO also acknowledges that Teck has a number of corporate commitments that align with the promotion of sustainability, such as a nature positive future by 2030 through conserving or rehabilitating at least three hectares of land for every one hectare affected by Teck mining activities, working towards zero industrial waste from its facilities by 2040, and working towards carbon neutral operations by 2050³⁴.

The relevant background chapters to this principle include [section 13.1 Air Quality](#), [section 13.4 Surface Water](#), [section 13.3 Groundwater](#), [section 13.5 Fish and Aquatic Resources](#), [section 13.6 Wildlife and Wildlife Habitat](#), [section 13.7 Vegetation and Ecosystems](#), [section 14.7 Greenhouse Gas Emissions](#), [section 10 Effects to Nlaka'pamux Nation Interests](#), and .

8.1.2.2. Principle 2: Fostering a sound economy

To understand how HVC MLE would contribute to fostering a sound economy, the EAO considered the incremental (residual) and cumulative effects of continued mining on the economy valued component, including the economic benefits to the region and the Province. In the Application, HVC reported that in 2021, the mine provided about \$170 million dollars in wages and benefits to its workforce, bought more than \$150 million dollars of local goods and services

³³ Source: Government of Canada [The Canadian Critical Minerals Strategy - Canada.ca](#)

³⁴ Source: Teck Resources Limited [Sustainability Approach and Goals \(teck.com\)](#)

from local businesses, and paid nearly \$200 million dollars in municipal, provincial, and federal taxes. Under HVC MLE, these benefits would continue for longer than if the mine closes in 2028.

HVC MLE would increase employment by adding about 350 direct, indirect and induced jobs to the existing 1,320 jobs at the mine site and an estimated average of 500 temporary jobs during Construction. These ongoing and new job opportunities would benefit workers and communities. The EAO notes that some Indigenous people may not be as able to access these opportunities due to barriers to economic participation. HVC noted in its Application that it has been working to increase Indigenous employment at the mine to continue recent increases in Indigenous staff from 136 in 2018 to 226 in 2022 and by developing an Indigenous Employment Strategy to help increase Indigenous recruitment and retention. HVC's Application also detailed HVC's spending of just over \$63 million on goods and services from First Nations-affiliated businesses, representing approximately 41% of HVC's total local procurement.

In the *Declaration on the Rights of Indigenous Peoples* Action Plan for 2022 – 2027, B.C. identified a goal to ensure that First Nations have economic opportunities and benefit from the lands and resources in their territories³⁵. B.C. has four ongoing Economic Community Development Agreements with Nlaka'pamux Nation organizations to share provincial mineral tax revenue from the mine, which help support Nlaka'pamux Nation communities and initiatives. As well, HVC and Nlaka'pamux Nation groups have bilateral agreements that provide financial and other benefits to their communities and are reflective of the collaborative work that would continue under HVC MLE.

If HVC MLE does not proceed, the mine would cease operations in 2028, resulting in a loss of employment at the mine and the end of financial and socioeconomic benefits to local communities, First Nations, and of government revenue. These effects would still occur under HVC MLE, but the time until onset of mine closure would be extended. To mitigate the negative economic and social effects that may occur at mine closure, HVC proposed to develop a Social Closure Plan to help manage the socioeconomic effects of the Closure process. The EAO has proposed Condition 16 Social Closure Plan, to require HVC to plan for the closure of HVC MLE and support employee and community transition post-mining.

The relevant background chapters to this principle include [section 13.9 Economic, Infrastructure and Services](#), [section 10 Effects to Nlaka'pamux Nation Interests](#), and [section 11.0 Effects to Bonaparte First Nation and Stk'emlúpsmeč te Secwépemc Nation](#).

8.1.2.3. Principle 3: Fostering the well-being of British Columbians and their communities

To understand how HVC MLE would contribute to fostering the well-being of British Columbians and their communities, the EAO considered the incremental (residual) and cumulative effects of continued mining on the social and health valued components, as well as the potential positive and adverse effects to communities near the HVC mine, including Indigenous communities.

The EAO concluded that HVC MLE would not contribute to significant adverse residual effects to human health, noise, infrastructure and services, and current and future generations. To mitigate potential effects of HVC MLE on housing affordability and to local health and emergency services due to the increases in employees associated with HVC MLE, the EAO has proposed Condition 11 Health and Medical Services Plan and Condition 10 Construction Workforce Accommodation Plan.

The EAO determined there are adverse cumulative effects to cultural heritage and archaeological resources in the Highland Valley due to past mining, industrial, and agricultural activities. The full extent of losses is uncertain, however, the EAO understands that First Nations have felt a significant effect from these past losses, which led to the EAO's conclusion that HVC MLE would contribute to existing significant adverse cumulative effects to heritage resources. The

³⁵ Source: Government of British Columbia [declaration_act_action_plan.pdf\(gov.bc.ca\)](#)

effects from HVC MLE itself would be lessened due to the improved identification and protection of heritage resources going forward.

To understand the residual and cumulative effects of HVC MLE on Indigenous interests, the EAO worked with members of the Nlaka'pamux Nation and BFN and SSN. The CNA and LNIB concluded that the effects of past mining plus the effects from HVC MLE would continue to have a significant negative effect on Nlaka'pamux culture, communities, and way of life, and that these effects would last for generations into the future. The mine site would not be reclaimed until the far future, extending the time in which First Nations would continue to be separated from the land and not able to fully implement their own cultural and governance activities at the site.

As part of the CNA's and LNIB's Indigenous-led assessments and the EAO's assessment of effects to Indigenous interests, the EAO understands that First Nations remain very concerned about the direct loss of harvesting areas and potential contamination of plants and wildlife from mine dust and effluent. The EAO acknowledges that *Environmental Management Act* permits for air and water discharge are in place and, if HVC MLE is authorized, these permits would be updated to continue to protect human health and to expand mitigations to address any new effects. These permits also require HVC to work with the Nlaka'pamux Nation to understand and integrate First Nations' concerns into monitoring and mitigation measures. As a result of the environmental assessment, and as a follow up to HVC's human health risk assessment and HVC's 2016 Dust Mapping and Traditional Plant Study, the EAO is proposing Condition 12 Nlaka'pamux Foods Monitoring Plan to require HVC to collaborate with Nlaka'pamux communities to develop a plan to monitor and mitigate effects from HVC MLE on traditional foods.

Over the longer term, HVC is also already required under its M-11 permit to work closely with the Nlaka'pamux Nation on the designs for the reclamation of the mine site, and this would continue under HVC MLE. HVC reported in the Application that they have worked with Nlaka'pamux communities to develop a Returning End Land Use Plan, which incorporates Nlaka'pamux information and preferences about site restoration, which, while not replacing the landscape that was lost to past mining, ensures that Nlaka'pamux views are at the forefront of planning for site restoration.

As a major regional employer, HVC contributes to the well-being of its employees individually through employee benefits programs and through its existing Health and Safety Policy and Indigenous Peoples Policy³⁶. HVC is also working with First Nations to develop an Indigenous Cultural Awareness Training Program designed to combat reported racism at the mine site and to support cultural awareness which will be required for all HVC employees. As noted above, HVC is also working to increase the number of First Nations employees at the mine site.

The economic and employment benefits outlined in the previous section would also contribute to the well-being of communities in the region, helping to deliver the jobs, opportunities, and services that British Columbians need to support their families and communities. Additionally, the agreements between HVC and First Nations, and B.C. and First Nations also further help support capacity-building and broader well-being in First Nations communities.

HVC also supports local and regional community initiatives through direct financial and in-kind contributions to social groups, non-profit organizations, and emergency management efforts. HVC's Application reported on contributions made to educational institutions to support faculty and student research on mine reclamation, and on HVC's efforts to build relationships with education providers related to recruitment and training. These relationships and benefits to the local and wider community are expected to continue under HVC MLE.

The relevant background chapters to this principle include [section 13.9 Economic, Infrastructure, and Services](#), [section 13.8 Human Health](#), [section 10 Effects to Nlaka'pamux Nation Interests](#), [section 11 Effects to Bonaparte First Nation and Stk'emlúpsenc te Secwépemc Nation Interests](#), [section 14.4 Effects on Current and Future Generations](#), and [section 13.10 Land and Resource Use](#).

³⁶ Source: Teck Highland Valley Copper Partnership [Microsoft Word - 5.01 HIGHLAND VALLEY COPPER COMMUNITY POLICY.docx \(teck.com\)](#)

8.1.3. EAO's Sustainability Conclusion

Considering the above principles and analysis, the EAO is of the view that:

1. Provincial requirements for HVC MLE established through proposed Certificate Conditions and new and amended permits would minimize adverse effects on the environment while expanding B.C.'s ability to provide critical minerals to support B.C., Canada and the wider world's transition to clean energy sources;
2. HVC MLE would foster a sound economy by providing continuing and new employment, contracting, and training opportunities, and would contribute financial support to First Nations organizations; and
3. While HVC MLE would have negative effects on Nlaka'pamux Nation's Indigenous interests, it would also contribute to the well-being of British Columbians and their communities, including First Nations communities, by managing the effects of HVC MLE in areas important to First Nations and local communities, by capacity building within First Nations communities and by ensuring Nlaka'pamux information, perspectives and interests are integrated in mine reclamation planning.

The EAO has administered the HVC MLE environmental assessment to allow for a clear understanding of HVC MLE's contribution to the promotion of sustainability. The EAO notes that, while HVC MLE is overall expected to have a positive contribution to sustainability, uncertainty remains related to some mitigation measures and interactions between valued components. Should a Certificate be issued for HVC MLE, the EAO and other regulatory agencies will provide oversight through Certificate Conditions and permit requirements. Considering all these factors, the EAO recommends that HVC MLE is consistent with the promotion of sustainability in B.C.

9.0 OVERALL CONCLUSIONS

Based on:

- Information regarding HVC MLE and the BASA Amendment contained in HVC's Application, as well as supplemental information provided by participating Indigenous nations, including the results of Indigenous-led assessments, and the Technical Advisory Committee;
- The EAO, MMO and HVC's consultation and engagement with First Nations and participating Indigenous nations, provincial and local government agencies, and the public;
- Comments received during the combined process from participating Indigenous nations, the Technical Advisory Committee, and the public, and HVC and the EAO's responses to those comments;
- Issues raised by participating Indigenous nations regarding the potential effects of HVC MLE on their Indigenous interests, as well as HVC's responses and efforts to address those issues;
- The design of HVC MLE as specified in the proposed Certified Project Description (Schedule A of the Certificate, if issued) which authorizes HVC MLE components and activities that may occur;
- Mitigation measures identified in the EAO's proposed Conditions (Schedule B of the Certificate, if issued) to be implemented by HVC during all phases of HVC MLE; and,
- Permitting and other regulatory requirements developed cooperatively with the EAO and participating Indigenous nations and to be referred to Statutory Decision Makers for approval if HVC MLE receives an Environmental Assessment Certificate.

The EAO and MMO are satisfied that:

- The combined environmental assessment and permitting process has adequately identified and assessed potential adverse environmental, economic, social, cultural and health effects of HVC MLE and the BASA

Amendment, having regard to the proposed Conditions set out in the Table of Conditions (Schedule B to the Certificate, if issued) and the draft proposed permit amendments;

- HVC MLE is expected to result in net positive residual effect to regional employment, regional business and regional economy and these positive effects have been maximized to the extent possible;
- Other assessment matters have been adequately assessed including: risks and uncertainties associated with effects, interactions between effects, the risks of malfunctions and accidents, disproportionate effects on distinct human populations, effects on biophysical factors that support ecosystem functions, effects on current and future generations, contributions to sustainability, consistency with land use plans, greenhouse gas emissions, alternative means for carrying out HVC MLE, and potential changes to HVC MLE and the that may be caused by the environment;
- Consultation with the public has been adequately carried out;
- Issues identified by the Technical Advisory Committee, as well as members of the public (which were within the scope of the environmental assessment), were adequately and reasonably addressed during Application Review;
- HVC MLE would result in adverse residual or cumulative effects to certain environmental, social, cultural, and health components, but with the application of mitigation measures and legally binding Conditions, these effects would not be significant;
- Extending the dewatering of the Basal Aquifer would result in residual or cumulative effects to groundwater and surface water and associated values, but that with the application of proposed mitigations measures those effects would not be significant;
- Practical means have been identified to prevent or reduce adverse effects, and these are included as appropriate in the proposed Conditions set out in the Certificate;
- The consultation, engagement, and consensus seeking efforts between the EAO and participating Indigenous nations have been carried out in good faith;
- The potential for adverse effects on the Bonaparte First Nation and Stk'émłúpsmc te Secwépemc Nation and Syilx Nation's interests within the scope of the environmental assessment have been avoided, minimized or otherwise accommodated to a reasonable level; and,
- The provincial Crown has fulfilled its legal obligations to consult and accommodate potentially affected First Nations related to the issuance of a Certificate for HVC MLE.

The EAO notes that:

- The historic operations of the HVC mine have adversely affected existing water quality and water quantity conditions. Although not required by the EAO, HVC provided pre-mining information in the Application. Based on this information and information from participating Indigenous nations, the EAO concludes that HVC MLE would contribute to significant cumulative effects that currently exist for water quantity and heritage resources. Mitigations applied and proposed are intended to reduce the effects.
- With the existing extensive effects to the land, water and wildlife in the Highland Valley due to past mining, industrial activity, and forestry, the ability for the Nlaka'pamux Nation members to meaningfully exercise their Section 35 rights in this area has been lost and is irreversible. HVC MLE would also have effects on Nlaka'pamux Nation's Indigenous interests beyond Section 35 rights and would continue the existing effects on Section 35 rights. These effects would extend until at least 2043 when mine Operations are predicted to end under HVC MLE. Mitigation and accommodation measures are proposed by B.C. and HVC to alleviate the effects of HVC MLE

to members of the Nlaka’pamux Nation, and the EAO’s view is that these effects have been avoided, minimized or otherwise accommodated to a reasonable level.

9.1. Provision of Consent by Participating Indigenous Nations

It is the objective of the B.C. environmental assessment process that both First Nations and provincial decision-makers are able to freely make fully informed decisions regarding whether or not a project should proceed. Participating Indigenous nations make decisions based on their own laws and traditions; this is an expression of their right to Indigenous self-determination and self-government. Under the Act, a participating Indigenous nation may choose to provide a notification of consent or lack of consent and their reasons. Ministers are required by the Act to consider each notification of consent or lack of consent provided by participating Indigenous nations before making their decisions.

For the HVC MLE environmental assessment, the EAO received the following responses from participating Indigenous nations:

- Nlaka’pamux Nation:
 - CNA, on behalf of its Participating Bands, issued a letter of support for the issuance of a Certificate for HVC MLE;
 - Kanaka Bar issued a letter of consent for the issuance of a Certificate for HVC MLE;
 - LNIB issued a letter of consent for the issuance of a Certificate for HVC MLE;
 - NNTC stated that it did not consent to the project in a letter requesting dispute resolution; that request was subsequently withdrawn
- Secwépemc Nation
 - SSN did not consent to the issuance of a Certificate for HVC MLE.

9.2. Dispute Resolution under the *Environmental Assessment Act*

9.2.1. Stk’emlúpsenc te Secwépemc Nation

On November 29, 2024, Stk’emlúpsenc te Secwépemc Nation (SSN) requested the initiation of dispute resolution under Section 5 of the Act for the pending referral decision for HVC MLE. The dispute resolution process concluded on April 15, 2025, with the submission of a [Facilitator’s Report](#) by the dispute resolution facilitator, who was mutually selected by the parties of the dispute and supported by an expert in Indigenous legal orders. Results from dispute resolution have been incorporated into this Report and proposed Certificate conditions.

The Citw Nlaka’pamux Assembly and the Nlaka’pamux Nation Tribal Council opposed the changes that the EAO proposed to the Certificate conditions to address SSN concerns in dispute resolution, expressing their view that the HVC mine and HVC MLE are in the exclusive territory of the Nlaka’pamux Nation and SSN should not be involved in the project. NNTC provided the following disclaimer: *NNTC has not disputed others’ assertions of title and rights in the EAO process as it is not the appropriate forum. However, this is not to be interpreted that NNTC is in agreement with those assertions.*

The EAO considered CNA and NNTC’s perspectives, as well as similar opposition expressed by the Nlaka’pamux Nation throughout the environmental assessment. With the understanding that there are opposing interests, the EAO sought to include SSN in proposed Certificate conditions that are regional in nature and reflective of the proximity and potential effects from HVC MLE on SSN’s Indigenous interests. In recognition of the potential seriousness of the effects of HVC MLE on the Nlaka’pamux, the EAO’s proposed Table of Conditions recommended four conditions that require exclusive

consultation with the Nlaka’pamux Nation and three conditions that require the Holder of the Certificate to invite representatives of the Nlaka’pamux Nation to collaborate on the development of management plans.

9.2.2. Nlaka’pamux Nation Tribal Council

On March 14, 2025, the Nlaka’pamux Nation Tribal Council (NNTC) requested the initiation of dispute resolution under Section 5 of the Act for the pending referral decision for HVC MLE. NNTC withdrew from the dispute resolution process on May 15, 2025, and the dispute resolution process concluded on May 20, 2025, when the [Facilitator’s Report](#) was submitted by the dispute resolution facilitator. No changes to the Assessment report or Certificate conditions were made as a result of this dispute resolution.

10.0 DETAILED ASSESSMENT – EFFECTS TO NLAKA’PAMUX INDIGENOUS INTERESTS

The Act outlines required matters for every environmental assessment in B.C. [Section 25\(1\)](#) requires that the effects of a project on First Nations, their rights and other matters of interest to each First Nation (collectively referred to as Indigenous interests) be included in every environmental assessment. The following assessment for the Nlaka’pamux Nation also considers potential effects due to the BASA Amendment.

The assessment of effects to Indigenous interests can be carried out in different ways, by the EAO or by First Nations themselves. Section 19(4) of the Act outlines how a participating Indigenous nation can notify the EAO of their intent to carry out an assessment and how the EAO can acknowledge it for the purposes of meeting the requirements under Section 25(1) of the Act.

For the Nlaka’pamux Nation (also spelled nte?kepmx), the Citxw Nlaka’pamux Assembly (CNA) and the Lower Nicola Indian Band (LNIB) both carried out Indigenous-led assessments under Section 19(4). The Nlaka’pamux Nation Tribal Council (NNTC) conducted an independent assessment, separate from the EAO. For Kanaka Bar Indian Band (Kanaka Bar) and Spuzzum First Nation (Spuzzum), the EAO has assessed the effects to their Indigenous interests.

In their Application, HVC assessed the potential effects to CNA Participating Bands, LNIB, and Kanaka Bar. The CNA also authored selected sections of the Application to provide the viewpoints of their eight Participating Bands. Spuzzum First Nation chose not to actively participate in the environmental assessment.

This chapter provides the detailed assessment of potential effects to Nlaka’pamux Nation interests from HVC MLE and proposed mitigations for those effects, drafted by and in consultation with the groups who form the Nlaka’pamux Nation.

NNTC submitted the following statement to the EAO to be included in this chapter of the Report:

NNTC is not responsible for the content or accuracy of the information in this BC EA Report Chapter (Detailed Assessment - Effects To Nlaka’pamux Indigenous Interests) and objects to non-Nlaka’pamux presenting and/or interpreting information in relation to the Nlaka’pamux and Nlaka’pamux Homeland.

10.1. Nlaka’pamux Nation Overview

The Nlaka’pamux Nation (pronounced ng-khla-kap-muhx) is one of the Interior Salish first peoples in the Southern interior of B.C. The Nlaka’pamux Nation traditional territory spans across the southern interior of B.C., encompassing the Highland Valley, Nicola Valley, and extending southward toward Hope and across the border into Northern Washington state, United States of America. Nlaka’pamux territory includes significant river systems such as the Fraser, Thompson, Nicola and Coldwater rivers and their tributaries. The HVC mine site is situated entirely within Nlaka’pamux Nation traditional territory.

Based on ethnographic information, the Province of B.C. understands that Interior Salish nations, including the Nlaka’pamux, had legal traditions which governed the ownership and stewardship of land, and that there were different types of access rights arising from membership in a nation and from personal kinship networks. Historically, the Nlaka’pamux Nation was comprised of two main groups, the Utā’mqamux, who lived south of present-day Kanaka Bar, and the Nku’kūmamux, who lived at or north of present-day Kanaka Bar. These Nlaka’pamux groups were further divided into multiple “divisions” which were associated with specific areas in Nlaka’pamux territory (for example those centred around Spences Bridge or the Nicola Valley, etc.). Territorial ownership and resource access, however, were held in common by the whole nation, and not separately by local groups or subdivisions. While local communities had customary hunting, fishing and harvesting areas over which they exercised a degree of stewardship, they did not and could not stop people from other communities of the same nation from accessing those resources, though it is important to note that in some areas, strict protocols were in place to regulate within-nation resource access. This ethnohistory informs the Province’s understanding that Nlaka’pamux rights are held at the nation level.

Today the Nlaka’pamux Nation comprises of 15 bands. Multiple Nlaka’pamux organizations have been formed to represent these 15 bands’ Indigenous interests, for different purposes and projects. For the HVC MLE environmental assessment, Nlaka’pamux bands were either representing themselves or were represented as a collective by the CNA or the Nlaka’pamux Nation Tribal Council, as shown in Table 5.

Table 5: Nlaka’pamux Band Affiliations for HVC MLE regulatory process

Affiliation	Nlaka’pamux Band
Citxw Nlaka’pamux Assembly (CNA)	Ashcroft Indian Band, Boston Bar First Nation, Coldwater Indian Band, Cook’s Ferry Indian Band, Nicomen Indian Band, Nooaitch Indian Band, Shackan Indian Band, and Siska Indian Band
Nlaka’pamux Nation Tribal Council (NNTC)	Lytton First Nation, Skuppah Indian Band, Boothroyd Indian Band, Oregon Jack Creek Band
Unaffiliated	Kanaka Bar Indian Band (Kanaka Bar)
Unaffiliated	Lower Nicola Indian Band (LNIB)
Unaffiliated	Spuzzum First Nation (Spuzzum)

10.2. Nlaka’pamux Nation Engagement and Consultation during the Combined Process

The EAO and the MMO engagement activities support the implementation of the United Nations Declaration on the Rights of Indigenous Peoples through seeking free, prior and informed consent with First Nations. The EAO and MMO approached bilateral engagement with respect to each First Nation’s preferences and their governance responsibilities.

The EAO and MMO sought to achieve consensus with representatives of the Nlaka’pamux Nation on key issues and materials throughout the environmental assessment, as well as at key milestones. Engagement included:

- Participation in the Technical Advisory Committee and topic specific sessions
- Regular government-to-government meetings between the EAO, MMO and each First Nation
- Opportunity to review, comment and collaborate on draft materials, such as the Process Order, Application Information Requirements, Assessment Plan, Notice of Application Review, Assessment Report, and draft Certificate and Conditions
- Opportunity to conduct a Section 19(4) of the Act assessment on their Interests or collaboratively draft the assessment on their Interests within the EAO’s Assessment Report;
- Provision of capacity funding during the Combined Process to the CNA, Kanaka Bar, LNIB and Spuzzum.

The EAO notes that HVC also engaged directly with the CNA, Kanaka Bar, LNIB, and NNTC. A description of that engagement is included in Chapter 3 of the Application.

10.3. Assessment Boundaries

The spatial assessment boundaries for assessing potential effects to Indigenous interests used by HVC in its Application were identified by the combined largest extent of the local study area and regional study area for valued components linked to Nlaka’pamux Nation Indigenous interests. The entirety of the Indigenous Interests local study area and regional study area are within Nlaka’pamux traditional territory from north of Cache Creek, west to the North Okanagan boundary and south past Aspen Grove (see Application Figures 11.2-1 and 11.2-2 in [Chapter 11 Assessment of Indigenous Interests](#)). The administrative boundaries for the assessments are limited to potential interactions with HVC MLE in the Nlaka’pamux

Nation Indigenous Interest local study area and regional study area and do not include off-reserve Nlaka'pamux Nation members. Technical boundaries associated with Nlaka'pamux Nation include how historic community-level governing policies and laws currently apply to the area, how they have evolved, and how existing processes will be used to review potential effects.

The temporal boundaries of the assessment include the construction, operation, closure and post-closure phases of HVC MLE. The project components and anticipated timelines are described in detail in [section 2.2.1 HVC Mine Life Extension](#) of this Report.

10.4. Regional Context

In the Application, HVC provided an overview of the regional context and considered the existing conditions for all valued components to understand and assess the potential effects of HVC MLE, which is summarized in this section. In conducting their assessment of effects to Indigenous Interests, HVC considered how existing development and disturbance in the area has already affected First Nations' ability to exercise rights recognized and affirmed in Section 35 of the *Constitution Act*, including the historical and current disturbance on the HVC mine site.

HVC described their Base Case (i.e. without the addition of the MLE project) as including the existing disturbance associated with current HVC mine site, as well as additional disturbance authorized under the M-11 permit, and how these might affect Nlaka'pamux Nation rights and interests.

Historically, Nlaka'pamux peoples utilized areas on and surrounding the HVC mine site for subsistence-based activities, as well as cultural and spiritual training purposes, social gatherings and intergenerational knowledge transfer. Nlaka'pamux Nation's Indigenous interests have been cumulatively affected for many generations by the implementation of systematic colonial governance and institutions and various industrial resource activities, including mining operations and logging, within the Highland Valley. Industrial resource extraction has contributed to the loss and destruction of terrestrial and aquatic ecosystems, Nlaka'pamux transportation routes and Indian Reserves having adverse effects on Nlaka'pamux people's way of life.

Effects to the land, resources and traditional systems in the Highland Valley have affected Nlaka'pamux Nation's ability to exercise their Aboriginal Rights and governance structures, laws and practices. Persistent environmental degradation and land use change have impacted harvesting practices, including hunting, fishing and plant gathering, and affected participation in traditional and newer economic activities such as cattle ranching. Land use changes have limited access to sites of interest and have impacted Nlaka'pamux Nations ability to practice traditional governance and stewardship of the lands. Climate events over the past few years have had further effects on the territory and caused immeasurable stress on the Nlaka'pamux Nation through displacement, prevention from work or earning of livelihoods and the inability to practice ceremony or culture. Climate events have also contributed to safety fears for those community members living downstream of mine infrastructure such as the Highland Tailings Storage Facility.

HVC also identified some of the socio-economic indicators that highlight the barriers that Indigenous communities experience compared to the overall population, including to employment opportunities, health care, and housing. The EAO recognizes this context is important to understand how any additional effect from HVC MLE might disproportionately affect Indigenous communities.

10.5. Citxw Nlaka'pamux Assembly

This section is authored by Citxw Nlaka'pamux Assembly – the [full results of Citxw Nlaka'pamux Assembly's assessment of effects to Citxw Nlaka'pamux Assembly's Indigenous interests](#) are available on the EAO's Electronic Project Information Centre.

The Citxw Nlaka'pamux Assembly (CNA) was created in 2013, but our work is rooted in hundreds of years of history and a legacy of protecting the nłeʔképmx people, culture, values, and Territory. This work to protect and advance nłeʔképmx

Rights, Title, values and laws is a modern iteration of efforts that stretch back to the 1800s when the aggressive incursion of thousands of gold miners resulted in the Canyon War (Fraser Canyon War) in 1858. At that time, strong nłeʔképmx leaders such as Chiefs Spintlum (CexpeʔntlEm) and Kowpelst (Cʔaupəlstən) played crucial roles in navigating the conflict and avoiding a full-scale war.

Although the violence subsided, the Canyon War marked the beginning of a long struggle for recognition and protection of nłeʔképmx rights to land and resources. In this century, the Teck Highland Valley Copper (HVC) mine, an open-pit copper and molybdenum mine operating within the unceded Territory of the nłeʔképmx Nation, operated (in various iterations) for about 50 years before nłeʔképmx leaders of the eight Participating Bands, Ashcroft Indian Band, Boston Bar First Nation, Coldwater Indian Band, Cook's Ferry Indian Band, Nicomen Indian Band, Nooaitch Indian Band, Shackan Indian Band and Siska Indian Band, negotiated agreements with the company and the province in 2013.

The CNA was founded to enact these agreements, which go beyond revenue-sharing to incorporate the cultural and community needs of the eight Participating Bands. The agreements include a Participation Agreement between the Participating Bands and HVC, an Economic and Community Development Agreement (ECDA) between the Participating Bands and the Province of British Columbia, and an Implementation Agreement between the Participating Bands outlining their commitment to work together.

The CNA plans to build on the legacy of our past leaders and community members to ensure a healthy, culturally grounded future for our people. We have a clear vision to provide positive opportunities that will enhance the economic and social well-being of our communities and members. Our work is part of a collective effort in the nłeʔképmx Nation to sustainably manage natural resources and economic development in our Territory.

10.5.1. Consultation and Engagement with Citxw Nlakaʔpamux Assembly

CNA, EAO and MCM began engagement on HVC MLE in 2019. CNA, the EAO and MMO held biweekly meetings between Summer 2019 and Fall 2024 to discuss HVC MLE. Having a dedicated meeting time allowed CNA and the EAO to work together to align CNA's assessment process with the EAO's assessment, and to provide a forum to explore CNA staff and community members' concerns and potential solutions. The EAO was also invited to present to CNA's Community Working Group and at leadership meetings regarding the EAO's assessment process.

CNA has a long-term working relationship with HVC and worked closely with HVC to in the lead-up to and during the environmental assessment, and integrated CNA's authorship of specific sections of HVC's Application. This process was established so that CNA could directly incorporate nłeʔképmx Knowledge from the CNA Participating Bands into HVC's Application, to ensure equal weighting of nłeʔképmx Knowledge and western insights in assessing impacts of HVC MLE.

As set out in the HVC MLE Assessment Plan, CNA is conducting an Indigenous led assessment under Section 19(4) of the Act to assess the effects of HVC MLE on the Participating Bands' rights and interests. To address the limitations of the Provincial environmental assessment process, the CNA developed the CNA Environmental Assessment Strategy. CNA's Environmental Assessment Strategy includes processes between the CNA and the eight Participating Bands, the CNA and HVC, and the CNA at the EAO. Identified in the CNA Environmental Assessment Strategy is the nłeʔképmx Impact Assessment Framework. For the results of CNA's nłeʔképmx impact assessment, please see the EAO's EPIC website³⁷.

As outlined in the CNA Environmental Assessment Strategy, the CNA has been engaging with the Community Working Group monthly since 2021. The Community Working Group is made up of knowledge holders and technical staff from the eight Participating Bands. This table provides for grassroots discussions between nłeʔképmx community members, and CNA technical staff to support meaningful integration of nłeʔképmx knowledge into the HVC MLE Single Application Package and inform the CNA nłeʔképmx Impact Assessment. The CNA has also gone into each of the eight Participating

³⁷ Source: Citxw Nlakaʔpamux Assembly [2024-EAO-nłeʔképmx Impact Assessment.pdf](#)

communities six times to discuss the HVC MLE environmental assessment, the nê?kêpmx Impact Assessment Framework, and the nê?kêpmx Impact Assessment. The CNA staff has also met with the CNA Board quarterly to discuss HVC MLE.

10.5.2. Citxw Nlaka’pamux Assembly’s Indigenous Interests

The nê?kêpmx Impact Assessment Framework guided CNA’s nê?kêpmx Impact Assessment report to address impacts of HVC MLE’s Single Application Package to nê?kêpmx Rights, Title, values and interests. The framework consists of a series of questions that were developed by the CNA and were applied to the HVC MLE Project during the Application Review phase. CNA assessed impacts to nê?kêpmx Rights, Title, values and interests from the HVC MLE Project by taking into consideration past, present, and future potential impacts from historical, the current state of the nê?kêpmx Territory, cumulative impacts, and future potential impact from the proposed extension. The characterization of effects for our nê?kêpmx impact assessment did not take into consideration mitigations because it would misrepresent the impacts that HVC, and other cumulative impacts, had and will have on nê?kêpmx, the Highland Valley and the Territory. Assessment of impacts were based on four Core values that include measurable Community Based Indicators that capture nê?kêpmx voices of past, present and for future generations. These Core values are tmíxw, Balance, Governance, and Teachings.

tmíxw

tmíxw is understood not only as ground, earth, or land, but tmíxw is also a more encompassing term meaning the world in its entirety, under the earth, in the earth, above the earth, the water in all its forms, the winds, and the skies. tmíxw is a Core Value because tmíxw articulates the relationships between all things and embodies the nê?kêpmx worldview. Culturally important places that reinforce tmíxw include traditional burial sites, locations where puberty training takes place, landscape features that have spiritual importance or where rituals take place, and traditional gathering places shared with other Indigenous Peoples. Community Based Indicators under the tmíxw Core Value are Connection to All, Ecosystem Balance, Restoration, and Peaceful Enjoyment of tmíxw.

Balance

Balance is an outcome or state of wholeness when we have what they need to be who they want to be and understand their role in relation to tmíxw and all living things. Balance is more easily attained when individuals have a strong sense of identity and belonging, connection to tmíxw, and to their community, and feel safe to practice their traditions and culture. The concept of balance arose from dialogue related to health and wellness, where it was felt that wellness or well-being was a non-nê?kêpmx concept that did not align to their worldview. Community Based Indicators identified under the Balance Core Value are Identity (Self Determination), Meaningful and Sustainable Employment, Sole-Source Revenue Generation, Self-Awareness, Connection, and Sense of Safety.

Governance

Self-governance, self-determination, and jurisdiction over nê?kêpmx lands creates the social, economic, and political conditions to achieve balance. Clear communication and accurate and accessible information are necessary for nê?kêpmx communities to govern effectively, make informed decisions, and fully exercise inherent Rights. Community Based Indicators identified under the Governance Core Value are Equal Representation, Effective Leadership, Communication, Guardians of the land, Protection, Non Nlaka’pamux Community Education, and Accountability.

Teachings

Passing on nê?kêpmx Knowledge, values, and way of life to future generations is vital to the nê?kêpmx. Respect, sharing, and caring for tmíxw, snéwt (wind), qʷúʔ, wildlife, and each other was regularly expressed as teachings that support healing from the impacts of colonization, recover from the harms made to tmíxw, and thriving in the future. Community Based Indicators identified in the Teachings Core Value are Use of nê?kêpmx Values in Personal Decision-Making, Knowledge of the Territory, Sharing Knowledge, Language, and nê?kêpmx Community Education.

10.5.3. Potential Effects to Citxw Nlaka'pamux Assembly Participating Bands due to HVC MLE

The following is a summary of the results of CNA's n̓eʔképmx impact assessment.

Cultural Heritage

HVC's assessment states that a total of 240 archaeological sites were identified within the area that the HVC MLE Project will impact. Artifacts that are unearthed are currently and will continue to be sent to a repository out of n̓eʔképmx Territory, impacting the sharing of knowledge, cultural heritage, and Title and Rights of n̓eʔképmx. The CNA has been working diligently to share information about the archeological work that takes place at the HVC mine site with the eight Participating Bands, however, many issues stem from the current Cultural Heritage Program, including the lack of centralized governance and inclusive involvement from the whole n̓eʔképmx Nation, which affects information sharing of the findings, and the loss of intangibles due to the program focusing only on archaeology. Impacts to cultural heritage have been identified as lasting longer than seven generations as loss to cultural heritage will irreversible consequences. Impacts are occurring consistently, as cultural heritage work must be ongoing as the mine continues to alter and disturb the land. These impacts are of high importance. The impacts to cultural heritage will be felt locally and in n̓eʔképmx Territory as a whole.

Table 6: Characterization of effects to Cultural Heritage

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project physically alter or destroy landscape features, culturally important sites, or preferred hunting/fishing/harvesting/recreation areas?	Connection to All Peaceful enjoyment of tmix ^w Identity Self-Awareness Sense of Safety Governance Effective Leadership Guardians of tmix ^w Indigenous Economies Sharing Knowledge Language	Duration: Long Frequency: Consistent Reversibility: Not reversible Magnitude: High Extent: Landscape	High Negative Impacts
How will the project physically alter or destroy n̓eʔképmx cultural heritage resources?	Connection to All Identity Connection Governance Sharing Knowledge Knowledge of the Territory Language	Duration: Long Frequency: Consistent Reversibility: Not reversible Magnitude: High Extent: Territory	High Negative Impacts

tmíxw

The HVC MLE Project will result in a loss of 1,526 ha, of which a majority will be to the interior Douglas-fir and Mountain Hemlock Biogeoclimatic zones. A direct loss and alteration of 1,481.5 ha of wildlife habitat will occur, of which will be primarily to syǵálxkn (moose) and sǵúle? (mule deer). Throughout Witches Brook there will be a shift in Critical Moose Winter Range, from shrubby riparian vegetation to more herbaceous. Range tenure surrounding the mine will also have significant impact. The HVC MLE Project will lead to the overlap and potentially the loss of 709.6 ha outside of the current permitted mine area, or a total 2,318.9 ha overlap between range tenures within and outside the permitted mine area.

Forms of reclamation have been occurring onsite since the 1970s, and restoration of tmíxw continues to be a priority for the CNA Participating Bands. Understanding how and when tmíxw will be restored is critical. CNA has concerns about the closure and post-closure plans and has identified many gaps. These gaps include the uncertainty about the preliminary closure and post-closure plans, the lack of collaboration on these closure plans, and costs and responsibilities assurances from Teck.

To date, emphasis for closure plans has been on environmental concerns and no comprehensive assessment and costing has been made related to social, cultural, spiritual, economic and health issues. It is impossible to address the environmental issues without simultaneously addressing these and vice versa. Full risk-based closure and post-closure planning completed with a rigorous assessment cost estimate base cannot be completed by the end of 2024 when the Certificate and related permits are targeted for approval. Without firm commitments and dates for completing a comprehensive risk-based closure and post-closure plan including cost estimate; it may not ever be completed. Without such planning and costing, the adequacy of financial assurance cannot be tested and confirmed. Inadequate financial assurance is a significant risk for by CNA and the B.C. Government.

The current Reclamation Liability Cost Estimate (RLCE) is not a risk-based instrument. The use of a 4 percent discount rate as prescribed by the MCM in their May 2024 RLCE Guidance makes little sense for use over the long term. It is not consistent with practices of other major mining companies (some of which use 2 percent); in personal injury litigation cases in B.C. a discount rate of 1.5 percent is currently prescribed for loss of future earnings; a discount rate of 2 percent is prescribed for costs of future care. Choice of discount rate is more art than science but the reasons in any given case should be given. The 100-year prescribed time horizon does not make sense when costs are known to be incurred well beyond 100 years. In the case of HVC, this guidance is impeding effective planning and costing for closure and post-closure.

These impacts to tmíxw will last longer than seven generations, and most impacts will be irreversible. These impacts affect the connection to the land, the ability to hunt, fish, harvest, and continue traditional nǵé?képmx ways of life. The importance of these impacts has been characterized as high and will be felt locally and across the nǵé?képmx Territory.

Table 7: Characterization of effects to tmíxw

Nlaka’pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact the feeling of connection to the land or ability to restore connection to the land for current and future generations of the Participating Bands?	Connection to All Peaceful enjoyment of tmixw Identity Sense of Safety Guardians of tmixw Sharing Knowledge	Duration: Long Frequency: Often Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impede access to culturally important sites or preferred hunting/fishing/harvesting/recreation areas for current and future generations of the Participating Bands?	Connection to All Peaceful enjoyment of tmix ^w Sense of Safety Indigenous Economies Language	Duration: Long Frequency: Consistent Reversibility: Irreversible Magnitude: High Extent: Landscape or territory	High Negative Impacts
How will the project impact current and future generations of the Participating Bands to use the land for agricultural purposes?	Connection Sense of Safety Indigenous Economies Governance	Duration: Long Frequency: Often Reversibility: Long term reversible Magnitude: High Extent: Landscape or territory	Moderate Negative Impacts
How will the project impact the ability for the land to return for current and future generations of the Participating Bands?	Connection to All Ecosystem Balance Restoration Peaceful enjoyment of tmix ^w Sense of Safety Governance Knowledge of the Territory Sharing Knowledge	Duration: Long Frequency: Consistent Reversibility: Irreversible Magnitude: High Extent: Landscape	High Negative Impacts

q^wú?

q^wú? (water) is the basis of life, and thus has great importance to nte?képmx. There have been many impacts to q^wú? due to mining in the Highland Valley. There has been a great loss of lakes, streams, and wetlands. Since the beginning of mining there has been a loss of 86.92 km of streams and five lakes were drained throughout the Highland Valley. The HVC MLE Project will result in an additional loss of 22.7 km streams and habitat disturbance. Currently, the HVC mine requires an average of 211,000 metres cubed per day (m³/day) of q^wú? but will require 311,000 m³/day if the HVC MLE Project is approved. The HVC MLE Project has a predicted maximum extraction rate of 55,200 m³/day of groundwater from the Valley, Highmont, and Lornex pits. Groundwater levels due to continues extraction are anticipated to be 10 to 50 meters lower surrounding Valley Pit. Groundwater and surface water quality has decreased since the beginning of mining, with increased sulphate levels, and dissolved molybdenum impacting both. These increases in contaminants have the potential to further impact fish health. There have been observed increases in zinc concentrations in fish in Pukaist Creek, and increased molybdenum concentrations in fish in the pit lakes. CNA is also concerned about the isolated fish population in Highmont Creek. Continued monitoring for trends in other contaminant concentrations in fish in water bodies surrounding the mine is needed.

There are various other contaminants of concern impacting the surrounding watersheds water quality in the Highland Valley, which is a high concern to nte?képmx for the health of those who rely on q^wú?, such as fish, plants, wildlife and

downstream users. Many of these impacts will persist through closure and post-closure without adequate treatments or mitigations in place. The closure and post-closure plans for qʷúʔ are currently preliminary concepts, and the CNA has concerns about the current concepts and preliminary plans in place. Closure and post-closure options analysis for water management is foreseen by Teck as needed but has not been completed. The current idea of using the pit as a water basin, collecting contaminated water in the pit, and treating it after about 100 years is currently a conceptual plan. Current closure water treatment plan is for nitrate, dissolved arsenic, dissolved copper, dissolved cadmium, dissolved molybdenum and dissolved selenium. This plan doesn't account for sulphates which is a concern for the CNA Participating Bands.

These impacts will exist longer than seven generations and will have irreversible consequences. The importance of impacts to qʷúʔ is high, and these impacts to water will extend into the nłeʔképmx Territory.

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact the availability of safe and/or perceived availability of safe water to meet the water needs of current and future generations of the Participating Bands?	Connection to All Ecosystem Balance Peaceful enjoyment of tmixw Sense of Safety Sharing Knowledge	Duration: Long Frequency: Often Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts

Balance

The nłeʔképmx worldview takes a holistic perspective when it comes to health and wellbeing. It does not just apply to humans, but to tmixw, qʷúʔ, and all they encompass, including the animals and plants. nłeʔképmx see health and wellbeing as Balance. There are many different factors that influence how HVC impacts members, whether they have lost their homes within the Highland Valley due to the conditional transfers of the Cook's Ferry reserves to HVC, the destruction of tmixw and the traditional harvesting, hunting, and fishing grounds, or being employed by HVC, and making their living from the mine. Balance of members who are employed at HVC has been affected as there are ongoing problems with racism and harassment at the mine. There is also the trauma and reminder of the destruction of the Highland Valley due to mining that causes a lot of grief for members. However, employment at the mine has improved the socio-economic health for members, and the HVC MLE Project will allow for several more years for employment, continuing to improve the socio-economic health of those who are employed at the mine. Impacts to Balance will be felt for more than seven generations and will be irreversible. The importance of these impacts has been characterized as high and will affect the whole nłeʔképmx Territory. The positive impacts to socio-economic health for the HVC MLE Project will continue for three to seven generations, however, employment opportunities for members are not as high as it should be. The positive impacts to socioeconomics are mostly felt locally.

Table 8: Characterization of effects to Balance

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact the overall health and wellbeing of current and future generations of the Participating Bands?	Connection to All Peaceful enjoyment of tmixw Identity Self-Awareness Sense of Safety	Duration: Long Frequency: Often Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts
How will the project impact the socio-economic health of the current and future generations of the Participating Bands?	Meaningful and Sustainable Employment Equal Representation Indigenous Economies	Duration: Medium Frequency: Often Reversibility: Reversible Magnitude: Moderate Extent: Landscape	Mild Positive Impacts

Food Sovereignty

Food sovereignty is the right to sufficient, safe, and nutritious foods to meet dietary needs and preferences for all people at all times, and to meet social and ceremonial needs, while also meeting the needs to take care of tmixw and q'wú?. The Highland Valley was an important place for hunting, gathering, and fishing, obtaining a large portion of the food sources for nle?képmx. Since the beginning of mining there has been the loss of tmixw, lakes, streams, and ecosystems, and an added pressure from non-nle?képmx users in the Highland Valley. HVC's total permitted mine area is 11,160 ha, however, the loss for nle?képmx users is greater due in the Highland Valley due to all other cumulative impacts within the area and the Territory. The loss of food sources has greatly impacted nle?képmx food sovereignty, and there have been concerns about the safety and health of the food sources within the Highland Valley due to mining. Communities do not feel informed enough to make decisions about nle?képmx resources in the Highland Valley. There is perception that it is not safe to consume food, medicines or water from the area, and thus it tends to be avoided by members. These effects to nle?képmx food sovereignty will last longer than seven generations, with aspects being long-term reversible or irreversible. These impacts to food sovereignty are important and are felt throughout the nle?képmx Territory.

Table 9: Characterization of effects to Food Sovereignty

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact the availability of safe food and/or perceived availability of safe food for the Participating Bands to sustain food sovereignty?	Connection to All Sense of Safety Governance Indigenous Economies Sharing Knowledge	Duration: Long Frequency: Often Reversibility: Long-term reversible Magnitude: High Extent: Territory	Moderate Negative Impacts

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact current and future generations of the Participating Bands ability to utilize the land for food sovereignty activities, spiritual/cultural, or recreation peacefully and free of disruption?	Connection to All Peaceful enjoyment of tmix ^w Identity Self-Awareness Sense of Safety Governance Effective Leadership Guardians of tmix ^w Indigenous Economies Sharing Knowledge Language	Duration: Long Frequency: Consistent Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts
How will the project impact the availability of safe and/or perceived availability of safe water to meet the water needs of current and future generations of the Participating Bands?	Connection to All Ecosystem Balance Peaceful enjoyment of tmix ^w Sense of Safety Sharing Knowledge	Duration: Long Frequency: Often Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts

Knowledge Sharing

The sharing of nte?képmx knowledge is deeply intertwined with tmíxw. Passing on nte?képmx knowledge, values, and way of life to future generations is vitally important to nte?képmx. The Highland Valley was an important place for sharing of knowledge, as it was used as a place to hunt, fish, harvest, and gather, and for spiritual and cultural ceremonies. Throughout the Highland Valley, several spiritual places and ceremonial sites existed. Higher elevations equated with stronger spiritual power. Certain sites in the area are imbued with supernatural powers, with accounts of capturing certain experiences without an explanation outside of the supernatural. Mining in the Highland Valley has impacted sense of identity. Many members have either never learned to or no longer harvest, hunt, and fish, due to the loss of knowledge, or loss of access to the land and traditional hunting, fishing, and harvesting. Knowledge and transfer of knowledge will continue to be impacted through HVC and the proposed HVC MLE Project. These impacts will be felt for more than seven generations and will have irreversible consequences. These impacts are felt constantly through the alteration and destruction of land due to mining. These impacts are felt throughout the nte?képmx nation.

Table 10: Characterization of effects to Knowledge Sharing

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project impact the ability to share knowledge, teachings, and nle?képmxcin between current and future generations of the Participating Bands?	Connection to All Identity Effective Leadership Communication Knowledge of the Territory Sharing Knowledge Language	Duration: Long Frequency: Consistent Reversibility: Irreversible Magnitude: High Extent: Territory	High Negative Impacts

Equity

Obtaining employment and contracting opportunities at HVC is very important to the CNA Participating Bands. There are opportunities available for additional employment and contracting opportunities through the HVC MLE Project, offering an additional 18 years of employment, not including the work needed for closure and post-closure. The CNA has been working hard to address barriers for member employment that have existed at HVC and continue to advance initiatives that support member employment and contracting opportunities. Many barriers still exist while trying to achieve positions that are higher than entry level, as applying directly into higher level positions is not possible, due to the Collective Bargaining Agreement that exists for union workers at the mine. While there are currently gaps regarding equity for nle?képmx and CNA Participating Band members, the HVC MLE Project will offer more opportunities for members, providing a way to improve the socio-economic wellbeing of nle?képmx. There will be low to moderate positive economic impacts for members, as with the HVC MLE Project there will be over three generations of work needed from operations to post-closure, however, these impacts will be felt locally rather than across the whole nle?képmx Territory. There is the uncertainty of how many more members will obtain employment and contracting opportunities through the HVC MLE Project, however, the CNA is working hard to ensure that as many members as possible obtain opportunities.

Table 11: Characterization of effects to Equity

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project provide equitable business and contracting opportunities to current and future generations of the Participating Bands?	Meaningful and Sustainable Employment Indigenous Economies	Duration: Medium Frequency: Infrequent Reversibility: Reversible Magnitude: Low Extent: Landscape	Low Positive Impacts

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project provide employment opportunities in a safe and respectful work environment for current and future generations of the CNA's Participating Bands?	Meaningful and Sustainable Employment Indigenous Economies Sense of Safety	Duration: Medium Frequency: Infrequent Reversibility: Reversible Magnitude: Moderate Extent: Landscape	Mild Positive Impacts
How will the project provide equitable economic benefits to current and future generations of the Participating Bands?	Meaningful and Sustainable Employment Indigenous Economies	Duration: Medium Frequency: Often Reversibility: Reversible Magnitude: Moderate Extent: Landscape	Moderate Positive Impacts

Title and Rights

Rights and Title are held collectively by the nleʔképmx Nation, and Title and Rights have been impacted by mining in nleʔképmx Territory and continue to be impacted by HVC. Infringement on nleʔképmx Title and Rights has a large ripple effect throughout the Nation and beyond. These issues in relation to nleʔképmx Title and Rights will have impacts that will be felt longer than seven generations, however, will be reversible over long-term. The CNA is very concerned that allowing a Nation to infringe on the Aboriginal Rights of another Nation for a project sets a precedent with severe consequences that extend beyond the nleʔképmx Territory.

Table 12: Characterization of effects to Title and Rights

Nlaka'pamux Impact Assessment Framework Question	Community Based Indicators	Characterization	Impact
How will the project the recognition of nleʔképmx Title and jurisdiction?	Identity Governance	Duration: Long Frequency: Consistent Reversibility: Long-term reversible Magnitude: High Extent: Territory and beyond	High Negative Impacts

The CNA's Environmental Assessment Strategy supports the engagement process, collaboration, and decision-making related to the HVC MLE Project. The CNA's nleʔképmx Impact Assessment allows decision-makers to be supported, by accurately capturing the past, present and future impacts from HVC. It also supports the creation of measures necessary to mitigate past and future impacts to nleʔképmx. For additional details on the CNA's mitigations and conditions for approval, please see page 54 of [CNA's assessment](#).

10.6. Kanaka Bar Indian Band

Kanaka Bar Indian Band (Kanaka Bar) is located 14 kilometers south of Lytton and was originally known as T'eqt'aqtn (the crossing place) and the residents ʔəqʔáqtnm (the crossing place people).³⁸

10.6.1. Consultation and Engagement with Kanaka Bar Indian Band

When the HVC MLE environmental assessment began in 2019, Kanaka Bar Indian Band engaged with the EAO based on the wider Nlaka'pamux traditional territory. In recent years, Kanaka Bar Indian Band has focused more on sustainability initiatives closer to the Kanaka Bar community, while still choosing to remain engaged on the HVC MLE project.

For HVC MLE, HVC and Kanaka Bar worked together on the assessment of effects to Kanaka Bar's interests as set out in HVC's Application. This included Kanaka Bar sharing Indigenous knowledge with HVC, which HVC included in its Application, and by approving the use of Kanaka Bar-specific information by HVC before it was shared in the Application.

10.6.2. Kanaka Bar Indian Band's Indigenous Interests

During Application Development, HVC worked with Kanaka Bar Indian Band to identify the Indigenous Interests that may be affected by HVC MLE and therefore requiring assessment:

- *Governance, Law and Stewardship*: Including changes to the ability to exercise Indigenous Rights, changes to governance, Indigenous laws and decision-making, and changes to stewardship of lands and resources
- *Indigenous Economies*: including changes to the ability to maintain Indigenous economies (both wage activities and non-wage traditional economic activities), changes to economic conditions for the First Nation and its community members, and changes to business and employment opportunities for Kanaka Bar Nation businesses and individual community members.

In the Application, HVC reflected that Kanaka Bar's Indigenous Interests have been historically affected by the implementation of systematic colonial governance and institutions and changes to the lands and waters of the Traditional Territory. These changes have also affected the Indigenous governance structures, laws and practices of the Nlaka'pamux People.

10.6.3. Potential Effects to Kanaka Bar Indian Band due to HVC MLE

In [Section 11](#) of the Application, HVC identified the potential effects to Kanaka Bar Indian Band, through the use of available information specific to Kanaka Bar, and in consideration of the Indigenous Interests relationships to the valued components, including air quality, noise, groundwater, surface water, fish and aquatic resources, vegetation and ecosystems, wildlife and wildlife habitat, human health, economics, infrastructure and services, land and resource use and culture.

10.6.3.1. Governance, Law and Stewardship

Change to Ability to Exercise Indigenous Rights

In the Application, HVC predicted residual positive and negative, and direct and indirect, effects from HVC MLE which may affect Kanaka Bar's ability to exercise Indigenous Rights. These effects are related to the following changes:

- Changes to abundance, distribution, or quality of resources relied upon to engage in harvesting and subsistence activities;

³⁸ A note on writing style: In this Report, the EAO's sections of this Report predominantly use the English alphabet. The EAO acknowledges that for some First Nations groups, the International Phonetic Alphabet is preferred, in which case Nlaka'pamux is written as ɪŋklə'kæpmə and Kanaka Bar residents, 'the crossing place people' or T'eqt'aqtnm, are written as ʔəqʔáqtnm.

- Changes to ability to safely access and travel to or through traditional territories;
- Changes to harvesting methods and practices; and
- Changes to use of culturally and ceremonially important sites and areas in and around the project site, due to HVC MLE may affect Kanaka Bar's ability to exercise Indigenous Rights.

Changes to governance, Indigenous laws and decision-making

In the Application, HVC predicted negative, and indirect, residual effects from HVC MLE which may affect Kanaka Bar's governance, Indigenous laws, and decision-making. These effects are related to the following changes:

- Changes to abundance, distribution, or quality of resources relied upon to engage in harvesting and subsistence activities;
- Changes to ability to safely access and travel to or through traditional territories;
- Changes to harvesting methods and practices; and
- Changes to use of culturally and ceremonially important sites and areas in and around HVC MLE that may affect Kanaka Bar's ability to manage and make decisions in accordance with Indigenous law and governance practices.

Changes to stewardship of lands and resources

In the Application, HVC predicted residual negative, and indirect, effects from HVC MLE which may affect Kanaka Bar's stewardship of lands and resources. These effects are related to the following changes:

- Changes to abundance, distribution, or quality of resources relied upon to engage in harvesting and subsistence activities;
- Changes to ability to safely access and travel to or through traditional territories;
- Changes to harvesting methods and practices; and
- Changes to use of culturally and ceremonially important sites and areas in and around the project site, due to HVC MLE may affect Kanaka Bar's ability to engage in stewardship of lands and resources.

10.6.3.2. Indigenous Economies

In the Application, HVC predicted that HVC MLE's activities and components will generate economic activity through employment and contracting, which may affect Kanaka Bar's ability to maintain Indigenous economies. These are anticipated to include both positive and negative, and direct and indirect effects.

10.6.4. Issues Raised by Kanaka Bar Indian Band due to HVC MLE

In the pre-Application phase of the environmental assessment before the transition to the Act, Kanaka Bar Indian Band raised a number of concerns to the EAO and MMO related to HVC MLE (listed below). Kanaka Bar Indian Band participated in the Technical Advisory Committee's review of HVC's Application and did not raise any concerns related to their review of HVC's Application or of the EAO's effects assessments in this Report.

10.6.4.1. Safety of the Highland Tailings Storage Facility, risks to downstream water quality and to fish downstream

- Concerns about risk to the environment from leaks and spills from equipment, risk of leachate/seepage to downstream water bodies and resultant effects to downstream waters including the Thompson and Fraser Rivers and to fish in these waterbodies;
- Potential effects from leachate to aquifers and groundwater, including long-term effects;

- Ensuring that the Highland Tailings Storage Facility is functioning properly and being monitored regularly to ensure this; and
- Whether the HVC MLE expansion could change the safe operation of the Tailings Storage Facility.

The EAO notes that the current PE-376 effluent permit under the *Environmental Management Act* has been in effect since 1985, and currently includes requirements for HVC to manage sulphate in Pukaist Creek (located upstream of Kanaka Bar Indian Band), to manage dissolved copper, total molybdenum, total manganese, nitrites, nitrates and ammonia at a key monitoring site in Witches Brook, to manage suspended sediment levels and ensure oxygen is available for aquatic life, and to treat sewage to the required provincial standard before reusing it in the mill process or discharging it to the Highland Tailings Storage Facility. Additionally, ENV has directed HVC to develop a discharge limit proposal that will be protective of the receiving environment for specific areas of the mine.

Should HVC MLE proceed, under its current and amended permits, HVC would be required to continue current practices, including spill identification and response, maintaining daily surveillance of the Highland Tailings Storage Facility, particularly of the L-L dam located upstream from Kanaka Bar Indian Band, to ensure the facility is performing as expected. Under its current M-11 permit, HVC is also required to maintain an independent Tailings Review Board to ensure the safety of the L-L dam. MCM geotechnical staff have reviewed HVC's Application related to the proposed changes to the Tailings Storage Facility and have requested additional information as needed to ensure they understand the proposed changes. The EAO's view is that safety aspects related to the changes to the Highland Tailings Storage Facility have been appropriately assessed for the purposes of the environmental assessment, and that regulatory requirements under the proposed amended permits are sufficient to manage these concerns raised by Kanaka Bar.

10.6.4.2. Air quality

- The potential for any changes to air quality at the site which could then impact the wider airshed; and
- Any changes that might be required to current air quality monitoring.

Potential changes to air quality are set out in [Section 13.1](#) of this Report. The EAO notes some uncertainty regarding what the actual effects to air quality will be due to inherent uncertainty in the air quality model but expects that these will be addressed by proposed amendments to ENV permit 1557. Under the proposed amended PA-1557 permit, which has also been provided to the Technical Advisory Committee in draft for review, ENV would require HVC to monitor air quality and take action to address exceedances, particularly for fugitive dust, where detailed monitoring stations will feed site data into a trigger action response plan which will be used to trigger additional dust suppression, as needed, at the mine site. The EAO's view is that the proposed changes to ENV permit 1557 would address any changes to air quality as a result of HVC MLE.

10.6.4.3. Reclamation and revegetation

- Potential for any changes needed to the current *Mines Act* reclamation / revegetation plan;
- Request that attention be paid to the effects of climate change on reclamation success. Kanaka Bar's experience with reclamation has been that weather, climate events and climate change are affecting the success of reclamation efforts in the wider region. Kanaka Bar has experienced a low of 4 percent success for reclamation on some exposed slopes at its Kwoiek Hydro Project; and
- The need for progressive reclamation at the HVC site due to the large extent of the disturbance to ensure that reclamation is successful.

MCM staff reviewed HVC's assessment and strategies related to reclamation presented in the Application and adjusted Part D Reclamation and Closure Program of the draft M-11 permit amendment as needed to account for changes made to the mine plan as a result of HVC MLE. Section 15 Closure Plan of the M-11 permit requires HVC to explain how it is considering projected climate change scenarios as part of its reclamation planning, and also requires progressive

reclamation of the mine site. The EAO's view is that the proposed amendments to the Mines Act permit, which have been provided to the Technical Advisory Committee for review and comment, will address the need for progressive reclamation of the mine site, with consideration of the potential effects of climate change.

10.6.4.4. Climate change and greenhouse gases

- Concerns about trucks used on the site and site contributions to GHG emissions;
- Concern about how B.C. will meet its GHG targets for 2030, and whether HVC MLE will contribute to climate change or result in B.C. not meeting its GHG targets; and
- Potential for microclimate conditions to be created at the mine site, noting that climate change is being experienced by Kanaka Bar (rain is falling at unusual times, drought killing trees in unexpected areas).

The EAO is proposing Condition 15 Greenhouse Gas Emissions and Net-Zero Plan which would require HVC to develop a GHG reduction plan for HVC MLE which would require HVC to achieve net-zero GHG emissions in 2050. The EAO's view is that this condition would address the need to manage GHGs as a part of HVC MLE.

10.6.4.5. Wildfire risk / forest fire hazard reduction

- What mitigations can be applied to protect the site from a forest fire, given the beetle-killed wood in the surrounding area? Perhaps dead tree removal within 500m of the site?
- It would be desirable for HVC to work with Logan Lake on forest fire hazard reduction.

HVC would continue to manage risk of effects to HVC MLE from wildfires with its current mitigations as set out in its assessment in [section 10.4.1.8](#) of the Application and would rely on its Mine Emergency Response Plan for safety and evacuation procedures and would continue to support local communities in the case of wildfires as it has done in the past. The EAO's view is that the mitigations proposed by HVC would be sufficient to manage the risk of wildfire to the mine site under HVC MLE.

10.6.4.6. Offsets / mitigation

- At Kanaka Bar's Kwoiek Project, riparian offsets were doubled, which resulted in double the instream fish habitat, resulting in an increase in fish populations. Kanaka Bar is interested in what mitigations HVC might offer to reduce or offset effects from HVC MLE, such as offering trees to First Nations communities to plant in their watersheds to offset vegetation loss at the site.

The EAO is proposing Condition 14 Wetlands and Riparian Mitigation and Offsetting Plan which would require HVC to develop a plan to offset losses of wetlands caused by HVC MLE. The EAO's view is that this condition would address the need to manage effects to aquatic resources.

10.6.4.7. Concerns about wildlife health and potential contamination

- Kanaka Bar hunters have reported concerns related to unhealthy animals and the potential for contamination of traditional foods through contaminants spread by mine dust or effluent.

The EAO is proposing Condition 12 Nlaka'pamux Foods Monitoring Plan which would require HVC to develop a plan to monitor and mitigate effects of HVC MLE on traditional foods. The EAO's view is that this Condition would help address concerns related to potential wildlife contamination and the harvest of traditional foods.

10.7. Lower Nicola Indian Band

This section is authored by Lower Nicola Indian Band – [the full results of LNIB's assessment](#) of effects to LNIB's Indigenous interests are available on the EAO's Electronic Project Information Centre (EPIC).

Lower Nicola Indian Band (LNIB) is part of the Scw'exmx division of the Nlaka'pamux Nation, primarily using the lands and waters within the Nicola Valley, downstream of the Highland Valley Copper mine.

LNIB, EAO and MCM began engagement on HVC MLE in 2019 and LNIB, the EAO, and MMO held biweekly meetings between Fall 2019 and Fall 2024 to discuss HVC MLE. This regular meeting forum provided space for LNIB to work with EAO and MMO on topics and issues of concern to the LNIB community.

LNIB also worked with HVC to allow for detailed Indigenous knowledge from LNIB community members to be included in the HVC MLE environmental assessment. Through the development of an Indigenous Knowledge database, accessed by Project team members who had reviewed and signed the Project's Indigenous Knowledge and Data Sharing and Confidentiality Agreement, Indigenous Knowledge was included in the HVC MLE environmental assessment baseline in a safe, respectful and appropriate manner with LNIB having the right to indicate what Indigenous Knowledge should be known and shared according to their customs, practices, protocols and Indigenous laws. Indigenous Knowledge presented in the database was provided only for the purpose and in the context of the assessment of the existing HVC mine and the proposed Project, and, unless agreed to by LNIB, no Indigenous Knowledge was disclosed, divulged or otherwise communicated to a third party.

HVC considered this knowledge in the baseline chapters of its assessment and included it directly in its Application. HVC has not included the knowledge in the assessment of effects to other valued components.

As set out in the HVC MLE Assessment Plan, LNIB is conducting an Indigenous led assessment under Section 19(4) of the Act to assess the effects of HVC MLE on the Participating Bands' rights and interests.

10.7.1. Lower Nicola Indian Band's Indigenous Interests

The United Nations Declaration of the Rights of Indigenous People recognize and re-affirms that Indigenous people possess collective Rights that are "indispensable for their existence, well-being and integral development as people"³⁹. While recognizing that there is no universal definition of what these rights are, given that they may vary between Indigenous communities, in general, Indigenous rights include:

- rights to the land;
- rights to subsistence resources and activities (i.e., hunting, fishing, trapping, resource gathering);
- the right to self-determination and self-government;
- the right to practice one's own culture and customs including language and religion⁴⁰.

Furthermore, Aboriginal rights are inherent and protected under Section 35 of the *Constitution Act*, 1982 and are acknowledged and recognized under the Act, the *Mines Act* and the *Water Sustainability Act*. Aboriginal rights are collective rights which flow from Aboriginal peoples' continued use and occupation of certain areas⁴¹.

The LNIB's Nl̓eʔkepmx cosmology embraces the understanding that all living things in the land, water and air are connected with a spirit of their own – a concept known as *Tmix*^w. Because LNIB's concept of *Tmix*^w includes tangible and intangible (i.e., spiritual and ceremonial) connections between earth, ground and sky, LNIB's Indigenous interests and the essence of their identity is defined through their rights-based activities which include fishing, hunting and traditional plant gathering and the ceremonial and spiritual activities that are connected to and are part of their resource procurement activities and their culture. In addition, full access to preferred resource areas along with optimal air and water quality are also included in the definition of LNIB's interests.

³⁹ Source: United Nations [UNDRIP E web.pdf](#)

⁴⁰ Source: University of British Columbia [Aboriginal Rights](#)

⁴¹ Source: University of British Columbia [Aboriginal Rights](#)

LNIB's *Tmix*^w assessment report focused solely on impacts to LNIB's Rights and Title caused by mining within defined spatial and temporal boundaries. Therefore, the focus of the assessment was entirely on the effects and impacts to *Tmix*^w and LNIB Rights and Title, often expressed as destruction of land and within it, the integrity of resources and places fundamental to the expression of Rights and Title. The *Tmix*^w assessment report comprised a combination of western science and Indigenous knowledge and use information to achieve the stated objectives. Publicly available secondary data along with traditional use reports provided by LNIB and virtual and in-person primary data gathering informed the description of historical and contemporary conditions, as well as perceived mining impacts. Scientific data collected by various consultants for Teck HVC as well as through published literature was also incorporated into the assessment. To help fully, meaningfully and appropriately incorporate LNIB's values into the *Tmix*^w assessment, LNIB was continuously engaged throughout the development of the report, especially in the defining of what constitutes the expression of Rights and Title on the land, and the traditional activities that define *Tmix*^w including:

- Fishing
- Hunting
- Gathering and
- Cultural continuity.

Furthermore, because LNIB's concept of *Tmix*^w includes tangible and intangible connections, the scope of their assessment report included all aspects of these connections because both the existing HVC mine and the proposed mine extension directly or indirectly affect all aspects of LNIB's Ntē?kepmx culture.

To fully understand and appreciate *Tmix*^w and the impacts both from the existing HVC mine and the proposed mine extension, the following table highlights the 4 activities that are critical to the continued practice of LNIB culture in the local study area and regional study area. A summary of the pathway of potential Project-related effects on LNIB's expressions of Rights and Title can be seen in Table 13 below and is also graphically represented in Figures 10-1 and 10-2.

Table 13: Summary of LNIB's Expression of Rights and Title

Subcomponent	Representative of / Focus on	Rationale for Selection
Fishing	Fish and fish habitat Aquatic resources and their habitat Subsistence fishing activities Water quality and quantity	Fish and aquatic resources are of intrinsic cultural and ceremonial importance to Ntē?kepmx, providing sustenance, economic and ceremonial importance, and inseparable links to numerous tangible (e.g., wage economy) and intangible (e.g., teaching the traditional use activity of fishing) values. Waterways such as Tunkwa Lake, Guichon Creek, Skuhun Creek, Mamit Lake, Pimainus Lake, Calling Lake, Pukiast Creek, and Pennask Lake have historically and / or continue to be of major importance to LNIB. Additional information can be found in section 7.5 Fish and Aquatic Resources of the HVC environmental assessment Application.

Subcomponent	Representative of / Focus on	Rationale for Selection
Hunting	Wildlife and wildlife habitat	Wildlife such as deer, moose, elk, rabbit, waterfowl and various species of migratory and non-migratory birds are inseparably linked to Nt̓eʔkepmx culture, providing numerous tangible (e.g., sustenance, ceremonial and/or spiritual purposes) and intangible (e.g., teaching the traditional use activities of hunting and trapping) values. Various waterbodies and rivers including but not limited to Skuhost Creek, Mamit Lake east along Rey Creek, and the area between Pimainus Creek and the southwest side of the HVC mine along with wetlands support a complex and varied wildlife ecosystem and culturally important hunting and trapping activities. Additional information can be found in section 7.7 Wildlife and Wildlife Habitat of the HVC environmental assessment Application.
Gathering	Terrestrial and wetland vegetation resources and habitats	Various terrestrial and wetland vegetation species are intimately linked to Nt̓eʔkepmx providing resources for food, medicines, and material needs (i.e., basket weaving), in addition to resources required for ceremonial and spiritual activities. Various terrestrial and wetland locales including but not limited to Tunkwa Lake, Guichon Creek, Skuhun Creek, Spatsum Creek/Spatsum Lake, Witches Brook, and Thompson River near the community of Spences Bridge have historically and / or continue to be of importance to LNIB for the harvesting of plant resources. Additional information can be found in section 7.6 Vegetation and Ecosystems of the HVC environmental assessment Application.
Cultural Continuity	Ceremony locations and sacred sites Spirituality Heritage and archaeological resources Teaching areas Transmission of Indigenous Knowledge and teaching practices Attachment and affinity to place	The cultural continuity of Nt̓eʔkepmx evolves, in part, through the tangible and intangible traditional values, activities, and lifeways central to traditional lifestyle, culture, and Indigenous Knowledge. Nt̓eʔkepmx peoples' cultural continuity is also deeply connected to, but also extends beyond, the tangible objects classified as archaeological resources. Defined as culturally meaningful, connecting community members to one another and the past, and representing their collective identity, cultural continuity reflects how ways of knowing and knowledge are passed on through the generations. Loss of heritage resources or significant places to practice ceremonial, spiritual, or cultural activities can result in a diminished or loss of culture. Cultural continuity is also evident in the intangible components associated with such spiritual and ceremonial practices as peace, quietness, and reflection and in the transmission of cultural knowledge from one generation to the next.

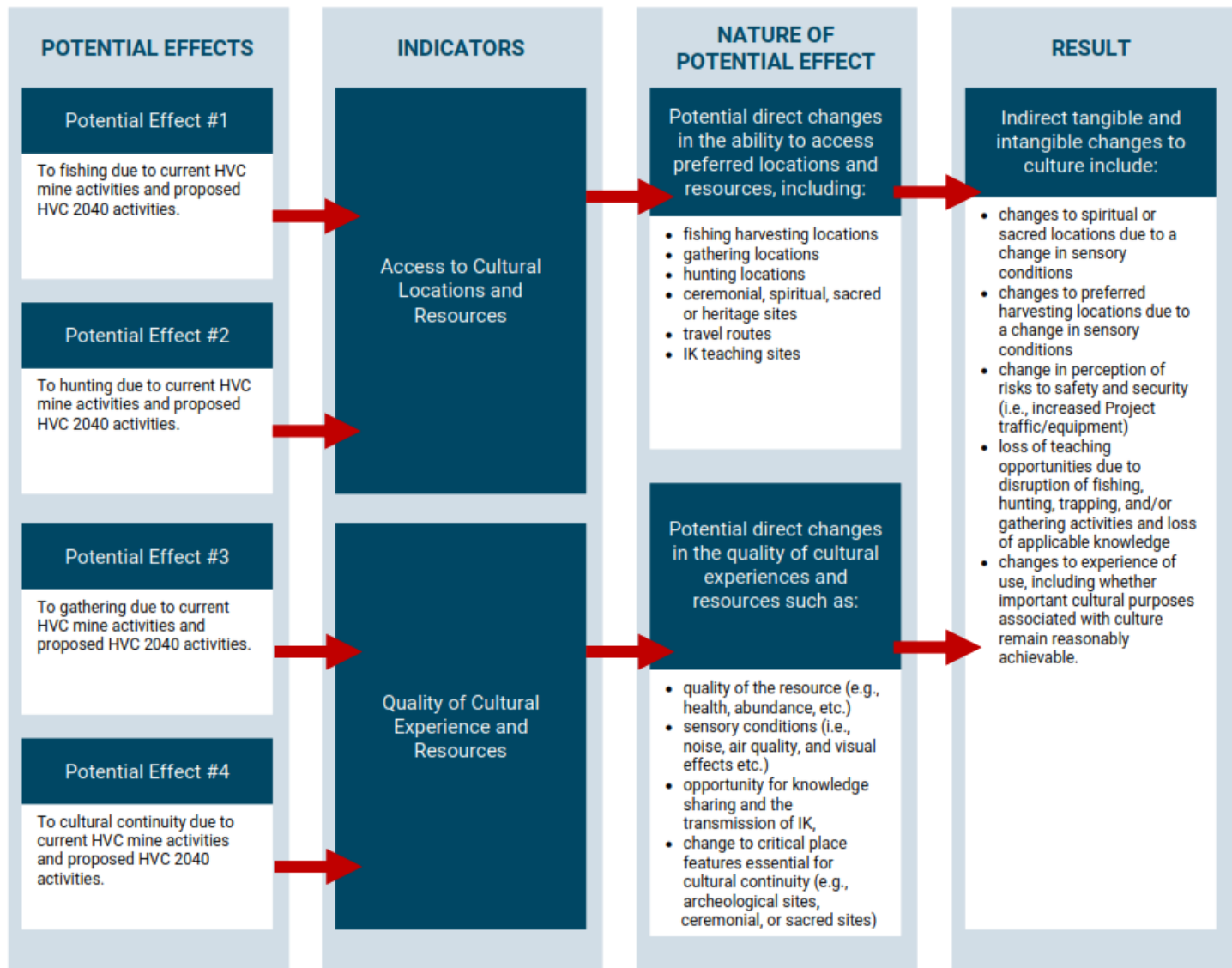


Figure 10-1: Pathway of Potential Project Related Effects on LNI's Expressions of Rights and Title

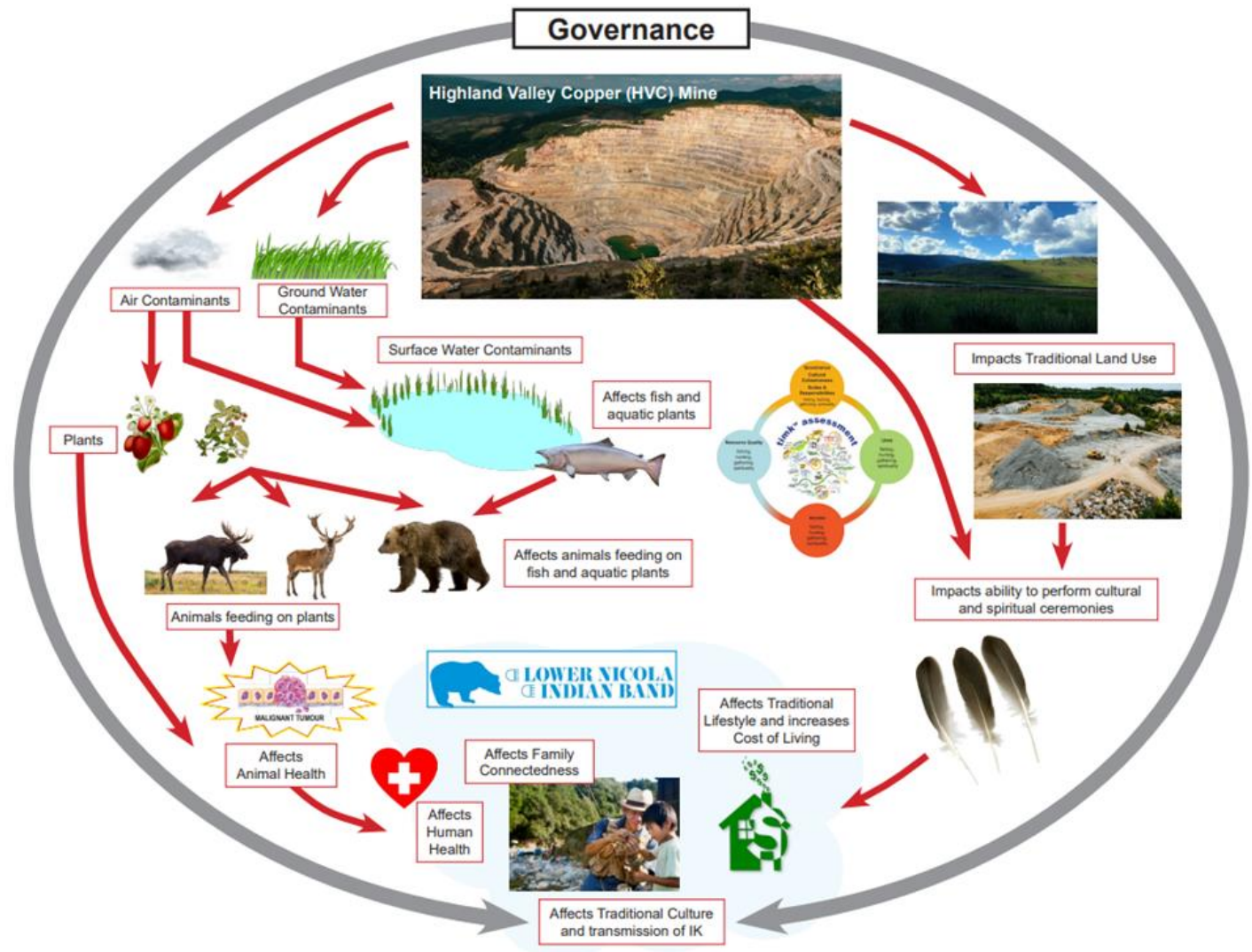


Figure 10-2: Graphic of the existing disturbance from the HVC mine to LNIB's Rights and Title

10.7.2. Key Issues Raised by Lower Nicola Indian Band

Since April 2021, virtual and in-person engagement sessions have occurred with LNIB community members to gather information on changes in quantities/qualities of resources, distance travelled to harvest the same number of resources and ability to practise ceremonial and/or spiritual activities since the construction of the HVC mine, and, by extension, anticipated and compounded interactions resulting from the proposed HVC MLE Project. During these engagement sessions, LNIB provided commentary on how their community has been affected by mining in general and how it has touched every aspect of LNIB life. Key issues raised by LNIB from these engagement sessions are identified below:

- Deterioration (including dust) in quality of traditionally used plants including soapberries
- Changes in fish size and health
- Alteration of fish habitat
- Changes in quality and quantity of animals hunted

- Alteration of water flows/water quality and quantity
- Deterioration of landscape because of dust or changes in water quality (appearance) and therefore, no longer using.

As discussed in the sections above, the construction and operation of the HVC mine has had a profound impact on the integrity and character of the landscapes resulting in significant changes to the expression of Rights and Title and interaction with *Tmix^w*. With the extension of the HVC mine, we can assume that impacts to LNIB's Rights and Title and interaction with *Tmix^w* will be, at a minimum, comparable to what LNIB have already experienced with the operation of the HVC mine. The following recommendations reflect desires, provisions and action steps expressed by LNIB community members to protect LNIB's cultural values and resources in the local study area and the broader territory through the identification of potential uses for the land once mining activity ceases. It is to be noted that this is in addition to the multiple conditions that have been developed by LNIB to be incorporated in the various regulatory instruments governing the HVC mine and its MLE:

- Clean stream and rivers – reclaim the area
- Individual monetary compensation
- Jobs available for local community members/training for people to increase their knowledge
- Encourage post-secondary education in Environmental Studies; offer full scholarships/bursaries for members who would like to pursue a higher role in addressing the closure plan
- Equal amount and quality of land (pre-development) returned to LNIB to what was taken [for mine development].
 - Unimpacted land elsewhere – an untouched piece of land that has not been used for commercial purposes – non-impacted land trade-off
- Fund projects and buildings that could be put onto that land
- Money for houses? Fix buildings?
- Long-term restoration plan thereby ensuring successional phases to ensure return of vegetation and animals
- Let band members have access to the land they want
- Education within the context of the safety of the water and land post closure. Economic sustainability of employment post closure
- Better control of toxic residues in water, air and soil
- Return the land to its natural state pre-mining
- Make sure that native plant species are used when restoring the area.
- A very aggressive reclamation strategy that will bring the dead soil back to earth. Replanting of trees and traditional use products is necessary. Turning the area into a protected area that would allow wildlife to regenerate. Perhaps the introduction of camping experiences that would support and educate the public on what happened before and what we are trying to do to restore the land.
- A camp for children to learn about the wilderness
- A protected park area for camping, hiking, etc.
- A campsite or something to enhance its natural features.

10.7.3. Potential Effects Lower Nicola Indian Band

The construction and operation of the HVC mine beginning in 1961 has had a profound impact on the integrity and character of the landscapes resulting in significant changes to the expression of Rights and Title and interaction with Tmixw (Nl̓eʔkepmx culture). LNIB, in particular, have cited impacts that include, but are not limited to, clean and abundant water, protected animal habitats, access routes and contamination to various plant species.⁴² The loss of Lost Lake and Quilanton Lake (also known as Divide Lake) was a significant change on the landscape and to LNIB traditional use in the Highland Valley during the mid-twentieth century.⁴³ Both of these lakes factored heavily in Nl̓eʔkepmx seasonal rounds as they connected travel routes to the Chataway area and to various creeks and lakes close to the mine. The lakes, besides offering camping and fishing opportunities, also connected via trails to the Thompson River near Spences Bridge and Toketic to the west. Impacts on Nl̓eʔkepmx traditional use and practices threatens families' abilities to use the land and resources, and, by extension, to pass cultural knowledge, values and language to future generations.

As indicated above, mining activities have resulted in significant changes to LNIB's landscapes, culture, and traditional lifestyle. Moreover, these changes over the years have had compounding, additive effects to LNIB's interactions with Tmixw resulting in continual pressure to LNIB's traditional harvesting areas, traditional activities, and access⁴⁴. Members have reported concerns about contamination of water, plants and animals around the HVC mine site, and many have limited or abolished their traditional activities in the area because of this. As per the HVC Application: "the total disturbed area in the regional study area since pre-mining (using 1951 imagery) has increased from 516 ha to 11,794 ha, the majority of which is associated with the HVC MLE Base Case footprint (8,025 ha). The remaining disturbance is mainly associated with forestry associated roads in the RSA. HVC MLE would increase the disturbed area by 1,526 ha." These impacts are direct losses of traditional use areas.

The following sections highlight losses of or impacts to traditional land uses such as hunting, fishing, gathering and ceremonial and/or spiritual activities through the lenses of various valued components. These sections are a summary from LNIB's Tmixw Assessment which is appended to the EAO Assessment Report.

Air Quality

The majority of the preferred harvesting locations that LNIB currently avoid are located under the dust plume of the HVC mine. LNIB's local observations of land quality and the year over year study of soil and water chemistry suggest that the large dust fall deposition has accelerated the deterioration of both soil and water features. The surface area of impacted land by dust deposition is 25,182 ha. All levels of indicators for all expressions of Rights and Title within that surface area have been heavily impacted by dust fall. Furthermore, with the operation of the HVC Mine, mining operations alone have resulted in anywhere from 486,000 to 574,000 tonnes of dust deposited within the local study area since 1972.

With regards to light pollution, LNIB members have noted that light from the mine site has resulted in a loss of traditional teachings, knowledge transfer to future generations, and cultural integrity through the inability to share Nl̓eʔkepmx sptékʷl (creation story) in their traditional way. A review of publicly available light pollution data indicates that the region surrounding the mine site is greatly affected by light pollution from the mine. This would have impacts on the ability of LNIB members to see the stars and constellations at night, substantiating the observations of the local LNIB members

⁴² Source: Fox, G. 2018. LNIB Traditional Land Use Study Review and Gap Analysis – In Reference to the HVC 2040 Expansion Project. Report provided by Lower Nicola Indian Band.

⁴³ Source: Bain, A., and G. Fox. 2023. Draft Traditional Use Study 2022 Update: In reference to the HVC 2040 Project. Provided by Lower Nicola Indian Band.

⁴⁴ Source: Bain, A., and G. Fox. 2023. Draft Traditional Use Study 2022 Update: In reference to the HVC 2040 Project. Provided by Lower Nicola Indian Band.

Surface Water

From initial pre-mining conditions, within proximity and downstream of the HVC mine, existing surface water quality and quantity have experienced significant reductions in discharge values. In terms of water flows and quantity, the three largest watersheds intersecting the mine and permitted mine area experienced an average 56 percent loss of flow between the pre and post mining discharge values. Witches Brook at Guichon Creek had the greatest loss at 75 percent. In Pukaist Creek, the decrease in flow was 60 percent while Inkikuh Creek had a 33 percent flow decrease. These three watersheds have been significantly impacted and in turn, considerably restricted if not eliminated the use of the area for the expression of Rights and Title dependent on the water quantity indicator. In turn, other indicators have been impacted because of this restriction, namely fish habitat. Furthermore, a total of 24,782 ha of watersheds have heavily impacted water quality affecting all levels of expression of Rights and Title. In terms of the magnitude of the change to the integrity of water quality, it is significant because LNIB members do not use it any longer for the expression of their interests.

Fish and Aquatic Resources

LNIB community members identified fishing as the third most popular activity (behind hunting and gathering respectively) enjoyed by LNIB members while out on the land. Impacts of the HVC Mine, and, by extension, anticipated and compounded interactions resulting from the proposed HVC MLE Project on fish and aquatic resources include direct changes to the quality of the resource (i.e., health), abundance of fish and fish habitat, and water quality and quantity which they attribute to HVC mine activities. Physical changes to the quality of fish, as reported by LNIB members, include a reduction in size, parasites and 'muddy tasting' with many fish reported to be soft and generally 'not as healthy'. The construction/development and operation phases for the MLE Project have the potential to further influence LNIB's fishing activities by changes that affect water quality and flow, thereby potentially altering the physical structure of fish habitat, fish health (i.e., mortality), access to fishing areas or fish abundance.

Furthermore, watersheds now occupied by mine infrastructure such as portions of Pukaist Creek and Witches Brook has resulted in the permanent alteration of 100.6 linear km of natural watercourses and 225.7 ha of lake habitat. In addition, direct changes, either real or perceived, in the quality of the resource (i.e., fish) and/or preferred fishing locations for whatever reason, may negatively affect a teaching opportunity that may have occurred at that preferred fishing location. This, in turn, can result in a loss of Indigenous Knowledge to the next generation that would have occurred at that preferred location.

Vegetation and Ecosystems

Impacts of the HVC Mine, and, by extension, anticipated and compounded interactions resulting from the proposed HVC MLE Project on vegetation and ecosystems include direct loss of vegetation and ecosystems through clearing, soil removal and alteration of drainage patterns, landforms and water quality and quantity. Indirect effects on vegetation and ecosystems include contamination by dust, ecosystem changes due to fire suppression, and introduction and spread of non-native weeds. The area now occupied by mine infrastructure (the footprint, including mine-related roads) has directly replaced 8,433 ha of natural ecosystems. The HVC MLE Project will remove an additional 1,481.5 ha of native ecosystems, including 1,456 ha of grassland, forest and sparsely vegetated ecosystems and 25.7 ha of riparian, wetland and water. Ecosystem losses to date to mining development in the HVC environmental assessment's local study area include approximately 30 percent of the moist, mesic and dry forest previously available, 43 percent of wetlands, over half of the native grasslands, and almost 70 percent of the water. Those ecosystems would have supported edible berries, roots, shoots and leaves, edible fungi, medicinal plants, and plants used by LNIB in construction of household goods, items of art and adornment, tools, domestic/ceremonial weapons and shelters. The forests, riparian areas and grasslands would have provided places to camp on the land. All of the ecosystems lost would have provided habitat for wildlife. The 8,433 ha now occupied by the mine is no longer available for LNIB to harvest and has been irreversibly altered from its previous landforms and plant communities. Even after reclamation it will bear little resemblance to the ecosystems and harvesting

sites known to the LNIB before mine development, which is why they are considered as lost for the expression of Rights and Title. The vegetation and ecosystems under the dust plume have been considerably impacted by dust fall and had their integrity compromised. They are no longer used for the expression of Rights and Title.

Berries and other plant parts from mine-influenced areas are perceived by some LNIB members as lower in quality (differences in size and taste from those harvested outside of mine-influenced areas). Concerns about inadvertently harvesting from areas where biosolids have been spread further decrease confidence in the safety of wild plants gathered from mine-influenced areas.

Lack of access to the areas influenced by the mine and lack of confidence in the safety and quality of plants in mine-influenced areas has resulted in some LNIB harvesters being forced to either go elsewhere to harvest plants or to purchase fruit and vegetables from supermarkets. LNIB Advisors highlighted needing to travel further to gather traditionally harvested resources, with some going as far as 60-70 km away from their homes. Both of these options result in increased travel costs. The increase in travel time and costs has raised barriers for participation in traditional gathering practices and exerts pressure on the sustainability of gathering in areas accessed by other non-LNIB people. A lower proportion of traditional wild produce in diets contributes to diminished opportunities for local LNIB Elders and Knowledge Holders to pass on cultural knowledge of harvesting sites, harvest timing, plant processing methods, uses of medicinal plants and the stories, spiritual practices and rituals associated with harvesting each species. The numbers of LNIB members with knowledge of and participation in the cultural seasonal round of harvesting plants in their allotted season is declining as there are fewer opportunities to take young people out on the land to pass on that knowledge.

Wildlife and Wildlife Habitat

Development of the HVC mine has affected LNIB hunting. The area now occupied by mine infrastructure (including mine-related roads) has directly replaced 8,433 ha of natural vegetation that previously provided wildlife habitat. The natural vegetation types lost to the mine footprint include lakes, rivers, ponds, wetlands, grasslands, and mesic to dry forest, which provided habitat for ungulates, bears, snowshoe hares, grouse, waterfowl, furbearers and other wildlife species hunted or trapped by LNIB. That area has been alienated as productive wildlife habitat and is no longer available for LNIB to hunt. The presence of mine infrastructure has resulted in permanent changes from its previous landforms and habitats. The HVC MLE Project will remove an additional 1,481.5 ha of native ecosystems, including 1,456 ha of grassland, forest and sparsely vegetated ecosystems and 25.7 ha of riparian, wetland and water changes. Even after reclamation and revegetation, the mine footprint will bear little resemblance to the wildlife habitat and hunting areas present before mine development.

Traditional hunting sites were destroyed by the mine footprint, severing familial history connections with places that provided food and the spiritual and social experiences of hunting for generations of LNIB members. Mine development has resulted in the direct loss of multiple hunting sites. Many more hunting sites that are undocumented would have existed within what is now the mine footprint but are undocumented as there are few remaining people that had direct experience with those sites before mine development. Other areas within LNIB traditional territory have not been directly replaced by mine infrastructure but are unavailable for LNIB hunting for various reasons associated with mine development. LNIB Advisors have stated that some areas of their territory not directly affected by mining are inaccessible to hunters due to fences. Noise from mining and mine-related road traffic can also disturb wildlife and alter their distribution patterns possibly reducing the numbers of game animals in proximity to the mine footprint.

LNIB Advisors report that they now avoid some areas previously used for hunting due to visible deposition of mine-generated dust, and concerns regarding potential impacts from wildlife ingestion of contaminated water and forage plants. Hunters have noticed that moose have 'growths on their bodies', the meat is 'pale pink', and the animals appear 'sickly'. The area under the dust plume has been considerably impacted by dust fall and its integrity compromised. It is no longer used for the expression of Rights and Title, including hunting, because of all-levels of indicators of impact.

Increased dependency on domestic meat adds substantial costs to feeding families and contributes to a lower proportion of traditional wild meat in the diets of LNIB members. A lower proportion of traditional wild game in diets contributes to diminished opportunities for LNIB Elders and Knowledge Holders to pass on cultural knowledge of hunting sites, timing of hunting for particular species, game processing methods, and the stories, spiritual practices and rituals associated with hunting.

Summary of Impacts from the HVC MLE Project

The HVC Mine currently impacts LNIB's expression of Rights and Title. Namely, the HVC mine and its extension have direct destruction impacts of 8,025 ha and an additional 1,526 ha, respectively. In addition to this, we see water quality and quantity changes over the three main watersheds that intersect the mine. In fact, approximately 24,782 ha of watersheds contain contaminated or compromised water. This area is no longer used for the expressions of Rights and Title, particularly fishing and therefore spirituality. One should also consider the drastic reductions in water quantity that impact downstream LNIB users. Witches Brook at Guichon Creek has seen its flow reduced by 75 percent, which in turn has removed approximately a third of Guichon Creek's flow. Guichon Creek goes on to feed LNIB's drinking and irrigation water systems. This is a severe impact particularly considering the additive affect of climate change. The surface area of land impacted by dust deposition is 25,182 ha. In addition to this surface area, mining operations alone have resulted in anywhere from 486,000 to 574,000 tonnes of dust deposited within the local study area since 1972, therefore heavily contributing to the loss of integrity and contamination of this area.

In summary, the following figure shows the combined areas considered as lost for the expression of Rights and Title by LNIB which total 33,025 ha. Reparation measures for this loss of land and integrity of resources for all expressions of Rights and Title will be sought, through a combination of Certificate or permit conditions and other negotiation measures.

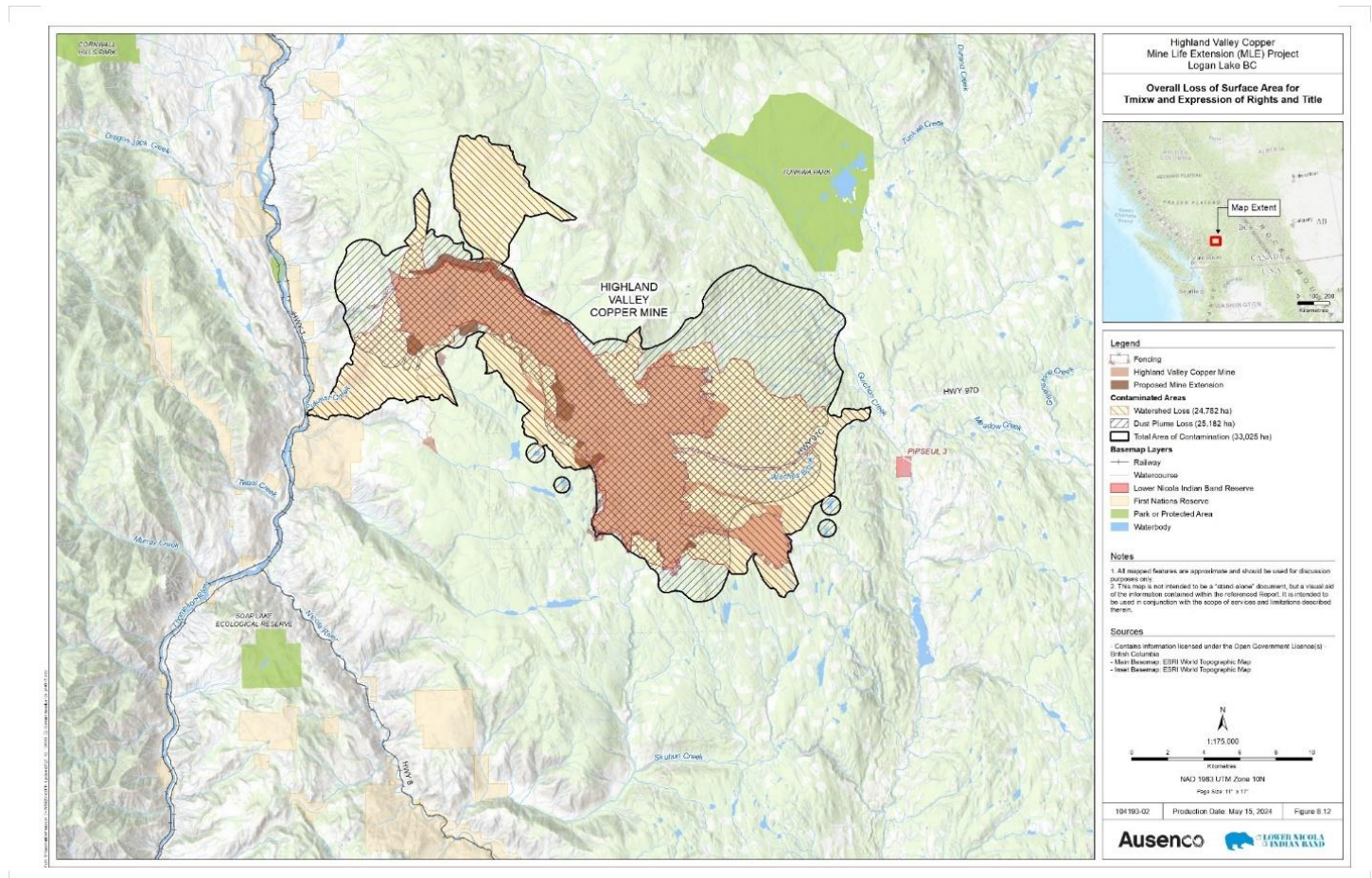


Figure 10-3: Overall Loss of Surface Area for Tmixw and Expression of Rights and Title

10.8. Nlaka'pamux Nation Tribal Council

From their own description, the Nlaka'pamux Nation Tribal Council (NNTC) "exists to protect and advance Nlaka'pamux title and rights and is involved with cultural and natural resources, environmental sustainability, economic independence, health and well-being. Protection of Nlaka'pamux title means protection of the boundaries of our Nation."⁴⁵

NNTC conducted a Recognition-Based Environmental Assessment (RBEA) and decision-making process for HVC MLE. In May 2024, NNTC chose to identify as a participating Indigenous nation under the Act.⁴⁶ On August 27, 2024, NNTC and the EAO signed the NNTC - EAO HVC MLE Process Agreement which sets out how NNTC and the EAO will work together to align their respective assessment and decision-making processes. NNTC also worked with MMO and permitting agencies on topics related to HVC MLE at its Shared Decision-Making Board as part of the Land and Resource Decision Making Agreement signed between NNTC and the Province of B.C. in March 2023.

⁴⁵ Source: Nlaka'pamux Nation Tribal Council [Who We Are - NNTC](#)

⁴⁶ Source: Environmental Assessment Office [Process Order Amendment](#)

10.9. Spuzzum First Nation

As part of the historical southern Nlaka'pamux division, Spuzzum First Nation is located in the vicinity of Yale, B.C., and is one of the 15 First Nations communities that make up the Nlaka'pamux Nation today.

At the beginning of the HVC MLE environmental assessment, Spuzzum First Nation was a member of NNTC. After Spuzzum First Nation left NNTC, the EAO and MMO offered direct engagement with Spuzzum First Nation and MMO provided funding to support Spuzzum First Nation's participation in the Combined Process. Spuzzum First Nation requested to be updated on the progress of the Combined Process, and so the EAO sent updates at key milestones. The EAO did not receive any comments or concerns from Spuzzum First Nation during the course of the Combined Process. As such, effects to Spuzzum First Nation are expected to be the same as effects to the broader Nlaka'pamux Nation.

10.10. Key Mitigation Measures Proposed by HVC

HVC identified mitigation measures proposed for valued components that are linked to Nlaka'pamux Nation Indigenous interests. These mitigation measures have been proposed by HVC to address potential negative effects and enhance potential benefits from the proposed mine expansion.

A selection of mitigations proposed to address potential negative effects to Nlaka'pamux Nation Indigenous interests include:

- In addition to existing fish and aquatic resources mitigation strategies, HVC would update construction management plans to protect water and fish during construction including a section on fish relocation practices. HVC would also develop a fish habitat offsetting plan, if required, and update the Annual Aquatic Biomonitoring Program to include increased fish tissue, water and sediment sampling.
- HVC would complete pre-clearing surveys to identify the presence of nest trees for schedule one species protected under the Migratory Bird Regulations and install artificial roosting structures to mitigate bat roosting following the removal of mature forest habitat, in addition to existing wildlife and wildlife habitat mitigation strategies and reporting requirements;
- HVC would support the community-led follow-up study to the 2016 Dust Mapping and Traditional Plant Study to assess the quality and safety of traditional foods harvesting in the region;
- HVC's management and mitigation of change in employment would provide career planning events and activities geared toward Indigenous youth and provide disability support by offering opportunities for work with appropriate support and safety considerations;
- HVC has committed to monitoring local and Indigenous employment and procurement through ongoing community engagement to inform continuous improvement; and

HVC would develop a Social Management Plan to consolidate all plans and actions to address social impacts generated from HVC's Mine Site operations and HVC MLE. HVC would also create a Social Closure Plan specifically to help manage the socio-economic effects of the Closure process by considering Indigenous Governments and Organizations and public input provided during ongoing engagement and drawing on Teck's previous experience closing mines.

10.11. The EAO's and Nlaka'pamux Nation's Characterization of Residual Effects to Nlaka'pamux Nation

Section 25(1) of the Act requires an assessment of the effects of a project on First Nations and their rights as recognized and affirmed by Section 35 of the *Constitution Act, 1982*.

Under Section 19(4) of the Act, and according to the Assessment Plan, the CNA assessed the effects from HVC MLE on the Indigenous interests of their eight Participating Bands, and LNIB assessed the effects on their Indigenous interests.

The CNA's assessment concluded that the effects of the existing mine plus HVC MLE would result in the following effects on the Participating Bands' Indigenous interests:

- High negative impacts to physical alteration or destruction of landscape features, culturally important sites, or preferred hunting/fishing/harvesting/recreation areas and to Nlaka'pamux cultural heritage resources.
- High negative impacts to connection to the land or ability to restore connection to the land, to access culturally important sites or preferred hunting / fishing / harvesting / recreation areas, and for the land to return for current and future generations and moderate negative impacts to potential future use for agricultural purposes.
- High negative impacts to availability of safe and/or perceived availability of safe water to meet the water needs of current and future generations.
- High negative impacts to overall health and well-being of current and future generations and mild positive impacts to the socio-economic health of the current and future generations.
- Moderate negative impacts to the availability of safe food and/or perceived availability of safe food for the Participating Bands to sustain food sovereignty and high negative impacts to current and future generations' ability to utilize the land for food sovereignty activities, spiritual / cultural, or recreation peacefully and free of disruption and the availability of safe and / or perceived availability of safe water to meet the water needs of current and future generations.
- High negative impacts to the ability to share knowledge, teachings, and nte?képmxcin between current and future generations.
- Low positive impacts to equitable business and contracting opportunities to current and future generations, mild positive impacts to provide employment opportunities in a safe and respectful work environment for current and future generations and moderate positive impacts to equitable economic benefits to current and future generations.
- High negative impact to recognition of nte?képmx Title and jurisdiction.

The CNA's assessment concluded that HVC MLE result in the additional loss of and effects to tmíx^w, cultural heritage resources, additional negative effects to q^wú? (water), to members' Balance, and that these effects would be long-term, at times lasting more than seven generations. The CNA also noted that employment for members is not as high as it should be, that the CNA has and will continue to break down barriers to members' employment and contracting opportunities, and that positive economic effects would continue locally under HVC MLE. Finally, the CNA concluded that HVC MLE would continue to infringe on nte?képmx rights and title.

LNIB's assessment was conducted holistically for the whole mine from start of mining in 1961 to the proposed end of HVC MLE and concluded that:

- The HVC Mine currently impacts all levels of indicators for the expression of Rights and Title and Tmixw, through affecting LNIB's historic and contemporary sites and opportunities for hunting, gathering, fishing, and cultural continuity;
- The HVC mine and its extension have direct destruction impacts of 8,025 ha and an additional 1,526 ha, respectively. The combined areas considered as lost for the expression of Rights and Title by LNIB total 33,025 ha. Reparation measures for this loss of land and integrity of resources for all expressions of Rights and Title will be sought, through a combination of Certificate or permit Conditions and other negotiation measures.
- Should HVC MLE be approved, reparation measures to significantly reverse the negative effects will likely not be noted for many generations (i.e., to the point where LNIB members feel comfortable enough to use those areas again).

- Since much traditional knowledge is passed down from generation to generation, if LNIB members are not able to use specific areas to express their Aboriginal rights for many generations, there is a loss of this knowledge which may affect LNIB as a community at a societal, psychological and cultural level for generations to come. It is the loss of the pass down of traditional knowledge that is most critical here for sustaining their culture. Even now, LNIB members have commented that local knowledge is decreasing in the community partially due to a decrease in LNIB members who speak their traditional language.
- LNIB's view is that the effects of HVC MLE would be of a high magnitude, would be irreversible, and that uncertainty is low.

To meet the requirement under Section 25(1) of the Act to assess effects to wider Nlaka'pamux Indigenous interests (for example for Kanaka Bar Indian Band and Spuzzum First Nation and noting that the Province's understanding is that Nlaka'pamux Nation rights are held at the Nation level), the EAO also conducted an assessment of effects to broader Nlaka'pamux Nation interests. To assess the potential effects of HVC MLE on the Nlaka'pamux Nation, the EAO considered the key areas of interest outlined in sections 11.5 and 11.6 of this Report, the information provided in section 7.12 and Chapter 11 of the Application: Assessment of Culture and Indigenous Interests, engagement with Nlaka'pamux Nation representatives from the CNA, Kanaka Bar, LNIB, and NNTC, and issues raised during environmental assessment.

The EAO also considered the ethnohistoric information that provides the background on the historical use and occupation of the Highland Valley and rights with associated historical use by Nlaka'pamux and Secwépemc groups and worked collaboratively with Nlaka'pamux Nation groups to review and adjust the assessment outlined below to reflect Nlaka'pamux views and perspectives.

After considering the historical background, the HVC MLE-specific information and analysis in both HVC's Application and this Report, the EAO characterized the expected residual effects of HVC MLE on the Nlaka'pamux Nation, considering HVC's proposed mitigation measures and draft Certificate and permit Conditions. The details are included in the table below.

The EAO concludes that HVC MLE would have a residual adverse effect on Nlaka'pamux Nation's Indigenous interests based on effects to valued components that then affect specific Indigenous interests (for example, losses of wildlife habitat could result in fewer wildlife individuals available for Nlaka'pamux nation members to hunt which would then affect their constitutionally protected Aboriginal rights).

Table 14: Summary of residual effects for Nlaka'pamux Nation and its Indigenous Interests

Indigenous Interest	Assessment Rating	Effects and Rationale
Aboriginal Rights Effects to Nlaka'pamux Nation's ability to exercise their Aboriginal Rights to hunt, fish, trap and engage in Nlaka'pamux practices, traditions and customs.	Context (resilience): Low Magnitude: Moderate to Serious Extent: Regional Duration: Long-term Reversibility: Irreversible Frequency: Continuous Affected Populations: Disproportionate Risk (likelihood and consequences): High Uncertainty: Moderate Importance: High	Moderate to serious The EAO acknowledges that important context of the proposed HVC MLE project, that First Nations people with current and historical connections to the Highland Valley area have already been impacted in their ability to exercise their rights by past industrialization, privatization of property, and fencing and gating of areas previously accessible, and restrictive colonial laws. Incremental negative residual effects on environmental, biophysical and socio-economic conditions (as represented by the residual effects to valued components assessed by the EAO for HVC MLE, such as effects to vegetation, including traditional use plants, wildlife, fish and fish habitat) result in a negative residual effect to Nlaka'pamux Nation's ability to exercise Aboriginal rights in the Indigenous interests local study area and regional study area. The wide range of mitigation measures proposed by HVC, amended permit conditions, and proposed Certificate Conditions are expected to help manage HVC MLE-specific effects to Nlaka'pamux Nation's rights and interests. This includes M-11 permit requirements to reduce effects to wildlife and vegetation, and to require that the mine site be reclaimed and revegetated, portions of the PE-376 and PA-1557 permits designed to minimise contaminants in air and water, proposed <i>Water Sustainability Act</i> licence conditions to implement a Drought Management Plan, and proposed Certificate Conditions designed to require HVC to manage the effects of HVC MLE on GHG emissions, increase watershed stewardship, and monitor contaminant levels in traditional foods. The EAO assessed the magnitude of effects to be moderate to serious as HVC MLE would result in 1,526 ha more of disturbance (731 ha of which is outside the permitted mine area) is in the northern portion of Nlaka'pamux territory, and as such effects will vary to different groups within the territory. For example, members of Cook's Ferry Indian Band who live near the mine site, source their water from downstream of the mine and are known to hunt or fish in areas closer to the mine (and previously in the area occupied by the current mine), would be more affected than members of Spuzzum First Nation who are located more distant from the mine site and did not provide any information about their use of the area to the EAO. Effects resulting from the development of HVC MLE are expected to be long term, with these effects being irreversible as although the mine site will be reclaimed in the far future, Aboriginal rights will not be able to be exercised in the future as they were in the past in the Highland Valley. The likelihood of residual effects is high with a moderate level of uncertainty. The negative residual effect is of high importance as Aboriginal Rights are constitutionally protected.

Indigenous Interest	Assessment Rating	Effects and Rationale
Governance, Law and Stewardship Effects to Nlaka’pamux Nation’s governance, laws, customs, protocols, conservation and stewardship systems.	Context (resilience): Low Magnitude: Moderate to Serious Extent: Limited Duration: Long-term Reversibility: Partially reversible Frequency: Continuous Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate to High Uncertainty: Moderate Importance: Moderate High	Moderate to serious The Nlaka’pamux Nation would be limited in governing or applying their laws, customs, protocols, conservation and stewardship systems in the HVC MLE footprint, but would continue to have the ability to implement laws, customs, protocols, conservation and stewardship systems beyond the HVC MLE footprint within their territory, though it must be noted that Nlaka’pamux Nation groups including LNIB view the exercise of governance, law and stewardship by the Nlaka’pamux Nation as being limited or non-existent by colonial laws. The EAO assessed the magnitude of effects from HVC MLE to be moderate to serious as HVC MLE is in the northern portion of Nlaka’pamux territory, and as such effects will vary to different groups within the territory. Considering that historically divisions of the Nlaka’pamux Nation managed areas of the territory within the nation, those members who live in communities located closer to the mine site will be more affected (less able to assert Nlaka’pamux governance, laws and customs) than members whose communities are located more distant from the mine site and are expected to retain the ability to exercise their governance, laws and stewardship in those areas closer to their communities, such as Spuzzum First Nation, which are further from the mine site. Limitations on the applications of Nlaka’pamux governance, law and stewardship as a result of HVC MLE are limited to the mine site footprint, and it should be noted that HVC has worked with communities to integrate Nlaka’pamux values into its Returning End Land Use Plan which governs the reclamation of the mine site. Due to the nature of mining, the exclusion of land taken up by HVC MLE from applicable Nlaka’pamux governance, law and stewardship would be continuous over the long-term and would be partially reversible, as reclamation efforts are expected to return the land to a useable state where Nlaka’pamux communities may have more future authority over the use and stewardship of the land. There is a moderate level of risk and uncertainty related to this effect. The residual effect on Law, Governance and Stewardship of high importance to Nlaka’pamux Nation.

Indigenous Interest	Assessment Rating	Effects and Rationale
Indigenous Economies Effects to Nlaka’pamux Nation’s economic conditions through economic opportunities and economic equity, employment income, unemployment rate and labour force participation rate, job market and skills and type or level of education.	Context (resilience): Low Magnitude: Moderate to Serious Extent: Beyond regional Duration: Long-term Reversibility: Partially reversible Frequency: Continuous Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate to High Uncertainty: Low Importance: High	Moderate to serious HVC MLE would result in many economic benefits and some Nlaka’pamux Nation members, including those who are business owners, may choose to benefit from the access to increased contract bids, employment, training and skill development opportunities associated with HVC MLE, though employment numbers are not set and while about 17% of HVC’s workforce self-identify as Indigenous, it is not certain how many Nlaka’pamux people would be hired on for HVC MLE, and Nlaka’pamux community members have reported experiencing racism at the mine site. HVC has also committed to working to increase Indigenous employment at the mine site and to working to combat racism at through training, which is hoped to help retain Indigenous employees. Along with the new economic opportunities for Nlaka’pamux Nation members associated with HVC MLE, the Nlaka’pamux Nation would also continue to gain mineral tax revenue from economic benefits agreements from B.C. and directly from HVC through mine revenue-sharing agreements, though LNIB stated that this is less than the 50 percent of revenue these groups expect to receive under traditional Nlaka’pamux law. These factors combine for a medium magnitude positive effect to Nlaka’pamux Nation economic interests. Positive residual effects from HVC MLE on economics are expected to extend beyond the region, though some Nation members may be less able to take advantage of the added jobs due to barriers that exist to workforce participation. Negative effects to Indigenous economies could be experienced if Nlaka’pamux Nation members’ participation in the traditional wage economy removes opportunities to participate in the Indigenous economy. The consequence of this effect is moderate (moderate magnitude and beyond regional extent), and the likelihood is high, resulting in moderate to high risk. There is a low level of uncertainty as the economic effects are predictable now and, in the future, when the mine is certain to close, as such effects would be partially reversible. The residual effects on Indigenous economies are of high importance to Nlaka’pamux Nation.

Indigenous Interest	Assessment Rating	Effects and Rationale
Culture, Health and Well-being Effects to Nlaka’pamux Nation’s quality of experience, spirituality, cultural attachment, inter-generational cultural transmission and Indigenous languages.	Context (resilience): Low Magnitude: Moderate to Severe Extent: Regional Duration: Long-term Reversibility: Partially reversible Frequency: Continuous Affected Populations: Even Risk (likelihood and consequences): Moderate to High Uncertainty: Moderate Importance: High	Moderate to serious The context for effects to Nlaka’pamux Nation’s Culture, Health and Well-being is considered moderate, as the Nlaka’pamux Nation has opportunities to exercise its culture across their territory, though not in the current mine footprint. Concerns about contamination of wildlife and plants would also continue to limit traditional activities in the wider Highland Valley. As set out in the Application, publicly available data indicates that First Nations people have more negative health outcomes than the non-First Nations peoples. The magnitude of this effect is moderate because effects from HVC MLE are expected to reduce the ability for Nlaka’pamux Nation members to have cultural experiences in the vicinity of HVC MLE and in the wider Nlaka’pamux territory via effects to water, noise, visual quality, and concerns about landscape and wildlife contamination related to HVC MLE. Water, air, noise and visual quality effects would interfere with nearby cultural activities, and concerns about contaminated air, water and traditional foods could reduce accessing the land for healthy traditional activities and reduce health outlooks through consumption of less healthy commercial foods. Loss of harvesting opportunities could also result in a reduction in inter-generational cultural transmission as less time is spent on the land. Residual effects to Nlaka’pamux Culture, Health and Well-being are expected to be regional with long-term duration and partially reversible following Closure and Post Closure reclamation efforts. The effects are expected to be even across the Nlaka’pamux Nation, as the EAO understands that the loss of additional area to mining in the Highland Valley will expand the area no longer available for any member of the nation to practice Nlaka’pamux culture in those areas. Risk of effects are rated as moderate to high (high magnitude and regional extent) with a moderate level of uncertainty due to cause-effect relationships between linked valued components and interactions with Nlaka’pamux Nation’s Culture, Health and Well-being.
* Note: Criteria and assessment ratings are defined in Appendix 1 – Residual Effects Characterization Definitions		

10.12. Assessment of Cumulative Effects to Nlaka’pamux Nation

Cumulative effects from development such as mining, forestry, and ranching are a focus for First Nations in the region and are one of the reasons why several First Nations chose to complete their own assessments for HVC MLE. The EAO’s methods for assessing project and cumulative effects, particularly for projects such as HVC MLE that are extensions and expansions of current operations, are not always in alignment with how First Nations view historical and ongoing effects to the land and their Section 35 rights and wider interests. Nlaka’pamux Nation groups regularly raised the issue of cumulative effects from the existing mine site, HVC MLE, and other activities on the landscape as a key concern.

10.12.1. HVC’s assessment of cumulative effects to Nlaka’pamux Nation

HVC’s Application assessed the negative cumulative effects on Nlaka’pamux Nation groups’ (Kanaka Bar and LNIB) ability to exercise Aboriginal rights and on Nlaka’pamux Nation’s Governance, Law and Stewardship and Culture, Health and Well-being. The HVC MLE Application Information Requirements identified the following two reasonably foreseeable projects, which HVC considered as they have the potential for cumulative interactions on Nlaka’pamux Nation’s Aboriginal rights: Mount Mabel Wind Projects and the quA-ymn Solar Project. This is in addition to forestry, mining exploration,

transportation, parks, recreation and agriculture activities currently operating in the region HVC assumed would remain similar to present levels.

The residual effects assessed by HVC on Nlaka'pamux groups' ability to exercise Aboriginal rights have the potential to interact with the reasonably foreseeable projects, land use activities in the regional study area and ongoing effects of climate change. HVC predicted that proposed mitigation measures for residual effects will be effective for cumulative effects and proposed no further mitigation measures to address cumulative effects.

HVC identified that cumulative effects to the Nlaka'pamux groups' ability to exercise their Aboriginal rights related mainly to land use and temporary increases in population levels during the Construction phase and were considered minor. This characterization of cumulative effects reflects that contributions from climate change and land use activities in the local study area and regional study area are larger effects and HVC concluded that HVC MLE represents a minor contribution to wider cumulative effects across the region.

10.12.2. The EAO's assessment of cumulative effects to Nlaka'pamux Nation

The EAO considered HVC's assessment and existing conditions at the mine site as described in the HVC Base Case scenario, that is, a very large, long-term mine which began operations in the 1960s, has a long history of effects to valued components in the Highland Valley, and has taken up much of the land in the Highland Valley which is now inaccessible to Nlaka'pamux community members.

The EAO also considered that in the time since the Application Information Requirements was issued, several other industrial solar power projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects, if they receive authorizations and advance to operations, could have effects on Nlaka'pamux Nation's interests, and the EAO expects that these projects would be required to mitigate effects in a similar manner to how HVC has proposed to manage effects to valued components and Nlaka'pamux Nation's interests for HVC MLE.

As for residual effects, the EAO considered effects to the Nlaka'pamux Nation as a whole. In considering the effects to Nlaka'pamux Nation's Aboriginal rights under Section 35 of the *Constitution Act*, the EAO acknowledges that the Nlaka'pamux people have already been impacted in their ability to exercise their rights across their territory by past industrialization, privatization of property, and fencing and gating of areas previously accessible. As previously noted, HVC MLE would result in a residual effect to Nlaka'pamux Nation's Section 35 rights through extending the mine life and expanding the disturbed mine area, both of which limit the exercise of Nlaka'pamux rights. In addition to this, the EAO notes that that much of the Highland Valley is currently part of the mine site (approximately 11,160 ha) and thus unavailable for Nlaka'pamux Nation members to exert their rights. In addition to past and future industrial and other activities on the land that limit Nlaka'pamux access within their territory, HVC MLE would therefore contribute to an existing significant adverse cumulative effect to Nlaka'pamux Nation's Section 35 rights⁴⁷.

The EAO assessed a residual effect to Nlaka'pamux Nation's Governance, Law and Stewardship from HVC MLE, and considering past limitations on the exercise of Nlaka'pamux Nation's Governance, Law and Stewardship both on the mine site and across the territory, new potential major projects close to HVC MLE, the EAO expects that a HVC MLE would contribute to an existing significant cumulative effect to Nlaka'pamux Nation's Governance, Law and Stewardship.

While the EAO assessed a positive residual effect to Indigenous Economies as a result of HVC MLE, there are no other major projects across the territory from which the Nlaka'pamux Nation would be expected to receive a significant number

⁴⁷ A note regarding the assessment of significance of effects to Indigenous interests. The EAO's rating scale for the effects of a proposed project on Indigenous interests is as follows: none / negligible / minor / moderate / serious, as used in the residual effects analysis table in section 10.11 of this Report. For HVC MLE, in recognition of Nlaka'pamux Nation groups' views regarding the significant nature of effects to Indigenous interests in the Highland Valley, the EAO has also used the word 'significant' to describe the assessment of effects to Nlaka'pamux Nation interests in this Report.

of jobs or revenue from with which HVC MLE would act cumulatively to positively affect the Nlaka'pamux Nation. The EAO's view is that HVC MLE would have a negligible cumulative effect to Nlaka'pamux Nation's Indigenous Economies.

The EAO considered information shared by Nlaka'pamux Nation representatives during engagement and consultation activities, noting that Nlaka'pamux Nation Culture, Health and Well-being has been interrupted by colonialism, including residential schools, land privatization, and industrialisation, including through mining and forestry. Nlaka'pamux Nation representatives also noted that once an area of land is disturbed, such as for a mine like HVC, the cultural features associated with that area are no longer intact as they were in their original form. That is, the industrial activity, particularly mining which alters the land profoundly, interferes with cultural features and even if the site is reclaimed after multiple generations, it no longer has that same, cultural integrity as was present pre-disturbance.

HVC MLE would continue the current levels of noise at the mine site over a longer period, and would slightly increase current noise levels, in addition to noise from roads such as Highway 95 and from other industrial activities, such as forestry, around the mine site. The effects to visual quality from changes associated with HVC MLE would increase the current level effects from the mine to the local viewscape which would affect the quality of cultural experiences.

Considering the current effects of HVC, that is a mine which has removed access to a large amount of the Highland Valley, the potential effects from HVC MLE which would extend the disturbance area and prolong the time until the mine site is reclaimed and Nlaka'pamux community members can again access the site for cultural and other activities, in addition to other industrial activity as described above, the EAO's view is that HVC MLE would contribute to a significant adverse cumulative effect to Nlaka'pamux Nation's Culture, Health and Well-being.

The EAO notes that the CNA's assessment highlighted that cumulative effects already exist to the CNA's indigenous interests, and that HVC MLE would expand those effects. Residual effects from HVC MLE to tmíx^w, balance, governance, teachings, and title and rights, would last longer than seven generations and would combine with previous effects from past mining and other post-colonial land uses in the Highland Valley.

Similarly, LNIB's tmíxw assessment concluded that the effects of past mining have already had a severe effect on the land, water, air, wildlife and vegetation, and thus on LNIB members' rights and title, health, well-being, cultural security, and prosperity, that these effects would be extended under HVC MLE, and would combine cumulatively to affect future generations of LNIB members. LNIB noted that the decisions that led to the current negative outcomes for LNIB were made entirely without incorporating Indigenous governance systems, protocols, laws, or stewardship plans. Reclamation efforts are expected to progress slowly and are not expected to restore the land to a reusable state, limiting future authority and stewardship by Nlaka'pamux communities.

10.13. Conclusions

The EAO considered the information provided in HVC's Application, the results of CNA's Nlaka'pamux Impact Assessment and LNIB's tmíx^w assessment, the information and analysis presented in this chapter, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions, and concludes that HVC MLE and the BASA Amendment in combination with existing effects, would have an adverse residual effect on Nlaka'pamux Nation Indigenous interests, and a significant adverse cumulative effect on Nlaka'pamux Nation's Indigenous interests, including Aboriginal rights, Governance, Law and Stewardship, and Culture, Health and Wellbeing, and a negligible cumulative effect on Nlaka'pamux Nation's Indigenous interests, to Indigenous Economies.

11.0 DETAILED ASSESSMENT – EFFECTS TO BONAPARTE FIRST NATION AND STK’EMLÚPSEMC TE SECWÉPEMC NATION INDIGENOUS INTERESTS

The Act outlines the matters that must be considered in every environmental assessment in B.C. [Section 25\(1\)](#), which requires that the effects of a project on First Nations and their rights (collectively referred to as Indigenous interests) be assessed in every environmental assessment. The following assessment for Bonaparte First Nation (BFN) and Stk’emlúpsmc te Secwépemc Nation (SSN), comprised of members of the Tk’emlúps and Skeetchestn Bands) also considers potential effects due to the BASA Amendment.

The assessment of effects to Indigenous interests can be carried out in different ways, by the EAO or by First Nations themselves, or both. Section 19(4) of the Act outlines how a participating Indigenous nation can notify the EAO of their intent to carry out an assessment of effects to their interests, and how the EAO can acknowledge it for the purposes of meeting the requirements under Sections 25(1) and 25(2) of the Act, which defines what matters, or potential effects, the EAO must consider in every assessment related to effects to First Nations and their interests.

The EAO carried out an assessment of the potential effects to BFN and SSN’s Indigenous interests to meet requirements under Section 25(1) and in accordance with the Process Order issued December 16, 2022. The EAO notes that SSN also carried out an independent Indigenous-led assessment, which included a Family Panel review conducted in July 2024. A redacted version of the Family Panel Recommendations Report was provided to the EAO on November 21, 2024 (a confidential version of the report was provided to the EAO on October 31, 2024).

This chapter provides the detailed assessment of potential effects to BFN and SSN’s Indigenous interests from HVC MLE and proposed mitigations for those effects.

11.1. Secwépemc Overview

The Secwépemc (pronounced suh-Wep-muhc) are the northernmost Salish-speaking Indigenous group in the Interior Plateau region and speak the Western dialect of Secwépemcstsin. Most contemporary SSN members are noted to live in the river valleys.⁴⁸ The Secwépemcstsin word Kúkwpi7 (Chief) refers to traditional leader of a Secwépemc community whose position is partially hereditary and partially by appointment but has evolved also to recognize elected leaders under colonial governance structures as enforced under the *Indian Act*. In an overview of their community history, Tk’emlúps te Secwépemc describes how “before the smallpox epidemic of 1862 there were thirty-two Secwépemc bands with four Secwépemc dialects. Today, there are seventeen remaining bands that make up the Secwépemc Nation and three Secwépemc dialects.”⁴⁹

Based on ethnographic information, the Province of B.C. understands that Interior Salish nations, including the Secwépemc, had legal traditions which governed the ownership and stewardship of land, and that there were different types of access rights arising from membership in a nation and from personal kinship networks. Historically, the Secwépemc Nation was comprised of multiple village or local area-based communities, described as “divisions” by James Teit, an early ethnographer. Local communities had customary hunting, fishing and harvesting areas, over which they exercised stewardship. This ethnohistory, along with the current views held by the broader Secwépemc Nation, informs the Province’s current view that Secwépemc rights are held at the division level.

Portions of the HVC mine site and some HVC MLE components are within the southwest edge of SSN’s asserted territory and the Highland Tailings Storage Facility overlaps BFN’s asserted territory. As noted in Section 3.1.1: Historical Use and Occupation of the Highland Valley of this Report, the boundary between historical Nlaka’pamux and Secwépemc territory

⁴⁸ Source: Tk’emlúps te Secwépemc <https://tkemlups.ca/profile/history/our-land/>

⁴⁹ Source: Tk’emlúps te Secwépemc <https://tkemlups.ca/profile/history/our-land/>

appears to have followed the divide between the Highland Valley and Barnes Creek watersheds. Based on the ethnohistoric information available, the Province has found no clear evidence that at the time European contact (1808 – 1811) Secwépemc territories included any part of the Highland Valley, but they may have. SSN disagrees with this characterization, and claims historical use and occupation of the area, and notes that its Family Panel Recommendations Report disputes the Province’s view. More information regarding SSN’s views is located in section 11.10 of this Report.

11.2. Engagement and Consultation during the Combined Process

The deep level of engagement and consultation activities for HVC MLE led by the EAO and the MMO support the implementation of the United Nations Declaration on the Rights of Indigenous Peoples through seeking free, prior and informed consent with First Nations. The EAO and the MMO sought to achieve consensus with all participating Indigenous nations, including BFN and SSN, throughout the environmental assessment, as well as at key milestones. Consultation and engagement included:

- Participation in the Technical Advisory Committee and topic-specific sessions;
- Regular government-to-government meetings held biweekly or monthly between the EAO, MMO, BFN, and SSN;
- Opportunity to review, comment and collaborate on draft materials, such as the Process Order, Application Information Requirements, Assessment Plan, Notice of Application Review, Assessment Report, and draft Certificate and Conditions;
- Option to conduct an assessment of the effects of HVC MLE on their interests under Section 19(4) of the Act or collaboratively draft the assessment on their Interests within the EAO’s Assessment Report; and
- The EAO and MMO providing capacity funding during the Combined Process to BFN and SSN.

The EAO and MMO approached bilateral engagement and consultation with respect to each participating Indigenous nations’ preferences and their governance responsibilities. More detail on how EAO and MMO engaged separately with BFN and SSN is provided in [sections 11.5](#) and [11.6](#) below.

The EAO notes that HVC also engaged directly with BFN and SSN. A description of that engagement is included in Chapter 3 of the Application.

11.3. Assessment Boundaries

In the Application, HVC carried out an assessment of the potential effects from HVC MLE to BFN’s Indigenous Interests. At SSN’s request, HVC did not assess the potential effects to SSN’s Indigenous interests, as SSN preferred to assess effects to its interests via its HVC MLE Project Review Process and Family Panel Recommendations Report.

The spatial assessment boundaries used by HVC in its Application for Indigenous interests were identified by the combined largest extent of the local study area and regional study area for valued components linked to Secwépemc Indigenous interests. The Indigenous interests local study area and regional study area overlap with Secwépemc traditional territory starting from the northern edge of the HVC MLE footprint, west past Bonaparte 3 Reserve, east to Falkland and north past Lake Bonaparte, including Kamloops ([see Application Figures 11.2-1 and 11.2-2](#)).

The temporal boundaries of the assessment include the Construction, Operations, Closure and Post-Closure phases of HVC MLE. HVC MLE components and anticipated timelines are described in detail in [section 2.21](#) of this Report.

11.4. Regional Context

In the Application, HVC considered the existing conditions for all valued components to understand and assess the potential effects of HVC MLE. For Indigenous Interests, HVC considered how existing development and disturbance in the

area has already affected First Nations' ability to exercise rights recognized and affirmed in Section 35 of the *Constitution Act*, including the historical and current disturbance on the HVC mine site.

In the Application, HVC acknowledges that ongoing development within Secwépemc traditional territory and colonial governance structures and institutions have cumulatively affected the Nation's ability to exercise their Aboriginal Rights and governance, law and stewardship practices across their territory. Industrial resource extraction has contributed to the loss and destruction of terrestrial and aquatic ecosystems in Secwépemc territory, impacting Secwépemc Nation members' way of life.

In recent decades, changes to Secwépemc Nation territory have fragmented the land and affected traditional land use practices and management. Industrial land use activities will continue to interact with Secwépemc Nation's traditional land use activities resulting in ongoing effects to the quality and quantity of resources and dissuading community members from using and accessing certain areas. Land use changes since the time of colonization have reduced opportunities for Secwépemc Nation members to meaningfully participate in the management of, and access to, their territory.

In the Application, HVC identified positive effects to Indigenous communities from the economic opportunities that HVC MLE will create, as well as some of the socio-economic indicators that highlight the barriers that Indigenous communities experience compared to the overall population, including to employment opportunities, health care, and housing.

The EAO acknowledges the adverse impacts from historical development and colonialism on Indigenous governance and ways of life and recognizes this context is important to understand how effects from HVC MLE might disproportionately affect Indigenous communities.

11.5. Bonaparte First Nation

Bonaparte First Nation, or St'uxwtéws, is a member band of the Shuswap Nation Tribal Council of the Secwépemc (Shuswap) people. The Band is located west of Cache Creek on about 1,878 ha of land. The band is separated into nine sections and has a membership of about 900.⁵⁰ The HVC MLE project footprint overlaps the southern edge of BFN's asserted territory.

11.5.1. Consultation and Engagement with Bonaparte First Nation

The EAO notified BFN of the HVC MLE environmental assessment on August 9, 2019. At that time, BFN declined to participate in the environmental assessment, wishing to leave engagement to more proximal communities, but requested that the EAO ask HVC to consider their members for employment. The EAO agreed and shared this request with HVC; HVC in turn held a meeting with BFN to discuss employment opportunities. The EAO continued to send key milestone notifications to keep BFN up to date on the environmental assessment.

In May 2022, BFN notified the EAO that they wanted to be more involved in the HVC MLE environmental assessment. Following the transition to the Act in August 2022, BFN provided notice of their intent to participate under the Act. From 2022 to 2024, the EAO and MMO scheduled monthly meetings with BFN and included BFN in the Technical Advisory Committee and all related project communication.

Key high-level concerns raised by BFN to the EAO during engagement and consultation included:

- Effects to water, fish, wildlife, economic, social and cultural factors, and to human health, with particular concern about effects to feral horses; and

⁵⁰ Source: Bonaparte First Nation [Bonaparte First Nation - Unified & Empowered by A Foundation of Tradition, Culture, and Language](#).

- Concerns about the proposed upgrades to the powerlines from the current mine site to the Nicola substation (not part of the HVC MLE environmental assessment).

HVC also met regularly with BFN between late 2021 and 2024 to discuss the effects of HVC MLE on BFN and its Indigenous interests. HVC worked collaboratively with BFN to carry out a traditional use study and assess the potential effects of HVC MLE on BFN's Indigenous interests. HVC incorporated this information into its Application, using only Indigenous knowledge approved by BFN to inform its assessment. HVC also shared drafts of its Application with BFN and worked to address comments, proposed edits and broader recommendations regarding the Application from BFN.

11.5.2. Bonaparte First Nation Indigenous Interests

During Application Development, HVC and BFN identified the following areas as having the potential to be affected by HVC MLE and therefore requiring assessment:

- Aboriginal rights:* Concerns include the effects of ongoing activities and development within Secwépemc Nation traditional territory on existing hunting, gathering, cultural and ceremonial sites in and around the northern end of the HVC Tailings Storage Facility. Existing development and activities in the area have already affected BFN's ability to exercise their Section 35(1) Aboriginal rights to hunt, fish, trap and participate in practices, traditions and customs.
- Governance, Law and Stewardship:* BFN governance, law and stewardship practices are guided by traditional laws and protocols rooted in respect for the land and its resources.
- Indigenous Economies:* Historic effects limiting BFN community members' access to their land and ability to practice land-based governance and livelihoods forced members to shift to the wage economy, however, resource extraction-based economic sources have proven to be unstable and financially insecure for Secwépemc communities.

11.5.3. Potential Effects to Bonaparte First Nation due to HVC MLE

In [section 11.7.4](#) of the Application, HVC identified the following potential effects to BFN due to HVC MLE.

11.5.3.1. Change to Ability to Exercise Aboriginal Rights

Effects to BFN's ability to exercise Aboriginal rights would include effects to practicing harvesting and other traditional use activities in the BFN traditional territory. HVC identified the potential for HVC MLE to cause direct and indirect negative effects to BFN's use and enjoyment of the lands through increased ambient concentrations of air contaminants and emissions, noise, and effects to the visual landscape. HVC MLE could affect the availability and quality of lands and resources relied upon for BFN to exercise their Aboriginal rights during the construction, operations and closure phases. In the Application, HVC outlined the predicted effects to BFN's right to hunt, fish and gather within the Indigenous Interest local study area and the potential effects to food security and obtaining resources required for cultural or ceremonial uses.

While HVC MLE may positively affect Indigenous Economies through increased employment, training and employee income through HVC MLE wage activities, increased participation of BFN members in economic wage activities may reduce participation in non-wage traditional economies due to timing limitations, and could negatively affect employed members' abilities to exercise their [Section 35\(1\)](#) rights to hunt, fish, trap and participate in practices, traditions and customs.

11.5.3.2. Governance, Law and Stewardship

Change to Governance, Indigenous Laws and Decision Making

BFN govern themselves as connected to the land and resources within their traditional territory. Potential changes to the land, air, water and resources as a result of HVC MLE may affect BFN's ability to practice Aboriginal rights and therefore

may affect BFN's ability to manage and make decisions in accordance with Indigenous law and governance practices. Predicted changes to economics, land and resource use, air quality, water, aquatic resources and wildlife have the potential to have irreversible effects due to the temporal extent of effects on the intergenerational transmission of knowledge.

Change to Stewardship of Lands and Resources

Incremental negative changes to biophysical, environmental and socio-economic conditions during HVC MLE Construction and Operation Phases may affect BFN's ability to engage in stewardship of the lands and resources in the Indigenous Interests local study area. Potential negative effects from predicted changes to linked valued components, including air quality, noise, ground and surface water, fish and aquatic resources, land and resource use, vegetation and ecosystems, wildlife and wildlife habitat, human health, and economic could conflict with BFN's governance, laws, customs, protocols, conservation and stewardship systems, or activities. These potential effects include changes to biophysical conditions, and the availability and quality of important resources such as wildlife, including feral horses, hunted mammals and birds, plants and fish resources, and cultural and spiritual locations.

11.5.3.3. Indigenous Economies

Changes in Ability to Maintain Indigenous Economies

HVC MLE has the potential to have positive and negative effects on BFN's ability to maintain Indigenous economies. Positive effects may include increased levels of financial income attributed to employment opportunities, access to training and economic activities associated with stimulated employment of local service-based businesses. Potential negative effects include effects to the availability of resources used in non-wage traditional economies and reduced participation in traditional practices such as harvesting due to increased engagement in wage activities. Further effects could stem from increased population, traffic and recreation facility usage in the Indigenous Interests local study area during HVC MLE Construction and Operation, straining local resources and disrupting harvesting practices. Additionally, during closure and Post-Closure Phases, BFN community members employed at the mine may experience job loss and a reduction in financial stability. This change would occur sooner if HVC MLE is not approved and the mine closes at an earlier date.

Changes in Economic Conditions

HVC MLE would contribute to the local and regional economy through direct, indirect and induced economic effects on jobs, income, gross domestic product and taxes which have the potential to have a direct positive effect on BFN's ability to improve economic conditions. Potential positive direct effects on BFN economic conditions are expected to occur due to predicted changes in economic conditions including increased job opportunities, access to training resources, enhanced skillsets and increased levels of financial income.

Changes in Business and Employment Opportunities

Changes in economic conditions from HVC MLE activities have the potential to have positive effects on BFN's business and employment opportunities with community members benefitting from employment opportunities, primarily the population with a trades certificate and construction experience. Businesses owned by or associated with BFN could benefit from contracting and procurement opportunities, however, smaller businesses competing for similar workforce requirements who cannot compete financially with wages and benefits or have inadequate capacity to deliver services to large projects may be disproportionately affected.

11.5.4. Issues Raised by Bonaparte First Nation

No key issues were identified by BFN related to potential effects to BFN or its Indigenous interests during the Application Review phase.

11.6. Stk'émłúpsmc te Secwépemc Nation

The SSN consists of the Tk'émłúps te Secwépemc and Skeetchestn Indian Band, one of the seven historic “Divisions” of Secwepemc Nation⁵¹. In 2007, the Tk'émłúps te Secwépemc and Skeetchestn Indian Band entered into a Resource Sharing Protocol Memorandum of Understanding, setting out SSN's responsibility for upholding SSN's constitutionally protected Aboriginal rights and title, managing conservation policies and natural resources within both nations' traditional territory, leading negotiations with governments and industry, and promoting the economic development of the SSN people. SSN is governed by the SSN Joint Council that is made up of the members of the Chiefs and Council from both nations.

The SSN traditional territory is located in the south-central Interior of B.C. stretching from the Columbia River Valley along the Rocky Mountains, west to the Fraser River and South to Arrow Lake.⁵² Tk'émłúps te Secwépemc has six reserves, and Skeetchestn Indian Band has four reserves located in the Kamloops area. The HVC MLE project footprint overlaps with the southern edge of SSN's asserted territory.

SSN wished to highlight in this Report that there is an ongoing legal proceeding in the Supreme Court of British Columbia that SSN filed against the Province, Canada and KGHM Ajax. SSN's filing claims rights and title to asserted SSN traditional territory, which includes a portion of the HVC mine site, and which states that the cumulative impact of industrial activities authorized by the Crown represent an infringement of their way of life and right to self-governance.

11.6.1. Consultation and Engagement with Stk'émłúpsmc te Secwépemc Nation

The EAO and SSN began meeting regarding the extension of the HVC mine life in 2019. On August 9, 2019, the EAO notified SSN an environmental assessment for the proposed expansion and extension of the HVC Mine was required. Between 2019 and 2024, SSN, the EAO and MMO met regularly to discuss HVC MLE, with MMO managing the permit amendment requirements on behalf of MCM, ENV, FOR and WLRS through the Combined Process. SSN and MMO also met monthly at their Joint Resource Committee in 2023 and 2024. SSN also attended meetings of the Technical Advisory Committee and met regularly with HVC regarding HVC MLE between 2018 and 2024.

In November 2022, as the EAO was finalizing the procedures for carrying out the environmental assessment, SSN indicated that they would participate in the HVC MLE environmental assessment as a participating Indigenous nation. SSN also stated that they would be carrying out their Project Assessment Process for HVC MLE, and would provide the results to the EAO by day 120 of the 150-day legislated Effects Assessment timeline, 30 days ahead of the EAO's referral of materials to ministers for decision. The EAO did not agree with SSN's timing as it did not believe that 30 days would be enough time for the EAO to incorporate the results of SSN's assessment into its referral materials and seek consensus with SSN on the referral materials. The EAO and SSN met multiple times to try to find a solution for timing of SSN's delivery of its assessment results that was workable for both parties. In correspondence dated December 9, 2022, SSN informed the EAO of the intention to provide the SSN Recommendation Report 30 days prior to referral.

The EAO decided that, to meet its requirements under the Act, the EAO would also carry out an assessment of the potential effects from HVC MLE to SSN's Indigenous interests and would accept the results of SSN's Project Assessment as an independent assessment, with results provided directly to Ministers for their consideration. SSN also indicated they did not want HVC to carry out an assessment of the potential effects of HVC MLE to SSN's Indigenous interests. In response, the EAO removed this requirement from the Application Information Requirements. The EAO confirmed the above in the Assessment Plan issued on December 16, 2022.

Additionally, SSN strongly disagreed with the Province's conclusions on First Nations' historical use and occupation of the Highland Valley and stated that that SSN has rights and title in the Highland Valley. The Province has no clear evidence

⁵¹ Source: Stk'émłúpsmc te Secwépemc Nation: <https://stkemlups.ca/about/>

⁵² Source: Tk'émłúps te Secwépemc <https://tkemlups.ca/profile/history/our-land/>

that Secwépemc territories included any part of the Highland Valley at the time of European contact or at 1846, but they may have. SSN provided several sets of additional information to support their assertion of rights and title in the Highland Valley, which were carefully reviewed and considered by the Province. These additional sets of information did not change the Province's understanding of First Nations' historical use and occupation of the Highland Valley at the legally relevant time periods or the Province's preliminary assessment of the strength of SSN's claims to Aboriginal rights and title in the Highland Valley.⁵³

The EAO engaged SSN as a participating Indigenous nation, including by seeking consensus with SSN at each required phase of the environmental assessment. Overall, consensus was not reached at any stage due to differing views on the scope and issues of the environmental assessment, and differing conclusions regarding the effects from HVC MLE to SSN's Indigenous interests.

During the environmental assessment, SSN raised multiple procedural concerns during meetings, in correspondence, and in reports shared with the EAO and MMO. Those concerns included:

- SSN's view that new federal and provincial environmental assessments should be required for ongoing groundwater extraction from the Basal Aquifer, rather than a provincial amendment.
- Inclusion of the Bethlehem project in the HVC MLE Base Case.
- SSN's view that current B.C. permits, including current M-11, PE-376, and PA-1557 are inadequate to manage effects from the current HVC mine.
- Ongoing concerns about past *Fisheries Act* violations at the HVC site and applicability of the federal Metal and Diamond Mine Effluent Regulation at the HVC mine site.
- SSN's disagreement with the Province's preliminary strength of claim assessment and the EAO's associated proposed accommodation measures.

The EAO, on behalf of the Province of B.C., responded to SSN's concerns through meetings, emails and letters, stating that:

- The Basal Aquifer Dewatering Project was substantially started in accordance with the Basal Certificate that originally authorized the project. An amendment to the Basal Certificate was the appropriate way to make the necessary changes to the Basal Certificate. Considering the effects of continuing dewatering in the HVC MLE environmental assessment would also provide a more holistic understanding of the effects of continued dewatering and HVC MLE.
- The Impact Assessment Agency of Canada declined to order a new environmental assessment for Basal Aquifer Dewatering Project as the Impact Assessment Agency of Canada views the changes proposed under HVC MLE as not triggering the *Physical Activities Regulations*, and that the federal Minister of Environment and Climate Change would not be able to designate HVC MLE as the physical activities proposed have substantially begun.
- As the Bethlehem project has already been approved to proceed through provincial permitting, it should be included in the Base Case for HVC MLE rather than assessed with the potential effects from activities associated with HVC MLE that have not yet been approved.
- The Combined Process would consider potential changes to the M-11, PE-376, and PA-1557 permits to manage effects associated with mine expansion and mine life extension.

⁵³ The term preliminary assessment refers an assessment of Aboriginal rights and title conducted by the Province based on available information; rights can only be established through litigation or a treaty negotiation process.

- While the Province's preliminary assessment of strength of claim helps inform which First Nations the EAO consults with on an environmental assessment and the scope of the Crown's consultation obligations, the environmental assessment process is not a rights-determining process nor is strength of claim the EAO's sole consideration in consultation. As noted previously, the Province considered all information provided by SSN, and the result was that the Province's preliminary assessment of SSN's claim to Aboriginal rights and title in the Highland Valley was unchanged. The EAO consulted SSN at the deepest level.

SSN also raised a variety of technical concerns regarding HVC MLE at meetings with the EAO and MMO, including the following concerns which were raised regularly by SSN:

- The effects of HVC MLE on environmental flow needs, water quantity and fish and fish habitat through changes to streamflows due to HVC MLE and climate change, noting the high recent levels of drought during summertime in the region.
- Concerns about the accuracy of the wildlife data collected by HVC and the wildlife habitat suitability mapping completed by HVC and HVC's effects assessment for wildlife, wildlife habitat and vegetation and ecosystems, noting that SSN believed that the effects to wildlife, wildlife habitat, vegetation and ecosystems were underestimated or inaccurate.
- Broader concerns about how the effects of HVC MLE would be mitigated and managed.

During Application Review, SSN's comments were responded to by HVC, and the EAO offered additional technical meetings, as did HVC, though SSN did not accept HVC or the EAO's offers to meet. The EAO carefully considered the issues SSN raised, considered potential effects to SSN's Indigenous interests, and developed proposed Certificate Conditions using an approach that considers the varying effects to the different First Nations engaged in the HVC MLE environmental assessment. At SSN's request, B.C. agencies, including the EAO and MCM, HVC, and federal agencies participated in SSN's Family Panel hearings, which were a component of SSN's Project Assessment Process for HVC MLE.

11.6.2. Stk'émłúpsəmc te Secwépəmc Nation Indigenous Interests

11.6.2.1. The EAO's assessment of effects to Stk'émłúpsəmc te Secwépəmc Nation

As requested by SSN, the HVC MLE Application did not include an identification of SSN's Indigenous interests that have the potential to be affected by HVC MLE. To meet its obligations under Section 25(1) of the Act, and as set out in Table 5 of the [HVC MLE Assessment Plan](#), the EAO used available information and concerns raised by SSN to identify interests that may be affected by HVC MLE, as well as information from consultation and engagement with SSN, including during SSN's Project Assessment process, and HVC's Application, to carry out this assessment.

Through SSN's participation in the environmental assessment, separate from its Project Assessment process, SSN expressed concerns about the effects of the current HVC mine and the potential effects of HVC MLE on the following areas:

- **Harvesting Rights:** Concerns regarding impacts to harvested organisms including fish, wildlife and vegetation through changes to air quality, water quality and quantity and noise disturbance. Existing developments and activities in their territory have already affected SSN's ability to exercise their Section 35(1) Aboriginal rights to hunt, fish, trap and participate in practices, traditions and customs. SSN wants to know how HVC MLE may change the abundance, distribution or quality of resources relied upon to engage in harvesting and subsistence activities, the ability to safely access and travel to or through traditional territories, the harvesting methods and practices and the use of culturally and ceremonially important sites and areas in and around the HVC MLE site.
- **Culture, Health and Well-being:** HVC's Application states that for Secwépəmc People, health is inextricably linked to culture. Secwépəmc health is holistic in nature and includes spiritual, physical, emotional and mental health supported by positive relationships with food, land, family and community. Industrial activity and changes to land

use have impacted Secwépemc way of life and have limited access and dissuaded communities from entering certain areas effecting knowledge transfer, harvest practices and cultural traditions and customs. SSN is interested in how HVC MLE will change their quality of experience, spirituality, connection to place and cultural attachment. SSN is also interested in how HVC MLE will make changes to revitalize, develop and participate in inter-generational cultural transmission and changes to Indigenous languages (including the opportunities for use, education, number of learners and speakers).

- **Governance, Law and Stewardship:** Secwépemc stsq'ey (Secwépemc law) is developed through thousands of years of Secwépemc history, learning and cultural practices where the history of the traditional territory has created the law and provides the “equipment for living” as Secwépemc People. SSN is interested in how HVC MLE may change their ability to practice or exercise their laws and governance systems, ability to manage and make decisions in accordance with Indigenous laws and governance practices and ability to engage in stewardship of lands and resources.
- **Indigenous economics:** Development within Secwépemc territory has impacted community members' access to their land and ability to practice land-based governance and livelihoods. Communities have been forced to shift to the wage economy, however, resource extraction-based economic sources have proven to be unstable and financially insecure for Secwépemc communities. SSN is interested in how HVC MLE may change their ability to maintain Indigenous economies, economic conditions and business and employment opportunities.

11.6.3. Potential Effects to Stk'emplúpsenc te Secwépemc Nation due to HVC MLE

The EAO identified the following potential effects to SSN due to HVC MLE, prior to the application of mitigation measures. This analysis draws from sources including, but not limited to: information in HVC's Application related to the wider Secwépemc Nation, from the EAO and MMO's engagement and consultation with SSN between 2019 and 2024, and from SSN's comments throughout the environmental assessment, including comments on the Application, and from reports and cultural heritage information shared by SSN, including SSN's 360 Reports and Family Panel Recommendations Report.

11.6.3.1. Harvesting Rights

- Potential for continued or increased effects to harvested species' populations and distribution, potentially reducing ability to exercise rights;
- Potential for increased contaminant exposure to the ecosystem affecting actual or perceived quality of harvestable resources; and
- Continued restrictions on access to potential harvesting areas altering harvesting practices and generational knowledge transfer.

11.6.3.2. Culture, Health and Well-being

- Potential for increased exposure for people and animals to contaminants through drinking water, harvestable resources and air quality;
- Continued effects to quality of experience, visual appearance and connection to place within the visual and noise local study areas and regional study areas; and
- Real or perceived contaminant exposure dissuading community members from travelling to or through certain areas of the Indigenous interests local study area, affecting participation in inter-generational cultural transmission and traditional cultural practices.

11.6.3.3. Governance, Law and Stewardship

- Land use change from historic and future use of the HVC mine site affect SSN's ability to engage in stewardship of the lands and resources in the Indigenous interests local study area;

- Predicted changes to valued components may conflict with SSN's governance, laws, customs, protocols, conservation and stewardship systems, or activities; and
- Delayed positive effects through increased land following closure and post closure phase.

11.6.3.4. Indigenous Economies

- Positive and negative effects on employment opportunities are expected:
 - Positive: increased employment, training and skill development opportunities, increased levels of financial income
 - Negative: increase in wages and employment reduces opportunities for non-wage economic activities and participation in traditional practices
- Positive and negative effects on Indigenous businesses are also expected:
 - Positive: increased bidding opportunities and access to contracts at the mine site
 - Negative: effects on smaller Indigenous businesses who may not be able to source workers
- Increased traffic and population in the region straining local resources;
- Contributions to the local and regional economy through direct, indirect and induced economic effects on jobs, income, gross domestic product and taxes have the potential to have a direct positive effect on SSN's ability to improve economic conditions; and
- Job loss and financial instability for any BFN or SSN members who may be employed at HVC and for any contracted SSN businesses following the Closure phase, which would occur sooner should HVC MLE not be approved.

11.6.4. Issues Raised by Stk'emplúsemc te Secwépemc Nation during Application Review

As previously noted, SSN raised a number of questions and comments about HVC MLE during the Application Review phase, to which the EAO and HVC responded. The EAO acknowledges that SSN was concurrently, and separately, conducting its own Project Assessment process. As part of this process, SSN's Family Panel review took place in July 2024, when the EAO's Effects Assessment phase was underway and the publicly available results were provided to the EAO on November 21, 2024⁵⁴. The list of key issues below has been summarized by the EAO based on SSN comments during Application Review and supplemented with results from SSN's Project Assessment Process.

11.6.4.1. Water quality and water quantity

SSN raised concerns regarding water quality, flow and quantity in Witches Brook and other watercourses, including:

- Metal concentrations and nutrient loading affecting the receiving ecosystems and thus affecting SSN consumable resources such as drinking water, vegetation (traditional medicines and traditional foods), fish and wildlife;
- Water flow, dewatering methods and the continuation of drought conditions, affecting ground and surface water at the receiving environment affecting consumable resources and water needs of SSN communities; and
- The amount of water used by the current mine and projected water use under HVC MLE, and potential related effects to water flows and the effects of changes in flows on fish and other organisms that rely on water to survive;

⁵⁴ Source: Stk'emplúsemc te Secwépemc Nation [Microsoft Word - HVC MLE Project Family Panel Recommendation Report - Final - Redacted Nov. 21 2024.docx](#)

- Water management strategies, inclusion of SSN perspectives and continued engagement with First Nations communities; and
- HVC's past non-compliances with the PE-376 permit and changes made to the permit by ENV.

The EAO notes that the current PE-376 effluent permit under the Environmental Management Act has been in effect since 1985, and currently includes requirements for HVC to manage sulphate in Pukaist Creek, to manage dissolved copper, total molybdenum, total manganese, nitrites, nitrates and ammonia at a key monitoring site in Witches Brook, to manage suspended sediment levels and ensure oxygen is available for aquatic life, and to treat sewage to the required provincial standard before reusing it in the mill process or discharging it to the Highland Tailings Storage Facility.

To address concerns from multiple parties, including SSN, about water quality and metal concentrations (as well as other parameters of concern), ENV has directed HVC to develop site performance objectives for Pukaist Creek per the draft PE-376 permit amendment (condition 3.7). This condition is in addition to the existing PE-376 permit requirement (condition 3.5) to develop discharge limits for releases from the Highmont Tailings Storage Facility, Bethlehem Tailings Storage Facility and Highland Tailings Storage Facility to Billy Lake, Witches Brook, Bose Lake and Pukaist Creek respectively. Condition 3.6 of the draft PE-376 permit amendment also sets out a proposed requirement for discharge limits for the Lower Trojan location. Water flow approvals and associated requirements are outlined in *Water Sustainability Act* licenses. One of the key mitigations proposed by HVC to address potential effects from continued water use at the HVC mine is an attenuation pond to support improved water flow in the Guichon watershed. The requirement for HVC to develop an attenuation pond is included in draft *Water Sustainability Act* licenses, developed by the WLRS in consultation with participating Indigenous nations.

The EAO has also proposed Condition 13 Watershed Management and Mitigation Plan, which would require HVC to develop an overall plan to manage the Witches Brook and Pukaist Creek watersheds, including considering how water flows can be maintained and enhanced. The EAO's view is that these mitigation measures will be sufficient to manage any effects to water quality and quality related to SSN's interests.

11.6.4.2. Indigenous businesses and employment opportunities

SSN posed questions regarding HVC's approach to ensuring adequate consideration of Indigenous businesses in contract bidding opportunities including detailed description, appropriate announcement and notification of opportunities and support for businesses to achieve necessary qualifications and improve bid submissions. SSN also requested information regarding HVC's plans to provide employment skill training programs for Indigenous peoples to increase economic and employment opportunities. Additionally, SSN raised the importance of employers understanding and accommodating Indigenous employees as they engage in cultural activities and suggest this be reflected in employment policies.

In response to SSN's questions, HVC highlighted the existing strategies in place and additional strategies under development to encourage Indigenous employment and procurement at the HVC mine.

The EAO's view is that HVC provided sufficient information regarding economics and the potential effects, including economic benefits to First Nations from HVC MLE, for the purposes of the environmental assessment.

11.6.4.3. Community support and involvement

SSN is interested in how HVC plans to support Indigenous Communities health and well-being with regards to the Emergency Preparedness and Response Plan, Traditional Food Quality Studies, inclusion in post-Certificate monitoring programs and through continued engagement with communities throughout Construction, Operation and Closure phases.

The EAO notes that HVC has committed to continue to engage with First Nations communities throughout the HVC MLE project, including throughout Construction, Operation and Closure phases, and that the M-11 permit requires continued engagement with First Nations.

11.6.4.4. Effects to wildlife and wildlife habitat

SSN raised concerns regarding HVC's Wildlife Management Plan including:

- Insufficient details about data collection, lack of agreement on monitoring methods and mortality reporting requirements, and overall dissatisfaction with scope and detail of the data collection;
- Lack of field verification of habitat types, which may have underestimated the level of habitat losses and thus underestimated effects to wildlife and wildlife habitat from HVC MLE; and
- Purpose and objectives of the assessment do not meet a requirement to identify and mitigate the loss of environment and social values to SSN, including through the Wildlife Management Plan in the M-11 permit, which is unsatisfactory to SSN.

The EAO acknowledges that SSN also has concerns about HVC's wildlife and wildlife habitat assessment, and that for SSN, there is uncertainty regarding the effects of HVC MLE on wildlife and wildlife habitat. The EAO's view is that uncertainty related to effects to wildlife and wildlife habitat are low to moderate, and that the existing requirements under the M-11 permit requiring HVC to implement the Wildlife Management Plan, including assessment of the effectiveness of the mitigation measures and results of monitoring associated with the Plan, sufficiently addresses SSN's concerns about the uncertainty of the wildlife and wildlife habitat assessment, and thus the effects of HVC MLE on wildlife and wildlife habitat.

11.6.4.5. Cumulative Effects

With consideration of historic, current and future land use and industrial activity in the Highland Valley, SSN has concerns regarding the cumulative effects on the land, water, animals, access to food, plants and other Indigenous determinants of health and well-being. SSN's view was also that cumulative effects should be assessed holistically rather than to individual valued components, and that incremental effects were assessed by HVC rather than cumulative effects. SSN also opposed limiting HVC's cumulative effects assessment to the regional study areas for each valued component. SSN pointed out particular concerns with declines in moose and mule deer populations, and knock-on effects from these to Indigenous people who rely on those species for food security and their way of life, including SSN members.

As required by the HVC MLE Application Information Requirements, HVC assessed cumulative effects arising from the combination of existing conditions, HVC MLE and new potential projects for each valued component. HVC did not find any cumulative effects from HVC MLE on any valued component, as it included existing and past effects into the Base Case and Project Case. As part of this Report, the EAO has also assessed effects to valued components and has noted where cumulative effects are expected to occur as a result of HVC MLE's contribution to existing cumulative effects. The EAO's view is that, while HVC MLE will contribute to existing cumulative effects, potential cumulative effects from HVC MLE will be adequately managed through the amendments to existing permit conditions, new permit authorizations where required, and through the EAO's proposed Certificate Conditions. The EAO has also proposed Condition 17 Cumulative Effects which would require HVC to participate in any cumulative effects assessment or management activities that includes the Highland Valley carried out jointly by First Nations and B.C, as required by the EAO.

11.6.4.6. Climate Change

SSN has concerns regarding infrastructure failures due to climate change-related events, which could result in unauthorized discharges. SSN also remains extremely concerned about climate change, drought and the mine's effects on water quantity given the water use levels at the mine site, and how these factors combine now and into the future to affect environmental flow needs.

The EAO acknowledges that this issue is of high importance to SSN. Requirements in the *Mines Act* M-11 permit and, in the Health, Safety and Reclamation Code for Mines in British Columbia are designed to protect workers and the public and reduce the health, safety and environmental risks related to mining activities and potential infrastructure failures.

The EAO has included a requirement for drought management strategies under Condition 13 Watershed Management and Mitigation Plan, which will help reduce the mine's water use during critical drought periods, making sure that the most water possible remains in watersheds to support environmental flow needs and the water use needs of communities and businesses downstream. WLR's draft *Water Sustainability Act* license conditions would also require the development of a drought management plan (which would further support planning and actions to be taken by HVC during times of drought) and would also require HVC to augment flows in Witches Brook, which would serve to protect environmental flow needs.

11.7. Key Mitigation Measures Proposed by HVC

HVC identified mitigation measures proposed for valued components that are linked to Indigenous interests in [Application Table 11.7-7](#). These mitigation measures have been proposed by HVC to address potential negative effects and enhance potential benefits from the proposed mine expansion.

A selection of mitigations noted by the EAO and proposed by HVC to address potential negative effects to Bonaparte First Nation and Stk'emlúpsmc te Secwépemc Indigenous interests include:

- In addition to existing fish and aquatic resources mitigation strategies, HVC would update construction management plans to protect water and fish during construction, including a section on fish relocation. HVC would also develop a fish habitat offsetting plan, where required, and update the Annual Aquatic Biomonitoring Program to include increased fish tissue, water and sediment sampling.
- HVC would complete pre-clearing surveys to identify the presence of nest trees for Schedule 1 species protected under the federal Migratory Bird Convention Act and install artificial roosting structures to mitigate bat roosting following the removal of forest habitat, in addition to existing wildlife and wildlife habitat mitigation strategies and reporting requirements;
- HVC's management and mitigation of change in employment would provide career planning events and activities geared toward Indigenous youth and provide disability support by offering opportunities for work with appropriate support and safety considerations;
- HVC has committed to monitoring of their local and Indigenous employment and procurement, and to reporting out on this monitoring as part of ongoing community engagement to help inform continuous improvement; and
- HVC would develop a Social Management Plan to consolidate all plans and actions to address social effects generated from HVC's Mine Site operations and HVC MLE. HVC would also create a Social Closure Plan specifically to help manage the socio-economic effects of the Closure process by considering Indigenous Governments and Organizations and public input provided during ongoing engagement and drawing on Teck's previous experience closing mines.

11.8. Stk'emlúpsmc te Secwépemc Nation Project Assessment Process and the EAO's Response

SSN undertook its Project Assessment Process on the past effects of the HVC mine and the effects of HVC MLE combined, and presented the findings to its SSN Family Panel held from July 22-26, 2024, in Kamloops, B.C. The Panel heard evidence from almost 70 witnesses, including from Secwépemc knowledge keepers and community members, HVC, provincial representatives (EAO, MCM, ENV), and Fisheries and Oceans Canada.

On October 31, 2024, SSN submitted the Review Panel Recommendations Report confidentially to the EAO and to HVC. SSN also released a public statement from the Joint Council on November 14, 2024⁵⁵ stating that SSN does not give its free, prior and informed consent to HVC MLE and that “the Highland Valley Copper Mine has already caused serious harm to the lands and water in SSN’s ancestral lands, and SSN believes that the proposed HVC MLE Project would lead to more significant and permanent damage.”

On November 21, 2024, a redacted version of that report was posted on SSN’s website, accessible here: [HVC MLE Project Family Panel Recommendation Report - Final.docx](#). The Review Panel Recommendations Report included more than 100 recommendations for measures to be undertaken if the proposed HVC MLE is approved by the Province. On December 5, 2024, HVC provided the EAO and SSN with detailed responses to each of SSN’s recommendations.

The EAO has summarized the key findings of SSN’s assessment below. For the full results of SSN’s assessment, including SSN’s views on its historical use and occupation of the Highland Valley and the Panel’s views on the adequacy of mitigation measures to address effects assessed by the Panel to SSN’s Aboriginal rights and title, please see the link above to the report on SSN’s website.

11.8.1.1. SSN Aboriginal rights, culture, governance and cumulative effects

SSN’s Joint Council Decision stated that the Highland Valley is in SSN territory and is culturally significant as an area where *tkwilc*, or Indigenous doctors, would meet and practice together. The Panel Reports stated that this area of SSN territory is identified by the Secwépemc people in Secwepemctsin as Ctseltsaltnéws. SSN stated that effects from colonialism, beginning with settlers’ introduction of cattle in the late 1850s and continuing with mining in the Highland Valley, have resulted in a loss of agency and control over ancestral lands, and disruption of the historical harvesting seasonal round. SSN stated that mining in the Highland Valley since the 1960s has polluted waterways, harmed plants and animals and disrupted their habitats and migration routes, which has in turn affected SSN’s Aboriginal rights and culture. SSN stated that HVC MLE would result in an additional 1,500 ha of disturbance, that HVC MLE is incompatible with SSN expectations for use of the land, that the effects from HVC MLE on SSN members would be unacceptable, and that HVC MLE would extend the time until SSN could again use the Highland Valley.

11.8.1.2. Water quality and quantity, need for water treatment, and compliance issues

SSN’s Joint Council decision expresses SSN’s deep concerns regarding the effects of HVC MLE on water quality and quantity, noting historical effects from mining through the draining of four lakes in the Highland Valley, contamination released by the mine, and depletion of aquifers which affects local streamflows. SSN stated that HVC’s proposed annual water use for HVC MLE of 113.5 million cubic metres is very high compared to the annual water use of 19 million cubic metres of water used by the City of Kamloops. SSN noted that water flows would not return to pre-mine levels until 2154, 80 years longer than if HVC MLE were not approved. SSN concluded that the timeline for implementing proposed water treatment is too long and that allowing HVC to postpone building a water treatment plant delays the risk of needing water treatment to a late time in mine operations. SSN also stated that fines imposed on Teck Coal (now Elk Valley Resources, a wholly-owned subsidiary of Glencore Canada) in the Elk Valley show that the cost of remediation is much higher than predicted, and that Teck has demonstrated non-compliance at its previous operations in the Elk Valley. SSN concluded that these effects to water would have unacceptable effects to SSN members and their rights, as the Family Panel Recommendations Report stated that SSN members continue to be adversely impact by the project as they eat the foods harvested, hunted, and trapped from this area.

11.8.1.3. Wildlife and habitat loss, air quality and human health effects

SSN’s Joint Council Decision states that the Highland Valley is an important hunting ground for mule deer and elk and explained that the loss of 1,500 ha of wildlife habitat for HVC MLE goes against SSN’s beliefs in properly managing and

⁵⁵ Source: Stk’emlúpsmc te Secwépemc Nation stkemlups.ca/hvc-mle-review-process/

caring for wildlife and wildlife habitat. SSN concluded that the amount of dust that would be produced under HVC MLE, the time over which it would be produced for, and the effects of dust on human, wildlife, and vegetation health (as mine dust can fall on vegetation that can be eaten by wildlife or humans) presented unacceptable risks and effects to SSN members and their rights.

11.8.1.4. The EAO's response to SSN's Project Assessment Process and Family Panel Recommendations Report

Upon receipt of SSN's Family Panel Recommendations Report and Conditions and the Joint Council Decision Statement on October 31, 2024, the EAO reviewed the materials and considered the report findings and the 105 conditions proposed by SSN, and HVC's December 5, 2024, response to each of the 105 proposed conditions.

The EAO's analysis is that the key issues and recommendations raised by SSN in its report have been discussed in detail throughout the Combined Process and were raised by SSN directly to the EAO during the environmental assessment. Based on a detailed analysis of SSN's proposed 105 conditions, the EAO's view is also that mitigations for many of the issues identified in the 105 conditions are addressed through the EAO's proposed Certificate Conditions, existing permit requirements or new proposed permit requirements. SSN has stated their disagreement with the management approach relied on by B.C. to address current effects from the HVC mine and any additional effects from HVC MLE; the EAO's view is that management actions currently planned and underway are the most effective way to manage any potential effects to Indigenous interests and to valued components resulting from HVC MLE.

The EAO highlights the following key mitigations proposed by the Province that will help to address recommendations included in SSN's Family Panel Recommendations Report:

- *Water quality and water treatment* – extensive effort and focus has been put to the topic of water quality around the HVC mine throughout the environmental assessment. To address concerns, the Environmental Protection Division in the Ministry of Environment and Parks (ENV) and the Ministry of Mining and Critical Minerals (MCM) have proposed stepped requirements to improve water quality at the HVC mine, as outlined in detail in section 13.4 of this Report.
- *Water Quantity, Aquatic Systems and Riparian Environments* – to address findings about the cumulative and HVC MLE-specific effects on water from the environmental assessment, the EAO has proposed conditions for a Watershed Management and Mitigation Plan and a Wetlands and Riparian Offsetting plan. Together, these plans are intended to mitigate effects from HVC MLE on the watersheds and ecosystems in the Highland Valley. As well, proposed authorizations by the Ministry of Water, Land and Resource Stewardship (WLRS), ENV and the EAO include requirements for increased monitoring and mitigations, with consideration of adaptive management and planning for drought periods and climate change.
- *Air quality, dust and contamination* – in response to concerns from First Nations, including SSN, ENV is proposing substantial changes to the PA-1557 air discharge permit including an updated fugitive dust management plan and a continuous monitoring network to trigger dust mitigation within the mine site, and two new stations to monitor ambient air quality outside of the mine with reporting to compare the results to federal and provincial air quality standards and objectives.
- *Flora and Fauna* – to address potential effects to wildlife and vegetation, the Wildlife Management Plan and Vegetation Management plan are required by *Mines Act* M-11 permit, including requirements for data collection and reporting.
- *Human, Ecological, Holistic Health* – the EAO determined there would not be significant adverse effects on health related to HVC MLE, as mitigations under the *Environmental Management Act* PE-376 permit and PA-1557 permit are reasonably expected to manage the potential effects of HVC MLE to water and air quality, respectively. As part of the environmental assessment, the EAO considered the potential disproportionate effects to distinct groups, including women, and Indigenous people, considered intersectionality between those identifiers for

people who are members of more than one group, and concluded that HVC MLE would not create disproportionate effects to any distinct group.

- *Tailings Storage Facility, Dam Safety and Reclamation costing* – these matters are within the regulatory oversight of MCM, which has a thorough process for the review and management of risks associated with mine infrastructure including the tailings storage facility, as well as for determining the financial bonding associated with mine sites. MCM notes that the *Mines Act* application requires a tailings alternatives assessment and that regulators do not prescribe specific technologies. MCM also notes that the *Mines Act* M-11 draft permit requires a dam breach and inundation study.
- *Effects to Cultural Heritage Features* - potential effects to cultural heritage features, such as hunting blinds, are documented in the SSN Family Panel Recommendations Report. The EAO understands that cultural heritage features such as hunting blinds were historically used by both the Nlaka'pamux and the Secwépemc peoples. HVC has been issued permits for archaeological work in the Highland Valley, and through these permits would be required to evaluate whether these cultural heritage features are included for protection under the *Heritage Conservation Act*. In a December 5, 2024 response to the SSN Family Panel Recommendations Report, HVC noted that there are policies and procedures in place at the HVC mine to protect cultural heritages sites such as hunting blind features from disturbance (e.g. HVC Disturbance of Land or Water Policy and HVC Chance Find Standard) and that HVC can work with SSN to map these features within existing policies and procedures. Should these cultural heritage features not be protected under the *Heritage Conservation Act*, or by HVC's existing policies, they may be lost to the mine expansion. The EAO has considered this loss in its assessment along with proposed mitigation measures and concluded that HVC MLE would have a non-significant residual effect on cultural heritage resources but would contribute to an existing significant cumulative adverse effect to cultural heritage resources (considering cultural heritage resources lost in the Highland Valley in the past, in addition to those that could be lost under HVC MLE).

The EAO notes that while there is a large amount of overlap in the concerns raised by all parties in the environmental assessment and those raised by SSN's Project Assessment process and Family Panel Recommendations Report, there are distinct differences in the assessment frameworks used by the EAO and SSN to scope, examine, and assess the effects of HVC MLE. These differences in assessment frameworks and in views on SSN's claims to Aboriginal rights and title in the Highland Valley have resulted in differing findings regarding the effects of HVC MLE and the proposals regarding how to best mitigate these potential effects.

The EAO considered the residual and cumulative effects to SSN's Indigenous interests and made its findings regarding the appropriate mitigations and accommodations in this context.

11.9. The EAO's Characterization of Residual Effects to Bonaparte First Nation and Stk'émilúpsemc te Secwépemc Nation

The Act requires an assessment of the effects of a project on First Nations and their rights as recognized and affirmed by Section 35 of the *Constitution Act, 1982*. To assess the potential effects of HVC MLE on the BFN and SSN, the EAO considered the key areas of interest outlined in sections 11.5 and 11.6 of this Report, the information provided in section 7.12 and Chapter 11 of the Application: Assessment of Culture and Indigenous Interests, engagement with representatives from SSN and BFN, and issues raised during environmental assessment. Based on the Province's understanding of the historical Indigenous use of the Highland valley and the proximity of HVC MLE on the edge of BFN and SSN's territory, the EAO concluded that the potential effects from HVC MLE to both BFN and SSN are similar, and as such, has combined the assessment of residual effects to these groups, as set out below.

After considering the historical background, the findings from SSN's Family Panel Recommendations Report, HVC MLE-specific information and analysis in both HVC's Application and this Report, the EAO characterized the expected residual

effects of HVC MLE on BFN and SSN, taking into account proposed mitigation measures and draft Certificate and permit Conditions. The details are included in the table below.

The EAO concludes that the residual effects from HVC MLE on BFN and SSN's Indigenous interests is negligible to minor.

11.9.1. Summary of Residual Effects to Bonaparte First Nation and Stk'emlúpsemc te Secwépemc Nation

Table 15: Summary of residual effects for Bonaparte First Nation and Stk'emlúpsemc te Secwépemc Nation and their Indigenous Interests

Aboriginal Rights or Indigenous Interest	Assessment Rating	Effects and Rationale
Aboriginal Rights Effects to BFN and SSN's ability to exercise their Aboriginal rights to hunt, fish, trap and engage in Secwépemc practices, traditions and customs.	Context (resilience): Moderate Magnitude: Negligible to Minor Extent: Regional Duration: Long-term Reversibility: Irreversible to partially reversible Frequency: Continuous Affected Populations: Even Risk (likelihood and consequences): High Uncertainty: Moderate Importance: High	Negligible to minor The EAO acknowledges the important context of the proposed HVC MLE project, that First Nations people with current and historical connections to the Highland Valley area have already been affected in their ability to exercise their rights by past industrialization, privatization of property, and fencing and gating of areas previously accessible. Incremental negative residual effects on environmental, biophysical and socio-economic conditions (as represented by the residual effects to valued components assessed for HVC MLE) may have add further negative residual effects to BFN and SSN's ability to exercise Aboriginal rights in the Indigenous interests local study area or regional study area. The wide range of mitigation measures proposed by HVC, amended permit conditions and proposed Certificate Conditions are expected to manage HVC MLE-specific effects to valued components which could cause effects to BFN and SSN's Aboriginal rights. This includes M-11 permit requirements to manage effects to wildlife and vegetation, and to require that the mine site be reclaimed and revegetated, portions of the PE-376 and PA-1557 permits designed to minimise contaminants in air and water, and proposed Certificate Conditions designed to require HVC to reduce HVC MLE on GHG emissions to net-zero by 2050, increase watershed stewardship, and consider drought management. The EAO assessed the magnitude of effects to be negligible to minor because the Province understands the HVC MLE to be at the very edge of Secwépemc territories, where territorial overlaps with the mine site are relatively small. Additionally, the Province's view of historical use of the Highland Valley is that while some historic Secwépemc people may have accessed the Highland Valley based on kinship ties, ethnohistoric information points to this area being Nlaka'pamux territory. Given these two factors, in combination with the EAO's understanding of the effects of HVC MLE, the magnitude of effects to BFN and SSN's Aboriginal rights is expected to be negligible to minor. Effects resulting from the development of HVC MLE are expected to be long term, with some effects, such as some types of valuable habitat loss being irreversible and others, such as revegetation efforts, partially reversible over time. The likelihood of residual effects is high with a medium level of uncertainty, as certainty in the effectiveness of mitigation measures is also moderate. The negative residual effect is considered to be of high importance as Aboriginal rights are constitutionally protected.

Aboriginal Rights or Indigenous Interest	Assessment Rating	Effects and Rationale
Governance, Law and Stewardship Effects to BFN and SSN's governance, laws, customs, protocols, conservation and stewardship systems.	Context (resilience): High Magnitude: Negligible to Minor Extent: Limited Duration: Long-term Reversibility: Partially reversible Frequency: Continuous Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Low Importance: Moderate	Negligible to minor The context for Governance, Law and Stewardship has been rated high as BFN and SSN will continue to have the ability to govern and implement laws, customs, protocols, conservation and stewardship systems beyond the HVC MLE footprint within their asserted territory. Land use changes from HVC MLE will be minimal resulting in a negligible to minor magnitude of residual effects to BFN and SSN with an extent limited to HVC MLE footprint. Additionally, B.C.'s view of historical use of the Highland Valley is that while some historic Secwépemc people may have accessed the Highland Valley based on kinship ties, ethnohistoric information points to this area being Nlaka'pamux territory. Due to the nature of the mine, land-use changes from HVC MLE will have long-term duration with a continuous frequency and will be partially reversible in reclamation efforts. Residual effects to governance, law and stewardship would evenly affect Secwépemc communities within the region with low risk and uncertainty this effect. The residual effect is considered of high importance to BFN and SSN.
Indigenous Economies Effects to BFN and SSN's economic conditions through economic opportunities and economic equity, employment income, unemployment rate and labour force participation rate, job market and skills and type or level of education.	Context (resilience): Moderate Magnitude: Negligible to Minor Extent: Beyond regional Duration: Mid-term Reversibility: Partially reversible Frequency: Irregular Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Negligible to minor BFN and SSN members, including those who are business owners, may choose to benefit from the access to increased contract bids, employment, training and skill development opportunities associated with HVC MLE, resulting in a moderate context rating with medium magnitude. BFN and SSN do not currently have economic benefits agreements with either B.C. for mineral tax revenue. Positive residual effects from HVC MLE on economics are expected to extend beyond the region, affecting populations evenly. Some negative effects to Indigenous economies may be felt if Secwépemc members' participation in the traditional wage economy removes opportunities to participate in the Indigenous economy. The consequence of this positive effect is moderate (moderate magnitude and beyond regional extent), and the likelihood is high, resulting in moderate risk. There is a low level of uncertainty as the economic effects are predictable now and, in the future, when the mine is certain to close; as such effects would be partially reversible. The residual effects on Indigenous economies are of high importance to BFN and SSN.

Aboriginal Rights or Indigenous Interest	Assessment Rating	Effects and Rationale
Culture, Health and Well-being Effects to BFN and SSN's quality of experience, spirituality, cultural attachment, inter-generational cultural transmission and Indigenous languages.	Context (resilience): Moderate Magnitude: Negligible to Minor Extent: Regional Duration: Long-term Reversibility: Partially reversible Frequency: Continuous Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Negligible to minor The context for Culture, Health and Well-being is considered moderate, as First Nations cultures in the region have been severely interrupted by colonialism, including residential schools, and industrialisation. Magnitude is considered negligible to minor because while the Highland Valley may have been a place of specific cultural uses by SSN as asserted, and effects from HVC MLE are expected to reduce cultural experiences via effects to noise, visual quality, and concerns about landscape and wildlife contamination, most of the losses to areas in the Highland Valley have occurred under previous mining, so are not a residual effect of HVC MLE. Additionally, the Highland Valley is on the edge of Secwépemc Nation asserted territory and BFN and SSN members can exercise rights and cultural practices in other areas of their territory. As noted above, B.C.'s view of historical use of the Highland Valley is that while some historic Secwépemc people may have accessed the Highland Valley based on kinship ties, ethnohistoric information points to this area being Nlaka'pamux territory. The extent of residual effects to Culture, Health and Well-being is expected to be regional with long-term duration and partially reversible following Closure and Post Closure reclamation efforts. Risk of effects are rated as moderate (low magnitude and regional extent) with moderate uncertainty with a moderate level of uncertainty due to cause-effect relationships between linked valued components and interactions with BFN and SSN's Culture, Health and Well-being.
* Note: Criteria and assessment ratings are defined in Appendix 1 – Residual Effects Characterization Definitions		

11.10. Assessment of Cumulative Effects to Bonaparte First Nation and Stk'émłúpsmc te Secwépemc Nation

Cumulative effects from development such as mining, forestry, and ranching are a focus for First Nations in the region and are one of the reasons why several First Nations chose to complete their own assessments for HVC MLE. The EAO's methods for assessing project and cumulative effects, particularly for project expansions such as HVC MLE, are not always in alignment with how First Nations view historical and ongoing effects to the land and their Indigenous interests. Cumulative effects across the region, and particularly related to past development of the HVC mine site, were raised as a key concern by SSN's representatives.

11.10.1. HVC's assessment of cumulative effects to Bonaparte First Nation and Stk'émłúpsmc te Secwépemc Nation

In the Application, HVC considered the cumulative effects on BFN's Indigenous interests rights. At SSN's request, the HVC MLE Application Information Requirements did not require HVC to assess either direct effects or cumulative effects to SSN's Indigenous interests, as SSN indicated it was conducting its own separate Project Assessment process outside the environmental assessment.

The HVC MLE Application Information Requirements identified the following two reasonably foreseeable projects that have the potential for cumulative interactions on Secwépemc Indigenous interests: Mount Mabel Wind Projects and the quA-ymn Solar Project. This is in addition to forestry, mining exploration, transportation, parks, recreation and agriculture activities currently operating in the region which are assumed to remain similar to present levels. Based on HVC's

prediction of residual effects to BFN, HVC considered that residual effects on BFN's ability to exercise Aboriginal rights have the potential to interact with reasonably foreseeable projects, land use activities in the regional study area and ongoing effects of climate change.

HVC identified that cumulative effects to BFN's ability to exercise their Aboriginal rights related mainly to land use and temporary increases in population levels during the Construction phase and were considered minor. This characterization of cumulative effects reflects that contributions from climate change and land use activities in the local study area and regional study area are larger effects and HVC concluded that HVC MLE represents a minor contribution to wider cumulative effects across the region. HVC predicted that proposed mitigation measures for residual effects would also be effective for cumulative effects and proposed no further mitigation measures to address cumulative effects.

11.10.2. The EAO's assessment of cumulative effects to Bonaparte First Nation and Stk'emlúpsmeḱ te Secwépemc Nation

The EAO considered HVC's assessment and existing conditions at the mine site as described in the HVC Base Case, that is, a large, long-term mine which began operations in the 1960s and has a long history of effects to valued components in the Highland Valley. The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects may have effects on BFN and SSN's interests, which are expected to be managed in a similar manner to how HVC has proposed to manage effects to BFN and SSN's interests for HVC MLE.

Based on HVC's assessment of potential residual and cumulative effects to BFN, the EAO's analysis related to residual effects from HVC MLE to BFN and SSN, and engagement with BFN and SSN, the EAO concludes that HVC MLE would contribute to an existing cumulative effect on BFN and SSN's ability to exercise their Aboriginal rights, culture, economies and governance. The EAO agrees with HVC that increased land disturbance from HVC MLE and predicted temporary increases in population levels during the HVC MLE Construction phase could reduce BFN and SSN members' abilities to hunt, trap, fish and gather in the Indigenous interests regional study area. Considering these effects and the Province's understanding of the historical Indigenous use of the Highland valley and the proximity of HVC MLE on the edge of BFN and SSN's territory, the EAO concludes that cumulative effects to BFN and SSN's Indigenous interests would be minor.

11.11. Summary of SSN's response to the EAO's assessment

As a result of the dispute resolution process between the EAO and SSN, SSN provided edits to this Report, which the EAO considered and sought to integrate throughout section 11 above. For transparency, the EAO is providing SSN's view in their own words; items included in italics below are direct excerpts from SSN's written comments to the EAO and items below in regular text are the EAO's summarizing of SSN comments and information on how the EAO has considered those issues. After thoroughly considering SSN's comments, the EAO's conclusions regarding the effects from HVC MLE to SSN's claimed Aboriginal rights and title, or other interests are unchanged.

11.11.1. The Secwépemc People and SSN's views on ethnohistory of the Highland Valley

The Secwepemc are an Aboriginal people living in the area around the confluence of the Fraser and Thompson Rivers. The Secwepemc Nation is comprised of seven large territorial groupings referred to as "Divisions". The Stk'emlúpsmeḱ te Secwepemc Division (SSN) is comprised of the Skeetchestn Indian Band and the Kamloops (or Tk'emlups) Indian Band. Both are bands within the meaning of section 2 of the Indian Act. SSN's members are also Aboriginal peoples within the meaning of section 35 of the Constitution Act, 1982 and paragraph 5(1)(c) of the Canadian Environmental Assessment Act, 2012. Tsleil-Waututh Nation v. Canada (Attorney General), 2018 FCA 153 (CanLII), [2019] 2 FCR 3 (throughout).

The HVC MLE Project is located in an area known to SSN and its ancestors as Ctsełtšalnénws. Ctsełtšalnénws was and is a cultural landscape of spiritual work and power that was a unique and important meeting ground for tkwilt (Indigenous

doctors from Secwépemc communities and neighbouring nations). *Ṭkwilc* underwent years of training to become experts in physical, emotional, spiritual, and mental healing practices, and were called upon by families whose members had fallen sick. There were certain places where *ṭkwilc* were known to practice together, including at *Cṭkwilcmeñ ten* (Quiltanton Lake), which means the “place where Indian doctors practice”, and includes the entire area around *Cṭkwilcmeñ ten*, Little Divide Lake and its outflow to Witches Brook, and extending to Bose Lake. Our elders tell us that the area between these sites was a unique and important medicine practicing place for the *ṭkwilc*. The water in this area was special and was used as a medicine due to the high concentration of copper found in that area which had healing qualities. The *ṭkwilc* who were active in this area continue to be remembered by name, and their descendants live in the *Skeetchestn* and *Tk'emlúps* communities. The *ṭkwilc* also relied on other natural elements. They knew where these powerful places were and they returned there to collect medicines and share information about medicines. The southeast part of *Cṭselt'sálnéws* remains a sacred area for the Secwépemc people who practiced there.

SSN's view is that the EAO has ignored both ethnohistoric information provided by SSN and the Family Panel Recommendations Report where sworn evidence from SSN members is to the contrary of the Province's preliminary assessment of strength of claim.

The EAO's view is that it has adequately addressed these concerns raised by SSN. Please refer to sections [3.1.1 Historical Use and Occupation in the Highland Valley](#) and [11.1 Secwépemc Overview](#) of this Report where EAO discusses the ethnohistory of the Highland Valley.

11.11.2. SSN's views on consultation undertaken by the EAO

SSN is of the view the EAO merely took notes of SSN's concerns but has not proposed adequate or any mitigation or accommodation measures to address the concerns. In a number of instances, SSN was directed to talk to Teck to accommodate its Indigenous concerns.

The EAO highlighted key mitigations proposed by the province that align with recommendations included in SSN's Review Panel Recommendations Report. In response SSN views the EAO's management approach to be inadequate and not consistent with best management practises and industry standards. SSN asserted that in many instances, the EAO does not even follow their own standards set out in other permits which are directly applicable to the circumstances of this HVC MLE Project.

By letter to the EAO, SSN submitted 360° Review Reports to the EAO outlining concerns with the Combined Process for the HVC MLE Project on November 2019 and June 2024; the EAO responded to these concerns through the environmental assessment process as well as directly by letter.

The EAO's view is that it engaged with SSN in good faith and consulted SSN at a deep level to understand SSN's concerns and issues related to HVC MLE. The EAO's conclusion is that it has adequately addressed these issues and concerns raised by SSN. Please refer to sections [11.6.1 Consultation and Engagement with Stk'emlúpsemc te Secwépemc Nation](#), [11.6.3 Potential Effects to Stk'emlúpsemc te Secwépemc Nation due to HVC MLE](#), [11.8 Stk'emlúpsemc te Secwépemc Nation Project Assessment Process and the EAO's Response](#) where EAO discusses consultation with SSN and mitigations proposed to address issues raised by SSN.

11.11.3. Cultural heritage

There are several impacts of the HVC MLE Project that are unique to SSN including, without limitation, the presence of eight (8) hunting blinds. These hunting blinds were described in the Cultural Heritage Studies and SSN knowledge keepers gave evidence at the SSN Review Panel Hearing. No mitigation measures or conditions have been made by the EAO to address the issue of protecting and preserving SSN's cultural and heritage interests in these hunting blinds. All are at or in proximity to the mine site and the road relocation area.

The EAO's view is that it has adequately addressed these concerns raised by SSN. Please refer to section [11.8 Stk'émłúpsəmc te Secwépəmc Nation Project Assessment Process and the EAO's Response](#) where EAO discusses potential effects to cultural heritage features raised by SSN, as well as section [13.11 Heritage Resources](#), where the EAO assesses effects from HVC MLE to cultural heritage resources.

11.11.4. Water quality and quantity

Teck continues not to meet the concentration limits in the current PE-376 effluent permit and the permit limits have been amended to permit Teck's non-compliance. Pukaist Creek is fish bearing and flows directly into the Thomson River. SSN's Review Panel Report describes concerns with the proposed extraction of water for the HVC MLE Project from 18,000 m³ to 51,000 m³ per day, further reducing the baseflow to Witches Brook, depleting our aquifers, and continuing to jeopardize the health and cleanliness of our waterways. For more information on the HVC MLE Project's impacts to water, see Chapter 5 of the SSN Review Panel Report. SSN members report observations of no water in Witches Brook where Witches Brook is a fish bearing stream.

In 2020, Teck notified the DFO that it discovered a number of non-compliance issues under the Fisheries Act regarding HVC Mine's operations, including at Witches Brook and other water bodies on an ongoing basis. Since that time, SSN has been engaged with Teck to take remediation measures to rectify its non-compliance, as discussed in Chapter 17 of the SSN Review Panel Report.

The EAO's view is that it has adequately addressed these concerns raised by SSN. Please refer to sections [11.6.4.1 Water Quality and Water Quantity](#) and [11.8 Stk'émłúpsəmc te Secwépəmc Nation Project Assessment Process and the EAO's Response](#) where EAO discusses potential effects to water quantity and quality, and proposed mitigation measures to address issues raised by SSN. Additional assessment and consideration of effects to water quality and quantity is included in sections [13.3 Groundwater](#) and [13.4 Surface Water](#).

11.11.5. Cumulative effects

SSN is critical that the cumulative effects must be measured holistically. Teck's application took a fragmented and piecemeal approach to cumulative effects. The EAO only required Teck to consider the incremental disturbance from the HVC MLE Project. The base case also included Bethlehem Extension Project even though that project has not started. Cumulative effects were limited to the boundaries of the RSA which failed to consider impacts like droughts and wildfires.

Dr. Klinkenberg provided expert opinion to the SSN Review Panel. Dr. Klinkenberg noted that one approach to considering cumulative effects is to consider a culturally-important species and how the habitat for that species has changed over time. He chose to assess how moose and mule deer have been significantly impacted by the cumulative effects of the HVC Mine, including by loss of wetland habitat, road mortality due to increased traffic in the region, and adverse impacts on food security and habitat suitability, and also examined natural factors (topography and vegetation) and non-natural factors (roads, urban areas, industrial activities, clear cuts, and forest fires) which could affect the two species and habitat suitability for them.

Over the last three decades, moose populations near the HVC Mine site have crashed: since 1995, the moose population has declined from 143 to 14 in 2019. These population declines are attributed to a host of factors, including habitat loss and alteration. Mule deer populations are also declining across the southern portion of the province, which is also partially attributed to habitat loss and alteration. A decrease in suitable habitat for these species has an adverse effect on the Indigenous populations that rely on those species for food security and their way of life, including SSN members. The adverse impacts on SSN's Aboriginal right to hunt for food must be mitigated and all efforts taken by Teck to ensure that moose and mule deer populations endure. None of these concerns were mitigated by the EAO.

SSN members continue to be adversely impact by the project as they eat the foods harvested, hunted, and trapped from this area.

The EAO's view is that it has adequately addressed these concerns raised by SSN. Please refer to sections [11.6.4.5 Cumulative Effects](#), [11.8 Stk'émłúpsəmc te Secwépəmc Nation Project Assessment Process and the EAO's Response](#), and [11.10 Assessment of Cumulative Effects to Bonaparte First Nation and Stk'émłúpsəmc te Secwépəmc Nation](#) for information related to how the EAO considered concerns about effects to wildlife and wildlife habitat, including moose. Additionally, the EAO has assessed the impact of HVC MLE on wildlife and has considered the depressed state of the moose population (please see section [13.6 Wildlife and Wildlife Habitat](#)).

11.11.6. Climate Change

In November 2018, SSN wrote to the BC Ministry of Environment and Climate Change Strategy expressing our concern that by separately reviewing the Bethlehem and the then-HVC 2040 projects, Teck was effectively project-splitting, when the collective adverse impacts of both projects ought to have been reviewed together on a more holistic basis. This concern was not addressed.

Seasonal variability, as well as uncertainty as to the future effects of climate change, may also affect surface water availability in Witches Brook. The modelling in the application package for the HVC MLE Project only goes up to the years 2017 and 2019. Given the extreme heat events that have occurred since 2019, more recent data on these events should be incorporated into the model to increase the accuracy of water quality predictions.

Given the recent droughts, the SSN Review Panel recommended that it be made clear by way of approval conditions at what point in a drought scenario the EAO would contemplate issuing a temporary protection order and/or a critical environmental flow protection order which suspends Teck's water rights and requires Teck to cease taking fresh water for the term of the order. We recommend that Teck be required to annually evaluate and prepare a report assessing drought conditions and whether watercourses impacted by the HVC Mine's operations have fallen or are at risk of falling below their critical environmental flow thresholds. SSN also recommended that Teck be required to install additional monitoring stations and regularly check and report to SSN on the water levels of the affected watercourses. The EAO's view is that it has adequately addressed these concerns raised by SSN. Please refer to sections [11.6.1 Consultation and Engagement with Stk'émłúpsəmc te Secwépəmc Nation](#), [11.6.4.1 Water Quality and Water Quantity](#), and [11.6.4.6 Climate Change](#) where EAO discusses potential effects and climate change to address issues raised by SSN. Additional assessment and consideration of effects to water quality and quantity is included in sections [13.3 Groundwater](#) and [13.4 Surface Water](#).

11.12. Conclusions

The EAO considered the information provided in HVC's Application, the results of SSN's Project Assessment Process and Family Panel Recommendations Report, SSN's comments on the EAO's Assessment Report, the information and analysis presented in this chapter, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions, and concludes that HVC MLE and the BASA Amendment in combination with existing effects would have a negligible to minor adverse residual effect on BFN and SSN's Indigenous interests for Aboriginal Rights, Governance, Law and Stewardship, and Culture, Health and Well-being, and a moderate positive effect on BFN and SSN's Indigenous interests for Indigenous Economies.

The EAO concluded that HVC MLE would contribute to an existing cumulative effect on BFN and SSN's Indigenous interests from current land disturbance and industrial activities, and considering these effects along with the Province's understanding of the historical Indigenous use in the Highland Valley and the proximity of the project to BFN and SSN's asserted territory, the potential cumulative effects from HVC MLE would be minor. The EAO concludes that it has deeply consulted BFN and SSN and has discharged the Crown's duty to consult with BFN and SSN.

12.0 DETAILED ASSESSMENT – EFFECTS TO SYILX INDIGENOUS INTERESTS

12.1. Syilx Nation Overview and the EAO's Consultation

The Syilx Nation comprises seven member communities in the southern interior of British Columbia: Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Upper Nicola Band, Upper and Lower Similkameen Indian Bands and Westbank First Nation. The member communities share the same land, *nsyilxcan* language, culture, and customs. All seven of these member communities of the Syilx Nation are also members of the Okanagan Nation Alliance.

The Syilx Nation's territory covers over approximately 69,000 km². The northern area of this territory was close to the area of Mica Creek, just north of modern-day Revelstoke, B.C., and the eastern boundary was between Kaslo and Kootenay Lakes. The southern boundary extended to the vicinity of Wilbur, Washington and the western border extended into the Nicola Valley. The HVC mine site is situated in the western edge of the territories of the Syilx Nation.

The [original scope](#) of the HVC MLE project included a secondary 138 kV transmission line running 60 km from the Nicola Substation to the HVC mine site. At that time, HVC identified that the construction and operation of this twinned powerline within Syilx Nation territory could have effects on Syilx Nation's Indigenous interests. However, in the [revised project description](#), HVC determined that upgrades to the existing powerline performed by B.C. Hydro would provide sufficient power supply needs to HVC MLE, meaning that the twinning of the transmission line was unnecessary, and thus minimizing the project scope within the Syilx Nation territory. As a result of this analysis, the EAO removed the transmission line twinning from the scope of the HVC MLE environmental assessment on September 27, 2021. The BASA Amendment proposed by HVC is also on the mine site but does not physically overlap with Syilx Nation territory.

The current Highland Valley Copper mine project footprint is situated adjacent to the northwest side of Syilx Nation territory, west of Logan Lake, B.C., with existing mine components overlapping the territorial boundary by approximately 0.33 km². HVC MLE would not result in an increase in overlap of the project area with Syilx Nation traditional territory.

Considering the low likelihood of effects to Syilx Nation Indigenous interests, the EAO has provided and will continue to provide notifications to Syilx Nation at the following milestones, so that Syilx Nation can be informed of the progress of the environmental assessment and raise concerns to the EAO for discussion.

Past notifications:

- Approval of the valued components proposal;
- Public comment period on the draft Process Order, Assessment Plan, and Application Information Requirements;
- Issuance of the Process Order, including the approval of the final Application Information Requirements;
- Start of the review of the Application and public comment period on the Application;
- End of the Application Review phase and name change of the project;
- Acceptance of the revised Application;
- Public comment period on the EAO's draft Assessment Report, draft Table of Conditions, and draft Certified Project Description;

Upcoming notifications:

- Referral of the final Assessment Report and proposed Certificate, including Certified Project Description, and proposed Table of Conditions to B.C. Ministers; and
- Ministers' decision on whether to issue a Certificate for HVC MLE.

Of the Syilx Nation groups, Lower Similkameen Indian Band, Okanagan Indian Band, Penticton Indian Band and Upper Nicola Band confirmed they wanted to receive these notifications. Other Syilx Nation groups identified that HVC MLE was outside their area of responsibility and chose to not receive notifications.

12.2. Potential effects of HVC MLE on Syilx Nation and the EAO's Conclusions

Activities associated with the Construction, Operations, Closure, and Post Closure phases of HVC MLE were assessed for effects to Syilx Nation's Indigenous interests. While there are no physical effects to areas in Syilx Nation's traditional territory, the following effects were considered by the EAO:

- Potential changes to water quality and quantity through surface and groundwater related to HVC MLE and the BASA Amendment deriving from the headwaters of Witches Brook within the eastern region of the mine site. Discharge from the eastern region of HVC MLE is mapped to flow into Syilx Nation territory through tributaries that feed the Nicola River 10 km downstream of Merrit, including inlets and outlets of Mamit Lake. HVC determined that with direction of flow in the Nicola River, discharge from the HVC mine site will ultimately report to Thompson River, minimizing contact with Syilx territory;
- HVC's Application shows that a failure of the H-H Dam (the side of the Highland Tailings Storage Facility closest to Syilx Nation territory) would lead to tailings entering the Valley Pit and would be contained to the mine site. HVC also concluded that the likelihood of failure of the H-H dam was negligible due to the integration of the Valley North Dump into the H-H dam. The EAO is satisfied with HVC's assessment and concludes that there are no potential effects to Syilx Nation Indigenous interests as a result of risk related to failure of the H-H dam;
- Potential air quality residual effects from modelled increases in criteria air contaminants could overlap Syilx Nation territory, as detailed in the modelling figures presented in [section 7.1.5.8.1](#) of the Application. The EAO determined that the predicted increase in criteria air contaminants from HVC MLE would result in a residual effect, but that no widespread effects to air quality are expected, and that no significant cumulative effects to air quality are expected as a result of HVC MLE. Effects to air quality, including current and new proposed mitigation measures which would be included in the PA-1557 permit, are described in further detail in [Section 13.1 Air Quality](#) of this Report; and
- The potential effects to wildlife and ecosystems from HVC MLE include loss and degradation of ecosystems, including wildlife habitat, effects to wildlife movement patterns, increased risk of wildlife mortality and effects on wildlife health, could affect some species in a wider area than just the mine site. More information on effects to wildlife and vegetation valued components is in [Section 13.6 Wildlife](#) and [Section 13.7 Vegetation and Ecosystems](#) of this Report. The EAO considered the increased effects to wildlife and vegetation associated with HVC MLE, and notes that the Wildlife Management Plan in the M-11 permit, updated for HVC MLE, will be used to mitigate effects to wildlife as a result of HVC MLE. None of the changes to wildlife or vegetation valued components are expected to result in effects to Syilx Nation's Indigenous interests.

Syilx Nation groups did not raise any concerns related to potential effects to Syilx Nation or its Indigenous interests and other interests from HVC MLE or the proposed BASA Amendment.

Considering the lack of anticipated physical effects on Syilx Nation's traditional territory and lack of comments or concerns from Syilx Nation, the information in HVC's Application, the information and analysis outlined above, the existing and new proposed permit conditions, and the EAO's proposed Certificate conditions, the EAO concludes that HVC MLE and the proposed BASA Amendment would have a negligible effect on Syilx Nation's Indigenous interests.

13.0 DETAILED ASSESSMENT – EFFECTS TO VALUED COMPONENTS

13.1. Air Quality

13.1.1. Summary

Air quality was selected as a valued component for the HVC MLE environmental assessment as the activities associated with the expansion and extension of the existing mine will continue existing effects to air quality and may also have additional potential effects. Changes in air quality can affect soil, water, vegetation, wildlife, and human health. Potential changes in air quality were identified as a key concern by First Nations and ENV.

In [Chapter 7.1 of its Application](#), HVC assessed the potential changes to air quality from HVC MLE and concluded that though its modelling exercises showed increased levels of criterial air contaminants, that the modelling was conservative, and that effects to air quality would be managed through the current and new mitigation measures, including the Fugitive Dust Management Plan which HVC is required to implement as part of its PA-1557 and M-11 permits. Reviewers raised concerns about the effects from predicted high levels of criteria air contaminants on people near the mine site and that the level of dustfall created by mining activities.

The EAO considered HVC's assessment and mitigation measures, the key issues raised by technical advisors, the requirements of the Fugitive Dust Management Plan, and concluded that there would be a residual effect to air quality as a result of criteria air contaminants which do not disperse as easily and falls as dust or may be breathed in by humans and wildlife [total suspended particulate, fine particles with diameters of 2.5 microns and smaller (PM_{2.5}) and small particles with diameters of 10 microns and smaller (PM₁₀)]. These same parameters will act together along with the past effects of the operating mine, HVC MLE, and other activities in the area to create a cumulative effect to air quality. The EAO concluded that HVC MLE would not have a significant residual or cumulative effect on air quality.

13.1.2. Assessment Boundaries

13.1.2.1. Spatial boundaries

The four spatial boundaries selected by HVC for the HVC MLE air quality assessment included a Base Case footprint (the current extent of the disturbed and permitted area of the mine), an Assessment Case footprint (the proposed expanded area due to HVC MLE), a local study area and a regional study area.

The local study area is a rectangle centered on the HVC mine site that stretches 43 km east-west by 40 km north-south, including the town of Logan Lake. The regional study area is the maximum area over which effects of any kind from HVC MLE to air quality may occur and includes the towns of Ashcroft and Tobiano (north), Spences Bridge, Logan Lake, Lower Nicola, Merritt, and Nicola.

For the potential effects to air quality for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.1.2.2. Temporal boundaries

The four temporal boundaries used for the HVC MLE air quality assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.1.3. Existing Conditions by HVC

Overall, air quality is influenced by industrial, commercial, residential, and recreational activities across the region, and the current mine operations are the main source of air quality emissions in the local area. The HVC MLE Application describes existing air quality conditions from both Indigenous knowledge and western science views. Participating Indigenous nations shared Indigenous knowledge with HVC which demonstrates the effects of changes to air quality over the life of the mine and its effects on Indigenous people individually and as communities. Indigenous knowledge-holders described losing access to preferred hunting and gathering areas as the mine expanded due to both dust contamination and fears that health effects could be caused by dust contamination, including to traditional, or country, foods (wildlife and vegetation) and medicinal plants.

For its western science analysis, as approved in the modelling plan that HVC submitted to ENV early in the environmental assessment, HVC used a CALPUFF model to calculate existing air quality conditions for the following criteria air contaminants that are and would continue to be produced by mine-related activities:

- Total suspended particulates;
- Fine particles with diameters of 2.5 microns and smaller ($PM_{2.5}$);
- Small particles (including $PM_{2.5}$) with diameters of 10 microns and smaller (PM_{10});
- Nitrogen dioxide;
- Sulphur dioxide;
- Hydrogen chloride;
- Chlorine gas; and
- Hydrogen sulphide.

HVC also included volatile organic compounds, polycyclic aromatic hydrocarbons, and metal compounds (metals) in the air quality assessment, the results of which were forwarded directly to the Human Health valued components assessment.

For the BASA air quality existing conditions calculations, HVC first calculated effects from 2002 to existing mine conditions, then calculated the change for the remainder of the permitted mine operations to 2028. HVC included BASA in the Base Case scenario for the HVC MLE assessment.

13.1.4. Potential Project Effects by HVC

HVC included both Indigenous and western science methods of knowing about potential effects of air quality. The Application includes Indigenous knowledge that shows that even though western science analyses have historically shown that local dust concentrations are non-toxic, Nlaka'pamux community members still have concerns about the potential effects of dust, particularly on traditional foods.

In the Application, the CNA applied its Community Based Indicators to potential air quality effects, and noted effects to four CNA values (Tmix^w, Balance, Governance, Teachings) and six CNA indicators (Peaceful Enjoyment of the Land, Guardians of Tmix^w, Sense of Safety, Sole-Source Revenue Generation and Indigenous Economies). The CNA indicated that all four could be negatively affected by changes to air quality, including a negative perception of safety to breathe the air and eat traditional foods. Some of these effects could also be felt in changes to human health, which the CNA examined further in the human health effects assessment.

For its western science analysis, HVC used the same CALPUFF model described above to calculate the potential effects of HVC MLE on air quality. The modelling results showed that many of the activities at the mine site, such as hauling, drilling, and blasting, currently produce criteria air contaminants and that this would continue under HVC MLE. No positive effects to air quality are expected from HVC MLE.

HVC's assessment predicted that the highest criteria air contaminant levels would be along Highway 97C which runs along the edge of the mine site near the Valley pit. At this location, 24-hour total suspended particulates, PM₁₀ and PM_{2.5} were predicted to be at least 10 times more than the applicable air quality guidelines. Higher levels of some criteria air contaminants, compared to the Base Case, were also predicted around the mine site, including areas close to the Bose Lake Recreation Site.

The CALPUFF model approved by ENV and used by HVC to predict criteria air contaminant levels, which is commonly used in industry applications, has a moderate level of uncertainty. HVC's view was that since it used conservative estimates (for example, using the year of peak anticipated mine site emissions to model Assessment Case emissions along with conservative assumptions), or observed local values to feed into the model, that the model results would be conservative enough to account for any variation in potential criteria air contaminant emissions.

The BASA Amendment was not expected to add any effects to the air quality valued component.

13.1.5. Proposed Mitigation Measures by HVC

Effects to air quality from mine activities are currently managed at the mine site as part of HVC's Fugitive Dust Management Plan using both best management practices and site-specific actions, such as watering of roads, surfaces and drilling areas, implementing speed limits, and limiting blasting during wind events to reduce dust creation as part of the Fugitive Dust Management Plan required by HVC's M-11 and PA-1557 permits.

For new mitigation measures, HVC also proposed to sweep the exteriors of concentrate transport trucks and to use a wind fence and misters to reduce dust produced when ore is crushed. HVC will be required to add these mitigation measures to the Fugitive Dust Management Plan and implement them.

13.1.6. Key Issues Raised

The following key issues were raised by members of the Technical Advisory Committee.

13.1.6.1. Potential effects on human receptors from predicted changes in air quality

During the review of the Application, the CNA, LNIB, ENV Rec Sites and Trails, and the EAO raised concerns about the air quality modelling, including which data were included in the model and that the modelled air quality changes related to the mine expansion could affect sensitive receptors which are outside the area where HVC currently monitors air quality, including at residences, culturally significant sites, and nearby public recreation areas. The CNA was concerned that modelling was only conducted for the worst-case scenario, not for the expected scenario nor for the Closure phase. These concerns, as they are related to effects to human health, are discussed further in [section 13.8 Human Health](#).

The CNA was also concerned about potential effects of poor air quality on mine workers – effects to mine workers are managed under the Health, Safety, and Reclamation Code for Mines in B.C. and are not included in the environmental assessment.

HVC responded that the modelling in the Application was using the CALPUFF industry-standard model and using the year with the largest amount material moved (predicted to be in 2028) which is intended to provide a very conservative worst-case scenario, and that exceedances at the levels predicted by the model are not likely to occur, and that expected and Closure model runs were not needed. HVC also noted that the maximum level of criteria air contaminants (maximum point of impingement or MPOI) was at the point where Highway 97C and the main site access connect, not near sites around the proposed mine expansion area. HVC explained that it selected data which were unaffected by wildfire to ensure the modelling was as accurate as possible, though it acknowledged that this reduced the amount of data available to characterise baseline conditions. HVC also noted that the modelling approach was pre-approved by ENV.

Under ENV permit PA-1557, HVC is required to maintain monitoring across the current mine site and uses the results of this monitoring to adaptively manage air quality effects. During the required annual review of the Fugitive Dust

Management Plan and as part of the adaptive management portion of the Plan, a qualified professional will review any new or altered air emissions sources and may recommend additional air quality monitoring in areas of new disturbance, or other mitigation measures as needed.

HVC's current mitigation measures for air quality form part of its Fugitive Dust Management Plan required under PA-1557. HVC has proposed two new mitigation measures for air quality, to sweep the exteriors of concentrate transport trucks and to use a wind fence and misters to reduce dust produced when ore is crushed. These two new mitigation measures will be included in HVC's updated Fugitive Dust Management Plan.

Considering the current mitigation and monitoring measures for air quality outlined in the Fugitive Dust Management Plan, particularly those related to engagement required with First Nations and those related to requirements for adaptive management, as required under PA-1557 and HVC's newly proposed mitigation measures, the EAO's view is that criteria air contaminants will be adequately managed with the current regulatory tools, and that a Certificate Condition to manage air quality is not necessary.

13.1.6.2. Dust Generation and Metals in Dustfall

In the review of the Application, LNIB expressed concerns about the data used and calculations made for metals in dustfall, as this could have knock-on effects to human health, the aquatic environment, and traditional uses. LNIB believes that the effects of metals in dustfall near sensitive human receptors and on wildlife have not been adequately considered. The CNA asked why dustfall sampling had been stopped at the mine and whether this information would have been useful to use to validate HVC's modelling results. These concerns are also explored further in [section 13.8 Human Health](#).

HVC responded that as set out in ENV guidance, dustfall monitoring is no longer accepted by ENV as it is highly inaccurate (dust can be blown out of the collectors or moved around by wind) and so not useful to understand the total amount of dust falling or the rate at which the dust is falling. Estimations of metals concentrations are better determined through sampling soil, water, or vegetation directly. HVC used historical dustfall measurements to identify the amount of metals in dustfall but not the total amount or deposition rate. HVC also provided more data with metals fractions information and more calculations for metals deposition rates. HVC's view was that the best way to determine if its modelling was correct is to use the monitoring program which is part of the Fugitive Dust Management Plan.

The Fugitive Dust Management Plan required by ENV permit PA-1557 includes an adaptive management approach to make changes to monitoring and mitigation measures if the effects of HVC MLE on air quality are exceeding required levels. HVC would work with First Nations on the implementation of the Fugitive Dust Management Plan, including by sharing annual air quality reports and to have input on any changes to the Fugitive Dust Management Plan proposed by HVC.

Considering the current mitigation and monitoring measures for dust production outlined in the Fugitive Dust Management Plan, particularly those related to engagement required with First Nations and those related to requirements for adaptive management, as required under PA-1557 and HVC's newly proposed mitigation measures, the EAO's view is that criteria air contaminants will be adequately managed with the current regulatory tools, and that a Certificate Condition to manage air quality is not necessary.

13.1.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, the EAO concludes that HVC MLE would result in the following residual adverse effects on the air quality valued component:

- Change in ambient concentrations of criteria air contaminants, including total suspended particulate (24-hour), total suspended particulate (annual), PM₁₀ (24-hour), PM_{2.5} (24-hour), PM_{2.5} (annual), sulphur dioxide (1-hour),

sulphur dioxide (annual), nitrogen dioxide (1-hour), nitrogen dioxide (annual), carbon monoxide (1-hour), and carbon monoxide (8-hour).

The EAO's characterization of the expected residual effects of HVC MLE on air quality is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 16: Summary of Residual Effects for Air Quality

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Change in ambient concentration of criteria air contaminants, including:</i> Total suspended particulate (24-hour), total suspended particulate (annual), PM₁₀ (24-hour), PM_{2.5} (24-hour) PM_{2.5} (annual), sulphur dioxide (1-hour), sulphur dioxide (annual), nitrogen dioxide (1-hour) nitrogen dioxide (annual), carbon monoxide (1-hour), carbon monoxide (8-hour)	Context (resilience): Moderate Magnitude: Varies, low to high Extent: Local Duration: Medium-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant The air near the mine site area is already affected by criterial air contaminants produced by mine operations. Emissions of gaseous criteria air contaminants can disperse easily (sulphur dioxide, nitrogen dioxide, carbon monoxide) are not expected to result in a residual effect, while those related to particulate matter which does not disperse as easily and falls as dust or may be breathed in by humans and wildlife (total suspended particulate, PM_{2.5} and PM₁₀) could cause a residual effect. The Fugitive Dust Management Plan required by ENV permit PA-1557 requires HVC to use an adaptive management approach to manage air quality. HVC would work with First Nations on the implementation of the Fugitive Dust Management Plan, including by sharing annual air quality reports and to have input on any changes to the Fugitive Dust Management Plan proposed by HVC. All effects are expected to remain within the local study area and would continue for the life of the extension (18 years) but would decline in Closure and again in Post Closure. Air quality emissions from HVC MLE would be continuously produced during the life of mine and air quality is expected to return to a pre-mining state at the end of Post Closure. First Nations land users may be more affected than other populations as they spend more time on the land and may thus be exposed to criteria air contaminant exceedances more often. Results of the assessment are moderately uncertain due to the uncertainty inherent in the CALPUFF model. First Nations have identified air quality as a key concern for the HVC MLE environmental assessment.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.1.8. Cumulative Effects Assessment

HVC determined that two existing and reasonably foreseeable projects and activities have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects it assessed for HVC MLE and potential effects from these two other projects and concluded that there would be no cumulative effects of HVC MLE on air quality. The CNA did not agree with HVC's assessment that HVC MLE would not cause cumulative effects to air quality.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects are not expected to have major effects to air quality, and any effects are expected to be managed in a similar manner to how HVC is required to manage air emissions for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects to air quality as needed).

The EAO considered the existing conditions at the mine site, with current effects to air quality from mine operations, the anticipated mitigation measures proposed by HVC and regulatory tools to implement those mitigation measures, and the EAO's assessed residual effect to air quality. Given these considerations, the EAO concludes that for criteria air contaminants which can disperse easily into air (sulphur dioxide, nitrogen dioxide, and carbon monoxide), no cumulative effects to air quality would occur. For criteria air contaminants related to particulate matter (total suspended particulates, PM_{2.5} and PM₁₀) which fall as dust or may be breathed in by humans and wildlife, the EAO concludes that there is uncertainty about whether HVC MLE would contribute to cumulative effects due to the inherent uncertainty in air quality modelling and the nature of the particulate matter criteria air contaminants, whose dispersal cannot be 100 percent mitigated; the EAO notes that predicted particulate matter for HVC MLE would be higher than the Base Case, and so a cumulative effect would occur on top of current conditions. Regulatory tools under the *Environmental Management Act*, including the PA-1557 permit, would allow ENV to manage any exceedances in air quality. The EAO expects that criterial air contaminants will be adequately managed with these regulatory tools and there would be no significant adverse cumulative effects on air quality.

13.1.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the air quality valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new mitigation measures under ENV permit PA-1557.

13.2. Noise

13.2.1. Summary

Noise is unwanted or harmful sound that is considered unpleasant, loud, or disruptive to hearing. Exposure to excessive or prolonged noise may disturb wildlife, cause negative human health effects, or stop people from conducting land use activities and spiritual and cultural practices. Noise was selected as a valued component for Highland Valley Copper Mine Life Extension Project (HVC MLE) because the activities associated with the expansion and extension of the existing HVC mine site will continue to create noise and could create higher levels of noise. The potential for effects from vibration was not assessed due to the distance between HVC MLE vibration sources to the nearest sensitive receptors.

HVC assessed the potential for HVC MLE to increase noise disturbance by modelling predicted noise levels at sensitive receptor locations (i.e., residential, recreational, and cultural sites) and then compared those levels against relevant Health Canada guideline⁵⁶ noise criteria (e.g., average day-night sound level and percent of population highly annoyed). HVC's assessment included noise sources from the existing HVC mine site operations, additional equipment associated with the HVC MLE operations, blasting, and traffic on roads. Indigenous knowledge informed the noise assessment by considering areas of traditional and cultural significance during the selection of study areas and noise receptor locations.

Considering existing mitigation measures, HVC predicted that HVC MLE would result in a low magnitude residual noise effect. Based on the results of the effects assessment, HVC did not propose additional mitigation measures. If noise complaints are received during HVC MLE operation, HVC could implement additional noise monitoring and subsequently modify existing mitigation measures.

The EAO concluded that HVC MLE would cause a residual effect to noise, however, cumulative effects would be negligible. Given the assessment, mitigation measures and proposed conditions, the EAO found that there would not be significant adverse effects to noise.

⁵⁶ Source: Health Canada [H129-54-3-2023-eng.pdf](#)

13.2.2. Assessment Boundaries

13.2.2.1. Spatial Boundaries

The four spatial boundaries selected by HVC for the HVC MLE noise assessment are the HVC MLE Base Case footprint (the current extent of the disturbed and permitted area of the mine), the Assessment Case footprint (the proposed expanded area disturbed by HVC MLE), a local study area and a regional study area.

The local study area consists of the Assessment Case footprint surrounded by a 1.5-km buffer. The regional study area extends up to 15 km from the Assessment Case footprint and includes areas where the predicted noise levels are 5 decibels lower than the strictest noise criteria (i.e., the nighttime criteria of 40 A-weighted decibels; dBA). Though not required as part of the scope of the environmental assessment, HVC also evaluated the expected change in noise levels for the Village of Ashcroft based on its location as the terminus for trucks transporting concentrate from the mine, in response to input from the CNA and community engagement sessions.

For the potential effects to noise for the BASA Amendment Assessment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.2.2.2. Temporal Boundaries

The four temporal boundaries used for the HVC MLE noise assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and,
- Post-Closure phase: steady state 100+ years.

HVC's noise assessment only modelled the Operations phase since Operations is when the highest noise levels would occur over the life of the mine. HVC also considered expected noise interactions for the other phases, but did not model those phases since noise was expected to be less than at peak operations.

The temporal boundaries for the Closure and Post-Closure phases of the BASA Amendment Assessment are the same as described above. The Construction and Operations phases were combined into one phase starting at BASA construction in 2002.

13.2.3. Existing Conditions by HVC

The existing noise conditions in the local and regional study areas, from both Indigenous knowledge and western science viewpoints, are described in Chapter 7, [section 7.2.4 of HVC's Application](#) and are summarized here.

First Nations community members and knowledge holders shared that currently, traditional land use activities and important spiritual and ceremonial sites can no longer be peacefully enjoyed due to noise from the HVC mine site and other industrial activities. This reduced use in turn reduces the transmission of cultural knowledge to First Nations youth.

For its western science analysis, HVC collected sound levels and weather data at a monitoring station near the homes located the closest to the HVC mine site, and noise measurements from the HVC mine site. This information was used to determine the rate at which sound is emitted from mine noise sources (the sound power level) for some on-site equipment and to calibrate HVC's CadnaA noise model.

HVC's data collection showed that average noise levels do not exceed the daytime (55 dBA) and nighttime (40 dBA) criteria for residential and recreational receptors located closest to the HVC mine site, except for one recreation receptor (mostly affected by mining noise) and one residential receptor (mostly affected by traffic noise). For context, a normal conversation would register about 55 dBA. noise exceedances noted by HVC were from vehicle traffic at receptors located

close to roads. Most noise at residential receptors is from traffic on public roads or dirt roads used for hunting, recreation and by contractors. The noise level at recreational receptors is mostly dependent on distance from public roads but in some cases HVC mine site noise is the main noise source.

The contribution of noise-generating activities associated with continued BASA dewatering is negligible compared to other Base Case noise sources. As no interaction with the noise valued component is expected, no further assessment on the effects of noise was conducted for the BASA Amendment.

13.2.4. Potential Project Effects by HVC

The potential project effects, from both Indigenous knowledge and western science viewpoints, are described in [Chapter 7, section 7.2.5 of HVC's Application](#) and are summarized here.

The CNA's application of its Community Based Indicators noted that four core values (Tmix^w, Balance, Governance, Teachings) and four community-based indicators (Peaceful Enjoyment of the Land, Connection to All, Ecosystem Balance, Guardians of Tmix^w) could be negatively affected from noise generated by HVC MLE. These effects include reductions in the ability to form connections to the land, to conduct cultural and spiritual practices, and to transmit culture to future generations, and could further disrupt wildlife, among other outcomes. Kanaka Bar Indian Band community members expressed concerns related to construction noise scaring traditional game species, such as goats and deer, from their natural habitats. Further consideration of the effects of noise on wildlife is available in [section 13.6](#) of this Report.

Noise sources used in HVC's CadnaA noise model included mine activities such as blasting rock, crushing ore, use of heavy equipment, pumping of tailings, traffic on mine service roads and Highway 97C for hauling concentrate to Ashcroft, and traffic on public roads. No other projects or activities in the study areas were close enough to substantially contribute to existing noise conditions.

The Assessment Case noise model showed the maximum expected mine activities of loading, hauling, and dumping of material in the Operations phase to characterize the worst-case noise output conditions. The model predicted a 0 to 2 dBA increase above the Base Case average noise levels, which was below the relevant Health Canada guideline noise criteria at most receptors.

Noise exceedances were predicted at the same sensitive receptor locations as in the Base Case, largely due to the strong effects of traffic noise at the receptors close to public roads. Non-mine traffic was assumed to grow at 2 percent per year for the Assessment Case while HVC MLE haul traffic through Ashcroft would increase by five trucks per day. At Closure the amount of mine traffic on public roads would decrease, while there will still be other non-HVC MLE traffic that will continue to create noise.

As a result of its modelling, HVC predicted a low to moderate potential adverse effect from change in noise levels through the increase in milling rate and associated drilling and blasting, material and haul truck movements, and traffic on public and mine site roads. HVC used the noise modelling results to inform HVC's assessment of Indigenous interests and effects assessments for the following valued components: wildlife and wildlife habitat, human health, and resource use, and culture.

The BASA Amendment was not predicted to contribute to effects to the noise valued component.

13.2.5. Proposed Mitigation Measures by HVC

HVC committed to continue implementing the following existing noise reduction measures for HVC MLE that are in use at the HVC mine site:

- Blasting would only occur during daytime hours;
- Processing equipment is located as far from noise sensitive areas as possible;
- Equipment such as the mill and pumps are contained within buildings;

- Speed limits are enforced; and,
- Noise complaints are resolved through HVC's *Public Feedback Procedure*.

The Health Canada guideline suggests noise mitigation measures be considered if project operations result in a change of percent highly annoyed greater than 6.5 percent or if average day-night sound levels exceed 75 dBA for any of the sensitive receptors. The predicted noise levels were below these thresholds for HVC MLE, so HVC did not propose new noise mitigation options.

Considering these mitigation measures, HVC predicted that HVC MLE would result in a low magnitude residual noise effect.

13.2.6. Key Issues Raised

13.2.6.1. Noise modelling methods, mitigations, and monitoring

During Application Review, only one key concern was raised related to noise, focused on modelling methods, mitigations and monitoring. The CNA's view was that the four days of field measurements collected by HVC were insufficient to characterize existing noise conditions, that culturally significant sites were not selected as receptors, and that the model was not run for different meteorological conditions. The CNA was also concerned that no additional mitigation measures to reduce existing high noise levels due to mining operations were proposed and that there was no plan for continued noise monitoring at receptor locations. The CNA felt that that HVC's current mechanism for dealing with noise complaints is reactive rather than proactive.

HVC responded that its noise modelling methods meet the Health Canada guideline, and that it used a conservative worst-case modelling scenario, including maximum noise production and good weather conditions for noise to spread, as suggested in the Health Canada guideline. HVC committed to engaging with the CNA about noise monitoring at culturally significant sites.

At the request of the EAO, HVC included more detail in the revised Application regarding existing noise reduction measures initiated for the HVC mine site that will continue to be implemented for HVC MLE, including resolution of noise complaints through its Public Feedback Procedure.

13.2.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, and current regulatory tools and their proposed amendments, the EAO concludes that HVC MLE would result in the following residual adverse effects on the Noise valued component:

- Increased noise levels.

The EAO's characterization of the expected residual effects of HVC MLE on the noise valued component is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 17: Summary of Residual Effects for Noise

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Increased noise levels</i> Activities associated with HVC MLE will increase environmental noise levels, causing nuisance, annoyance, and sleep disturbance to people, as well as displacement and sensory disturbance to wildlife.	Context (resilience): Moderate Magnitude: Low Extent: Local Duration: Medium-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Low Uncertainty: Moderate Importance: Moderate	Not significant Current average noise levels do not typically exceed the daytime (55 dBA) and nighttime (40 dBA) Health Canada guideline criteria for residential and recreational receptors located nearest to the HVC mine site, with nighttime exceedances related to traffic at receptors close to roads and at one recreational receptor. Although people and wildlife in the area are likely habituated to noise from the existing mine, any additional noise could be more noticeable due to the quiet rural environment. Considering these factors, the resilience of human and wildlife receptors to an increase in noise is rated as moderate. HVC MLE's contribution to environmental noise is predicted to be low in magnitude, ranging from a 0 to 2 dBA increase over and above Base Case average noise levels. Potential effects would be local. Noise effects would be continuous (constant) during Operations, and would cease at Closure, so are considered medium-term in duration. Once HVC MLE noise sources cease, the noise levels in the assessment areas would return to levels less than Base Case conditions. Members of First Nations who peacefully enjoy the use of land near HVC MLE would be disproportionately affected by noise from the mine. The likelihood of the predicted noise effects occurring is high. With mitigations, the consequences of residual effects are considered minor. The risk of the effect of an increase in environmental noise was therefore also determined to be low (moderate likelihood and minor consequences). There is a low degree of uncertainty associated with the predictive noise modelling techniques used to quantify potential changes in noise levels at receptors within the assessment areas from activities associated with HVC MLE, but an overall moderate amount of uncertainty due to the limited field data and sensitivity analysis. Since the potential for noise disturbance due to HVC MLE was previously identified as an interest by First Nations and some members of the public, the importance was considered moderate.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.2.8. Cumulative Effects Assessment

As outlined in the Application Information Requirements, HVC considered the two existing and reasonably foreseeable projects and activities that have the potential to act cumulatively with HVC MLE through spatial and temporal overlap within the noise valued component regional study area, including the proposed Mount Mabel Wind Project, the proposed quA-ymn Solar Project.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. Construction of both wind and solar projects are each expected to last less than a year and are not anticipated to overlap with construction of HVC MLE. When in operation, these projects would not contribute to an increase in noise levels within the regional study area such that the regulatory thresholds would be exceeded. Future land use activities in the area (e.g., forestry, agriculture, mineral exploration and tenures) are assumed to continue at present levels captured in the Base Case noise modelling and any potential change to future noise levels would be marginal. For these reasons, the potential for cumulative effects from these projects and activities is considered negligible.

The EAO concludes that there are negligible cumulative effects to the noise valued component as a result of the effects of HVC MLE interacting with the effects of other past, present and reasonably foreseeable future projects and activities.

13.2.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the noise valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new permit conditions.

13.3. Groundwater

13.3.1. Summary

A clean and abundant groundwater system and water supply supports healthy communities, safe drinking water, and ecosystems. First Nations in the area have emphasized the importance of easy access to a clean groundwater supply for consumption and cultural wellbeing. Groundwater was selected as a valued component for the HVC MLE environmental assessment as the activities associated with the expansion and extension of the existing HVC mine would continue to have effects on groundwater quantity and quality. Changes in groundwater quantity and quality can affect creeks, rivers, lakes, vegetation, wildlife, and human health.

Potential changes in groundwater quantity and quality from HVC MLE were identified as a key concern during the environmental assessment. Proposed continued and expanded mining could cause changes due to continued groundwater pumping, increase in the size of waste rock facilities, increase in the size of the Highland Tailings Storage Facility and related seepage under and through adjacent dams. HVC predicted that baseflows to creeks would continue to decrease and these effects should be mitigated. HVC is working with First Nations and provincial subject matter experts on plans to mitigate effects, however, because mitigations are still in development, there is uncertainty about their effectiveness.

There is also uncertainty regarding predictions of groundwater flow and related groundwater seepage pathways to the environment, with further studies needed to fully understand the interactions between surface water and groundwater flows. While the temporal boundaries of the environmental assessment compare current conditions to the potential effects from continued mining, HVC included historical data in the Application for context where possible. HVC also worked with the CNA to carry out a Historical Water Conditions Study to help understand the long-term effects of mining in the Highland Valley.

Indigenous knowledge included in HVC's Application emphasized the cultural significance of water and its interconnectedness with the natural and human environment. Indigenous knowledge highlighted changes to the landscape and waterways in the Highland Valley since mining began in 1961. Common themes include observations of drying conditions leading to lower abilities to use the water; distrust of the water quality in terms of drinking water; loss of lakes through historical mining practices; and concerns about whether water can support healthy fish, wildlife, and riparian vegetation.

The EAO assessed the potential effects to groundwater quantity and quality, considering the Application, existing and proposed mitigation measures, and the issues raised by participating Indigenous nations and Technical Advisory Committee members. The EAO determined that it is likely that the extraction of water from the Basal Aquifer since 2009 created residual effects to water quantity, however, because the 2002 baseline data used drought-like conditions and mitigations subsequently put in place for water management affected water quantity and quality, it is difficult to attribute effects to BASA. The EAO determined that HVC MLE is likely to cause residual effects to groundwater quality and quantity.

For assessing potential cumulative effects, the EAO considered that because some of the mitigations for groundwater are in development, for example plans for additional stream diversions and the development of the attenuation pond proposed under the *Water Sustainability Act* licenses to improve water flows, the outcomes are uncertain. While the EAO expects that HVC MLE's contribution to existing cumulative effects to groundwater quality would not be significant, given

that uncertainty and the potential for residual effects from HVC MLE to add to the current water scarcity across the region, the EAO concludes that HVC MLE would contribute to an existing significant cumulative effect for groundwater quantity.

13.3.2. Assessment Boundaries

The assessment boundaries encompass geographic areas (i.e., spatial boundaries) and times (i.e., temporal boundaries) of the potential effects on the groundwater valued component (as presented in [Chapter 7.3.3.1 in the Application](#)).

13.3.2.1. Spatial Boundaries

The spatial boundaries for the groundwater assessment include a local study area and a regional study area.

The groundwater local study area is the area within which the potential HVC MLE effects on the groundwater valued component are predicted to occur (including potential effects on aquifers, watercourses, and watersheds). The local study area encompasses catchment areas that drain directly toward the axis of Highland Valley and HVC MLE infrastructure, as well as the catchment areas of Pukaist Creek, Coldstream Creek, Axe Creek, Witches Book, upper Skuhost Creek, upper Skuhun Creek and Billy Lake.

The groundwater regional study area refers to the maximum spatial extent over which effects of HVC MLE could potentially occur. This area includes the major river systems and topographic divides located further away from the proposed project. This groundwater regional study area is the same as the surface water regional study area.

The BASA Amendment study area is within the regional study area and covers the extent of measurable effects of current and proposed BASA dewatering activities. HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.3.2.2. Temporal Boundaries

The four temporal boundaries used for the HVC MLE groundwater assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-Closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the Construction and Operations phase is based on the start of work on BASA in 2002 when the Basal Aquifer was first exposed and dewatered and includes the subsequent operating phases of the mine. Of note, the effects from BASA activities are assessed in combination with other effects on groundwater that have occurred since 2002 (due to Trojan Diversion improvements, climatic variability, new Shula groundwater wells etc.) that are not part of BASA.

13.3.3. Groundwater in the Highland Valley

13.3.3.1. Historical context

Although not required by the Application Information Requirements, in the Application, HVC included a description of pre-mining conditions based on existing, available sources to support an understanding of the long-term effects of mining on groundwater. HVC used Indigenous knowledge and other sources (i.e. conditions of analogous watersheds within the region which are not mine affected) to illustrate how watersheds would have looked like, pre-mining. Indigenous knowledge included in the Application describes the historical groundwater conditions in the Highland Valley, where LNIB community members note that pre-mining, they would drink groundwater coming up through springs and harvest watercress growing near these springs.

The CNA also carried out a Historical Water Conditions Study, which examined the effect of mining in the Highland Valley on water resources from pre-mining eras (1951) to the present (2022). The study integrates Nlaka’pamux knowledge with Western science analysis to show the significant changes to water quantity and quality. Findings from the Study highlight the uncertainty about the groundwater to surface water connections.

The Stk’emlúpsenc te Secwépemc Nation also indicated that the water worlds throughout Secwépemcúlecw are connected through aquifers, and that there is an underwater system (aquifers) that connect the South Thompson, Adams Lake and Shuswap Lake with the North and Main Thompson Rivers.

For its western science analysis, HVC stated that historically, the lower lying areas in the Highland Valley contained numerous lakes, ponds, and wetlands. Groundwater levels in the higher upland areas around the Valley were relatively deep, and groundwater migrated from the uplands toward the lower-lying Highland Valley. In the lower areas in the Valley, the groundwater fed wetlands, lakes, and streams.

Mining in the Highland Valley started in the Bethlehem mine area in 1962, affecting groundwater levels and flow. Several pits were mined and later backfilled with tailings and/or waste rock and were filled with water to form pit lakes. The earliest recorded groundwater elevation data from around the mined areas date from 1978 and records indicate that current groundwater levels are lower, except for the areas where the landscape has been artificially elevated for tailings facilities and waste rock piles.

13.3.3.2. Current groundwater system

In the Application HVC presented current effects of mining on the groundwater system in a conceptual groundwater schematic using historical information, indigenous knowledge, and regional groundwater data (Figure 13-1). This overview of the groundwater and surface water system in the Highland Valley indicates that groundwater originates in the upland areas, where it is fed by precipitation and surface water. From these uplands, groundwater flows through aquifers to the valley bottom where the HVC mine is located.

The schematic in Figure 13-1 shows that the groundwater system under the HVC mine is found within several geological layers. These layers consist of aquifers where movement of groundwater occurs more readily and less permeable layers such as till where groundwater flow is more restricted. From the surface, water infiltrates into the soil and mine features (such as the Tailings Storage Facility and Waste Rock Dumps). The HVC mine pumps groundwater to stabilize the pit walls and facilitate the extraction of the ore from deep inside the pit. This groundwater is pumped into the Tailings Storage Facility water storage pond from where it can then be used in the ore milling process. The groundwater that originates from the Waste Rock Dumps and the Tailings Storage Facility area is captured with interception wells and recycled back into the mine water management system.

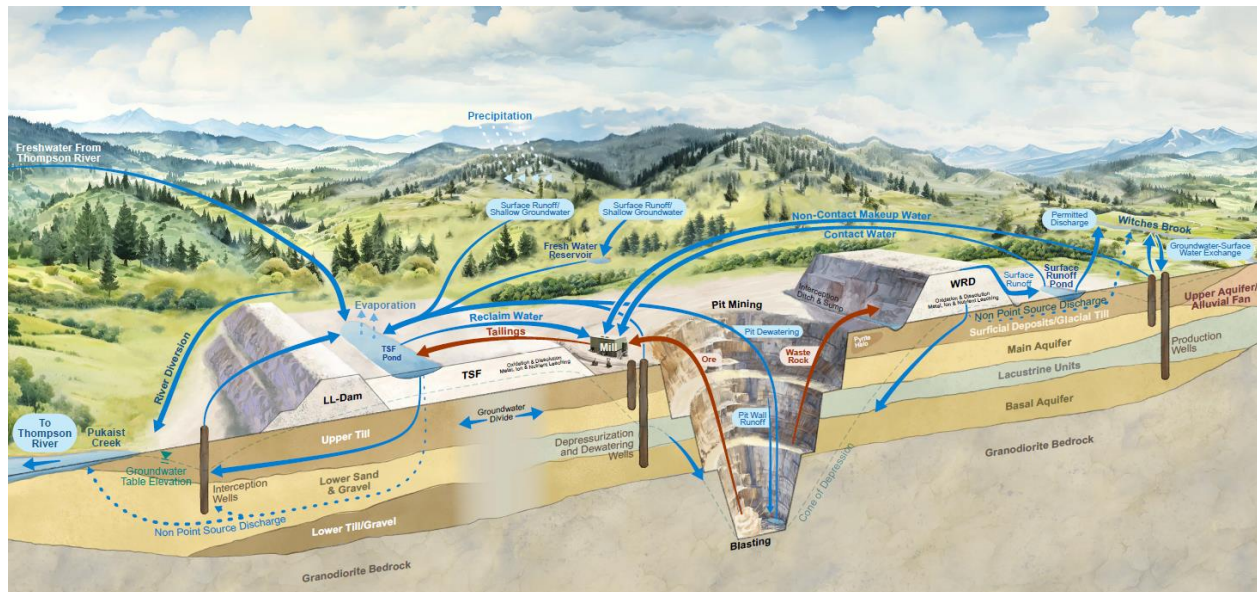


Figure 13-1: Schematic of Groundwater and Surface Water Flow-paths During Mine Operations

13.3.3.3. Groundwater monitoring

In the Application, HVC indicated that there is limited data on pre-mining groundwater quantity and quality. Consistent groundwater data collection programs were initiated in 2000 and expanded around the mine site. In 2018, a total of 65 wells were being monitored quarterly, and HVC installed an additional well that same year and again in 2021 for continuous monitoring of groundwater levels and water quality (refer to Figure 7.3.4-3 in [section 7.3.4.2.1](#) in the Application for groundwater quality monitoring locations).

HVC applies customized monitoring with active groundwater management systems for the Sulphate Adaptive Management Plan system which manages the groundwater seepage from the Highland Tailings Storage Facility. In addition to the Sulphate Adaptive Management Plan there are other groundwater management systems which pump water from aquifers throughout the mine area at wellfield locations such as at Shula Flats for potable water, at the H-H dam for milling process water, and dewatering wells in the Valley Pit.

HVC's geochemical studies of the soil, waste rock, tailings, and pit walls provided information to understand the possibility for effects to groundwater through the life of mine and Post-Closure. These studies show waste rock and overburden coming from the actively mined deposits is nearly all non-acid generating. The same is true for existing waste rock seepage, which is due to the presence of natural buffering material and low sulphide content. The potential for leaching of metals only applies to copper, molybdenum, and to a lesser extent, arsenic. However, a small component of waste rock at the Valley deposit has the potential for localized acid generation.

HVC stated that for groundwater quality, concentrations of parameters of interest in the pre-mining period are generally lower than concentrations measured in more recently analyzed groundwater. Seven of the parameters of interest are detected (or inferred to be present for periods pre-dating monitoring) in historical groundwater samples at concentrations above the current water quality guidelines (arsenic, cobalt, copper, manganese, molybdenum, uranium, and nitrate). HVC states that the more recent groundwater quality samples exceedances are likely caused by mining Operations, rather than representing natural conditions.

13.3.4. Potential Project Effects by HVC

HVC assessed effects to groundwater from a western science perspective, informed by Indigenous knowledge shared by First Nations. HVC assessed the effects to groundwater in the following cases:

1. Base Case: Considers the existing conditions including disturbance of current HVC mine site Operations as well as approved permitted developments.
2. Assessment Case: Considers the total effect of existing Operations, already approved development, and the proposed HVC MLE expansion. The incremental change between the Base Case and Assessment Case is the effect of HVC MLE.
3. BASA Amendment: Considers the existing disturbance of current HVC Operations (existing conditions) as well as previously approved developments until the end of HVC mine life.

The predicted effects on the groundwater valued component for the Base Case and the Assessment Case are presented below and are organized by key indicators (changes in groundwater levels, changes in baseflows in streams, and effects on groundwater quality).

Indigenous Knowledge included in the Application from the CNA and LNIB conveyed the Nlaka'pamux worldview of the interconnectedness of life and all that encompasses life and should be considered when assessing the potential effects of HVC MLE. During a community gathering at an Open House an Elder from the CNA Participating Bands explained that “a wound to the land is the same as a wound to the people”.

The CNA highlighted that the ability to peacefully enjoy Tmíxw is tied to the ability for members of the Bands to connect to Tmíxw and All. Connection to All is the holistic relational understanding when past, present, future, teachings and sptékʷl (creation story), and Tmíxw converge. Changes in water levels, and dryness on the land affect the ability of the CNA Participating Bands' members to connect to sptékʷl (creation story), and culturally and spiritually significant places to the four core elements of all life. As such, traditional teachings, knowledge transfer to future generations, and cultural integrity are lost.

13.3.4.1. Base Case summary of effects of mining

Mining in the Highland Valley has changed groundwater quantity and quality through the pumping and diversion of groundwater. Changing of the topography around the mine by HVC has introduced new interactions with groundwater. HVC states that mining has altered, and continues to alter, groundwater conditions in the following ways:

- The development of mine pits to extract ore and related dewatering lowers groundwater levels around the pits and diverts groundwater flow (for example from Upper Witches Brook) toward the active pits;
- The development of dumps is likely to lower the quality of groundwater below and downgradient of the dumps; and
- The development of Tailings Storage Facilities raises groundwater levels and alters the chemistry of groundwater below and downgradient of those facilities.

13.3.4.2. Assessment Case summary of effects

HVC's Application stated that continuing mining proposed under HVC MLE would further change groundwater levels and base flows to creeks. More groundwater extraction would be required to expand the Highmont and Valley pits, while ongoing pumping and diversion of groundwater is required for other mine processes. Groundwater quality is predicted to remain similar to current conditions, with the exception of around the waste rock dumps, the Highland Tailings Storage Facility and after Closure around the pit lakes.

Indigenous knowledge included in the Application from the CNA and LNIB highlighted that community members have reported decreasing water availability, resulting in effects to intergenerational learning, harvesting, and cultural practices in the Highland Valley. LNIB has observed changes to regional water quality and quantity. LNIB emphasized the importance of water and landscapes for agriculture, drinking water, and traditional plants.

The HVC MLE groundwater model predictions show the following potential effects on groundwater at key milestones when comparing the Base Case and the Assessment Case:

Predicted changes in groundwater levels

- At the end of mine Operations (after 2043) the groundwater levels around the Tailings Storage Facility are predicted to be 10 metres higher. This is due to the increase of the size of the Tailings Storage Facility and higher water level in the Tailings Storage Facility Pond. Due to the increase in depth and duration of groundwater pumping, the groundwater levels around the Valley Pit would be lower (varying from 10-50 metres). HVC predicted that these effects are expected to be limited to the center of the Highland Valley and around Lornex and Highmont Pits.
- During Post-Closure (100+ years after mine Closure), HVC predicted that groundwater levels would still be 10 meters higher around the Tailings Storage Facility due to the change in landscape. Near the pits, groundwater levels would be lower.

Predicted change in baseflow to creeks

Baseflow to creeks is driven by groundwater. HVC predicted that changes in groundwater levels and groundwater flows related to mine activities would have the following effects on creeks:

- At the end of Operations, compared to existing conditions, in the eastern mine area the baseflow to upper Witches Brook, Highmont Creek, and Highmont area wetlands is expected to decrease, and the baseflow to Skuhost Creek is expected to increase.
- At the end of Operations, compared to existing conditions, in the western mine area the baseflow to Pukaist Springs would decrease, and baseflow to Coldstream Spring would increase. No changes are predicted at Upper Coldstream Creek.
- At Post-Closure, compared to the existing conditions, in the eastern mine area the baseflow to Witches Brook, Skuhost Creek, and Highmont wetland area would increase, and baseflow to Highmont Creek is expected to decrease.
- At Post-Closure, compared to existing conditions, in the western mine area the baseflow to Pukaist Springs would increase, while no change is predicted for Coldstream Springs and Upper Coldstream Creek.
- In the far future (200+ years post Closure) it is expected that Woods Creek discharge would increase.

The above predicted effects are the maximum expected including work that has already been approved under the Base Case scenario and considering the HVC MLE expansion. HVC concluded that there would be no mine activity-related effects on domestic/private groundwater well users.

Predicted changes in Water Quality

HVC predicted that future metal concentrations in groundwater are likely to be similar to those observed under existing conditions. Metal loading to streams from non-point groundwater sources would change due to predicted changes in baseflows. Sulphate concentrations indicate seepage from the L-L Dam. Those concentrations showed a decreasing trend during 2021. This is attributed to implementation of the Sulphate Adaptive Management Plan mitigation measures. An ongoing program of water quality monitoring will indicate if this decreasing trend holds.

HVC indicated that in Post-Closure, pit lake water could enter the surrounding groundwater if is not properly mitigated. HVC anticipates being able to manage this through Valley Pit water level control. The management of pit lake water quantity and quality during and after Closure remains a topic of concern for First Nations and will be further discussed in detail with government agencies, First Nations, and other stakeholders.

Predicted climate change

HVC predicted that the effects of either a drier or wetter climate on the groundwater system would be negligible. Modelling shows that the climate in the Highland Valley is predicted to be warmer and wetter in the future. Resulting changes in groundwater recharge rates would have a low effect on seepage pathways and baseflow to the creeks. However, the groundwater flow rates into the pits are predicted to be more sensitive to changes in climate change impacted recharge rates.

13.3.4.3. BASA Amendment

The BASA Amendment assessment compared 2002 baseline conditions against existing conditions. The Amendment also assessed planned activities into Closure and Post-Closure as part of the Base Case.

Dewatering of aquifers around the Valley Pit would continue during approved mine production and during this phase the Basal Aquifer is the main source of the dewatering volumes. The dewatering rates from the Valley Pit are between 10,000 and 25,000 m³/day. This is below the pumping limit set at 54,500 m³/day in the Basal Certificate issued in 2002, and to date no water has been discharged to Witches Brook.

For the BASA Amendment, changes in conditions were assessed in combination with other effects that have occurred since 2002 which are not part of BASA (i.e., Trojan Diversion upgrades, climatic variability, and new Shula wells). HVC indicated that the most relevant effects are changes to groundwater discharge rates to streams (those provide the baseflow parts of the streams). Baseflow to Witches Brook has been affected, which affects changes in the surface water systems.

Continuation of BASA until the end of Operations would result in further changes to baseflows. After mine Closure, the baseflow to Witches Brook is expected to increase and would be much higher than in existing conditions, causing some concerns related to increase in potential for erosion.

Basal Aquifer groundwater quality meets applicable water quality guidelines, except for molybdenum, manganese, and uranium. HVC further indicates that parameter of interest levels in groundwater have remained stable in recent years. Based on this, HVC stated that it is likely that effects to groundwater quality are not expected to develop for the Basal Aquifer.

13.3.5. Mitigation Measures by HVC

HVC indicated that several mitigation measures have already been implemented, including:

- HVC Site-Wide Water Management Plan – Water management at HVC is coordinated under this Plan, including water use and re-use for production, operation, maintenance, extension, and reclamation activities while meeting business, health and safety, ecological, regulatory, and community goals.
- Sulphate Adaptive Management Plan – Established in 2011 as a condition provided in the M-11 permit update, upgraded in recent years to mitigate adverse effects of operating the Highland Tailings Storage Facility on groundwater and surface water quantity and quality downgradient of that Tailings Storage Facility.

New mitigation measures proposed by HVC to mitigate specific effects on groundwater quantity and quality, include the following:

- Changes in groundwater levels and water table depth – HVC stated that groundwater extraction is unavoidable during mining Operations to support safe mining. After Operations, the pits would be allowed to fill with water, which would mitigate the worst (but not all) effects to ground water resulting from the Operations Phase.
- Changes in baseflow to creeks – HVC stated that during Operations, changes to baseflow cannot be avoided but total flows in water courses could be mitigated. HVC has proposed a Watershed Stewardship Strategy to mitigate effects in total flows of creeks in the eastern part of the local study area. The Watershed Stewardship Strategy

would establish management objectives and a process to identify, evaluate and prioritize mitigation measures for water management on the HVC mine site, including identifying and prioritizing measures that HVC can implement to improve total flows in Witches Brook.

- Effects to Witches Brook – following the early development of the Witches Brook Adaptive Management Plan in 2021 and 2022, HVC continues to work with First Nations to find solutions through the Witches Brook Ecological Stewardship Strategy. Several options have been evaluated, including augmenting stream flow through creating new attenuation pond storage solutions which could release flows when and where the need arises. These storage solutions could be fed by new creek diversions.
- Changes in groundwater quality – HVC predicts that the most substantial effects in groundwater quality to occur in Pukaist Creek. The existing Sulphate Adaptive Management Plan is expected to mitigate any adverse effects on Pukaist Creek water quality and quantity and is an adaptive system which is adjusted depending on the results of ongoing monitoring.
- Water management plans such as the HVC MLE Mine Closure Water Management Plan.

The HVC Reclamation Program for Current Life of Mine and HVC MLE has been guided by HVC 2016 Returning Land Use Plan, which was developed as a collaboration between HVC, Nlaka'pamux community members and technical representatives. The Reclamation Program calls for re-establishing pre-mine ecosystems to support the range of traditional land uses identified by Nlaka'pamux participants. This would help mitigate effects to wetlands (Highmont and Witches Brook) and help improve the water quality of shallow groundwater originating from the waste rock areas compared to pre-reclamation conditions.

After mine Closure, in the Post-Closure phase, active water management would continue until groundwater reaches a natural state of equilibrium (Figure 13-2). During Post-Closure, more groundwater would discharge into the local creeks, benefitting the instream flows and water supply to local lakes. The surface water runoff from and groundwater in the Tailings Storage Facility and Waste Rock Dumps would be allowed to report to the pit lake and local creeks such as Witches Brook and Pukaist Creek.

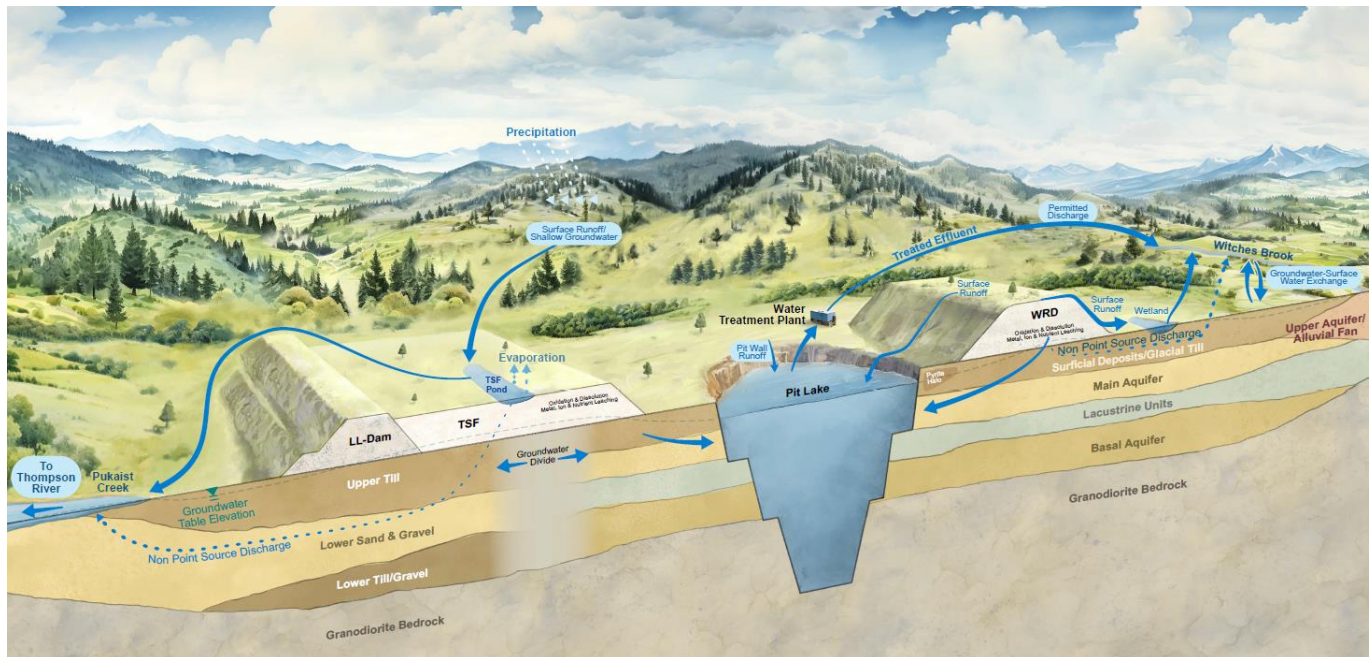


Figure 13-2: Schematic of Groundwater and Surface Water Flow-paths Post Closure

13.3.6. Key Issues Raised

The following key issues were raised during review of the Application by the Technical Advisory Committee, including participating Indigenous nations, and the public.

13.3.6.1. Use of historical data in the assessment

Concerns were raised by First Nations about the time period for the environmental assessment starting at current conditions, rather than a pre-mining baseline. The EAO's scope for the HVC MLE environmental assessment is the expansion and extension of mining due to HVC MLE, and did not require HVC to provide long-term historical conditions data. However, HVC included available pre-mining data (descriptive and conceptual) in the Application to provide an indication of how water flows in the Highland Valley have changed since mining began in the 1960s.

The CNA noted the insufficiency of modelling that begins in 2015 excludes more than 50 years of data. In the Historical Water Conditions Study, completed by the CNA on behalf of HVC, the CNA highlighted that historical and current mining Operations have resulted in resource conflicts, reduced water quantity and quality, decreased fish health, diminished wildlife populations, and contaminated water, raising concerns about the safety of consuming fish, meat, plants, and water. The Study showed observed changes in groundwater quality over a longer range in time (decades) and concluded that using a short date range distorts or provides an incomplete picture of groundwater quality changes and trends.

HVC responded that data from 2015 to 2020 provide the most reliable flow and water quality records. HVC also noted that extending the model calibration period before 2015 is not possible due to the lack of sufficient monitoring data to calibrate the model, however, HVC will periodically revisit and update the model calibration as additional monitoring data becomes available.

The EAO found that the Application met the requirements of the Application Information Requirements, but also acknowledges the historical data limitations that don't allow for a full, long-term picture of the effects of historical mining in the Highland Valley.

13.3.6.2. Closure and Post-Closure water management

During review of the Application, the CNA noted concerns and uncertainty about water management at Closure, specifically the potential for groundwater effects to reach surface water at Pukaist Creek from Highland Tailings Storage Facility. Despite the Sulphate Adaptive Management Plan, uncertainty remains in terms of the duration of mitigations required, including other mitigations that may be required to reduce effects to surface and groundwater from the Highland Tailings Storage Facility. Some reviewers noted that additional studies should be carried out to better understand the geochemistry of the tailings pore water quality and potential surface and groundwater effects of this water over time after Closure. LNIB specifically questioned the understanding of effects to Coldstream Creek under current conditions.

HVC responded that as with all modeling and predictive tools, there is always some level of uncertainty, and that HVC is doing further work to understand the geochemical behavior of tailings pore water in the LL-Dam. This work will support the improvement of the conceptual model for both groundwater and surface water, which will ultimately help refine water management to reduce groundwater seepage toward Pukaist Creek during Operations and into Closure. The Water Management Plan and the Sulphate Adaptive Management Plan also have mechanisms to evaluate results and adjust plans and mitigations as needed. The work being done to understand the geochemical behavior of tailings pore water in the L-L Dam has been initiated, and results will be shared.

The EAO notes that model updates are required be completed every five years under the current M-11 permit and as part of the adaptive management process and on-going data collection. The next planned update is for March 31, 2026, as part of the Mine Plan and Reclamation Program Updates or if site water management or source terms significantly change and require an off-schedule update.

13.3.6.3. Uncertainty in groundwater flow and seepage pathway predictions

HVC has indicated that during Closure and Post-Closure, Witches Brook would receive seepage from many sources (such as Trojan, Bethlehem Tailings Storage Facilities, Valley Pit, Lornex Pit, Highmont Pit and Tailings Storage Facility, Iona/Jersey Pit, Huestis Waste Rock Dump, etc.). HVC is currently working on developing mitigations to address seepage from non-point sources through the development of Site Performance Objectives as required by ENV permit PE-376. To address concerns from multiple parties about water quality and metal concentrations (as well as other parameters of concern), ENV has directed HVC to expand current discharge limit developments to include an additional discharge to Witches Brook and develop site performance objectives for six discharges which include discharges to Witches Brook, Pukaist Creek, Billy Lake and Bose Lake that will be protective of these receiving environments. The current ENV permit requires the development of discharge limits for the Highmont TSF.

The CNA expressed that they felt HVC should develop a detailed plan to address seepage in Post-Closure to Witches Brook. This should include installing more groundwater monitoring wells and more water quality monitoring of seeps to improve identification of seepage pathways. The CNA is concerned that no groundwater studies identify groundwater/seepage flow pathways on the eastern part of the site. Studies could help in determining potential effects from pit lakes to Witches Brook.

HVC noted that they are currently undertaking a groundwater investigation to advance the understanding of the connection between contact waters and receiving waters. HVC has recently installed monitoring wells and plans to install additional wells as part of the groundwater investigation. The results of this investigation will be communicated to First Nations, when available.

The EAO's view is that HVC's response regarding uncertainty related to groundwater flows and seepage is sufficient for the purposes of the environmental assessment, noting that the ENV PE-376 permit will require continued work to address seepage concerns.

13.3.6.4. Segregation and diversion of contact and non-contact water to natural watercourses

During Application Review, First Nations expressed concerns with the Sulphate Adaptive Management Plan and stressed the importance of Pukaist Creek to Cook's Ferry Indian Band. Current HVC plans involve diverting non-contact water to Pukaist Creek (such as from the upgraded Woods Creek diversion). The CNA is of the view that HVC should co-develop a plan with the Nlaka'pamux Nation to use other source water options to supplement flows in Pukaist Creek (such as Boyes Creek, East Side Creek, etc.).

In response HVC stated that one of the primary goals of water management at HVC, and for the proposed HVC MLE Project, is to minimize, to the extent practicable, the amount of non-contact water runoff reporting to mine facilities by diverting it to natural conveyance channels downstream of the mine area. HVC further states that there are limited practicable opportunities to divert non-contact water flows to Pukaist Creek during Operations and Closure due to topographic constraints and the presence of existing Project and non-Project related infrastructure (e.g., Highland Tailings Storage Facility itself and Highway 97C).

During Post-Closure, and when meeting water quality requirements within the Highland Tailings Storage Facility Pond and Pukaist Creek, non-contact water flow reporting from these catchments would be routed through the closed Highland Tailings Storage Facility and Highland Tailings Storage Facility Pond to Pukaist Creek. HVC also confirms the water management concepts presented in these documents are represented in the HVC MLE water balance model.

HVC intends to collaboratively develop a Watershed Stewardship Strategy with First Nations. The Watershed Stewardship Strategy would establish management objectives and a process to identify, evaluate and prioritize mitigation measures for surface water management on the HVC mine site to be protective of areas downstream of the HVC mine site, including Pukaist Creek.

13.3.6.5. Lack of fully developed or immediate mitigations

Mitigations for the effects to groundwater from HVC MLE are already in place for existing mine Operations or under development. Existing measures increase certainty because data is available. Measures that are under development are less certain. The lack of fully developed or immediate new mitigations was a key concern for First Nations and the ENV.

HVC pointed to ongoing management plans that are evaluated for their effectiveness and committed to continuing to engage with First Nations and ENV on mitigation and effects management approaches with First Nations, including on HVC's proposed Watershed Stewardship Strategy, and Site Performance Objectives that are under development and intended to mitigate effects to water quality.

The CNA also raised a significant concern with HVC's long-term (100+ years) plans for water treatment and management into Post-Closure, which the CNA felt lacks detailed scheduling and plans. HVC highlighted that a Best Achievable Technology study is currently underway to evaluate both active and passive water treatment mitigation options. Closure water management and treatment designs will be developed in collaboration with Indigenous Governments and Organizations well in advance of submitting detailed designs that are required by provincial ministries prior to Closure. Iterative design development will allow for the most relevant and timely input to be gathered throughout the design process.

The EAO found that the information provided in the Application from HVC met the requirements outlined in the Application Information Requirements, including the preliminary concepts for water management and treatment at Closure. The nature of HVC's proposed mitigations, however, leave some uncertainty about the effects of HVC MLE on groundwater. With an understanding that mining in the Highland Valley has had a significant effect on groundwater, the lack of fully developed and immediate mitigation measures creates uncertainty.

13.3.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the groundwater valued component:

- Changes to groundwater quantity,
- Changes to groundwater quality, and
- Changes to groundwater quantity from BASA.

The EAO's characterization of the expected residual effects of HVC MLE and the proposed BASA amendment on groundwater quantity and quality is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 18: Summary of residual Effects for Groundwater from HVC MLE and BASA Amendment

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes to groundwater quantity</i> Changes in groundwater levels and groundwater flow patterns	Context (resilience): High Magnitude: Low to high Extent: Local to regional Duration: Long-term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Medium Uncertainty: Moderate to high Importance: High	Not significant The groundwater quantity context is rated as high as the ability to recover is good due to high resiliency of the valued component. The magnitude is rated as low to high since areas of small changes compared to existing conditions would occur. The high magnitude rating pertains to areas where increased pumping related (and non mitigated) effects would occur. Effects would be mainly local in extent, though regional effects are also possible. Regional effects would manifest in reduced baseflow to creeks. The pit groundwater pumping would occur mainly during Construction and Operations, and the recovery of the groundwater levels and groundwater flow system would continue into Closure and Post-Closure. Predicted effects to groundwater quantity are expected to be partially reversible long-term into Post-Closure with groundwater levels rebounding and groundwater contribution to baseflow in creeks predicted to dramatically increase. The changes of groundwater flow patterns would be continuous during all mine phases mainly in the pit area, the Tailings Storage Facility, and other mine related workings and would mostly recover into the far future once pumping stops. The changes in the groundwater system are expected to occur (medium likelihood), although the consequence would be minor (low to medium magnitude and mostly local extent). This led to a rating of medium risk. Existing mine operations provide an increased understanding of the effects of pumping and diversions on the groundwater system. Since additional field investigations and refinement of the two groundwater models are needed to improve understanding of the connection between the basal aquifer and the surficial aquifer and the groundwater seepage interception under the western Tailings Storage Facility dam, the uncertainty in the assessment for groundwater quantity is moderate to high. The importance is high as groundwater resources have been continuously identified as such by First nations, community members, the public, local governments, and provincial agencies.

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes in groundwater quality</i> Changes in groundwater quality due to mine pit pumping during HVC MLE Construction and Operations, and increased Tailings Storage Facility and waste rock seepage during Closure, and Post-Closure.	Context (resilience): Low Magnitude: Low to high Extent: Local to beyond regional Duration: Long-term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Medium Uncertainty: Medium to high Importance: High	Not significant The context for groundwater quality is low due to existing conditions not meeting B.C. Water Quality Guidelines in some cases and far future predicted effects of HVC MLE specifically from non-point sources such as the waste rock dumps, the Tailings Storage Facility and after Closure around the pit lakes. The magnitude is rated as low to high since instances of small water quality changes compared to existing condition would exist. The high magnitude rating pertains to situations where mitigation is predicted to be moderately effective such as intercepting Tailings Storage Facility affected groundwater seepage reporting as baseflow to Pukaist Creek. Effects to groundwater quality would be mainly restricted to near the local active mine area with some potential for mine related effects on a landscape scale. Residual effects are predicted to occur during Operations such as seepage from facilities, however, after Closure when the pumping of groundwater has seized the groundwater flow system would equilibrate into the far future. Effects to groundwater system would be continuous through Operations, Closure, and Post-Closure. Some of the effects to groundwater quality are expected to be partially reversible, and in some instances irreversible (such as continuous effects from the closed mine facilities). The effects to groundwater quality are expected to occur (medium likelihood), and low to moderate magnitude and relatively local extent led to a consequence of moderate, which culminates in a rating of medium risk. Existing mine Operations monitoring provides an increased understanding of the effects of pumping and diversions on the groundwater system. Since additional field investigations and refinement of the two groundwater models and water balance model used for water quality predictions are needed to improve understanding and related predictions of the water quality in the groundwater system and implement adequate mitigation measures, the uncertainty in the assessment for groundwater quality is medium to high. The importance is high as groundwater quality and related future water quality prediction uncertainty has been continuously identified by First nations, community members, the public, local governments, and provincial agencies.

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes in groundwater quantity from BASA</i>	Context (resilience): High Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Moderate Uncertainty: Medium to high Importance: High	Not significant The context is high as the ability of the groundwater system to recover is good due to high resiliency of the groundwater valued component, with the ability to recover to potentially near pre-mining conditions. The magnitude is low since there would be minor changes compared to existing conditions and predicted effects in 2002. The main effects on groundwater quantity would only be close to where groundwater pumping would (continue) to occur and therefor the extent is local. It is predicted that it would take between 100 and 200 years for water levels of the Valley pit Lake and groundwater levels around to fully recover and reach a new equilibrium. Predicted effects to groundwater quantity are expected to be partially reversible long-term into Post-Closure with groundwater levels rebounding and groundwater contribution to baseflow in creeks predicted to dramatically increase. Basal Aquifer pumping is expected to be continuous during Operations and would continue partially into Closure/Post-Closure to maintain pit stability. The likelihood of predicted effects to occur is high since some baseline conditions can be qualitatively compared against existing conditions and form the basis of future groundwater quantity predictions. The resulting uncertainty for the predictions is low since the cause-effect relationship between BASA Operations and its interaction with the groundwater environment is well understood. The importance is high as groundwater resources have been continuously identified by First Nations, community members, the public, local governments, and provincial agencies.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.3.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, HVC identified two existing and reasonably foreseeable projects and activities which have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects it assessed for HVC MLE and potential effects from these two other projects and concluded that no cumulative effects of HVC MLE in combination with these future projects on groundwater are predicted.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects are not expected to have major effects to groundwater, and any effects are expected to be managed in a similar manner to how HVC is required to manage surface water effects for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects to surface water quality, and ENV permits as needed should waste discharge be necessary).

The EAO considered the existing conditions at the mine site, with mining starting in the 1960s that resulted in long term changes to groundwater in the region. Additionally, before 1978 no groundwater system elevations or movements records exist, so it is not possible to know for certain how and to what extent the groundwater system has changed locally or regionally. The EAO also considered concerns from First Nations related to the lack of understanding of groundwater to surface water interactions, especially around Witches Brook. HVC committed to undertake field studies and transient groundwater modelling to close gaps in understanding. It is expected that mineral levels in water would have been elevated historically related to the weathering of naturally occurring minerals in the Highland Valley which are the reason mining has taken place in the Valley, but actual pre-mining contaminant levels are not known. In 2022, ENV established requirements in the PE-376 permit that are intended to address surface water quality concerns, which are related to groundwater quality due to expected connections to between surface and groundwater systems. Despite the uncertainty

about mitigations that are under development, the EAO concludes that HVC MLE would not contribute to a significant cumulative effect on water quality.

In terms of water quantity, the EAO notes the very dry nature of the region, where water is not plentiful. Competition over water between users exists, even at a very small scale, and the mine is already a large industrial user of water. Although HVC is proposing to re-use a higher rate of water and has proposed other mitigation measures for water quantity, the existing nature of effects to water quantity locally and in the region mean that any effect to water quantity is serious. The EAO therefore concludes that HVC MLE would contribute to existing significant cumulative effects to groundwater quantity. The EAO has proposed Condition 13 Watershed Management and Mitigation Plan to support the advancement of mitigation measures for effects on groundwater and surface.

13.3.9. Conclusion

The EAO concludes that HVC MLE itself and the BASA Amendment would not have significant adverse residual effects on the valued component. However, considering the additive effects of HVC to the current water scarcity across the region and the uncertainty about the effectiveness of proposed mitigations, the EAO concludes that HVC MLE would contribute to existing significant cumulative effects for groundwater quantity. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, the existing and proposed new mitigation measures under ENV permit PA-1557, and the EAO's proposed Certificate Conditions.

The EAO notes that the Combined Process for HVC MLE has brought the critical issue of water scarcity issue into focus. Current pressure on water availability is the result of multiple historical and present-day users, licencing decisions and changing climatic regimes. Although they are underdevelopment, the EAO is encouraged that the work planned by HVC that would address requirements proposed in Condition 13 Watershed Management and Mitigation Plan and requirements in the *Water Sustainability Act* authorizations would work to mitigate the effects of HVC MLE and potentially improve the current effects to groundwater in the Highland Valley.

13.4. Surface Water

13.4.1. Summary

A clean and abundant surface water system and water supply supports healthy communities, safe drinking water, and ecosystems. First Nations in the area have emphasized the importance of easy access to a clean surface water for their consumption and in their cultural wellbeing. Surface water was selected as a valued component for the HVC MLE environmental assessment as the activities associated with the expansion and extension of the existing HVC mine would continue to have effects on surface water quantity and surface water quality. Changes in surface water quantity and quality can affect the viability of creeks, rivers, lakes, vegetation, wildlife, and human health.

Potential changes in surface water quantity and surface water quality were identified as a key concern by during the environmental assessment. Proposed continued and expanded mining could cause these changes to occur due to continued mine water pumping and surface water realignments, increases in the size of waste rock storage facilities, increase in the Highland Tailings Storage Facility size and related seepage under and through the adjacent dams which are part of the Tailings Storage Facilities. HVC predicted that baseflows to creeks would continue to decrease until Closure, especially in Witches Brook, and these effects need to be mitigated. HVC is working on plans to mitigate this specific effect through management plans as well as specialized technical committees.

Key issues raised by reviewers included uncertainty about HVC's predictions of seepage pathways to surface water and the environment, planned diversions of non-contact water to natural watercourses, the expected effects of HVC MLE on surface water flows, the potential for erosion, and surface water quality downstream. Concerns were also raised regarding the lack of fully developed and immediate mitigations for effects to water and uncertainty related to water

management and potential effects in the future, post mine Closure. First Nations also raised concerns about the Sulphate Adaptive Management Plan, the uncertainty around the estimated 10-year timeline for decommissioning of the Plan, and its related effects on surface water quality.

Indigenous knowledge provided to HVC emphasized the cultural significance of water and its interconnectedness with the natural and human environment. Indigenous knowledge highlighted changes to the landscape and waterways in the Highland Valley since mining began in 1961. Common themes include observations of drying conditions leading to reduced abilities to use the water; distrust of the water quality in terms of drinking water; loss of lakes through historical mining practices; and concerns about whether water can support healthy fish, wildlife and vegetation.

The EAO assessed the potential effects to surface water quantity and quality from HVC MLE and the BASA Amendment, taking into account HVC's Application, existing and proposed mitigation measures, and the issues raised by First Nations and Technical Advisory Committee members. The EAO determined that it is likely that the extraction of water from the Basal Aquifer since 2009 created residual effects to water quantity, however, because of uncertainty in the connection between groundwater and surface water and mitigations put in place for water management that affected water quantity and quality, it is difficult to attribute effects to BASA. The EAO determined that HVC MLE would result in residual effects to surface water quality and quantity.

For assessing potential cumulative effects, the EAO considered that because some of the mitigations for surface water are in development, for example plans for additional stream diversions and the development of the attenuation pond as set out in the proposed *Water Sustainability Act* licenses to improve water flows, the outcomes are uncertain. While the EAO expects that HVC MLE's contribution to existing cumulative effects to surface water quality would not be significant, given that uncertainty and the potential for residual effects from HVC MLE to add to the current water scarcity across the region, the EAO concludes that HVC MLE would contribute to an existing significant cumulative effect for surface quantity.

13.4.2. Assessment Boundaries

The assessment boundaries for the surface water valued component encompass geographic areas (i.e., spatial boundaries) and times (i.e., temporal boundaries), as documented in [section 7.4.3.1](#) of the Application.

13.4.2.1. Spatial Boundaries

The spatial boundaries for the surface water assessment include a local study area and a regional study area. The surface water local study area is the area within which the potential HVC MLE effects on surface water are predicted to occur (this includes the HVC MLE footprint and zone of influence of HVC MLE). The local study area boundary for the surface water valued component includes Pukaist Creek, Axe Creek, and Witches Brook, and other watercourses and waterbodies, and is the same as the fish and aquatic resources valued component local study area.

The surface water regional study area encompasses a larger area over which effects of HVC MLE could occur. This regional study area includes major river systems, watersheds, and topographic divides, and seamlessly interconnects with the groundwater regional study area.

The BASA Amendment study area falls within the regional study area and includes the potential extent of measurable effects of current and proposed BASA dewatering activities, including the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.4.2.2. Temporal Boundaries

The four project phases used for the HVC MLE surface water assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and

- Post-Closure phase: steady state 100+ years.

These project phases were considered for each area of the mine to develop temporal boundaries that corresponded to the anticipated changes that could occur to surface water over time at each specific location.

The three temporal boundaries for the BASA Assessment are the same except the Construction and Operations phase is based on the start of work on BASA in 2002 when the Basal Aquifer was first exposed and dewatered and includes the subsequent operating phases of the mine. Of note, the effects from BASA activities are assessed in combination with other effects on surface water that have occurred since 2002 (due to Trojan Diversion improvements, climatic variability, new Shula groundwater wells, etc.) which are not part of BASA.

13.4.3. Surface Water in the Highland Valley

13.4.3.1. Historical context

The existing surface water conditions are detailed in [Chapter 7.4](#) of HVC's Application and are summarized below. Historical information about surface water conditions in the Highland Valley is supplemented by Indigenous knowledge that highlights the cultural, spiritual, and traditional significance of the area. Creeks such as Pukaist Creek and Witches Brook have been vital for First Nations' livelihood and remain culturally significant. Indigenous narratives describe the reliance on waterways for travel and sustenance, contributing to a deeper understanding of historical water conditions. It is understood that some water also flows from surface water into underground aquifers, which can provide water back to rivers at varying locations through wells and springs. This water sustains various life forms and has a profound connection with First Nations people, underscoring the loss experienced through restricted access to these areas.

HVC's western science analysis showed that historically, the lower Highland Valley contained numerous water features fed by upland areas, with groundwater migrating towards the Valley's lower surface water features. The earliest recorded data from around the mined areas date from 1949, with significant mining activity beginning in 1960. Mining activity led to several mine pits being developed, backfilled and filled with water to form pit lakes.

13.4.3.2. Current surface water system

HVC illustrated the existing mining-influenced surface water system in a conceptual water schematic included in the Application, using historical information, indigenous knowledge, and regional water data (Figure 13-3). This schematic demonstrates that surface water originates as runoff from higher elevations, collects in local streams, and drains towards the Highland Valley bottom. At the mine site, surface water is collected in runoff ponds and the Tailings Storage Facility Pond, with additional mine-affected surface water (also known as contact water) pumped into the Tailings Storage Facility Pond to be used for ore extraction. The surface water from the Tailings Storage Facility Pond and the surface runoff pond is used by HVC in the ore milling process.

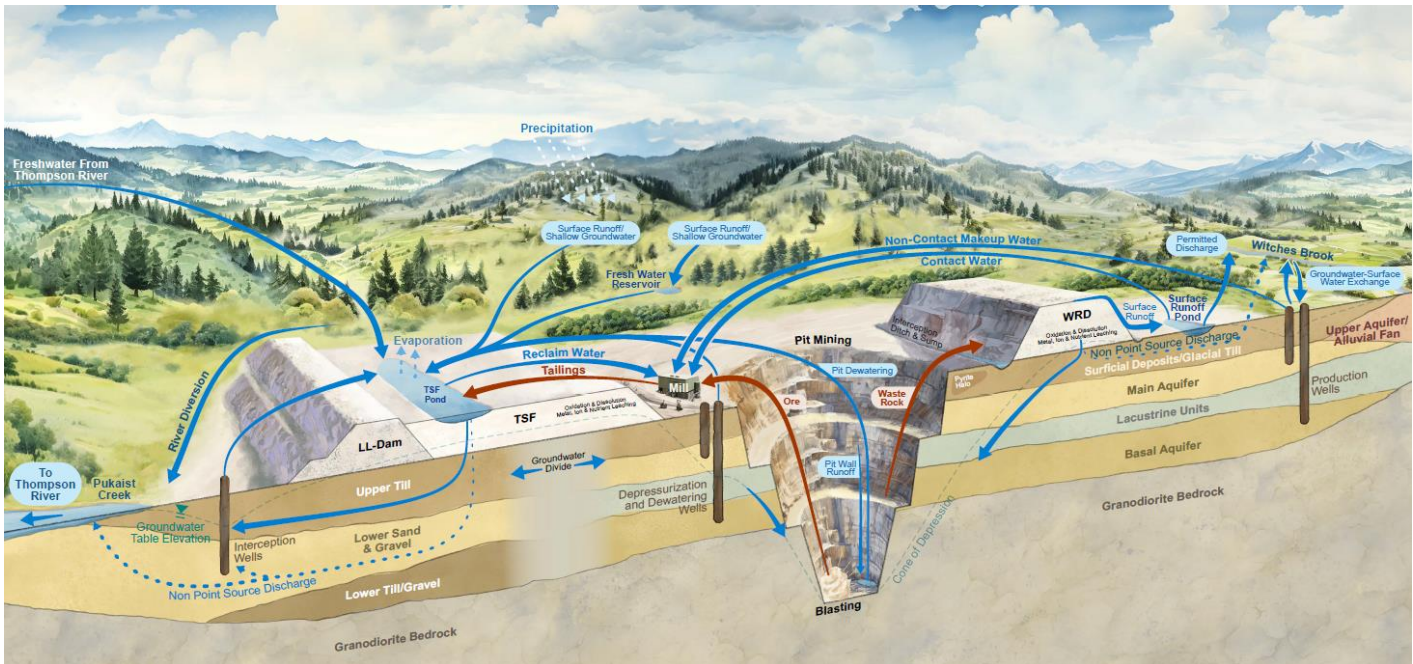


Figure 13-3: Schematic of Groundwater and Surface Water Flow-paths During Mine Operations

13.4.3.3. Existing Conditions by HVC

Surface water quantity

HVC reported that several creeks entering the mine have been partially or fully diverted to avoid contact with mine site infrastructure. Creeks such as Trojan, Nicholson, Ford, Michael, Mann, and Woods Creeks have been diverted. Water from Bethesda, Tait, Oram, Boyes, Forgotten, Burr, East Side and Winslow Creeks is used for milling ore (known as process water). The Highland Tailings Storage Facility is located on the former creek bed of Pukaist Creek, and intercepts diverted surface water from several creeks, including Boyes, Woods, Burr, and Forgotten Creeks. To supplement flows in Pukaist Creek and reduce the amount of water contacting mine works and disturbed areas, a pipeline diverts water from Woods Creek. Diversions of tributaries such as Bethesda Creek and Highmont Creek also affects surface flow patterns in Witches Brook, with a diversion built to route water from Trojan Creek around the Bethlehem Operations area into Witches Brook.

Since 2015, HVC has been monitoring local streamflow at 34 continuous flow hydrometric stations, with 10 key stations identified for the HVC MLE assessment. In 2020, two new continuous flow stations were established on Witches Brook. Stations are classified as mining-influenced or non-mining influenced. HVC calculated and confirmed continuous flow data with monthly manual measurements. Due to limited historical records and data gaps, no one monitoring station has a complete record, so a single long-term data set was created from various stations spanning from 1967 to 2018.

Regional streamflow data showed that the mean annual discharge generally increases with drainage area. The Thompson River near Spences Bridge station has the highest mean annual discharge (775 m³/second), while the smallest drainage area (Guichon Creek Above Tunkwa Lake Diversion) has the lowest (0.151 m³/second). Mean annual discharge is low for all local stations (well under 1 m³/second) with high flows typically in April, May, and June, and low flows in January, February, and March.

For assessment purposes, a site-wide water balance model was developed using GoldSim®. This model includes the existing HVC surface water system and can predict average daily flows at select locations under different assessment scenarios.

Surface Water Quality

HVC indicated that the surface water quality data from 1990 to 2021 covers both mine-affected and non-mine affected areas. Non-mine affected areas show background high concentrations of certain metals, exceeding Water Quality Guidelines for drinking water quality, and protection of aquatic life. These guideline exceedances may result from non-mining activities like land use management related to pine beetles and forest fires.

HVC monitors surface water quality in mine affected areas including Bose Lake, Billy Lake, the Valley Pit, Witches Brook, the Highland Tailings Storage Facility area and in the regional study area. HVC analyzed water quality data for on-site locations such as the Highland Tailings Storage Facility Pond, the Valley Pit, Trojan Creek at the end of diversion, the Bose Lake Seepage Station, and the Highmont Seepage Pond S4. Exceedances of the most stringent B.C. guidelines were identified as parameters of concern and used in the effects analysis.

HVC used a site-wide water quality model to simulate existing and future water quality, and to integrate input from water balance data, groundwater, and leaching from mine waste. This model allowed HVC to predict future effects of the mine during different phases of HVC MLE (Operations, Closure, and Post-Closure).

13.4.4. Potential Project Effects by HVC

The assessment of effects of HVC MLE on the surface water valued component is set out for the following cases:

1. Base Case: Considers the existing conditions including disturbance of current HVC mine site Operations as well as approved permitted developments.
2. Assessment Case: Considers the total effect of existing Operations, already approved development, and the proposed HVC MLE. The incremental change between the Base Case and Assessment Case is the effect of HVC MLE.
3. BASA Amendment: Considers the existing disturbance of current HVC Operations (existing conditions) as well as previously approved developments until the end of the current HVC mine life.

The predicted effects on the surface water valued component for the Base Case and the Assessment Case are presented below and are organized by key indicators (changes in overall flow and flow regimes in streams, and effects on surface water quality).

13.4.4.1. Base Case summary of effects of continued mining

Mining in the Highland Valley has changed surface water quantity and quality through the diversion of creeks and other mine related activities. The changing of the topography around the mine by HVC has introduced new interactions with surface water (such as construction of the Highland Tailings Storage Facility and related dams). HVC stated that mining at the HVC mine site has and would continue to alter surface water conditions in the following ways:

- Predicted changes in water flows in Witches Brook and Pukaist Creek due to ongoing mine water management, with increasing flows during mine Closure and Post-Closure. On Witches Brook, these transitions correspond with the transition to Valley Pit filling and eventually discharging. For Pukaist Creek, increased flows would result from reconnecting upstream tributaries, such as Burr Creek and Forgotten Creek, across the Highland Tailings Storage Facility to Pukaist Creek. The Trojan-Bethlehem Area and the Highmont Tailings Storage Facility area are not expected to experience any changes in water flow.
- Water quality modeling indicates that the primary sources of parameters of concern are related to mine activities, discharge from diversions, and background sources. The maximum predicted concentrations of the parameters of concern in the Highland Tailings Storage Facility and Pukaist Creek areas would remain well below all guidelines for the Thompson River. Water quality indicators including pH, temperature, and dissolved oxygen are predicted to remain similar to those at non-mine affected locations. HVC expected that its proposed water management infrastructure would enhance the management of contact water and support ongoing compliance efforts.

13.4.4.2. Assessment Case summary of effects

HVC stated that potential effects on surface water quantity and quality are expected during all phases of HVC MLE. A conceptual representation of the current and future mine water system and interactions is provided in Figure 13-4.

HVC MLE project activities would largely be a continuation of existing mining activities, including the extension of the Valley Pit and the Highmont East Pit, and raising of the L-L Dam. During Closure and Post-Closure, activities would be similar to the Base Case but with larger footprints and dimensions of mine waste facilities, which would continue to alter surface water conditions.

HVC acknowledged the importance of water availability to First Nations over the long term, considering the potential effects on all watercourses and waterbodies that could be affected by HVC MLE over the next 175 years, including potential effects from climate change.

Predicted changes in water quantity

- Trojan-Bethlehem Area: The extension of mining in the Bethlehem pit by 10 years would delay the filling of the Bethlehem pit lake by a corresponding 10 years.
- Highmont Tailings Storage Facility Area: This reclaimed area is not expected to experience any potential effects from HVC MLE.
- Main Mine/Witches Brook Area: Expansion of pits, dumps, and changes in water management would affect stream flows. Effects of pit dewatering would cause a reduction of flow in Witches Brook until the pit begins to discharge at surface. Pit discharge is predicted to shift from 2075 in the Base Case to 2154 under the Assessment Case, delaying the onset of increased flows to Witches Brook. Post-Closure flows in Witches Brook are predicted to be similar to the Base Case.
- Highland Tailings Storage Facility/Pukaist Creek Area: The Tailings Storage Facility would be increased in size, requiring the raising of the Tailings Storage Facility Dam, resulting in a potential for increased tailings pond seepage into Pukaist Creek. However, there are no predicted material changes to flow in Pukaist Creek during Operations compared to the Base Case. After Closure, upstream catchments such as Burr Creek and Forgotten Creek would be re-connected to Pukaist Creek, increasing flow rates. However, as HVC MLE entails an offset in the timing of Closure activities, the increased flows that would be realized in Post-Closure are later under HVC MLE, resulting in a comparative reduction in Pukaist Creek flows during the active Closure period. Construction of the Valley North Dump may affect water reaching Pukaist Creek, though it was not identified as a major driver of effects.

Predicted changes in water quality

The assessment by HVC concludes that the potential effects to water quality would be largely consistent with current effects from mining activity:

- Trojan-Bethlehem Area: Resumption of mining for the already-permitted Bethlehem Extension may change water quality, increasing volumes of contact water. HVC determined that Bethlehem Extension waste rock has similar chemical characteristics to existing waste rock with lower metal leaching potential. The development of an area containing pyrite could expose potentially acid generating materials, which could release sulfate and metals like copper.
- Highmont Tailings Storage Facility Area: This reclaimed area is not expected to experience any potential effects.
- Main Mine/Witches Brook Area: Increasing volumes of contact water would increase the loading of mine-related constituents in the receiving environment. Future waste rock is expected to have similar geochemical characteristics and metal leaching and acid rock drainage potential to existing waste materials. Localized areas of

higher acid generating potential could occur in the final Valley Pit walls, potentially releasing sulphate, copper, and manganese to surface water. Pit water management activities would influence constituent concentrations in surface water discharging to the Witches Brook, but constituent loadings are predicted to remain largely unchanged.

- Highland Tailings Storage Facility/Pukaist Creek Area: Proposed changes to the dimensions of the Highland Tailings Storage Facility could affect water quality in the Highland Tailings Storage Facility Pond, potentially affecting water quality in Pukaist Creek during low and high flow periods. Future tailings material is expected to have similar or lower concentrations of copper and molybdenum. Construction of the North Dump may affect water quality in Upper Pukaist Creek.

HVC further stated that HVC MLE could affect water quality indicators (e.g., pH, temperature, dissolved oxygen, total suspended solids, and turbidity). HVC's assessment concluded that it appears unlikely that dust deposition is contributing significant loads of metals of total suspended solids to waterbodies near the mine. The precise amount of dust being deposited on waterbodies is likely small, but uncertain. Relocating the Lornex Landfill to the Lornex East Dump would result in leachate and contaminated runoff to be discharged to the Highland Tailings Storage Facility, which could potentially affect water quality in Pukaist Creek.

HVC also noted that several First Nations groups identified dust as a potential effect on water quality. During the environmental assessment process, dust was recognized as a key issue. The rich and detailed knowledge shared by the community informed opportunities for HVC to consider mitigations for managing dust and addressing potential cultural effects. HVC's water quality modelling incorporated dust deposition results from the air dispersion model as contaminant loads to modelled water concentrations.

13.4.4.3. BASA Amendment

The Basal Aquifer Dewatering Project (BASA) was approved in 2002 under the Basal Certificate. This approval allowed for groundwater extraction from the aquifers near the Valley Pit at a rate up to 54,500 m³/day and the discharge of excess groundwater to Witches Brook at a rate up to 32,700 m³/day. To date, all extracted groundwater has been used in mine processing. The BASA Amendment proposes continued dewatering through the remainder of permitted mine Operations and into Closure and Post-Closure to maintain pit stability, aligning with the Base Case.

HVC's BASA Amendment assessment interpreted how conditions have changed due to groundwater pumping. BASA dewatering is believed to have resulted in additional losses to Witches Brook baseflows (reduced groundwater discharge and/or increased stream leakage). However, both Witches Brook and Guichon Creek have increased flow conditions compared to 2002 baseline conditions, likely due to drought-like conditions included in the 2002 baseline data and to upgrades to the Trojan Diversion.

HVC stated that continued BASA dewatering could affect surface water quantity through losses of Witches Brook baseflows for the remainder of planned Operations. HVC's groundwater model predicted future changes in baseflow contributions to Upper and Lower Witches Brook through to Post-Closure. During continued Operations, upper Witches Brook would see a 38 percent reduction in baseflow (a reduction of 1.9 L/s in stream flow), and Lower Witches Brook would see a 13 percent reduction (a reduction of 3.0 L/s in stream flow) relative to existing conditions.

After operation cease, groundwater pumping would gradually stop, leading to an increase in groundwater levels. This would increase groundwater discharge to Witches Brook and reduce surface water losses to groundwater. The rising Valley Pit Lake would alter groundwater surface water interactions. HVC predicted that it would take between 100 and 200 years for water levels of the Valley Pit Lake and groundwater levels around to fully recover and reach a new equilibrium.

Under existing conditions, Witches Brook has higher measured metal concentrations than non-mine affected areas, particularly for total molybdenum and total uranium, due to various mine water inputs. Some metals such as copper,

show similar or higher concentrations in non mine affected areas. HVC reported that measured concentrations at Witches Brook and Guichon Creek are generally below the Water Quality Guidelines for sulphate, total and dissolved iron, and total selenium, although total aluminum concentrations occasionally exceeded guidelines.

Witches Brook water quality is also characterized by elevated levels of dissolved copper, total manganese, total molybdenum, and total uranium, leading to regular exceedances of applicable Water Quality Guidelines at both Upper and Lower Witches Brook and occasional exceedances in Guichon Creek. Total molybdenum also regularly exceeds Water Quality Guidelines in Guichon Creek. Most water quality indicators are within Water Quality Guidelines, with the occasional exceptions for pH and regular exceedance for dissolved oxygen and background elevated total suspended solids and turbidity.

Dewatering the Basal Aquifer has operated differently than was originally anticipated in the 2002 BASA environmental assessment. Predicted effects at that time were primarily related to an increased discharge to Witches Brook, which did not occur. Because of other changes in water management around the mine site since 2002, including the Trojan diversion, HVC noted that there is uncertainty about identified changes in water quality since 2002. HVC did not expect that the continued dewatering of the Basal Aquifer would result in measurable changes to Witches Brook water quality relative to existing conditions.

13.4.4.4. Assessed positive effects by HVC

HVC anticipated several positive environmental effects on the surface water valued component compared to the Base Case due to updated engineering designs and management and mitigation changes. The relocation and upgrade of the landfill with modern controls is expected to reduce existing effects to surface water quality. Leachate generated by the new landfill would be collected and managed through leachate collection systems, including lined seepage ponds, reducing the landfill's effect on water quality. The planned relocation of the Lornex landfill to the Lornex East Dump would cause leachate and contaminated runoff to be discharged to the Tailings Storage Facility, which in turn could affect water quality in Pukaist Creek.

13.4.4.5. Predicted effects from climate change

Climate change predictions indicate higher annual mean temperatures and precipitation across the study area, with larger changes projected far into the future (2071-2600). These changes imply increased water volumes in water management facilities and stream flows in the receiving environment, though this is variable depending on the season.

13.4.5. Mitigation Measures by HVC

HVC listed the following mitigation measures which have already been implemented:

- HVC Site-Wide Water Management Plan: This plan coordinates water use and re-use for production, operation, maintenance, extension, and reclamation activities while meeting business, health, and safety, ecological, regulatory, and community goals; and
- Sulphate Adaptive Management Plan: Established in 2011 as a condition of the M-11 permit update, this plan was recently upgraded to mitigate the adverse effects of operating the Highland Tailings Storage Facility on surface water and groundwater quantity and quality downgradient of the Highland Tailings Storage Facility.

New and updated mitigation measures proposed by HVC to address the effects of HVC MLE on surface water quantity and quality include:

- Changes in baseflow to creeks – during Operations, baseflow to creeks cannot be mitigated, but total flows in water courses can be managed. HVC's proposed Water Stewardship Strategy would establish management objectives and a process to identify, evaluate and prioritize mitigation measures for surface water management on the HVC mine site, including identifying and prioritizing measures that HVC can implement to improve total

flows in Witches Brook. After Operations, baseflows to creeks would gradually increase, managing most effects to surface water resulting from the Operations phase.

- Witches Brook – HVC is working to find solutions for mitigating current and potential effects on stream flows. Options include augmenting stream flow through new attenuation pond storage solutions, which could release flows as needed. These storage solutions could be fed by new creek diversions.
- Pukaist Creek – upgrading the Woods Creek Diversion would increase its capacity, allowing a greater proportion of Woods Creek to be diverted to Pukaist Creek during Operations and Closure.
- Surface water quality – small changes to surface water chemistry are expected compared to existing conditions, except for potential changes in Pukaist Creek. HVC expected the existing Sulphate Adaptive Management Plan to mitigate any adverse effects on Pukaist Creek water quality and quantity. The Sulphate Adaptive Management Plan is an adaptive system adjusted based on ongoing monitoring results.
- HVC MLE Erosion and Sediment Control Plan – this Plan applies risk assessment to identify best management practices to reduce erosion and sedimentation risk.
- Fugitive Dust Management Plan – this existing plan was updated to address potential effects of HVC MLE on surface water. It includes a Trigger Action Response Plan and application of best management practices to reduce dust production by mining activities.
- Landfill Relocation – the relocation and upgrade of the landfill, as described in the New Lornex Landfill Design, Operations, and Closure Plan, would mitigate the leachate originating from the existing landfill.

The HVC Reclamation Program for Current Life of Mine and HVC MLE has been guided by HVC 2016 Returning Land Use Plan, which was developed as a collaboration between HVC, Nlaka’pamux community members and technical representatives and will be updated. The Reclamation Program calls for re-establishing pre-mine ecosystems to support the range of traditional land uses identified by Nlaka’pamux participants. This would help mitigate effects to wetlands (Highmont and Witches Brook) and help improve the water quality of shallow groundwater originating from the waste rock areas compared to pre-reclamation conditions.

After mine Closure, all active mine water management would cease, and the pit lake would be allowed to fill in the former mine pit. After the Valley Pit fills (estimated to take more than 100 years), a water treatment plant would be constructed to treat pit lake water before it is discharged into the environment. The water treatment plant would remain active until the desired water quality is achieved, after which the water treatment plant would be decommissioned. During Post-Closure, more baseflow would feed into local creeks, benefitting instream flows and water supply to local lakes. Surface water runoff from the Tailings Storage Facility and Waste Rock Dumps would flow into the pit lake and local creeks such as Witches Brook and Pukaist Creek.

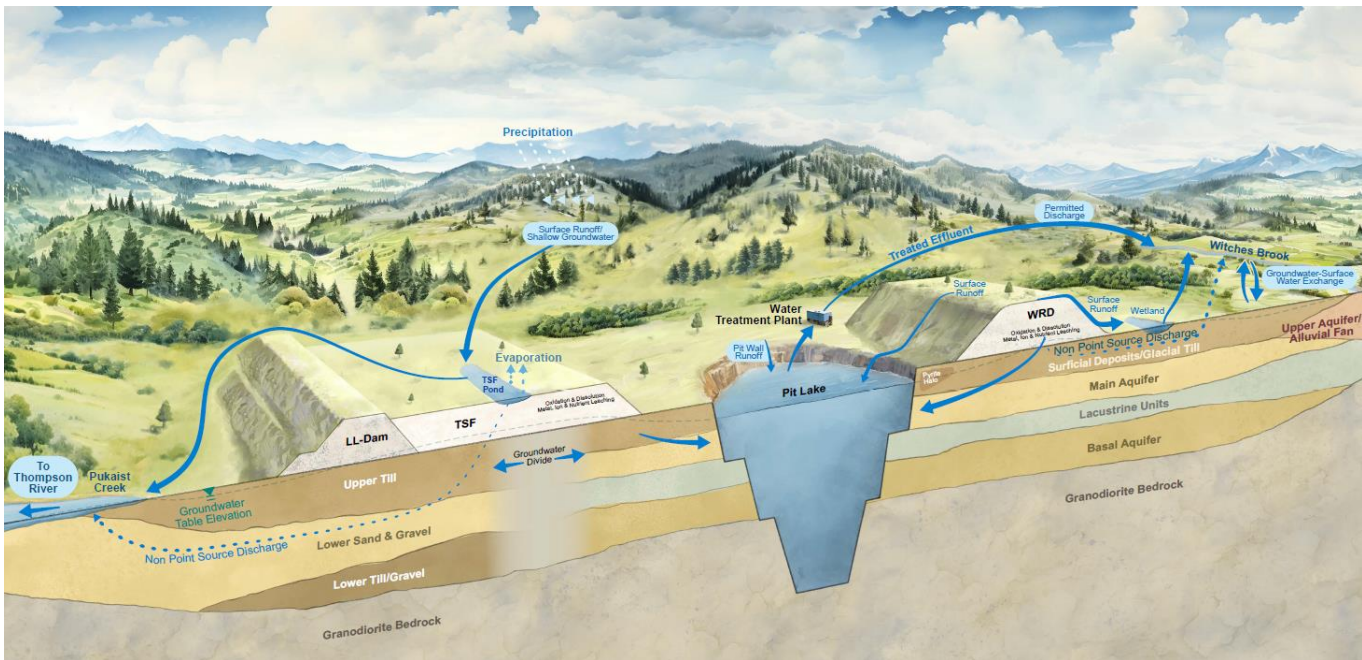


Figure 13-4: Schematic of Groundwater and Surface Water Flow-paths in Post-Closure

13.4.6. Key Issues Raised

The following key issues were raised during review of the Application by the Technical Advisory Committee, including participating Indigenous nations, and the public.

13.4.6.1. Treatment of historical data in the assessment

During review of the Application, concerns were raised by First Nations about the time period for the environmental assessment starting at current conditions, rather than a pre-mining baseline. The EAO's scope for the HVC MLE environmental assessment is the expansion and extension of mining due to HVC MLE, and did not require HVC to provide long-term historical conditions data. However, HVC included available pre-mining data (descriptive and conceptual) in the Application to provide an indication of how water flows in the Highland Valley have changed since mining began in the 1960s.

The CNA noted the insufficiency of modelling that begins in 2015 and excludes more than 50 years of data. In the Historical Water Conditions Study completed by the CNA on behalf of HVC, the CNA highlighted that historical and current mining operations have resulted in resource conflicts, reduced water quantity and quality, decreased fish health, diminished wildlife populations, and contaminated water, raising concerns about the safety of consuming fish, meat, plants, and water. The Historical Water Conditions Study showed observed changes in surface water quality over a longer range in time (decades) and concluded that using a short date range distorts or provides an incomplete picture of groundwater quality changes and trends.

HVC responded that data from 2015 to 2020 provide the most reliable flow and water quality records. HVC also noted that extending the model calibration period before 2015 is not possible due to the lack of sufficient monitoring data to calibrate the model, however, HVC will periodically revisit and update the model calibration as additional monitoring data becomes available.

The EAO found that HVC's Application met the requirements of the Application Information Requirements, but also acknowledges the historical data limitations that don't allow for a full, long-term picture of the effects of past mining in the Highland Valley.

13.4.6.2. Closure and Post-Closure water management

During review of the Application, the CNA noted concerns and uncertainty about water management at Closure, specifically the potential for groundwater effects to reach surface water at Pukaist Creek from Highland Tailings Storage Facility. Despite the Sulphate Adaptive Management Plan, uncertainty remains in terms of the duration of mitigations required, including other mitigations that may be required to reduce effects to surface and groundwater from the Highland Tailings Storage Facility. Some reviewers noted that additional studies should be carried out to better understand the geochemistry of the tailings pore water quality and potential surface and groundwater effects of this water over time after Closure.

HVC responded that as with all modeling and predictive tools, there is always some level of uncertainty, and that HVC is doing further work to understand the geochemical behavior of tailings pore water in the LL-Dam. This work will support the improvement of the conceptual model for both groundwater and surface water, which will ultimately help refine water management to reduce groundwater seepage toward Pukaist Creek during Operations and into Closure. The Water Management Plan and the Sulphate Adaptive Management Plan also have mechanisms to evaluate results and adjust plans and mitigations as needed. The work being done to understand the geochemical behavior of tailings pore water in the L-L Dam has been initiated, and results will be shared.

The EAO notes that model updates are required be completed every five years under the current M-11 permit and as part of the adaptive management process and on-going data collection. The next planned update is for March 31, 2026, as part of the Mine Plan and Reclamation Program Updates or if site water management or source terms significantly change and require an off-schedule update.

13.4.6.3. Uncertainty in groundwater flow and seepage pathway predictions to Surface Water

HVC concluded that during Closure and Post Closure, Witches Brook would receive seepage from many sources (such as Trojan, Bethlehem Tailings Storage Facilities, Valley Pit, Lornex Pit, Highmont Pit and Tailings Storage Facility, Iona/Jersey Pit, Huestis Waste Rock Dump, etc.). HVC is currently working on developing mitigations to address seepage from non-point sources through the development of Site Performance Objectives as required by ENV permit PE-376. To address concerns from multiple parties about water quality and metal concentrations (as well as other parameters of concern), ENV has directed HVC to expand current discharge limit developments to include and additional discharge to Witches Brook and develop site performance objectives for six discharges which include discharges to Witches Brook, Pukaist Creek, Billy Lake and Bose Lake that will be protective of these receiving environments. The current ENV permit requires the development of discharge limits for the Highmont TSF.

The CNA expressed that they felt HVC should develop a detailed plan to address seepage in Post Closure to Witches Brook. This should include installing more groundwater monitoring wells and more water quality monitoring of seeps to improve identification of seepage pathways. The CNA is concerned that no groundwater studies identify groundwater/seepage flow pathways on the eastern part of the site. Studies could help in determining potential effects from pit lakes to Witches Brook.

HVC noted that they are currently undertaking a groundwater investigation to advance the understanding of the connection between contact waters and receiving waters. HVC has recently installed monitoring wells and plans to install additional wells as part of the groundwater investigation. The results of this investigation will be communicated to First Nations, when available.

The EAO's view is that HVC's response regarding uncertainty related to groundwater flows and seepage is sufficient for the purposes of the environmental assessment, noting that the ENV PE-376 permit will require continued work to address seepage concerns.

13.4.6.4. Views on Indigenous engagement on the Sulphate Adaptive Management Plan

The CNA raised concerns about what it views as the lack of Indigenous engagement on the Sulphate Adaptive Management Plan and the uncertainty around the estimated 10-year timeline for decommissioning the Sulphate Adaptive Management Plan. The CNA emphasized the need for detailed mitigations and planning.

In response HVC stated that the Application provides a groundwater effects assessment but is not intended to detail all mitigation measures. The effectiveness of existing management plans in mitigating predicted effects is being evaluated, and HVC committed to ongoing engagement with First Nations groups on mitigation and effects management approaches, including the proposed Watershed Stewardship Strategy and potential improvements to existing plans.

HVC added that the Sulphate Adaptive Management Plan will maintain Site Performance Objectives for Pukaist Creek, with a Site Performance Objective Development Plan being created in collaboration with a Qualified Professional, the Technical Advisory Committee Water Quality Sub-committee, First Nations, and provincial regulators as required under the PE-376 permit. Preliminary Closure concepts are appropriately designed for the current planning stage. HVC has provided a water treatment strategy using proven technologies to meet risk-based thresholds at permitted discharge locations (per ENV permit PE-376). A Best Achievable Technology study is underway to evaluate water treatment options. Closure water management and treatment designs would be developed collaboratively with affected First Nations well before detailed designs are submitted to agencies three years before Closure, allowing for relevant and timely input.

13.4.6.5. Diversion of water away from natural watercourses

During Application Review, the CNA stressed the importance of Pukaist Creek to Cook's Ferry Indian Band and expressed concerns with diverting water that would naturally flow to Pukaist Creek to other watersheds. Current HVC plans involve diverting non-contact water to Pukaist Creek (such as from the upgraded Woods Creek diversion). The CNA was of the view that HVC should co-develop a plan with Nlaka'pamux Nation to use other source water options to supplement flows in Pukaist Creek (such as Boyes Creek, East Side Creek, etc.).

In response, HVC stated that that one of the primary goals of water management at HVC, and for HVC MLE is to minimize, to the extent practicable, the amount of non-contact water runoff reporting to mine facilities by diverting it to natural conveyance channels downstream of the mine area. HVC further states that there are limited practicable opportunities to divert non-contact water flows to Pukaist Creek during Operations and Closure due to topographic constraints and the presence of existing Project and non-Project related infrastructure (e.g., Highland Tailings Storage Facility itself and Highway 97C).

During Post-Closure, and when meeting water quality requirements within the Highland Tailings Storage Facility Pond and Pukaist Creek, non-contact water flow reporting from these catchments will be routed through the closed Highland Tailings Storage Facility and Highland Tailings Storage Facility Pond to Pukaist Creek. HVC also confirmed that the water management concepts presented in these documents are represented in the HVC MLE water balance model.

HVC intends to collaboratively develop a Watershed Stewardship Strategy with First Nations. The Watershed Stewardship Strategy would establish management objectives and a process to identify, evaluate and prioritize mitigation measures for surface water management on the HVC mine site to be protective of areas downstream of the HVC mine site, including Pukaist Creek.

13.4.6.6. Concerns about water scarcity in the region and drought management

During review of the Application, WLRS raised concerns with the proposed additional water extraction for HVC MLE, considering the lack of available water in the area. WLRS noted that water licenses have been denied in recent years because of water scarcity and had concerns about effects to water quantity, particularly during periods of drought. WLRS questioned how HVC would mitigate the effects of extracting more water from the system, concerns that were also raised by First Nations.

In response, HVC developed a memo to show the consideration of options to mitigate effects, including a proposed attenuation pond in the Witches Brook system. HVC stated that it intends to collaboratively develop a Watershed Stewardship Strategy with First Nations. The Water Stewardship Strategy would establish management objectives and a process to identify, evaluate and prioritize mitigation measures for surface water management on the HVC mine site to be protective of areas downstream of the HVC mine site.

Further, to address the issue of water usage at the HVC mine during periods of drought, HVC has begun work on a drought management plan, with staged approaches for different levels of drought. This work will support WLRS-led regional water planning, particularly considering the potential for climate change to increase the intensity and duration of droughts. WLRS has included conditions in new and draft water licences requiring flow augmentation to Witches Brook to meet Environmental Flow Needs in Witches Brook, and the EAO has proposed a requirement for consideration of drought management in proposed Certificate Condition 13 Watershed Management and Mitigation Plan.

13.4.6.7. Lack of fully developed and immediate mitigations

Mitigations for the effects to surface water from HVC MLE are already in place for existing mine Operations or under development. Existing measures increase certainty because data is available. Measures that are under development are less certain. The lack of fully developed or immediate new mitigations was a key concern for First Nations and ENV.

HVC pointed to ongoing management plans that are evaluated for their effectiveness and committed to continuing to engage with First Nations and ENV on mitigation and effects management approaches, including on the proposed Watershed Stewardship Strategy, and Site Performance Objectives that are under development and intended to mitigate effects to water quality.

The CNA also raised a significant concern with HVC's long-term (100+ years) plans for water treatment and management into Post-Closure, which the CNA felt lack detailed scheduling and plans. HVC highlighted that a Best Achievable Technology study is currently underway to evaluate both active and passive water treatment mitigation options. Closure water management and treatment designs would be developed in collaboration with First Nations well in advance of submitting detailed designs that are required by provincial ministries prior to Closure. Iterative design development will allow for the most relevant and timely input to be gathered throughout the design process.

The EAO found that the information provided in the Application from HVC met the requirements outlined in the Application Information Requirements, including the preliminary concepts for water management and treatment at Closure with a high Technology Readiness Level anticipated. The nature of HVC's proposed mitigations, however, leave some uncertainty about the effects of HVC MLE on surface water. With an understanding that mining in the Highland Valley has had a significant effect on surface water, but one that is not thoroughly understood, the lack of fully developed and immediate mitigation measures creates uncertainty.

13.4.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the surface water valued component:

- Changes to surface water quantity;
- Changes in surface water quality; and
- Changes in surface water quantity from BASA.

The EAO's characterization of the expected residual effects of HVC MLE and the proposed BASA amendment on surface water quantity and quality is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 19: Summary of residual Effects for Surface Water

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes to surface water quantity</i> Changes in surface water quantity from water management activities, diversions, and drainages extend the period of reduced baseflow in creeks and decades delays in mine pit lake filling.	Context: High Magnitude: Low to high Extent: Limited to regional Duration: Long term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Medium Uncertainty: Moderate to high Importance: High	Not significant Context is considered high because of the ability to recover due to high resiliency of the natural surface water quantity system. The magnitude is low to high because of existing effects to surface water vary in relation to the decrease or increase in contribution to baseflows to creek and water management activities such as creek diversions and active drainage management across the mine site. Effects would be noticeable on a limited (mine site wide) scale and on a regional scale such as predicted reduced flow contributions from Witches Brook and Pukaist Creek to larger rivers systems (e.g. Guichon Creek) during Operations; flows are predicted to increase in Closure and Post-Closure which would increase water availability downstream. The duration is rated as long-term since effects of HVC MLE would propagate through the groundwater system into the surface water quantity system and manifest as directly linked reduced baseflow to creeks for centuries. Surface water quantity changes would occur continuously through mine Operations, while increases in flows are predicted for the Closure and Post-Closure phases. Effects to surface water quantity are expected to be partially reversible in most instances into Closure/Post-Closure, except for the potentially permanent (irreversible) changes to the drainage patterns of the receiving surface water system due to the size increase and delay in filling of the pit lake. The changes in the surface water system are expected to occur (medium likelihood), although the consequence would be minor with appropriate mitigation (low to medium magnitude and mostly local extent). This led to a rating of low to moderate risk. Existing mine Operations provide an increased understanding of the effects of mine water management (such as diversions) on the surface water system. Since additional field investigations and refinement of the water balance models are needed to improve understanding of the connection between groundwater aquifers and the surface water system, the uncertainty in the assessment for surface water quantity is moderate to high. The importance is high as surface water resources have been continuously identified as such high importance by First Nations, community members, the public, local governments, and provincial agencies.

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes in surface water quality</i> Changes in surface water quality from seepage, increased amount of mine contact water, expanded Tailings Storage Facility and waste rock dumps, and increased deposition of particulate matter.	Context: Low Magnitude: Low to high Extent: Local to Regional Duration: Long term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Medium Uncertainty: Medium to high Importance: High	Not significant The context for surface water quality is low due to existing conditions not meeting B.C. Water Quality Guidelines for some constituents in some cases and predicted effects of HVC MLE specifically from non-point sources such as the waste rock dumps, the Tailings Storage Facility and after Closure around the pit lakes and relocated landfill. Additionally, changes in water quality as a result of disturbance often lag and trends can be slow to appear, particularly when tied to groundwater pathway effects. The magnitude is rated as low to high since instances of small surface water quality changes compared to existing mine production conditions would exist. The high magnitude rating pertains to situations where mitigation is predicted to be moderately effective such as Tailings Storage Facility affected seepage reporting as baseflow to Pukaist Creek. Surface water quality effects would be identifiable close to the mine site where most of the potential effects related to mine activities occur and depending on time of year and regional influences the changes would be measurable on a regional scale, such as effects to rivers (Guichon Creek and Thompson River). Surface water quality effects would persist into Closure and Post-Closure phases and would be continuous as effects on the surface water system are continuous through Operations, Closure, and Post-Closure from both mine Operations activities as well as legacy mine structures such as the Tailings Storage Facility, waste rock dumps and pit lakes. Some of the effects to surface water quality are expected to be partially reversible, and in some instances irreversible (continuous effects from closed mine facilities such as the Tailings Storage Facility and exposed pit lake rock faces). Effects to surface water quality are expected to occur (high likelihood), and the low to high magnitude led to a consequence of moderate, which culminates in a rating of medium risk. The existing mine Operations monitoring provides an increased understanding of the effects on surface water quality. Since additional field investigations and refinement of the water balance and water quality model used are still needed to improve understanding and related predictions of the water quality in the surface water system and required mitigations, the uncertainty in the assessment for surface water quality is medium to high. The importance is high as surface water quality and related future water quality prediction uncertainty has been continuously identified by First Nations, community members, the public, local governments, and provincial agencies.

Residual Effect	Assessment Rating	Significance and Rationale
<i>Changes in surface water quantity from BASA</i>	Context (resilience): High Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (Likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant The context is rated as high as the ability of the surface water system to recover is good due to high resiliency of the valued component and ability to recover to near pre mining conditions. This would be mainly at Closure at the beginning of reclamation activities and long-term as the mine pits filled with water and the system has established a new equilibrium. The magnitude is low since there would be minor changes compared to existing conditions. The effects on surface water quantity would mainly be close to where mine related activities such as diversions occur, however some effects would extend to the more regional water system. Since the surface water system is under the influence of the groundwater system for baseflow contributions, it is also predicted to take several centuries to reach Post-Closure conditions and as such the duration would be long-term into the far future. Predicted effects to surface water quantity are expected to be partially reversible long-term into Post-Closure with groundwater levels rebounding and contribution to baseflow in creeks dramatically increasing. Effects on surface water are expected to be continuous during Operations and continue into Closure/Post Closure until the pit lakes are filled and stable. The likelihood of predicted effects to occur is high since baseline conditions can be qualitatively compared against existing conditions and form the basis of future surface water quantity predictions. The resulting uncertainty for the predictions is low since the cause-effect relationship between BASA Operations and its interaction with the surface water environment is well understood. The importance is high as surface water resources have been continuously identified by First nations, community members, the public, local governments, and provincial agencies.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.4.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, HVC identified two existing and reasonably foreseeable projects and activities which have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects it assessed for HVC MLE and potential effects from these two projects and concluded that the cumulative effects of HVC MLE in combination with these future projects on surface water would be negligible.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects are not expected to have major effects to surface water, and any effects are expected to be managed in a similar manner to how HVC is required to manage surface water effects for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects to surface water quality, and ENV permits as needed should waste discharge be necessary).

The EAO considered the existing conditions at the mine site, with mining starting in the 1960s that resulted in long term changes to surface water in the region, and notes that because of significant changes to the landscape since pre-mining conditions, it is not possible to know for certain how and to what extent that the quality of surface water has changed locally or regionally. It is expected that mineral levels in water would have been elevated historically related to the weathering of naturally occurring minerals in the Highland Valley which are the reason mining has taken place in the Valley, but actual pre-mining contaminant levels are not known. In 2022, ENV established requirements in the PE-376 permit that are intended to address surface water quality concerns. Despite the uncertainty about mitigations that are

under development, the EAO concludes that HVC MLE would not contribute to a significant cumulative effect on water quality.

In terms of water quantity, the EAO notes the very dry nature of the region, where water is not plentiful. Competition over water between users exists, even at a very small scale, and the mine is already a large industrial user of water. Although HVC is proposing to re-use a higher rate of water and has proposed other mitigation measures for water quantity, the existing nature of effects to water quantity locally and in the region mean that any effect to water quantity is serious. The EAO therefore concludes that HVC MLE would contribute to existing significant cumulative effects to surface water quantity. The EAO has proposed Condition 13 Watershed Management and Mitigation Plan to support the advancement of mitigation measures for effects on groundwater and surface water.

13.4.9. Conclusion

The EAO notes that that HVC MLE and the BASA Amendment would not have significant adverse residual effects on the surface water valued component. However, considering the additive effects of HVC MLE to the current water scarcity across the region and the uncertainty about the effectiveness of proposed mitigations, the EAO concludes that HVC MLE would contribute to existing significant cumulative effects for surface water quantity. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, the existing and proposed new mitigation measures under the M-11 permit and ENV permit PA-1557, and the EAO's proposed Certificate Conditions.

The EAO notes that the combined environmental assessment and permitting process for HVC MLE has brought the critical issue of water scarcity issue into focus. Although they are underdevelopment, the EAO is encouraged that the work planned as part of HVC through the proposed Watershed Stewardship Strategy and requirements in the *Water Sustainability Act* licenses would mitigate the effects of HVC MLE and potentially improve the current effects in the Highland Valley.

13.5. Fish and Aquatic Resources

13.5.1. Summary

A healthy and thriving fish population is crucial for maintaining a balanced ecosystem that supports the health of communities and local wildlife. First Nations have emphasized the importance of healthy fish populations for their consumption and cultural well-being. [Chapter 7.5](#) of HVC's Application outlines the potential effects of HVC MLE on fish and aquatic resources.

HVC identified adverse effects to fish, fish habitat, aquatic habitat, primary producers and benthic macro invertebrates. These effects could result from activities related to HVC MLE, including construction activities during the expansion of the mine footprint and highway realignment, changes in water management activities, and extended timelines before closure and reclamation. The Technical Advisory Committee raised concerns about the ongoing HVC mine operations' effects on an isolated population of rainbow trout in Highmont Creek, the lack of details for fish habitat offsetting, potential increases in mercury concentrations, and the absence of offsets for the loss of non-fish bearing streams.

The EAO reviewed HVC's assessment and mitigation measures and considered the key issues raised and the existing requirements under ENV permit PE-376. The EAO concluded that HVC MLE would likely cause residual effects to fish health, fish and aquatic habitat, and primary producers and benthic macro invertebrates from the loss or alteration of stream habitat due to the mine footprint extension, continuation of dewatering, and contact water seepage. Considering existing effects to fish and aquatic resources in the area, the EAO concludes that HVC MLE and the BASA Amendment would not have significant residual or cumulative effects on the fish and aquatic resources valued component.

13.5.2. Assessment Boundaries

13.5.2.1. Spatial boundaries

The four spatial boundaries selected by HVC for the HVC MLE fish and aquatic resources effects assessment included the Base Case footprint (the current extent of the disturbed and permitted area of the mine), the Assessment Case footprint (the proposed expanded area of the mine due to HVC MLE), a local study area and a regional study area.

The local study area encompasses catchment areas that drain directly towards existing and proposed HVC MLE infrastructure, as well as the catchment areas of Pukaist Creek, Axe Creek, and Witches Brook. The local study area also includes sources of surface water that are licenced to supply the mine – the Thompson River at Spatsum, and Inkikuh Creek via Laura Lake. The local study area aligns with the surface water and groundwater local study areas due to the interconnected nature of fish and aquatic resources and surface and groundwater systems.

The regional study area is defined by major river systems and topographic divides, with the Thompson River on the west, the topographic divide between the Highland valley and the Thompson River on the north, Guichon Creek on the east, and the Nicola River on the south. The regional study area aligns with that of the surface water and groundwater assessments in acknowledgement of the interconnected nature of fish and aquatic resources and surface and groundwater systems.

The spatial boundary used for the BASA amendment assessment of the fish and aquatic resources valued component includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.5.2.2. Temporal boundaries

The four temporal boundaries used for the fish and aquatic resources assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.5.3. Baseline Conditions by HVC

Baseline fish and aquatic resources conditions in the local and regional study areas were assessed in Chapter 7.5 of HVC's Application and are summarized here. The HVC MLE Application describes existing fish and aquatic resources conditions utilizing both Indigenous knowledge and western science views.

First Nations have articulated the cultural importance of fish and fishing in the Highland Valley, emphasizing the significance of rainbow trout as a vital food source. Indigenous knowledge included in the Application from the CNA highlighted the historic and continuous loss of fish and changing aquatic habitat as a result of the existing mine, which has had a negative effect on CNA Participating Bands. Community members have experienced a decrease in their sense of belonging and Balance to the land and connection with their cultural and spiritual heritage.

HVC conducted multiple field-based sampling programs to assess the baseline conditions of fish and aquatic resources in the areas that would be affected by HVC MLE. These programs include studies on fish presence and habitat, fish health surveys, rainbow trout tissue analyses, benthic marine macroinvertebrate and periphyton community composition, benthic macro invertebrate tissue analyses, and sediment chemistry in various watercourses.

Key findings from HVC's assessment are summarised in the following sections.

13.5.3.1. Fish and Aquatic Health

- **Sediment Quality:** Sediments in the study area were found to have naturally elevated metal concentrations due to mineral-rich deposits. At all sites, including those not affected by mining, copper concentrations exceeded the Canadian Council of Ministers of the Environment interim sediment quality guidelines, with many sites also showing elevated levels of nickel and chromium. Copper concentrations exceeded both these interim guidelines and Canadian Council of Ministers of the Environment probable effects level guidelines at sites within or near the south mine site footprint: lower Highmont Creek, upper Skuhun Creek, Skuhun Lake, Skuhun Creek and upper Witches Brook.
- **Fish Tissue Analysis:** All fish muscle tissue collected by HVC from monitoring sites in 2022 had metal concentrations (mercury, selenium, lead) below relevant guidelines for human consumption. However, mercury concentrations in fish tissues from Pukaist Creek exceeded the reference range in all sample years and exceeded the Canadian Council of Ministers of the Environment guideline for the protection of wildlife consumers of fish in muscle tissues in most years.
- **BMI Selenium Concentrations:** Elevated benthic macro invertebrate selenium concentrations were found in some areas of the local study area. Pimainus Creek, a reference site not influenced by mining activity, had the highest selenium concentration, followed by Highmont Creek and Witches Brook. Maximum concentrations did not exceed B.C. water quality guidelines.
- **Periphyton Biomass:** Periphyton biomass was lower at sites not directly affected by mine activities (e.g., Chataway Creek, Woods Creek) compared to those currently influenced by mining (e.g., Witches Brook, Highmont Creek, Pukaist Creek), likely due to nutrient enrichment at mine-affected sites. Periphyton community composition was highly influenced by site conditions and, to a lesser extent, mining activities.

13.5.3.2. Fish and Aquatic Habitat:

- **Witches Brook:** This brook is seasonally fish-bearing along its entire length and contains rainbow trout. Although the current flow rate is lower than before the mine's operation, long-term trends show increasing flows, which may improve habitat conditions over time. These changes are linked to operational dewatering, and transitions during mine closure and post-closure phases.
- **Pukaist Creek:** Prior to mine development, Pukaist Creek was the main westward watercourse draining the Highland Valley into the Thompson River. Now, most surface water flow is intercepted by the Highland Tailings Storage Facility, with current flows originating from groundwater-fed seeps and diversion pipes from Woods Creek. The creek appears to be fish bearing for rainbow trout along its entire length.
- **Guichon Creek:** Upstream of the Mamit Lake dam, Guichon Creek historically supported rainbow trout and coho salmon, though no coho have been recorded upstream since 1979. The 2022 field program captured three juvenile burbot in upper Guichon Creek, indicating use by both rainbow trout and burbot. This was the only recorded instance of a fish species besides rainbow trout within the local study area outside the Thompson River. In lower Guichon Creek below Mamit Lake, several species of fish are present, but a dam at the outlet of Mamit Lake may restrict fish access to upstream habitat.
- **Highmont Creek:** This headwater tributary of the Witches Brook watershed supports an isolated, self-sustaining rainbow trout population. The creek currently receives mine contact water from multiple sources, including seepage from waste rock dumps. Fish in Highmont Creek face mortality risks from being swept into the Highmont diversion inlet pipe or being impinged on the fish fence. HVC Operations is conducting an options analysis to identify an appropriate mitigation for the effects of the mine on rainbow trout in Highmont Creek. The potential mitigations may include relocating the isolated rainbow trout population. These mitigations will be implemented regardless of HVC MLE.

- **Other Fish Habitat:** Southward flowing watercourses (flowing away from the Tailings Storage Facility) include: Skuhun Creek, Skuhost Creek, and Chataway Creek. Westward flowing creeks include: Inkikuh Creek and Pimainus Creek. Additionally, environmental DNA surveys identified two additional potentially fish-bearing streams: TSF09 and Burr Creek which are tributaries of the Highland Tailings Storage Facility.

13.5.4. Potential Project Effects by HVC

The Application identified that HVC MLE has the potential to affect fish and aquatic resources through the physical and chemical alteration of the aquatic environment (e.g., changes to surface water quantity, surface water quality and sediment quality). These effects could occur during the Construction, Operation, Closure and Post-Closure phases.

HVC considered the effects to the subcomponents and associated assessment parameters for fish and aquatic resources in their assessment (subcomponents are listed in [Table 5.3-1](#) of the Application). An assessment parameter is a measurable feature or issue that could change as a result of HVC MLE. These parameters describe aspects of fish and aquatic resources that, if affected by HVC MLE, could indicate an effect on these resources.

13.5.4.1. Fish community and distribution

The Application noted that rainbow trout were the only species present within and adjacent to the HVC mine site and were therefore at the highest risk for changes in fish distribution due to interactions with HVC MLE. The extension of the HVC mine site due to HVC MLE would encroach on fish habitat immediately adjacent to previously disturbed areas, therefore no new barriers to fish passage were anticipated, and HVC expected that fish habitat would not become further fragmented.

13.5.4.2. Fish health

The Application stated that changes in fish health, primarily from exposure to metals, dust and total suspended solids, could occur during all phases of HVC MLE and result in a risk of toxicity to fish or of these materials physically clogging fish gills. Fish health could also be affected by sound waves from blasting, which can cause physical damage to all life stages of fish, or from dewatering activities which could result in fish stranding or mortality. Potential effects from changes in nutrients, ions and metals are expected to occur in areas where the development activities for the Assessment Case would take place, including construction or upgrading of on-site facilities and changes in water management activities.

Changes in water quality may also occur in areas where no specific activities for HVC MLE are planned because of the overall shift of timing in activities already permitted for the Base Case, including the extended time before Closure and reclamation. Rainbow trout are at the highest risk for changes in fish health due to interactions with HVC MLE due to their proximity to the HVC mine. Burbot in Guichon Creek might experience changes in fish health; however, these effects are expected to be negligible due to the distance from the HVC mine and results of the water quality assessment.

Changes in fish health due to sub-lethal toxicity from contaminants of potential concern may occur as a result effect of HVC MLE. Each waterbody or watercourse would be affected differently due to proximity and activities, with Pukaist and Highmont creeks and Witches Brook being most likely affected. The predicted contaminants of potential concern trends for Pukaist Creek during the various mine phases in the Assessment Case model suggest that while sulphate levels are above toxicity reference values, these are expected to decrease as compared to the Base Case.

HVC used an ecological risk assessment to predict effects from the contaminants of potential concern for each waterbody and watercourse, which concluded that the risk to aquatic biota was negligible for all streams except Highmont Creek where a risk to aquatic life would exist from elevated levels nitrate (NO_3^-), selenium (Se) and sulphate (SO_4^{2-}).

- **Nitrate:** Nitrogenous compounds, including nitrate, in high enough concentrations can be toxic (fatal) to all life history stages of fish due to gill and other tissue damage. At lower concentrations, exposure to nitrogenous wastes has been shown to cause sublethal effects, including a general stress response in fish that can lead to changes in development, decreased growth and decreased swimming performance. As well, long-term exposure

can alter immune system function resulting in an increase in the susceptibility of fish to infection. Generally, invertebrates and algae are less sensitive to the effects of nitrogenous compounds; early life stages of some invertebrates may experience increased mortality and decreased growth at very high nitrate concentrations. Highmont Creek was identified as having an increased risk for aquatic biota due to nitrate.

- **Sulphate:** Sulphate can cause toxicity to fish, with early life stages of rainbow trout being the most sensitive species tested⁵⁷. The arrange from 128 to 429 milligrams/litre dependent on hardness of water. Concentrations in upper Witches Brook are projected to be above the chronic aquatic life guideline (i.e., 309 milligrams/litre) after the Valley Pit would begin to discharge in 2154. However, concentrations of sulphate are predicted to be lower than those predicted under the Base Case when Valley Pit begins to discharge due to the change in volume of the pit and resulting changes to proportion of water that report to the pit over the decades-long filling period. Highmont Creek was identified as having an increased risk for aquatic biota due to sulphate.
- **Selenium:** Excessive amounts of selenium may result in adverse effects in fish including reductions in growth; behavioural changes; increased deformity; and increased mortality in early life stages. While there are some small increases in risk for aquatic biota from selenium in Guichon Creek, Pukaist Creek and Witches Brook, these increases are well below the toxicity reference values for selenium, and as such, no negative effects in these watercourses are expected. Highmont Creek was identified as having an increased risk for aquatic biota due to selenium.
- **Mercury:** HVC identified mercury as a special contaminant of potential concern given its potential for bioaccumulation. Mercury can be present in three forms: elemental mercury, inorganic mercury compounds and organic mercury compounds, which includes methylmercury. Both inorganic and organic forms are known to bioaccumulate. Methylmercury (organic form) is absorbed with much higher efficiency than other forms, so it bioaccumulates in organisms higher up the food chain. In aquatic environments, methylmercury which has entered the food chain as a result of bioaccumulation can biomagnify in the food web to a degree that it may cause adverse effects in predatory species such as piscivorous fish and consumers of fish. High levels of methylmercury from dietary uptake in aquatic organisms can have effects on survival, growth, behaviour and reproduction.

Most watercourses would likely see a reduction in mercury methylation rates based on the results of the ecological risk assessment, however, based on an examination of other factors that may affect the rate of mercury methylation, there is potential for increased rates of mercury methylation during the HVC MLE in all examined watercourses based on projected reductions in stream flow, removal of terrestrial vegetation with associated soil disturbances, the installation of culverts, waste rock dump runoff and inundation of terrestrial areas as the mine footprint expands.

13.5.4.3. Direct fish mortality

The Application identified activities associated with potential for HVC MLE-related direct fish mortality which would occur primarily during the Construction phase, including site preparation, the potential realignment of Highway 97C and the extension of the Highland Tailings Storage Facility. Rainbow trout are expected to be the only species at risk of direct HVC MLE-related fish mortality. Construction activities that would occur within the Operations phase, particularly the relocation of a portion of Highway 97C, also have the potential to result in fish mortality. This effect could be caused by direct contact with heavy equipment; dewatering activities, which could result in fish stranding or unintentional mortality during fish salvage operations; blasting activities; and introduction of deleterious substances (such as hydrocarbons or sediment) to fish-bearing waters, which could result in acute toxicity or smothering of incubating eggs.

⁵⁷ Source: British Columbia Ministry of Environment and Parks [bc_moe_wgg_sulphate.pdf](#)

13.5.4.4. Loss/alteration of fish habitat

The Application identified that unavoidable fish habitat losses would occur in areas of footprint extension and road realignments. This could result in the loss of approximately 3,211 square metres (m²) of fish habitat and aquatic resources in Woods and Burr creeks, Woods Creek Tributary 1 and TSF09.

HVC also identified a potential loss or alteration of approximately 1,135.7 m² of fish habitat in Pukaist and Highmont creeks and Witches Brook due to water use, dewatering and changes in flow regimes, and would occur during all phases of HVC MLE. The change in water quantity may result in the decrease of some habitat types and the increase of other habitat types. Decreases in stream flow may cause subsequent changes in habitat availability for various fish life history stages, including spawning, incubation, rearing and migration periods. In the case of Witches Brook, because the Valley Pit would be extended, it would take longer to fill the Pit at Closure, resulting in a longer time before flows reach Witches Brook and a longer period of time before Closure-related benefits to fish habitat are realized.

Changes in flow could result in physical habitat effects which may affect functional wetted area, depth and velocity, habitat structure and cover, including changes to connectivity between mainstem and off-channel habitat, temperature, nutrient dynamics, substrate quality, and sediment scour and deposition. Changes to surface water quantity could restrict fish movement within channels and affect primary producers mainly by altering the amount of water available to carry out life processes, as well as by changing the amount of oxygen and nutrients available, and moderating water temperatures.

HVC completed detailed instream flow assessments of Witches Brook, Pukaist and Highmont creeks, the watercourses which would be the most affected by HVC MLE dewatering. For Witches Brook the models showed that during Closure and Post-Closure, habitat generally decreased for HVC MLE relative to the Base Case due to the longer time it would take for Valley Pit to fill. HVC predicted baseflow at Pukaist Creek would be only minimally affected by HVC MLE and would result in small habitat changes. On Highmont Creek, habitat types are predicted to increase in almost all combinations of phases and climate models, except during Closure when HVC predicted a decrease in spawning habitat of up to 80.4 percent which amounts to an actual loss of 0.2 m².

Riparian vegetation contributes food and nutrients to instream habitats, buffers against channel erosion and sediment deposition and stabilizes stream flow levels and regulates instream temperatures throughout the year. During site preparation and construction, HVC MLE would cause the loss or alteration of 14.5 ha of riparian habitat due to the expanded footprint of the mine, which would occur along side the loss of stream habitat.

13.5.4.5. Changes in primary producers, benthic macro invertebrates, and quality of aquatic habitat

Aquatic resources include all aspects of the aquatic environment, including non-fish bearing streams. The loss or alteration of fish habitat outlined shows the change in aquatic habitat in fish-bearing streams, however an additional loss of non-fish-bearing and uncategorized stream segments totalling 21 km in length would occur under HVC MLE. This would reduce the amount of aquatic habitat available in the region, the functions that it provides (e.g. carbon sequestration, biodiversity), and would result in a reduction in the abundance and biomass of primary producers and benthic macro invertebrates in the local study area.

The Application stated that the loss of these non-fish bearing segments of streams is unlikely to result in a loss of unique or critical habitat, but that some smaller headwater tributaries of Pukaist Creek could be lost with the expansion of the mine footprint. Stream headwaters are important areas of nutrient and organic matter collection and processing, providing resources for downstream areas through drift and downstream flow.

Alterations in the abundance and composition of primary producers and benthic macro invertebrates can have cascading effects through aquatic ecosystems. Reductions in benthic macro invertebrate populations can affect the availability of

Primary Producer:

Primary producers are tiny organisms, such as plants and phytoplankton, that form the base of the food chain that get their energy directly from the sun.

food for fish and other predators, which can in turn affect higher trophic levels in the food web. Changes in the presence of primary producers and benthic macro invertebrate species can alter ecosystem processes such as nutrient cycling and decomposition, which can have further effects on stream health and function.

HVC determined that HVC MLE could result in changes in primary producer and benthic macro invertebrate abundance, biomass and community composition due to toxicity from contaminants of potential concern, and each waterbody or watercourse would be affected differently due to proximity and activities. HVC's environmental risk assessment assessed the predicted effects of contaminants of potential concern for each waterbody and watercourse. The ecological risk assessment concluded that the risk to benthic macro invertebrates and primary producers from contaminants of potential concern was negligible for all streams except Highmont Creek which posed a risk to aquatic life from elevated levels of NO_3^- , Se and SO_4^{2-} (as discussed in fish health section above). A risk to benthic macro invertebrates and primary producers from sulphate was also identified in Pukaist Creek, however the risks were predicted to be 24 percent lower in the Assessment Case compared to the base case conditions. Similar to the fish health section above, there could be an increased risk to benthic macro invertebrates and primary producers from potential modest increases in mercury methylation rates.

13.5.4.6. BASA amendment

The predicted effects from the original 2002 effects assessment related to the proposed discharge of from dewatering the Basal Aquifer to Witches Brook were not realized as lower than anticipated, as dewatering rates were lower than predicted. Groundwater extraction associated with this dewatering may have affected fish and aquatic resources conditions in Witches Brook through potential losses to Witches Brook baseflows.

Despite the lack of augmented flows, there has been a large observed increase in flows in Witches Brook from 2002 baseline conditions to existing conditions, which is attributable to a combination of a substantially wetter climate in HVC MLE existing conditions compared to 2002 baseline conditions and additional flow contributions from the Trojan Diversion upgrades beginning around 2014.

13.5.5. Proposed Mitigation Measures by HVC

Effects to fish and aquatic resources from mine activities are currently managed at the HVC mine site through multiple plans and monitoring programs, including the Sulphate Adaptive Management Plan, Surface Water Quality Monitoring and Reporting Plan, Annual Aquatic Biological Monitoring Program, and Fugitive Dust Management Plan.

For new mitigation measures, HVC proposed to update the Annual Aquatic Biological Monitoring Program to include ultra-trace level total and methyl mercury samples of water and sediment; and fish tissue sampling by submitting eight individual tissue samples for each site instead of a single composite tissue sample at each site.

HVC also proposed fish relocation where construction may directly interact with fish and a fish habitat offsetting or compensation plan to counterbalance residual fish habitat loss or alteration resulting from HVC MLE. HVC has also proposed mitigation strategies for Witches Brook to augment flows and improve habitat conditions including source water options and potential habitat improvement through the Water Stewardship Strategy and Witches Brook Ecological Stewardship Strategy.

13.5.6. Key Issues Raised

13.5.6.1. Highmont Creek

HVC identified that an isolated population of rainbow trout in Highmont Creek was being affected by current mining operations through contact water seepage, entrainment and impingement. To mitigate these effects, HVC proposed to relocate this population following engagement with First Nations and acquiring required permits and approvals. The CNA and SSN opposed the removal of fish from Highmont Creek and requested that other options be explored to mitigate

ongoing effects to these fish. LNIB requested more information on the Highmont population of fish, where they might be moved to and if they would mix with existing populations.

HVC proposed to advance an options analysis project to look at mitigation measures to reduce the risk to fish and aquatic habitat in Highmont Creek. The risk and proposed mitigations are under discussion and would be developed in consultation with First Nations and regulatory agencies, including Fisheries and Oceans Canada.

The existing effect and mitigation strategy will proceed whether or not HVC MLE proceeds. Effects to fish in Highmont Creek that could continue through HVC MLE will be included and considered in monitoring required in existing *Environmental Management Act* permits.

The EAO considered HVC's responses and the expected requirements related to a future authorization under the federal *Fisheries Act* and is satisfied that these concerns related to Highmont Creek have been adequately addressed for the purpose of the HVC MLE assessment.

13.5.6.2. Offsetting

During review of the Application, questions were raised about proposed offsetting for effects to fish habitat. LNIB noted that the Application does not clearly identify how lost fish habitat would be mitigated, other than pointing to a conceptual Fisheries and Oceans Canada offsetting plan. LNIB also wanted to know how access to fish resources could be improved and had concerns about the quantity and quality of fish habitat, given the long-term effects of mining in the Highland Valley. The EAO requested more information about the planned offsets and how those offsets were incorporated into HVC's characterization of effects.

HVC responded that they would engage with LNIB and other First Nations on fish habitat compensation plans. Compensation plans would be developed using the Fisheries and Oceans Canada Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the *Fisheries Act*. The policy requires compensation plans to consider Indigenous peoples and Indigenous knowledge in offsetting residual effects. HVC has begun work to develop appropriate offsetting / compensation plans and would incorporate considerations, such as access to resources, based on engagement with First Nations. Multiple offsetting concepts would be considered, which could include an updated Woods Creek Diversion channel, removing existing barriers to fish passage, improving connectivity with ponds and side channels, etc. HVC is planning for habitat offsetting to be designed in 2024-2025 and implemented in 2028-2029 before habitat disturbance. A final offsetting plan, however, including the location and timing, would be dependent on requirements from Fisheries and Oceans Canada under the federal *Fisheries Act*.

The EAO considered HVC's responses, the expected requirements related to a future authorization under the federal *Fisheries Act*, and the EAO's proposed Condition 14 Wetlands and Riparian Mitigation and Offsetting Plan and is satisfied that these concerns related to offsetting have been adequately addressed for the purpose of the HVC MLE assessment.

13.5.6.3. Increasing mercury

The CNA, LNIB and SSN raised concerns about the potential increases in mercury concentrations. The CNA raised concerns about effects to people that consume greater amounts of fish than those covered by the Canadian Council of Ministers of the Environment guidelines. LNIB stated that monitoring is needed to verify HVC's conclusions that predicted mercury increases would pose low risks and that the effects on food security and traditional harvesting practices need to be considered. SSN asked what mitigation would be in place to decrease mercury and if water treatment is being considered.

HVC acknowledged that the standard of 0.5 milligram/kilogram (mg/kg) may not be protective of individuals who rely on fish as a traditional food source. While B.C. provides screening values for contaminants in fish tissue, these do not provide

advice regarding consumption amount limits or constitute a fishing advisory. However, Alberta Health does provide the following criteria for issuing fish consumption advice⁵⁸:

1. Mercury concentrations greater than 0.5 mg/kg (commercial fishing guideline) will result in an “avoid consuming fish” recommendation for women of reproductive age and children under 12 years old;
2. Mercury concentrations between 0.2 and 0.5 mg/kg (Health Canada’s recommendation for subsistence consumers) will result in “consumption limit” advice; and,
3. Mercury concentrations less than 0.2 mg/kg will not result in any consumption recommendations.

In the absence of fish tissue guidelines for fish consumption in B.C., HVC compared the Alberta Health criteria to measured mercury concentrations in fish caught in the aquatics local study area. The highest mercury concentration measured in fish from the local study area was 0.2 mg/kg. Based on the Alberta Health criteria, this would indicate that no consumption recommendations would be made. The mean, median, 95 upper confidence of the mean and 95th percentile mercury concentrations in fish muscle were all below 0.2 mg/kg. Based on the mercury monitoring data presented in Table 7.5.5-7 of the Application, fish collected from the local waterbodies are safe to eat.

The Annual Aquatic Biological Monitoring Program required by authorizations under the *Environmental Management Act* would continue to identify potential concerns throughout the operation of HVC MLE and would be updated to include:

- Fish tissue sampling by submitting eight individual tissue samples for each site instead of a single composite tissue sample at each site; and
- Ultra-trace level total and methyl mercury samples of water and sediment.

Under existing HVC mine operations, effects to water quality in the receiving environment are reduced by minimizing the release of contact water to the environment, maximizing on-site water re-use, and maximizing the diversion of freshwater around the mine. In Post-Closure, water treatment is expected to reduce effluent concentrations for nitrate, arsenic, cadmium, copper, molybdenum and selenium and thereby mitigate the effects of contact water reporting to Witches Brook. New mitigations for water quality are under development, as part *Environmental Management Act* permit requirements.

The EAO is also proposing Condition 12 Nlaka’pamux Foods Monitoring Plan, which would require HVC to monitor contaminant levels in traditional foods. The EAO’s view is that the issue of increases in mercury is sufficiently addressed for the purposes of the HVC MLE assessment.

13.5.6.4. Loss of aquatic habitat

During review of the Application, the CNA and LNIB asserted that the loss of non-fish bearing streams needed to be offset. The CNA stated that all streams, fish-bearing or not, are significant to Nlaka’pamux. Any destruction or disturbance of streams should be avoided or mitigated. LNIB commented that the non-fish bearing streams provide riparian and aquatic productivity and are culturally important LNIB community members. The CNA and LNIB felt that any future offsetting plans presented should account for the loss of aquatic productivity in non-fish bearing streams.

HVC responded that nearly all the non-fish-bearing watercourses that would be affected by HVC MLE flow directly into the Highland Tailings Storage Facility and therefore do not currently contribute to downstream fish and fish habitat productivity. The only affected watercourses that do not flow into the Highland Tailings Storage Facility are upper Highmont Creek and upper Pukaist Creek. The loss of these creeks is not expected to influence downstream fish or fish habitat productivity. If fish or fish habitat productivity is effected, then the loss of non-fish-bearing watercourses would be considered under the *Fisheries Act* Authorization.

⁵⁸ Source: Government of Alberta [Fish Consumption Guidance: Mercury in Fish](#)

Prior to effects on fish and fish habitat occurring, HVC would need to apply for an Authorization under the *Fisheries Act* and would need to develop offset plans to compensate for lost and affected habitat. The EAO is also proposing Condition 14 Wetlands and Riparian Mitigation and Offsetting Plan and is satisfied that these concerns related to loss of aquatic habitat have been adequately addressed for the purpose of the HVC MLE assessment.

13.5.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the fish and aquatic resources valued component:

- Changes in fish health;
- Loss / alteration of fish habitat;
- Changes in primary producers and benthic macro invertebrates, and quality of aquatic habitat; and
- For the BASA Amendment, changes in flow and effects to water quality from contaminants of potential concern.

The EAO's characterization of the expected residual effects of HVC MLE on fish and aquatic resources is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 20: Summary of Residual Effects for Fish and Aquatic Resources

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes in fish health</i> <i>Effects to fish health from contaminants of potential concern due to changes in water quality and water quantity.</i>	Context (resilience): Low Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant The context is rated as low as fish health is less resilient due to ongoing pressures from mining and existing water quality and quantity effects. Magnitude is rated as low as the increased risks identified for HVC MLE are a low risk of bioaccumulation of mercury, and an increased risk to an isolated population of rainbow trout in Highmont creek being affected by ongoing mining operations through contact water seepage. The extent of the residual effect is local as effects are not expected outside of the local study area. The duration of the residual effect is long-term and reversible since fish health would improve as water quality improves after closure. The frequency of the residual effect is continuous because there would be releases of contaminants of potential concern throughout HVC MLE. The effects to fish health would disproportionately affect First Nations as they consume larger amounts of fish and the predicted increases in Mercury, while small, are a greater concern to individuals who rely on fish as a traditional food source. Risk is considered moderate (moderate consequence and medium likelihood). Uncertainty is rated as low. Importance is High as fish were identified as a top interest by First Nations.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Loss/alteration of fish habitat</i> Loss/alteration of fish habitat from the mine footprint extension and continuation of dewatering.	Context (resilience): Low Magnitude: Low Extent: Local Duration: Short-term and long-term Frequency: Continuous Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant The context is rated as low. Any future loss of fish habitat from HVC MLE is in addition to the fish habitat already lost from mining and is therefore less resilient to change. Ongoing BASA dewatering has resulted in some loss of Witches Brook baseflow relative to 2002 baseline conditions, and a further reduction is predicted for the remainder of permitted mine operations. The magnitude is characterized as low. HVC MLE would result in the loss of 3,211 m² fish habitat from the mine footprint extension (Woods and Burr creeks, Woods Creek Tributary 1 and TSF09) and the loss/alteration of up to 1,135.7 m² in Witches Brook, Highmont and Pukaist creeks from changes in flow. This would reduce the abundance of fish habitat in the local study area to a small degree directly adjacent to the mine but would not affect the overall abundance of fish habitat and the functions they provide in the region. The extent of the residual effect is local as effects are not expected outside of local study area. The duration of effect is short term for the loss of habitat which would occur during construction and long-term for the loss/alteration due to changes in flow. The frequency is continuous as there would be flow alterations throughout the life of the mine. The effects are characterized as irreversible because the habitat lost due to footprint extension would not be able to recover. The loss/alteration of fish habitat would disproportionately affect First Nations who rely on traditional foods such as fish. The likelihood is high, and consequences are low. Importance is High as fish and fish habitat were identified as a key interest by First Nations.
<i>Changes in primary producers and benthic macro invertebrates, and quality of aquatic habitat</i> Loss/alteration of fish and non-fish bearing streams from the and the mine footprint extension and continuation of dewatering and resulting in net loss of primary production and BMI	Context (resilience): Low Magnitude: Medium Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant Context is low for aquatic habitat, primary producers and benthic macro invertebrates as their resilience is already affected by existing water quality and quantity effects and habitat loss. Magnitude is medium for quality of aquatic habitat because HVC MLE would result in the loss of the above mentioned 1.7 km of fish bearing streams along with an additional 21 km of non-fish bearing and uncategorized stream segments reducing the amount of aquatic habitat in the local study area directly adjacent to the mine site. Magnitude is medium for primary producers and benthic macro invertebrates as the habitat loss/alteration would also result in the loss of the associated primary producers and benthic macro invertebrates from those stream segments. This would reduce the abundance and biomass of primary producers and benthic macro invertebrates in the local study area, although it is highly unlikely to affect biodiversity in these areas. The duration is long-term and effects are irreversible as the aquatic habitat lost would not be replaced. The loss of aquatic habitat would disproportionately affect First Nations as non-fish bearing streams are considered culturally important. Risk is moderate (high likelihood and moderate consequence). Uncertainty is moderate as the specific function of the aquatic habitat, primary producers and benthic macro invertebrates has not been characterized in areas that are non-fish bearing. Importance is high due to non-fish-bearing aquatic habitat and aquatic resources being identified as a top interest by First Nations.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>BASA amendment</i> Changes in flow and effects to water quality from contaminants of potential concern	Context (resilience): Low Magnitude: Low Extent: Local Duration: Long term Frequency: Continuous Reversibility: Reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Low Uncertainty: Moderate Importance: High	Not significant The context is rated as low as fish, fish habitat and aquatic resources are less resilient due to ongoing pressures from mining and existing water quality and quantity effects. Magnitude is as low as the predicted exceedances of guidelines in Witches Brook for manganese and molybdenum are not directly associated with BASA dewatering. Ongoing BASA dewatering has resulted in some loss of Witches Brook baseflow relative to 2002 baseline conditions, and a further reduction is predicted for the remainder of permitted mine operations. The extent is local as the effects from BASA dewatering may extend along Witches Brook and into Guichon Creek. The effect is continuous, long-term and reversible as BASA dewatering would continue until end of Operations and it is predicted to take 100-200 years for the Valley Pit Lake to fill and the groundwater to fully recover. Uncertainty is moderate as the predicted increases in contaminants of potential concern were not able to be shown to be directly associated with BASA dewatering. The importance is high because there are concerns about BASA-related surface water flow reductions and First Nations have a high interest in Witches Brook and Guichon Creek flows and the area's habitat overall.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.5.8. Cumulative Effects Assessment

As set out in the Application Information Requirements HVC identified two existing and reasonably foreseeable projects and activities that have the potential to act cumulatively with HVC MLE. The potential for cumulative effects from these projects and activities is considered negligible. The quA-ymn Solar Project occurs within a previously disturbed area of the Base Case and Assessment Case footprints and there are no foreseeable changes to fish or aquatic resources as the area is already disturbed. The Mount Mabel Wind Projects fall outside of the fish and aquatic resources regional study area. Neither project's activities are expected to influence the water balance or water quality projections for the Assessment Case, and thus would not change effects to fish and aquatic resources.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects are not expected to have major effects to fish and aquatic resources, and any effects are expected to be managed in a similar manner to how HVC is required to manage surface water effects for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects to surface water quality, and ENV permits as needed should waste discharge be necessary).

The EAO considered the existing conditions at the mine site, including current effects to fish and aquatic resources, the anticipated mitigation measures proposed by HVC and regulatory tools to implement those mitigation measures, and the EAO's assessed residual effect to fish and aquatic resources. Given these considerations and the existing effects to fish and aquatic resources in the region, the EAO concludes HVC MLE may contribute to cumulative effects.

13.5.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the fish and aquatic resources valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, the existing and proposed new mitigation measures in the M-11 and PE-376 permits, and the EAO's proposed Certificate Conditions.

13.6. Wildlife and Wildlife Habitat

13.6.1. Summary

Wildlife and wildlife habitat was selected as a valued component for the HVC MLE environmental assessment because of the importance of wildlife to the function of natural ecosystems, as a contributor to biodiversity, and to human activities such as traditional hunting. First Nations identified the importance of the following wildlife species as a traditional food source, of cultural significance, or related to hunting and trapping: moose, mule deer, black bear, beaver, feral horses, big horn sheep, snowshoe hare, wolves, cougars, lynx, bobcat, pika, American porcupine, western toad, pileated woodpecker and bats.

HVC assessed the current state of wildlife populations and wildlife habitat in the region, conducting surveys such as: environmental risk assessments for contaminants of potential concern, aerial moose and feral horse surveys, moose tissue sampling and pellet surveys, analysis of fur harvest data, bat mist net surveys and echolocation detection surveys, observational bird, amphibian, reptile, and small mammal surveys, utilized wildlife cameras and conducted owl call-playback surveys. In accordance with the AIR, HVC assessed potential effects on the wildlife and wildlife habitat valued component using representative species to allow for potential effects to be assessed on both species of conservation concern and broadly as a valued component. HVC provided rationale for the inclusion of representative species in Table 5.2-1 and summarized in Table 7.7.1-2 of the Application.

The key issues raised by reviewers regarding the assessment of effects on wildlife included concern over assessment scope and data collected, with requests for additional wildlife habitat monitoring and reporting out to be included as mitigation. The health of ungulates in the study area, moose in particular, is a concern for First Nations who identify potential copper-molybdenum related disease as a risk to animal health and the ability of First Nations to engage in traditional harvesting activities. Other concerns included the potential effects to bats, raptors, large carnivores, and recovery of wildlife habitat following closure of the mine.

The EAO considered HVC's assessment and proposed mitigation measures, the key issues raised by technical advisors, including participating Indigenous nations, and the requirements of the M-11 permit related to wildlife protection, including pre-disturbance field surveys and the Wildlife Management Plan. Given the assessment, mitigation measures, and proposed permit conditions, the EAO identified several residual adverse effects to wildlife as a result of HVC MLE. The effects on wildlife from HVC MLE are anticipated to overlap cumulatively with other past, present, and reasonably foreseeable future projects and activities within the regional study area. The EAO concluded that HVC MLE would not result in significant adverse residual or cumulative effects to the wildlife and wildlife Habitat valued component.

13.6.2. Assessment Boundaries

13.6.2.1. Spatial boundaries

The four spatial boundaries selected for the HVC MLE wildlife and wildlife habitat valued component effects assessment included the Base Case footprint (the current extent of the disturbed and permitted areas of the mine), the Assessment Case footprint (the proposed expanded area disturbed by HVC MLE), a local study area and a regional study area.

The local study area refers to the area of anticipated effects caused by the HVC MLE project which amounts to an area extending 1.5 km around the proposed HVC MLE infrastructure at the mine site and 500 metres on either side of linear features like roads. The local study areas for the wildlife and wildlife habitat valued component and the vegetation and ecosystems valued component are the same. The regional study area is a broader scope and includes the maximum area in which direct, indirect, or cumulative effects from the HVC MLE project are anticipated. For the potential effects to wildlife for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.6.2.2. Temporal boundaries

The four temporal boundaries used for the HVC MLE wildlife and wildlife habitat assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.6.3. Existing Conditions by HVC

The baseline wildlife and wildlife habitat in the region were assessed in [section 7.7](#) of the HVC's Application and are summarized below.

The HVC mine is in the Thompson Plateau Ecoregion which is primarily composed of dry forested plateau and low elevation sagebrush-steppe basins. The area sees hot dry summers and cold dry winters and represents some of the warmest and driest climate in the province. The dry climate is reflected by the local vegetation which is dominated by grasslands and dry conifer forests. Broadly, there are five wildlife habitat types surrounding the HVC mine: dry forests, grassland, wetlands, barren and vegetated anthropogenic disturbance (e.g. farmland).

The Application describes existing wildlife and wildlife habitat conditions from both Indigenous knowledge and western science views. Indigenous knowledge included in the Application discussed the observed changes to wildlife and wildlife habitat over the life of the mine and its effects on Indigenous people individually and as communities. Indigenous knowledge-holders described losing access to preferred hunting and gathering areas as the mine expanded due to both dust contamination and fears that health effects could be caused by dust contamination, including to traditional foods (wildlife and vegetation) and medicinal plants.

HVC conducted field studies prior to 2016 for the HVC mine, including: aerial moose surveys, moose tissue samples, fur analysis of furbearers and carnivores, remote camera summaries, bat mist net surveys, bat acoustic detections surveys, visual bird nesting surveys, raptor stand watch surveys, and auditory bird surveys. More recent surveys (between 2016 and 2022) were conducted for HVC MLE, including: a wildlife camera study, aerial moose survey, moose pellet survey, a feral horse aerial survey, American pika point-count surveys, bat hibernacula surveys, bat echolocation detection and acoustic recorder surveys, visual amphibian and reptile surveys, bird call-playback surveys, raptor aerial and migration surveys, bird point count surveys, as well as incidental wildlife observations and the inclusion of HVC Incident Reporting information.

HVC also worked with participating Indigenous nations to include Indigenous knowledge of wildlife and wildlife habitat effects and changes. The following information was provided for key species of concern in the application.

13.6.3.1. Moose

Historically, moose occupied various biogeoclimatic zones within the regional study area, excluding the ponderosa pine and bunchgrass zones. Indigenous knowledge indicates that moose arrived in the south-central interior in the early 20th

What is molybdenosis?

Molybdenum is an essential element for humans and animals. Some animals, such as cows, sheep, and moose have different digestive mechanisms from humans and can be susceptible to molybdenum accumulation. A high dietary intake of molybdenum in these animals can result in a copper deficiency, known as molybdenosis. Molybdenosis can cause a variety of health effects in these animals, including poor growth, infertility, diarrhea, lameness and neurological effects.

century and is considered an important species for the Nlaka'pamux Nation. Moose prefer open habitats, particularly riparian areas, and lowland fens, with habitat use varying seasonally. They avoid areas with human disturbances and winter habitat presents challenges due to snowpack and reduced forage quality.

The HVC MLE regional study area has the potential to provide year-round moose habitat, although forestry and trails have reduced the availability of dense forested habitats that moose need for winter shelter. Climate change will likely further alter moose habitat in the Highland Valley. Habitat suitability modeling indicates effective winter forage and cover habitat within the regional study area, with significant portions located in mature forests. Critical winter habitat was identified in the upper reaches of Witches Brook.

The moose risk score for the HVC MLE region is moderate indicating a 33-66 percent likelihood of losing hunting opportunities due to declining moose populations. HVC's ecological risk assessment identified a possible risk to ruminant mammals within the local study area including moose, mule deer, and California bighorn sheep (species of conservation concern), based on a ratio of copper to molybdenum in vegetation of less than 2:1 for existing conditions, the Base Case and the Assessment Case. The copper to molybdenum ratios in moose diets under the Construction/Operations Phase of the Assessment Case compared with that of the Base Case are predicted to be approximately 3 percent higher, which could result in some improvement for risk to moose from molybdenosis under the Assessment Case relative to the Base Case. Additionally, no wild ungulates have been observed showing symptoms and moose are unlikely to develop symptoms of molybdenosis. HVC's ecological risk assessment proposed additional monitoring of moose to address residual uncertainty. Indigenous hunters have reported unhealthy moose with discolored livers, and there is a perception that these issues relate to dust and chemicals in the region.

13.6.3.2. Mule Deer

Mule deer hold cultural significance in the regional study area, traditionally harvested by Nlaka'pamux hunters, contributing to their social and economic value. They are also hunted by resident and non-resident hunters. Classified as yellow-listed in B.C., mule deer have a stable or declining population trend.

Mule deer prefer habitats based on forage, security, and thermal needs, occupying all areas in B.C. except for coastal Mountain Hemlock zones. While their summer habitat is diverse, winter habitat is limiting, with a preference for older forests with less snow cover. They migrate between high-elevation summer habitats and low-elevation winter ranges via perennial migratory corridors, with winter habitat being crucial for population maintenance due to low forage availability.

Climate change is expected to affect mule deer habitat, with lower-elevation areas in the study area resembling the Okanagan Very Dry Hot Interior Douglas-fir biogeoclimate by the 2050s. Mule deer are more common during summer in the local study area but less prevalent in winter due to increased snow cover. Other threats include anthropogenic land use changes (e.g., ranching, forestry), loss of habitat from wildfire and increased predation from the expansion of white-tailed deer. Concerns over mule deer health are related to the potential for molybdenosis.

13.6.3.3. Feral Horse

Feral horses are culturally significant ungulates used for ranching and hunting by First Nations. Provincially listed as exotic, they are excluded from conservation status and not federally assessed. Historical records suggest their presence in B.C. before the 1800s, but they were culled in the 20th century to conserve cattle rangeland. They need grazing areas, shelter, water, and shade. Habitat loss and climate change threaten their habitat use by the 2050s. They are abundant year-round in the local study area, with a managed population for public safety and resource concerns. HVC's Feral Horse Management Plan started in 2012 includes capture and rehoming efforts. Aerial counts show a population of 100-200 since 2012, using reclaimed grassland habitats in the Highland Valley. Wildlife cameras detected feral horses on 12 of 30 cameras, with three incidents reported at the HVC mine site from 2009 to 2022. Concerns exist about ingestion of contaminants, but their response to molybdenum differs from other ungulates. HVC's assessment determined a negligible risk to non-ruminant herbivorous mammals, including feral horses, with low uncertainty.

13.6.3.4. Bighorn Sheep

Bighorn sheep are culturally significant to the Nlaka'pamux and are harvested by both resident and non-resident hunters. They are provincially blue-listed (special concern) and require specific winter habitats for survival. Local and regional bighorn sheep populations in B.C. are generally stable but have seen declines in recent years and climate change is expected to further alter bighorn sheep habitats by 2050. The Thompson Region population is estimated at 1,400 to 1,600 individuals with current threats including habitat loss, degradation, fragmentation, livestock ranching, and disease (particularly pneumonia related to the spread of *Mycoplasma ovipneumoniae* from domestic sheep and goats). Bighorn sheep prefer open habitats, grasslands, shrub-steppe, escape terrain, and low grasses, with distinct summer and winter habitat preferences. In the regional study area, they are likely found in open grassland zones, with low elevation winter habitats being crucial. Habitat suitability models show effective lambing and winter foraging habitats distributed throughout the regional study area, especially along river valleys. Historically, bighorn sheep were harvested in the Nicola Valley, including near the HVC mine site. From 2007 to 2019, there were minimal detections of bighorn sheep in the local study area and permitted mine area.

13.6.3.5. Mountain Goat

Mountain goats are provincially blue-listed (special concern) indicating vulnerability to extirpation or extinction due to specific habitat needs. While such habitats have been identified in other B.C. areas, none overlap with the regional study area. Mountain goats are representative of alpine and subalpine habitats, particularly rocky and steep areas, offering escape terrain from predators. The nearest known populations of mountain goats are approximately 50 km to the west of the regional study area in the Coast mountain range. Therefore, no mountain goats are expected in the regional study area, as confirmed by the absence of detections on wildlife cameras in the local study area and no incidental observations from 2016 to 2022.

13.6.3.6. Pika

The American pika is a small herbivorous mammal found in alpine to subalpine regions, particularly on rocky talus slopes. It inhabits the current HVC mine site and is provincially yellow-listed (secure) with widespread populations. Pikas have variable seasonal home ranges and primarily feed on grasses, sedges, and forbs. They do not hibernate and primarily face the threat of climate change affecting their habitat, which leads to range contractions and population declines. HVC's modeling indicated effective year-round pika habitat in the local study area (0.8 percent) and regional study area (1.2 percent). Observations were made in the Bethlehem and Highmont areas along the northern eastern edge of the permitted mine area. Incidental sightings suggest potential migration from artificial to natural sites. From 2009 to 2022, five incidents involving small to medium-sized mammals at the HVC mine site resulted in mortality events. HVC concluded that pikas face negligible risks from contaminants, with low uncertainty in this conclusion.

13.6.3.7. Yellow Bellied Marmot

The yellow-bellied marmot, a provincially yellow-listed (secure) species in B.C., is historically and currently hunted by First Nation communities. They are commonly found at low elevations in the dry interior of B.C., requiring alpine tundra, meadows, foothills, and canyons as habitat. Marmots face threats from habitat loss due to harvesting, forest fires, and climate change, with habitat changes expected by 2050. Effective growing season and foraging habitats are present in the local study area (0.8 percent) and regional study area (5.8 percent). Effective winter hibernation habitats are in the local study area (2.9 percent) and regional study area (9.3 percent). From 2009 to 2022, five mortality events involving small to medium-sized mammals occurred at the HVC mine site. All five mortality events resulted from mammals being entrapped in open excavation or having unknown mortality sources. HVC concluded that contaminant exposure for marmots, primarily through food and water ingestion, shows negligible risk with low uncertainty.

13.6.3.8. Porcupine and Snowshoe Hare

Porcupine and snowshoe hare, culturally important species at the HVC mine site, were historically hunted by Indigenous community members. Both species are provincially yellow-listed (secure), and with hazard quotients less than one, based on the results of HVC's ecological risk assessment for representative species like American pika and snowshoe hare, contaminants are not expected to affect mortality.

From 2009 to 2022, five incidents involving small to medium-sized mammals occurred at the HVC mine site, resulting in mortality events. These incidents involved mammals being entrapped in open excavation or having unknown mortality sources. HVC concluded that the uncertainty in the conclusion regarding the risk to representative species is low.

13.6.3.9. Beaver

Beavers are culturally significant to Indigenous communities, historically hunted and trapped for fur. They are provincially yellow-listed (secure) with widespread and abundant populations. Beavers inhabit various forests and wetlands, preferring deciduous ecosystems and as "ecosystem engineers", they affect aquatic and riparian habitats through lodge and dam construction. Beavers live in territorial colonies and disperse an average of 8 to 16 km, and up to 238 km, to find new habitat. Herbivorous, beavers rely on woody vegetation in fall and spring and consume aquatic plants in summer. Their main limiting factors are habitat access and predation, primarily by humans. HVC's modeling indicated substantial year-round foraging and shelter habitats in both local and regional study areas, though less dense in some areas. Historically, more abundant habitat existed before 1961 due to fewer anthropogenic disturbances. From 2007 to 2022, only one incidental observation of beaver occurred in the permitted mine area. Two nuisance beavers were removed in winter 2022/2023. Fur harvest records show that less than 50 beavers were harvested in the regional study area over the last century.

13.6.3.10. Black Bear

B.C. hosts the world's largest black bear population, estimated at 120,000 to 160,000 individuals with stable trends. Black bears are highly adaptable and occupy various habitats during the non-hibernating period. Denning habitat is crucial, especially for females, with inadequate sites leading to litter loss or reproductive failure. There are effective denning habitats present in the local and regional study areas, mainly along river valleys. Bears are sensitive to disturbances, which can reduce adult and offspring survival. The current threats to black bear populations include human interactions and habitat loss from logging, forest fires, beetle kill, and mining activities. From 2007 to 2016, 66 sightings were reported in the permitted mine area. Wildlife cameras captured 1,361 photos and 269 unique detections from 2016 to 2022, with ten incidental observations. 322 bears were harvested in the Thompson Region from 1976 to 2020. One mortality of a bear cub was reported at the HVC mine site from 2009 to 2022. HVC's ecological risk assessment indicated negligible risk to black bears with low uncertainty.

13.6.3.11. Wolves

Wolves are a provincially yellow-listed species in B.C. with a stable to increasing population, estimated at 290 to 600 in the Thompson Region. As generalist carnivores, wolves are adaptable to various habitats and primarily driven by prey availability, commonly found at lower elevations. Human-caused mortality from vehicle collisions and persecution to mitigate livestock depredation poses significant threats and prey availability determines their carrying capacity in B.C. In the study area, two wolf detections occurred on wildlife cameras in the local study area, with 11 incidental detections in the permitted mine area (2007-2016) and one from June 2017 to June 2019. No wolves were recorded in fur harvest records (1927-2021). The ecological risk assessment concluded that contaminant hazard quotients for wolves indicates a negligible risk with low uncertainty,

13.6.3.12. Coyotes

Coyotes are a provincially yellow-listed (secure) species in B.C., adapting well to various habitats, including urban areas. Coyotes use dens for birthing and raising pups, typically located in brush-covered slopes or thickets. As opportunistic

omnivores, they primarily consume mice, rats, ground squirrels, snowshoe hares, and carrion. Food abundance influences their density, and territoriality affects resource acquisition, especially in winter. Their adaptable nature helps them to thrive in altered landscapes. HVC's modeling shows substantial year-round foraging habitat, with 33.1 percent in the permitted mine area and 53.0 percent in the regional study area. Fourteen coyote detection occurred in the permitted mine area (2007-2016). Fur harvest records show 47 coyotes harvested from three traplines in the regional study area (1927-2021). At the HVC mine site, eight coyote mortality events from vehicle collisions (2009-2022) and nine dispatches due to aggressive interactions with staff were reported (2016-2022). HVC's ecological risk assessment concluded that the contaminant hazard quotients for coyotes indicate a negligible risk with low uncertainty.

13.6.3.13. Cougars, Lynx, and Bobcat

Cougars, bobcats, and lynx are culturally significant and harvested by Indigenous communities. They are all provincially yellow-listed, with cougars ranked S4 (some concern), and bobcats and lynx ranked S5 (secure). None are federally assessed by COSEWIC or listed under the Canadian *Species at Risk Act*. Primary threats include competition, habitat fragmentation, vehicle collisions, habitat destruction, and behavioral disturbances. Cougars may compete with lynx where ranges overlap, while bobcats and lynx habitats are separated by deep snow. A wildlife camera study recorded 46,593 detections of 30 species, including cougars, bobcats, and lynx, though these felids were less frequently detected. After considering the risk from contaminants to wolves, which were used as a representative carnivorous species for furbearing mammals, including cougars, lynx and bobcats, HVC concluded that the risk of contamination of these mammals was negligible with low uncertainty.

13.6.3.14. Bats

Bats are culturally significant to First Nations and protected both provincially and federally. The little brown myotis, common in the study area, is federally listed as endangered under the Canadian *Species at Risk Act*. All 14 bat species in B.C. are protected, with nine species of conservation concern potentially inhabiting the regional study area. Bat diversity is influenced by climate and roosting site availability, primarily in mature to old-growth forests. Foraging habitats depend on prey abundance and avoid large open areas. Bat surveys detected four species in 2013 and 13 species (including eight of conservation concern) between 2016 and 2022. Potential hibernacula sites were identified, and bat activity was confirmed at one of the potential hibernacula features. The little brown myotis is endangered due to white-nose syndrome, with cases documented in Grand Forks, B.C. Threats include habitat loss (especially hibernacula destruction), forestry, agriculture, urbanization, resource extraction, wetland drainage, and wind turbines causing mortality. Effective foraging and roosting habitats exist within the study area, with the little brown myotis accounting for 33 percent of bat detections. HVC's environmental risk assessment indicates potential adverse effects on bats due to elevated copper, selenium, and vanadium in their prey, with high uncertainty in this conclusion.

13.6.3.15. Amphibians

The western toad, chosen as a representative species due to its confirmed presence and significance as a pond-breeding indicator, is provincially yellow-listed and federally listed as special concern. The study area may also support other amphibians, including the Great Basin spadefoot, a species of conservation concern. Key threats include infectious diseases like chytridiomycosis, habitat loss, and degradation from industrial development, logging, and agriculture. Amphibian surveys in 2017-2018 detected many western toad larvae, adults, and sub-adults at various sites. With the breeding season in May, breeding activity is influenced by seasonal water availability. Habitat suitability modeling shows effective breeding and overwintering habitats in the local and regional study areas. HVC's ecological risk assessment identified potential risks to western toad in Highmont Creek due to elevated nitrate, nitrite, selenium, and sulphate concentrations. While the overall risk to western toads in most water bodies is negligible, uncertainties remain for Highmont Creek, despite the absence of detections in surveys. HVC noted that Highmont Creek and flow are currently diverted for mine processing and the creek does not discharge to downstream watercourses. As such western toad exposure is not anticipated.

13.6.3.16. Reptiles

The western rattlesnake, culturally significant and associated with hunting sites, was chosen as the representative reptile species. It is present in the local and regional study areas, with an estimated population of 2,500 to 10,000 in B.C., primarily in the Thompson-Nicola river valley bottoms. Key threats to the species include road mortality, human interactions, and habitat loss. Recovery plans aim to protect critical habitats such as hibernacula, foraging, and gestation sites. HVC's surveys and habitat suitability modeling suggest the local study area does not contain hibernacula but supports a small number of rattlesnake foraging areas. Limited detections in visual transect surveys reflect the difficulty of monitoring this cryptic species. Effective summer foraging habitat is found primarily along the Thompson and Nicola River valleys. HVC's Environmental Risk Assessment indicated a negligible risk to western rattlesnakes, with contaminant hazard quotients below the screening threshold of one and low uncertainty associated with this conclusion.

13.6.3.17. Raptors

The term "raptor" includes hawks, eagles, falcons, and vultures. For HVC MLE, the representative species for diurnal and nocturnal raptors are the Northern Goshawk, Flammulated Owl, and Western Screech-Owl subspecies. Although other raptors like the Golden Eagle and Burrowing Owl are of conservation concern and cultural significance in the region, HVC assessed that their low probability of occurrence or lack of interaction with HVC MLE minimizes their relevance for the assessment of effects.

13.6.3.18. Waterbirds

Waterbirds in the study area include ducks, geese, swans, shorebirds, and other species. The great blue heron, provincially blue-listed and ranked as S3 in B.C., served as the representative species for HVC's assessment. The regional study area can support 19 waterbird species of conservation concern due to suitable habitats provided by the Thompson River, Nicola River, lakes, and other water bodies.

Field surveys and historical data confirmed 39 waterbird species in the regional study area, including species like surf scoter, horned grebe, and great blue heron. Common summer waterfowl species include Canada goose, Barrow's goldeneye, and mallard, with breeding evidence noted for several species. Staging surveys in 2020 and 2021 detected a few waterfowl species, with mallard and blue-winged teal being most abundant.

Breeding evidence for 12 waterbird species was found in the local study area during HVC MLE surveys, with sora detected during marsh bird call-playback surveys. HVC's environmental risk assessment showed negligible health risks for aquatic herbivores (Canada goose), insectivores (bufflehead), and piscivores (common loon). Although aquatic omnivores (ring-necked duck) had higher hazard quotients for vanadium, HVC concluded that the low magnitude and conservative assumptions indicate low risks.

13.6.3.19. Forest and Grassland Birds

Forest and grassland birds are protected under the 1994 Migratory Birds Convention Act, and some are federally listed under the Canadian *Species at Risk Act*. Representative species studied include grouse, common nighthawk, Lewis's woodpecker, among others. Grouse hold historical and contemporary importance for First Nations communities.

The regional study area has potential habitat for 20 forest and grassland bird species of conservation concern, with 143 potential species identified and 116 confirmed through historical or HVC MLE field surveys. Ravens, passerines, cliff swallow, snow bunting, and yellow-rumped warbler are the most commonly detected species in the regional study area. Breeding bird surveys from 2017-2019 detected Swainson's thrush as the most frequently observed. In subsequent surveys at Witches Brook and Guichon Creek, the willow flycatcher was the most frequently detected species in 2020, and the western meadowlark was the most frequently detected in 2022. Of the species observed, the olive-sided flycatcher and barn swallow were among those identified as species of special concern.

HVC's ecological risk assessment indicated negligible health risks for forest and grassland birds under existing conditions. Terrestrial herbivores like grouse may face low risk due to copper exposure, but overall risk is minimal. The main threats to forest and grassland bird species are habitat degradation which contributes to avian species loss, affecting game birds and affecting traditional land use activities of First Nations communities.

13.6.4. Potential Project Effects by HVC

HVC identified the following direct and indirect potential effects on the wildlife and wildlife habitat valued component due to HVC MLE.

13.6.4.1. Change in habitat

The Construction phase of HVC MLE would involve direct changes to wildlife habitat through vegetation clearing for site preparation, causing loss or alteration of upland and wetland habitats. Concerns include the reduction of historical hunting locations due to infrastructure construction and mine footprint extension. Vegetation clearing induces indirect habitat changes through edge effects, windthrow, and fragmentation. Edge effects harm breeding songbirds, while windthrow risk is greatest during initial forest clearing, and fragmentation isolates ecosystems. Sensory disturbances (noise, vibration, light) and dust emitted during construction create indirect habitat changes, disturbing wildlife and altering habitat use. Alteration of flows into Witches Brook from dewatering during construction would affect baseflows, potentially reducing streamflow and affecting vegetation, and thus wildlife habitat.

During the Operations phase, no new direct habitat changes are predicted, but indirect changes would persist through maintenance of edge effects, fragmentation, and sensory disturbances. Light emissions would contribute to minor habitat alterations, while dust would continue to negatively affect vegetation communities. The indirect loss or alteration of habitat along Witches Brook would continue during Operations.

HVC anticipated that the Closure and Post-Closure phases would have positive effects on wildlife and habitat, with reduced sensory disturbance, dust deposition, and reclamation of the HVC mine site footprint. Reclaimed habitats would improve over the long term within the local study area and regional study area. No direct habitat changes are expected during Closure, but some loss may occur for habitat overlapping disturbed sites. Indirect loss or alteration of habitat along Witches Brook would be maintained during Closure and Post-Closure, similar to the Construction phase.

13.6.4.2. Change in movement

HVC's assessment of change in movement patterns for wildlife considered alterations in large-scale movement or corridors. Avoidance behavior, an indirect effect of habitat change, was assessed through assuming a reduced ecological effectiveness of habitats near the HVC mine site.

During Construction and Operations, HVC MLE activities may lead to direct or indirect habitat loss or alteration, affecting terrestrial movement corridors. This can result in physical or sensory barriers hindering wildlife movement, affecting species' persistence, resource access, and causing range shifts. Sensory disturbance may lead to increased opportunity costs, exposure, and energy expenditure, particularly in winter. The effect on wildlife movement varies by disturbance duration, frequency, and intensity. While HVC MLE isn't expected to cause high habitat fragmentation, small mammals and amphibians with limited dispersal may face risks in accessing habitat patches. Bird and bat movements are likely to remain unaffected as there are no concentrated bird or bat travel corridors around the HVC mine site.

In the Closure and Post-Closure phases, HVC MLE activities would enhance the potential for establishing terrestrial movement corridors during habitat restoration. Reclamation of the HVC mine site and HVC MLE is anticipated to improve wildlife movement, with increased vegetation, reduced barriers, and improved conditions for wildlife in the local study area and regional study area over the long term.

13.6.4.3. Change in mortality risk

During the Construction phase of HVC MLE, various activities would pose a direct risk to wildlife mortality. Vegetation

clearing, ground disturbance, and stockpile disturbance may increase mortality risk for less mobile species or life stages like amphibians, bird eggs, and nestlings, as well as species that burrow or hibernate beneath the surface (e.g., black bear) or inhabit trees (e.g., bats). Project-related traffic and machinery movement may lead to collisions with wildlife, affecting both less mobile and larger, more mobile fauna like deer. Human-wildlife encounters or conflicts may occur due to improper waste handling, leading to wildlife mortality. Vegetation clearing for linear infrastructure (for example, the powerline realignment around the Tailings Storage Facility) can also indirectly increase wildlife mortality risk by creating linear disturbance and access points, potentially altering predator-prey dynamics and increasing harvest pressure. The creation of edge habitat may adversely affect bird nesting success. Hunters may also avoid habitats near the local study area due to concerns about the health of harvested species, altering traditional hunting practices.

In the Operations phase, the direct and indirect pathways contributing to increased mortality risk are expected to persist, involving project-related traffic, human-wildlife encounters, and the maintenance of linear disturbances and access creation.

During the Closure and Post-Closure phases, a general reduction in wildlife mortality risk is anticipated compared to Construction and Operations phases due to decreased vehicular traffic and on-site personnel. However, there may be increased mortality risk for some species that inhabit disturbed sites or anthropogenic structures, such as common nighthawk and barn swallow, which would be removed during the reclamation process. Overall, wildlife conditions are expected to improve following reclamation, with remaining mortality risk limited to the Tailings Storage Facility powerline realignment right-of-way, as observed during the Construction phase.

13.6.4.4. Change in wildlife health

During the Construction phase of HVC MLE, various activities that emit atmospheric pollutants, discharge contaminants into the environment, and generate solid, liquid, or hazardous wastes could directly or indirectly affect wildlife health. Dispersal and deposition of emissions and discharges across the environment may elevate the levels of contaminants of potential concern, affecting wildlife health through the contamination of the food chain. Ingestion of solid, liquid, and hazardous wastes by wildlife is another concern during Construction.

In the Operations phase, fugitive dust emissions, particularly from ore and waste rock, may contain heavy metals, such as arsenic, copper, cadmium, lead, and chromium, with potential direct effects on wildlife health through inhalation and indirect effects via contamination of surface water, sediments, soils, and vegetation. Atmospheric emissions from combustion by-products and road dust are expected to be highest during Operations, anticipated to peak in 2035 and then decrease, contributing to environmental contamination. Mining activities have the potential to expose mercury-containing rock, leachates and airborne particulate matter to the surrounding environment from activities such as dewatering, blasting/crushing and waste rock storage. Methylmercury, which has entered the food chain as a result of bioaccumulation, can concentrate in the food web to a degree that it may affect predatory species such as fish-eating wildlife. Based on HVC's assessment of wildlife health, it is unlikely that HVC MLE would result in a change in the bioaccumulation of mercury concentrations that would negatively affect fish-eating wildlife.

The Closure and Post-Closure phases are generally expected to reduce wildlife exposure to contaminants as mining operations are curtailed, and reclamation efforts begin. While some contaminants may persist in the surrounding environment, it is anticipated that the condition for wildlife following the reclamation of the HVC mine site footprint would be improved in the long term within the local study area and regional study area.

13.6.4.5. Potential for effects from BASA Amendment

As required by the Application Information Requirements, HVC assessed the potential effects of the BASA Amendment on the wildlife and wildlife habitat valued component. HVC's assessment concluded that ongoing dewatering of the Basal Aquifer could affect water quantity and water quality, but that changes to water quantity were not expected to affect wildlife or wildlife habitat. Molybdenum concentrations in Guichon Creek and Witches Brook, which could affect wildlife

health, particularly moose, have increased since the BASA 2002 baseline data collection, but are not expected to increase significantly during the remainder of Operations. HVC concluded that ongoing BASA dewatering would not contribute to a declining regional moose population and would not affect other wildlife through habitat loss.

13.6.5. Proposed Mitigation Measures by HVC

Effects on wildlife from mining activities are currently managed at the mine site through several plans, including the Wildlife Management Plan and the Reclamation and Closure Plan, both required under the M-11 permit. These management plans incorporate both best management practices and site-specific actions. For example, pre-clearing surveys and boundary marking are used to avoid land disturbance, road and traffic management minimizes wildlife mortality, and waste management to reduce wildlife encounters.

For new mitigation measures, HVC has proposed pre-clearing surveys and abandoned nest reporting for species listed under the Canadian *Species at Risk Act*, including great blue herons and pileated woodpeckers, the installation of nest boxes for flammulated owls in suitable habitat. For a full list of HVC's proposed mitigations related to wildlife and wildlife habitat, see Table 7.7.5-3 of [Chapter 7.7](#) of HVC's application.

13.6.6. Key Issues Raised

13.6.6.1. Effects to moose from dust and riparian habitat and forage availability

Members of the Kanaka Bar Indian Band and LNIB have reported ceasing to hunt moose near the mine due to concerns about the animals' health, particularly related to the ingestion of heavy metals such as copper and molybdenum, and the threat of molybdenosis. HVC acknowledged that their ecological risk assessment indicates a potential risk to ruminant ungulates based on current data. HVC is committed to continuing studies on moose health and incorporating data from First Nation hunters, when available, to inform those studies.

SSN raised concerns that HVC's methods for assessing effects to moose were unsuitable to accurately identify inventory levels for monitoring, suggesting that the loss of hunting opportunities was underestimated. As well, historical mining activities have altered the riparian habitat along Witches Brook, affecting soil moisture and reducing preferred forage species for moose. This has significantly affected the viability of critical moose winter range (kmA_73_100). There is an estimated 33-66 percent chance that moose hunting opportunities would be lost due to declining populations. Continued interference with Witches Brook from HVC MLE project could further harm moose populations and impede access to traditional hunting and plant gathering for the Nation. HVC responded that their Water Stewardship Strategy and related mitigations aim to provide positive effects on wetlands, instream flows, and associated wildlife and fish populations, which should benefit wider wildlife habitat.

To mitigate and monitor potential effects to Aboriginal rights related to hunting and perceived contamination of hunted species, the EAO proposed Condition 12 Nlaka'pamux Foods Monitoring Plan. The EAO acknowledges that SSN did not agree with portions of the wildlife and wildlife habitat assessment by HVC but considers that the responses provided by HVC are sufficient to address these concerns for the purposes of the environmental assessment.

13.6.6.2. At Risk Species Concerns – listed bat species, flammulated owl and western toad

Concerns were raised by LNIB and SSN about the potential effects of HVC MLE on the little brown myotis, a listed bat species, including the future effects of white-nose syndrome on bats as well as habitat loss or disturbance from mine activities. LNIB and SSN were concerned about the loss of flammulated owl habitat from land clearing, and SSN was concerned about effects to Western toad, noting previous information about western toad breeding in Bethlehem tailings ponds.

In response, HVC noted that the ecological risk assessment evaluated the potential for HVC-related metals to harm bats in the local study area. HVC concluded that there is a potential risk but with a high level of uncertainty and a high likelihood of risk over-estimation due to multiple conservative model assumptions. HVC proposed the collection of soil invertebrate

tissue within the local study area to reduce the uncertainty to ensure that insectivorous mammals (including bats) are not at risk. Biological effects such as white nose syndrome, and physical effects such as habitat loss and disturbance were not evaluated in the ecological risk assessment. However, HVC acknowledged the sensitivity of the little brown myotis to habitat disturbance and has committed to specific mitigations including the installation of artificial bat roosting structures.

HVC committed, and has completed, surveys for flammulated owl in 2024 within the local study area where suitable habitat exists. HVC also plans to erect nest boxes in suitable habitats adjacent to the assessment footprint, which are readily used by the species. HVC also clarified that its 2017 and 2018 amphibian surveys focused on the local study area, with assessments of Witches Brook completed in 2020 and 2021, where potential HVC MLE effects on amphibians were most likely to occur.

The EAO considered HVC's responses sufficient to address the concerns related to potential effects to species at risk for the purposes of the environmental assessment.

13.6.6.3. Assessment scope and methods

The CNA expressed concerns that the spatial extent of assessments was not appropriately scaled to the species, potentially leading to underprediction of effects due to a disconnect between HVC MLE's scale and species ranges. HVC responded that the methodology for deciding on the assessment scope was consistent with industry standards and provincial regulations for environmental assessments, as was as set out in the Application Information Requirements approved by the EAO.

LNIB raised concerns about outdated or insufficient baseline data for certain wildlife species, citing dated studies that may not accurately represent current species status. SSN noted concerns with the validity of the habitat suitability modelling considering the effects of the Tremont Creek wildfire in 2021. HVC noted that 2023 pre-construction field surveys were conducted to inform project mitigation but were not incorporated into the effects assessment. Species or species groups surveyed in 2023 included: American goshawk, American pika, amphibians, bats, breeding birds, Lewis's woodpecker, raptors, reptiles, waterfowl, and Williamson's Sapsucker. The Trigger Action Response Plan for Wildlife Management and Monitoring at the HVC mine site includes monitoring effects on individual animals and important habitats and sensitive wildlife features. HVC also responded that it recognised the effects from the Tremont Creek fire in 2021, but that HVC's view was that wildlife and habitat recovery had begun in the area. In the Issues Tracking Table, HVC committed to considering the effects of wildfires in the regional study area when reporting on the results of wildlife monitoring programs, and to considering the potential effects from the Tremont Creek wildfire on deer populations when planning environmental monitoring and adaptive management programs during Construction and Operations.

The CNA and SSN both criticized HVC for not including terrestrial invertebrates in the scope of assessment for wildlife health for HVC MLE and beyond into reclamation, noting that invertebrates provide important information that can inform species health further up the food chain. In response HVC has proposed collecting soil invertebrates in the local study area to reduce the uncertainty in the risk assessment for insectivorous mammals. Additionally, specific to reclamation monitoring, as part of the Life of Mine reclamation monitoring program, HVC implemented a pilot insect monitoring program in the summer of 2023. Samples and data analysis is currently being conducted by the University of Guelph. Once all of the data has been analyzed, the results of the pilot program will be shared with First Nations.

The EAO considered HVC's responses related to assessment methods and concluded that these are sufficient to address the concerns raised for the purposes of the environmental assessment.

13.6.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the wildlife and wildlife habitat valued component:

- Change in habitat;
- Change in movement;
- Change in mortality risk; and
- Change in wildlife health.

The EAO's characterization of the expected residual effects of HVC MLE on the wildlife and wildlife valued component is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 21: Summary of Residual Effects for Wildlife and Wildlife Habitat

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Change in habitat</i> Wildlife habitat will be lost in the mine footprint expansion, and may be negatively affected in areas adjacent to the mine	Context (resilience): Low to Moderate Magnitude: Negligible to moderate Extent: Local to regional Duration: Long-term Frequency: Continuous Reversibility: Partially reversible to irreversible Affected Populations: Even Risk (likelihood and consequences): High Uncertainty: Low to Moderate Importance: High	Not significant While some species such as snowshoe hare can be considered relatively adaptable to habitat changes, other species such as moose, flammulated owls, little brown myotis, or western toad have a low natural resilience to change and/or already considered threatened, while already stressed from the loss of habitat from historical anthropogenic use of the valley to date. Magnitude is negligible to moderate, with some habitat loss, such as critical moose winter grazing areas being towards a moderate magnitude. Change in habitat is expected to be mostly within the local study area, however some indirect habitat loss is expected along Witches Brook in the regional study area. Duration is anticipated to be long-term as habitat reclamation would extend well beyond mine closure (>50 yrs). The frequency would be continuous as the habitat disturbance would persist continuously through the construction and operation of the mine. While some habitat types are anticipated to be re-established through reclamation, returning the land to pre-mining conditions is impossible. The risk of habitat changes or loss is considered high, with a high likelihood and a moderate to high consequence, depending on the species considered. While there is a high confidence in the effects of direct habitat loss, there is a moderate level of uncertainty related to indirect habitat loss effects. The importance of habitat changes or loss and the effect on many representative species has been identified as important to First Nations, governments and agencies and the public.
<i>Change in movement</i> Animals may face barriers to movement due to the expanded mine footprint	Context (resilience): Low to Moderate Magnitude: Low Extent: Limited to Local Duration: Long-term Frequency: Continuous Reversibility: Partially Reversible Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Low Importance: High	Not significant Animal movement patterns in the area have been strongly affected by historical mining, forestry, and agriculture in the region. The ability to absorb additional effects is low to moderate. The magnitude of the residual changes from HVC MLE is low given the relatively small change to habitat movement from current conditions. The extent is limited to local with some species seeing effects within the mine site and others beyond the immediate mine site, in the local study area. The duration is long-term with residual effects anticipated beyond the operation of the mine and into long term reclamation efforts, with a continuous frequency. Effects to change in movement are considered partially reversible. While some species may easily re-establish migratory patterns post reclamation, other pre-mining game trails and water access may be permanently lost. As no migratory patterns were identified in studies conducted during the environmental assessment, the risk is considered low (low likelihood and moderate consequence), as is uncertainty. Any change in animal movement is of high importance to First Nations, governments, agencies, and the public.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Change in mortality risk</i> Change in mortality risk may result from vegetation clearing, vehicle collisions and human-wildlife conflict. Indirect mortality may occur from changes in predation and increased harvesting pressure	Context (resilience): Moderate Magnitude: Low Extent: Limited to Local Duration: Medium to Long-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant The context for a change in mortality risk is considered moderate. While the likelihood of increased mortality is low based on the changes relative to the existing mine, some threatened species have a lower resilience to any population effects. The magnitude is low. The extent with most instances anticipated to occur on the mine site or related infrastructure, some indirect mortality may occur in the local study area. The duration is medium to long-term, with most direct mortality risk expected during operations. Some species may be affected by changes in predation beyond closure. The effect would be continuous throughout the life of the mine. Residual effects to mortality are expected to be fully reversible after the application of long-term remediation strategies. Uncertainty is low, with the effects from the mine to animal mortality well understood. Any change in mortality risk is of high importance to First Nations, governments, agencies, and the public.
<i>Change in wildlife health</i> Potential increase in contamination affecting ruminant herbivores, aerial insectivores, ground insectivores and amphibians	Context (resilience): Low to moderate Magnitude: Low Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant While HVC MLE is unlikely to considerably increase the current effects to health of wildlife, the resilience of certain species to additional health stresses from the mine is low, particularly insectivores, the little brown myotis (threat of white nose syndrome) and moose, which have already been qualitatively observed to be experiencing health effects which has believed to result from mining (First Nations hunters). The magnitude of effects to wildlife health is low, with no additional effects expected beyond the continuation of existing operational effects. The extent of effects from mine-related dust affecting wildlife would be limited to a local extent in the local study area. The duration of effects would be long-term. The frequency of effects is continuous and would persist throughout the operation of the mine site. Effects to wildlife health are partially reversible with the application of remediation. Effects to wildlife health, in particular for ungulates are expected to have a disproportionate effect on First Nations in the area who participate in traditional harvesting. The risk is moderate with a low likelihood of increasing the effect to wildlife health, but a high consequence for any change. The uncertainty is considered moderate after the implementation of mitigation measures including a study of traditional foods developed and conducted collaboratively with First Nations. Any change in wildlife health is of high importance to First Nations, governments, agencies, and the public.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.6.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, HVC determined that two existing and reasonably foreseeable projects and activities have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects it assessed for HVC MLE and potential effects from these two other projects along with continued forestry activity and concluded that there would be no cumulative effects of HVC MLE on wildlife and wildlife habitat. Some First Nations did not agree with HVC's assessment that HVC MLE would not cause cumulative effects to wildlife and wildlife habitat, in particular due to continued strain from both the mine and external anthropogenic activities on certain wildlife species.

The EAO considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. Due to potential habitat disturbance, these projects are expected to have effects to wildlife and habitat, and any effects are expected to be managed in a similar manner to how HVC is required to manage wildlife effects for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects wildlife and habitat health as needed).

The EAO also considered the existing conditions at the mine site, with current effects to wildlife and habitat from mine operations, the anticipated mitigation measures proposed by HVC and regulatory tools to implement those mitigation measures, and the EAO's assessed residual effect to wildlife and habitat. Given these considerations, the EAO concludes that for wildlife and habitat, HVC MLE would contribute to cumulative effects. For moose or listed species, considering the affected nature of the existing populations, the uncertainty of the effectiveness of mitigation strategies for HVC MLE and the future drought-related challenges to riparian habitat in the region, the EAO determined there would be a greater cumulative effect. These predicted cumulative effects to wildlife and wildlife habitat are not expected to be significant.

13.6.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the wildlife and wildlife habitat valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new mitigation measures in the M-11 permit.

13.7. Vegetation and Ecosystems

13.7.1. Summary

Plant species, whether provincially or federally listed, along with plant communities and wetlands, play a crucial role in the functionality of natural ecosystems. They serve as vital habitats for wildlife, contribute to biodiversity, and are integral to traditional harvesting and land stewardship for First Nations.

HVC assessed the potential effects to vegetation and ecosystems, including terrestrial ecosystems, wetland ecosystems, sensitive ecosystems, ecological communities of interest and plant species of interest. This included plant species of traditional importance for First Nations. Mitigation measures proposed to reduce the potential effects to vegetation were described.

The key issues identified by reviewers of the vegetation assessment related to the continuation or increase of mining dust deposition on traditionally harvested plants, concerns about plants absorbing contaminants from mining dust and effecting ecosystem health, concerns about invasive species management during construction and operations and reclamation, a need for vegetation and ecosystems reclamation goals, and the need for wetland functional assessments prior to construction.

The EAO considered HVC's assessment and mitigation measures, the key issues raised by technical advisors, the requirements of the *Mines Act* permit for vegetation management under the Construction Environmental Management Plan and the Fugitive Dust Management Plan and identified several residual effects to vegetation and ecosystems from HVC MLE. The EAO concluded that HVC MLE would not result in significant residual or cumulative effects to the vegetation and ecosystems valued component.

13.7.2. Assessment Boundaries

13.7.2.1. Spatial boundaries

The four spatial boundaries selected by HVC for the HVC MLE vegetation and ecosystems valued component assessment included the Base Case footprint (the current extent of the disturbed area of the mine and areas already approved for use), the Assessment Case footprint (the proposed expanded area disturbed by HVC MLE), a local study area and a regional study area.

The local study area refers to the area of anticipated effects caused by the HVC MLE project which amounts to an area extending 1.5 km around the proposed HVC MLE infrastructure at the mine site and 500 metres on either side of linear features like roads. The local study areas for the vegetation and ecosystems valued component and the wildlife and wildlife habitat valued components are the same. The regional study area is a larger area and includes the maximum area in which direct, indirect, or cumulative effects from the HVC MLE project are anticipated.

For the potential effects to vegetation and ecosystems for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

Ecosections and Ecoregions refer to areas containing a geographically distinct assemblage of species, natural communities, and environmental conditions, with Ecoregions being the larger.

13.7.2.2. Temporal boundaries

The four temporal boundaries used for the HVC MLE vegetation and ecosystems assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.7.3. Existing Conditions by HVC

The existing vegetation conditions in the region were assessed in [Chapter 7.6](#) of HVC's Application and are summarized here.

The Highland Valley Copper mine is in the Thompson Basin and Guichon Upland Ecosections of the Thompson-Okanagan Plateau Ecoregion. The Thompson Basin is characterized by a warm and exceptionally dry climate, low elevation and a high diversity and abundance of wildlife, with sagebrush and bunchgrass steppe occupying the valley and lower slopes and ponderosa pine forest at higher elevations.

The Guichon Upland Ecosection is a plateau with steep sides and a rolling upland surface intersected by creeks that drain north into the Thompson and Nicola Rivers. Lower slopes are characterized by bunchgrass-steppe and ponderosa pine forests, and the upper slopes are dominated by montane and subalpine forests. All the lodgepole pine forests in the area have been heavily affected by mountain pine beetle outbreaks and logging activities. All vegetation and ecosystems in the region have been affected by industrial and agricultural practices, including the Highland Valley Copper mine as well as climactic effects from drought and wildfires.

The HVC MLE Application describes existing vegetation and ecosystem conditions from both Indigenous knowledge and western science views. Indigenous knowledge included in the Application illustrates changes to vegetation and ecosystems over the life of the mine and its effects on First Nations people individually and as communities, including lost

access to preferred hunting and gathering areas as the mine expanded due to both dust contamination and fears that health effects could be caused by dust contamination, including to traditional foods (wildlife and vegetation) and medicinal plants.

HVC conducted vegetation field studies, terrestrial ecosystem field surveys, terrestrial ecosystem mapping, and site productivity estimates across the regional study area to map, describe and classify ecosystems and vegetation in the area. The following information was provided by HVC as a part of their Application:

- **Wetlands:** wetlands are distinct ecosystems with soil that remain saturated for sufficient lengths of time to influence soil and vegetation community development. Near the HVC mine site, wetlands are primarily composed of fens; peatlands where groundwater inflow maintains relatively high mineral content within the rooting zone. The primary vegetation present is scrub birch and sedges.
- **Riparian Ecosystems:** Riparian ecosystems are the interface between land and a river or stream. In the study area, riparian ecosystems are mostly in the form of moist or wet forests with some floodplain ecosystems and primarily fringe flood class shrubs and low trees.
- **Old Growth Forest and Old Growth Management Areas:** an old growth forest is a climax forest in the late stages of stand development containing large, old trees. Old Growth Management Areas (OGMAs) are areas identified by the provincial government to have special values that are worthy of protection and harvesting of these areas is restricted.
- **Sparsely Vegetated Ecosystems:** Mostly are represented by rock outcrop ecosystems which are comprised of bluffs and knobs of bedrock with limited soil development and high cover of exposed rock with drought tolerant vegetation.
- **Grasslands:** The assessed grasslands include grasslands, shrub-steppe, and brushland ecosystems. These habitats are crucial for species at risk in B.C. Grasslands are dry with deep, fast-draining soils. Shrub-steppe ecosystems feature semi-desert-adapted, heat-tolerant shrubs like sagebrush. The HVC grassland ecosystems are dominated bluebunch wheatgrass, balsamroot, rough fescue, and sagebrush.
- **Listed Ecological Communities:** The provincial conservation data centre ranks ecological communities in terms of level of threat to help set conservation priorities. Red listed ecological communities are considered endangered, threatened or extirpated and blue listed ecological communities are of special concern or vulnerable to human activity. A total of 0.1 ha of red-listed ecological communities and a total of 13.4 ha of blue-listed ecological communities would be lost or altered by HVC MLE. The greatest area of blue listed ecosystems is represented by the Douglas-fir/ponderosa pine/spirea/pinegrass ecological community.
- **Rare or Endangered Plants:** no plants were identified in the local study area that are on any endangered lists. One red-listed ecological community was listed on the BC Centre for Disease Control in the regional study area (*Puccinellia nuttalliana* – *Hordeum jubatum*, or Nuttall's Alkaligrass – Foxtail Barley). This occurrence was not field verified.
- **Traditional Use Plant Species:** traditional use plant species are species with particular importance to the Nlaka'pamux communities. were identified with input from the Nlaka'pamux Nation. For more information regarding traditional use plants please refer to the [CNA](#) and [LNIB](#) Indigenous led assessments.
- **Invasive Plant Species:** Invasive plants are harmful non-native plant species that are aggressive and difficult to manage and are listed as restricted, noxious or nuisance weeds by the B.C. *Weed Control Act*. They invade ecosystems and may displace native plants, which can have negative effects on how ecosystems function, on native vegetation, and native wildlife. A total of 27 species of invasive plants were recorded in the local study area. The most identified species were spotted knapweed, Canada thistle, and Western Goat's beard blueweed.

Table 22. Base Case vegetation distribution by HVC in the HVC MLE regional and local study areas

<i>Habitat Type</i>	<i>Local Study Area</i>	<i>Regional Study Area</i>
<i>Wetlands</i>	511 ha	2,775 ha
<i>Riparian Ecosystems</i>	348 ha	4, 234 ha
<i>Old growth forest/OGMAs</i>	11.9/1133 ha	554.5/15,847 ha
<i>Sparsely Vegetated Ecosystems</i>	64 ha	1,534 ha
<i>Grasslands</i>	241 ha	7,769 ha
<i>Listed Ecological Species</i>	1,432 ha (8.1 percent red-listed and 91.9 percent blue listed)	24,601 ha (21.3 percent red-listed and 78.7 percent blue-listed)
<i>Rare or Endangered Species</i>	None cited	None field verified
<i>Traditional Use Plant Species</i>	14,856 ha	88, 178 ha
<i>Invasive Plant Species</i>	502 records	1,057 records

The Highland Valley has experienced the effects of climate change in recent years, with hotter, dryer summers, warmer winters and decreasing snowpack¹. Due to modelled future climate change, the region is predicted to experience a shift in regional ecosystem distribution, with the Engelmann spruce-subalpine fir and montane spruce ecosystems being extirpated (pushed out) from the local and regional study areas by 2041. These ecosystems are expected to be replaced with Interior Douglas-fir and an expansion of the ponderosa pine and bunchgrass zones.

13.7.4. Potential Project Effects by HVC

HVC identified the following direct and indirect potential effects on vegetation and ecosystems due to HVC MLE:

- **Direct Loss** of vegetation and ecosystems associated with site preparation and clearing activities during the Construction phase. This loss is a direct effect that would occur during the removal of vegetation. Indirect effects, including the loss of vegetation, may occur as the result of changes to soil characteristics due to clearing activities during Construction.
- **Edge Effects** result from new or maintained edges and would alter the environment at forest edges, affecting vegetation structure, composition, and function. Tree vulnerability to disease, insects, and windfall along new edges depends on the magnitude of change. Edge effects are anticipated during clearing and grubbing activities, persisting through the Construction and Operations, and Closure.
- **Windthrow** is the toppling of trees by wind, is common along newly cleared forest edges due to historical lack of wind exposure. Windthrow would be expected along cleared edges during the Construction phase, reducing over time as trees adapt to increased wind exposure.
- **Fragmentation** is caused by activities like clearing that isolate species and effect nutrient flows, energy transfers, and genetic exchanges. This process reduces species richness and abundance, affecting both limited and high-dispersal species. The only fragmented area expected from HVC MLE is a 19-ha forested space, resulting from the proposed BC Hydro transmission line realignment.
- **Invasive Species** are a threat to biodiversity and may affect ecosystems with reduced native diversity. Their documented effects rank as the second greatest threat to listed species, following habitat loss. The competition

from non-native species as a significant threat to the success of native plants vital for Nlaka'pamux cultural practices. Disturbed edges are common sites for invasive species dispersal, and vehicles can act as a dispersal mechanism making road edges a favourable environment for invasive species. Potential effects from invasive species occur at all phases of HVC MLE.

- **Hydrological Processes** are important to ecosystems, influencing geomorphic, biogeochemical, and ecological aspects. Changes in hydrologic connectivity can affect sediment, water, and nutrient movement, affecting successional pathways, ecological integrity, and functions. For HVC MLE, groundwater levels would decrease during Operations and Closure phases, affecting stream baseflows. Hydrologic changes may affect wetlands and riparian areas, influencing functions and ecosystem dynamics.
- **Dust:** is a potential issue during the harvesting of traditional use plants, can adversely affect vegetation health, depending on amount, frequency, and chemical properties. Its effects include blocking photosynthesis, respiration, transpiration, and causing physical injuries. Chemical effects, especially from alkaline, acidic, or bio-available dusts, can alter soil conditions and biochemical pathways, affecting plant growth. Indigenous knowledge emphasizes dust generation and deposition from Highland Valley Copper mine as a significant concern.

The BASA amendment is not expected to contribute any effects to the vegetation and ecosystems valued component.

13.7.5. Proposed Mitigation Measures by HVC

Effects on vegetation and ecosystems from mining activities are currently managed at the mine site through several plans, including the Vegetation Management Plan, Reclamation and Closure Plan, and the Invasive Plant Management Plan. These management plans incorporate both best management practices and site-specific actions. For example, pre-clearing surveys and boundary marking are used to avoid land disturbance, use of native plant species in reclamation programs helps minimize invasive species incursion, and a fugitive dust management plan reduces dust deposition.

For new mitigation measures, HVC proposed a sequenced shutdown of dewatering operations at the end of HVC MLE and the termination of dewatering operations at the end of the mine's life and after the dewatering is no longer required to maintain safety of the Valley Pit. This approach aims to allow pits to fill with water, thereby supporting the return of the water table and creek baseflow, which in turn would aid vegetation and ecosystem recovery.

For a full list of HVC's proposed mitigations related to vegetation and ecosystems see Table 7.6.5-3 of [Chapter 7.6 of HVC's application](#).

13.7.6. Key Issues Raised

The following key issues were raised by members of the Technical Advisory Committee.

13.7.6.1. Mining dust deposition and metal uptake by vegetation

During review of the Application, First Nations voiced concerns about dust from the HVC mine on local vegetation, ecosystems, and traditional food sources. Of particular concern was the quantity of dust deposition and the expected uptake of metals, altering soil chemistry and affecting vegetation health. Members of the LNIB highlighted that dust contamination had already led to the loss or alteration of traditional harvesting grounds.

HVC used predictive modeling for dust accumulation in surface water and air quality in their ecological risk assessment to support their assessment of the effects on vegetation. To improve accuracy of models, in 2016, HVC carried out direct sampling of soil and vegetation metal concentrations. Members of the Technical Advisory Committee pointed out that they consider data used by HVC as dated and that this creates challenges in assessing current effects. Based on modeling outcomes and sampling results, HVC concluded that the risk to plant health from HVC MLE is low, with a low level of uncertainty.

LNIB objected to the methodology employed by HVC for modeling the effects of project-induced dust, citing observed alterations in traditional harvesting and consumption practices within the community due to existing dust effects from the mine. In response, HVC committed to collaborating with First Nations to develop a Traditional Foods Study that would include a monitoring plan of the quality and safety of traditional foods harvested in the region. Additionally, HVC would revise the Fugitive Dust Management Plan to include culturally significant monitoring sites, ensuring a more comprehensive approach to addressing community concerns and preserving traditional practices.

The EAO considered HVC's assessment, concerns from First Nations, and existing mitigations to reduce dust deposition. To monitor and mitigate potential effects from HVC MLE, the EAO proposed Condition 12 Nlaka'pamux Foods Monitoring Plan, which would require a follow-up to the 2016 Dust Mapping and Traditional Plant Study.

13.7.6.2. Risks to native plant biodiversity through invasive species colonization

Concerns raised by the Technical Advisory Committee note that invasive plants pose a considerable threat to biodiversity in landscapes, as they may outcompete native species, disrupt ecosystems, accelerate soil degradation, and elevate the risk of wildfires. The Highland Valley region faces an increased risk of invasive species proliferation due to continued land disturbance, exacerbated by decades of anthropogenic activities associated with mining and other human interventions. Invasive plants are notably adept at colonizing areas that have been disturbed, such as those cleared for industrial purposes.

In response, HVC committed to continue implementing its Invasive Plant Management Plan aimed at instituting a more unified and comprehensive approach to managing invasive species. While some concerns have been raised by First Nations regarding the frequency of invasive plant surveys, the revised Plan commits to conducting annual surveys and opportunistic assessments in areas already known to harbor invasive species or those with a high potential for invasion.

HVC has also committed to collaborating with First Nations to develop an approved seed mix of native plants. These native seeds would be promptly utilized post-disturbance, even before full reclamation efforts are completed, to mitigate the establishment of invasive species.

The EAO is satisfied with the information provided by HVC, existing *Mines Act* M-11 permit requirements for vegetation management, including to address the risks posed by invasive species, and proposed new requirements for an Invasive Plant Management Plan as part of the M-11 permit.

13.7.6.3. Loss of ecologically valuable soils

First Nations and MCM raised concerns regarding the practice of long-term soil stockpiling resulting from soil salvaging activities related to the HVC MLE. Most of the area that would be lost or altered occurs on sites with moderate or good soil productivity, which are integral components of local ecosystems. The majority of available reclamation suitable soils from those areas would be stripped, stockpiled, and later utilized as cover materials during reclamation. Some poorer quality soil would be spoiled or buried in waste rock dumps.

HVC acknowledged that stockpiling soils is less effective than salvage and direct placement, as the latter allows for the immediate utilization of soil for reclamation, thereby maintaining soil productivity and preserving the benefits of natural soil microbes and plant propagules. However, HVC highlighted the limited availability of areas for reclamation that are not susceptible to re-disturbance, particularly considering the scale of activities planned under HVC MLE. HVC has outlined mitigations in the Soil Management Plan, emphasizing the importance of salvaging, storing, and protecting salvaged soil wherever feasible.

The EAO considered HVC's responses related to soil salvage as sufficient for the purposes of the environmental assessment.

13.7.6.4. Loss of sensitive plant habitat

Natural vegetation species and ecosystems in the vicinity of HVC MLE have been subject to effects of industrial and agricultural development for many years. First Nations have stressed that despite not being considered 'endangered', any additional effects of an industrial project to valuable ecosystems such as riparian habitat or grasslands is considered significant by their communities. Objections were raised by First Nations that the scale of the vegetation assessment (regional scale level) was too large, making accurate estimations of vegetation loss difficult.

Concerns were also raised regarding the potential effect on a 1.5-ha fen situated along upper Witches Brook, which falls within the footprint of the proposed utilities corridor. HVC has noted that this fen lies 70 meters north of the existing Valley South Dump, situated within a disturbed area surrounded by existing infrastructure. According to the Application, the absence of forested habitat in the adjacent area means that ground clearing is not anticipated, and no hydrological effects are predicted. HVC has highlighted that the Vegetation Management Plan includes mitigation measures to guide activities in riparian zones, aimed at minimizing effects.

Concerns were also voiced by First Nations regarding the health of riparian vegetation along Witches Brook, noting considerable reductions in flow compared to pre-mining conditions, which affect riparian habitat health. Riparian habitats hold considerable ecological and cultural significance. Acknowledging this importance, HVC has emphasized their commitment to aquatic research and reclamation, with a focus on integrating aquatic and riparian ecosystems into their reclamation efforts, as detailed in the Five-year Reclamation and Closure Plan. Among the possibilities considered are relocating the BC Hydro Transmission line and Highmont diversion pipeline to the Valley South Dump to mitigate effects on the wetlands associated with Witches Brook and relocating the Fortis natural gas line to Shula Flats or north of Highway 97C.

Mitigation strategies for Witches Brook and adjacent ecosystems include plans for future flow augmentation and the establishment of an attenuation pond. HVC is developing these plans in collaboration with First Nations through the Witches Brook Ecological Stewardship Strategy and Watershed Stewardship Strategy. The EAO is also proposing Condition 13 Watershed Management and Mitigation Plan and Condition 13 Wetlands and Riparian Mitigation and Offsetting Plan to help mitigate the effects to sensitive wetland areas.

13.7.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the vegetation and ecosystems valued component:

- Loss/alteration to terrestrial ecosystem abundance;
- Loss/alteration to terrestrial ecosystem productivity;
- Loss/alteration of wetland ecosystems;
- Loss or alteration of sensitive ecosystems;
- Changes to listed ecological communities; and
- Effects to plant species of interest.

The EAO's characterization of the expected residual effects of HVC MLE on the vegetation and valued component is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 23: Summary of Residual Effects for Vegetation and Ecosystems

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Loss/alteration to terrestrial ecosystem abundance</i> This effect would include the loss or alteration of terrestrial ecosystems due to surficial disturbances, edge effects and fragmentation, alteration of hydrological connectivity, and introduction and/or spread of invasive and non-native plant species.	Context (resilience): Moderate Magnitude: Medium Extent: Limited Duration: Long-term Frequency: Once and continuous Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant Terrestrial ecosystems are the foundation for biodiversity, First Nations' stewardship, and wildlife habitat. While vegetation in the Highland Valley consists mainly of previously disturbed ecosystems, the overall resilience of vegetation in this region is considered high. However, the existing strain on natural ecosystems, changed nature of the substrate from mining and reclamation, and predicted climate change effects result in moderate resilience. Loss is expected to occur during Construction and extend beyond the life of the mine. Vegetation removal would primarily occur during Construction. Edge effects would also occur continuously during Operations and through reclamation. Recovery of terrestrial ecosystem abundance is considered irreversible because following reclamation, ecosystems would take more than 100 years to be re-established and would likely be permanently altered. First Nations land users are expected to be disproportionately affected by any further loss to strained ecosystems and the ability to maintain traditional stewardship of the land. Due to the scale of the vegetation mapping and the type of imagery used, the uncertainty of effects to vegetation is moderate. The risk of loss or alteration to sensitive ecosystems is considered moderate, with a high consequence over a relatively small extent. The loss of any ecosystem's abundance is considered of high importance to First Nations.
<i>Loss/alteration to terrestrial ecosystem productivity</i> A measure of how well soil conditions support tree growth. HVC MLE would include clearing and stockpiling of soil to be used in reclamation. Soil is degraded over time while stored, becoming less productive.	Context (resilience): Moderate Magnitude: Low Extent: Limited Duration: Long-term Frequency: Once Reversibility: Irreversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: Moderate	Not significant The baseline condition of soil productivity and the ability to recover from being removed and stockpiled is considered moderate. Effects to terrestrial productivity would be limited to where soil disturbance occurs, which is limited to the HVC MLE footprint. Effects to soil quantity are expected to be irreversible and long-term, with a decrease in overall productivity from changes to the soil over time. Soil removal and disturbance would occur once during Construction, then be stockpiled for Closure and reclamation. It is expected that effects to terrestrial productivity would affect all populations similarly. The loss of terrestrial productivity is expected to occur (high likelihood), with a moderate consequence after reclamation. This led to an overall risk rating of moderate. Effects to terrestrial productivity from stripping of soil are well understood from existing mining operations and the uncertainty in the assessment is low. ENV and First Nations, in particular the LNIB, have identified ecosystem productivity as an important concern for HVC MLE.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Loss/alteration of wetland ecosystems</i>	Context (resilience): Low Magnitude: Medium Extent: Local Duration: Long-term Frequency: Once Reversibility: Irreversible Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Moderate Importance: High	Not significant Wetlands, which are delicate ecological communities, are highly vulnerable to adverse effects, particularly in regions where their resilience is notably low. While a minor reduction in wetland area is projected (9.2 ha) with some long-term gains (15 ha), the full restoration of wetland functions is known to be very difficult and remains uncertain. Consequently, the potential effect on wetland function is deemed moderate. Effects on wetland function would primarily occur where vegetation disturbance is concentrated, mainly within the HVC MLE footprint and some areas of Witches Brook's lower reaches. Although vegetation disturbance is expected primarily during construction and operations, the re-establishment of pre-disturbance wetland function would likely require several decades or more beyond reclamation efforts to reestablish. The effects to existing wetlands are considered irreversible, as certain wetland types would undergo permanent alteration even with reclamation. Vegetation removal is anticipated primarily during Construction. The effects on wetland function are expected to be consistent across all human populations. While the loss and disturbance of vegetation are highly likely, the resulting consequences are expected to be minor, with limited extent and potential positive mitigation measures. This results in a low risk rating for changes to wetland function. Despite a low level of uncertainty regarding the effects of vegetation removal in wetlands, there is significant uncertainty concerning proposed mitigation strategies, particularly regarding the positive creation of an attenuation pond related to Witches Brook flow augmentation. The role of wetlands in supporting traditional plant use and providing habitat for plant and wildlife species of interest is considered of high importance to both First Nations communities and government agencies
<i>Loss or alteration of sensitive ecosystems</i>	Context (resilience): Low Magnitude: Low Extent: Local Duration: Long-term Frequency: Once and Continuous Reversibility: Irreversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low to Moderate Importance: High	Not significant Sensitive ecosystems including riparian, sparsely vegetated, and grasslands ecosystems, have been heavily affected in the Highland Valley from industrial use, forestry, agriculture, and invasive species. Their relative scarcity and importance in supporting biodiversity equate to a low resilience to loss or alteration. Effects are expected to be mostly contained to the HVC MLE site, with some riparian wetlands adjacent to Witches Brook. Loss is expected to occur during construction and extend beyond the life of the mine with restoration taking more than 100 years. Vegetation removal would primarily occur during construction, though edge effects and threats from invasive species would also occur continuously during operations and through reclamation. Effects to sensitive ecosystems are considered irreversible based on the time frame for reclamation and external factors such as climate change. All populations are expected to be affected equally by loss or alteration of sensitive ecosystems. The risk of loss or alteration to terrestrial ecosystems is considered moderate, with a high likelihood and a high consequence over a relatively small extent. The uncertainty in the loss or alteration of all sensitive ecosystems is low, however the effectiveness of proposed mitigations for riparian habitats is somewhat uncertain. The importance of all sensitive ecosystems is considered high, with significant interest from First Nations, as well as provincial and federal government (grassland and riparian habitat conservation measures).

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes to listed ecological communities</i> Only blue listed ecological communities are included as effects on red-listed communities was <0.1 ha.	Context (resilience): Low Magnitude: Medium Extent: Limited Duration: Long-term Frequency: Once and Continuous Reversibility: Irreversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant Blue-listed ecological communities are considered to be of Special Concern (formerly Vulnerable) in B.C. Species or ecological communities of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed species or ecological communities are at risk, but are not Extirpated, Endangered or Threatened. Their context (resilience) is low, both to project related effects and exacerbating conditions such as climate change. Magnitude is medium, with a high potential for a change in function in a relatively small extent, which is contained to the HVC MLE footprint. Loss is expected to occur during Construction and extend beyond the life of the mine with restoration taking more than 100 years. Clearing would primarily occur during Construction, while edge effects and threats from invasive species would also occur continuously during operations and through reclamation. Effects to sensitive ecosystems are considered irreversible based on the time frame for reclamation. The risk of loss or alteration is considered moderate, with a high likelihood and a high consequence over a relatively small extent The uncertainty for effects of clearing to listed ecological communities is low. The importance of listed ecological communities is high based on their rarity, unique importance to wildlife and interest from First Nations and provincial and federal governments.
<i>Effects to plant species of interest</i> This effect would include the loss or alteration of sensitive ecosystem and introduction and/or spread of invasive and non-native plant species	Context (resilience): Moderate Magnitude: Low Extent: Local Duration: Long-term Frequency: Once and Continuous Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant Traditional plant species have already been affected by mining in the Highland Valley and the HVC MLE project would expand and extend these effects which include clearing, dust deposition, and hydrological changes. Context is considered moderate based on ecological resilience and already altered social and cultural use of plant species. The magnitude of the residual effect is expected to be mostly adjacent to existing disturbance and is of low magnitude. Clearing would primarily occur during Construction, while edge effects and threats from invasive species would also occur continuously during Operations and through reclamation. Dust accumulation on vegetation and edge effects would also occur continuously during Operations. Effects are considered irreversible based on the time frame for reclamation and subsequent changes to harvesting practices. Effects on traditional use plants would be disproportionately experienced by First Nation people. The loss and disturbance of vegetation was expected to occur (high likelihood), although the consequence would be minor (moderate magnitude and limited extent). This led to an overall moderate risk rating for changes to plant species of interest. There was a moderate level of uncertainty in the vegetation assessment based on the data provided and the relationship of plant species and disturbance, although edge effects, changes to hydrology, and where dust would accumulate introduces additional uncertainty. First Nations stressed the great importance of plant species of interest in their traditional land use studies as in this region.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.7.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, two existing and reasonably foreseeable projects and activities were determined to have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects assessed for HVC MLE and potential effects from these two other projects along with continued forestry activity and concluded that there would be no cumulative effects of HVC MLE on vegetation and

ecosystems. LNIB did not agree with HVC's assessment that HVC MLE would not cause cumulative effects to vegetation and ecosystem health, in particular due to continued dust deposition.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. Due to potential tree and vegetation clearing, these projects are expected to have effects to vegetation and ecosystems, though any effects are expected to be managed in a similar manner to how HVC is required to manage vegetation effects for HVC MLE (e.g., data collection on existing conditions, assessment of effects and development of appropriate mitigation measures, and regulatory tools to minimize effects to vegetation and ecosystem health as needed).

The EAO considered the existing conditions at the mine site, with current effects to vegetation and ecosystems from mine operations, the anticipated mitigation measures proposed by HVC and regulatory tools to implement those mitigation measures, and the EAO's assessed residual effect to vegetation and ecosystems. Given these considerations, the EAO concludes that HVC MLE would contribute to existing cumulative effects to terrestrial vegetation and ecosystems. For riparian or wetland ecosystems, considering the uncertainty of mitigation strategies and the future of water availability in the region, the EAO determined there is likely to be a greater cumulative effect than to the other ecosystems assessed as part of the vegetation and ecosystems valued component.

13.7.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the vegetation and ecosystems valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new mitigation measures in the M-11 permit.

13.8. Human Health

13.8.1. Summary

Human health was raised early in the HVC MLE environmental assessment as a key concern for First Nations, particularly related to the effects of dust, criteria air contaminants, changes in water quality, and loss of habitat on harvested vegetation and wildlife. HVC's assessment of effects to the Human Health Valued component is in [section 7.08 of the Application](#).

The Human Health assessment considered changes to social and environmental factors as a result of HVC MLE. Environmental determinants of health are the presence of contaminants in air and dust, water, soil, plants, fish, and game animals (traditional foods, also described as country foods in the Application). HVC used a human health risk assessment to understand the connections between existing and predicted levels of contaminants and possible human health outcomes. Social determinants of health were also considered, which combine an individual person's characteristics, such as health habits, and population level effects, such as availability of local health services, to see how HVC MLE might influence health outcomes.

Current pressures on local communities include accessing medical services and reasonably priced housing, achieving food security, and additionally for First Nations communities, accessing good quality housing, culturally appropriate health care, and ensuring cultural continuity. Air quality and mine dust levels are long-term concerns for First Nations communities who are not sure if traditional foods are safe to eat. The area

What are traditional foods?

Traditional foods are harvested by First Nations people to sustain communities and individuals. Traditional foods can be wildlife, plants, roots, or berries, and are a key connection between First Nations people and their culture. Colonialism disrupted the harvest of these foods by excluding First Nations people from preferred harvesting areas and allowing land uses such as agriculture, ranching, mining and forestry.

around the mine is expected to have higher levels of contaminants due to naturally occurring contaminants from mineral deposits. Additionally, mining has also changed water quality, with contaminants often or sometimes above guideline thresholds at the mine site. With water playing an important cultural role, changes to water at and around the mine site are a key concern for First Nations.

HVC concluded that HVC MLE could increase pressure on healthcare services, particularly in Merritt, could increase instances of negative behaviours and traffic accidents, could increase demand for regional housing and prices of this housing, and could increase demand for foodbanks due to population increases, and possibly decrease safety for First Nations women and girls. HVC also noted that members of Indigenous communities have reported experiencing racism at the HVC mine. In addition to its current/in development mitigation measures, HVC committed to developing a Construction Workforce Accommodation Strategy and conducting a Traditional Food Quality Study to follow-up its 2015/16 Dust Mapping and Traditional Plant Study.

The EAO determined that residual effects to human health may occur, and that there may be a cumulative effect from environmental determinants of health. The EAO proposed Condition 12 Nlaka'pamux Foods Monitoring Plan to verify the results of HVC's human health risk assessment. The EAO concluded that HVC MLE would not have a significant adverse residual or cumulative effect on human health.

13.8.2. Assessment Boundaries

13.8.2.1. Spatial Boundaries

The four spatial boundaries set out for the human health assessment included the Base Case footprint (the current extent of the disturbed area of the mine and permitted disturbance areas), the HVC MLE Assessment Case footprint (the proposed expanded area disturbed by HVC MLE), a local study area and a regional study area.

The social determinants of health local study area is bounded by Highways 1 and 5 that run between Kamloops, Cache Creek, Spuzzum, Merritt and back to Kamloops. The environmental determinants of health local study area for the human health risk assessment is based on the local study areas for the input valued components such as air quality. The regional study area for social determinants of health is the Thompson Nicola Regional District and considers the regional study areas for the infrastructure and services, economic, land and resource use and air quality valued components since the assessment of potential effects to human health uses the results from these assessments.

To assess effects to human health for the BASA Amendment, HVC selected a study area that includes the length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.8.2.2. Temporal Boundaries

The four temporal boundaries used for the HVC MLE human health valued component assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.8.3. Existing Conditions by HVC

The existing conditions in the local and regional study areas were assessed in section 7.8.4 of the Revised Application produced by HVC and are summarized here.

For its Western science assessment, HVC considered the following social and environmental determinants of health:

- **Social determinants of health:** Population demographics, education, employment, and income, housing and cost of living, community infrastructure, access to health services and culturally appropriate health care; health behaviours and health awareness; behaviours and activities, including recreational and traditional activities and other land uses, food security, and health status, including mental health and chronic illnesses; effects to traditional food, racism/trauma, public safety and emergency response services.
- **Environmental determinants of health:** air, water (surface and groundwater) and food quality, and noise.

13.8.3.1. Social Determinants of Health

HVC completed a detailed assessment of the existing conditions for social determinants of health. The CNA applied their Community Based Indicators that showed that generally, local First Nations communities had variable population growth, educational attainment, and incomes, higher unemployment, less access to housing overall and to good quality housing particularly, and less access to services such as childcare. First Nations communities tend to experience greater rates of chronic disease due to higher levels of poverty and unequal access to healthcare, and Indigenous People have an increased risk of premature death compared to the B.C. average and equal rate of infant mortality. Food insecurity in First Nations communities across the regional study area was high, with 57 percent of adults reporting moderate or severe food insecurity. Some communities, such as Kanaka Bar Indian Band, have designed a community resilience plan with food security as a core component. Protective traditional practices such as sharing harvested traditional foods with elders continue in First Nation communities, but do not fully protect against food insecurity. The reluctance to harvest traditional foods in the Highland Valley and across the territory for fear of contamination from industry and farming has decreased consumption of traditional foods.

Local non-First Nation communities generally have an expanding population due to increasing in-migration from other areas of B.C. (particularly in the over-65 age bracket), education attainment about the same as the B.C. average, and a somewhat constrained access to housing, again due to in-migration pressures and lack of local housing stock. Residents have a slightly lower life expectancy than the B.C. average and lower chronic disease levels, except in Merritt. Food insecurity and need for foodbank support was a particular concern in Merritt where average income is lower and unemployment is higher. Overall, regional crime rates increased between 2012 and 2020. HVC reported good communication and working relationships with the local Royal Canadian Mounted Police resulting in low demand for police services at the mine site.

Smoking is slightly higher in the region at grade 12 than the B.C. average and excessive alcohol use is about the same as the B.C. average, while regional deaths due to illicit drug toxicity are the highest in B.C. First Nations community members raised the need for more support to help youth steer clear of drugs and alcohol. Mental health in the region remains a concern with about 30 percent of the population affected by mood and anxiety disorders

Indigenous human health conditions

Socio-economic inequalities and legacies of colonialism have negatively affected Indigenous Peoples' health outcomes. Indigenous Peoples are consistently ranked lower in almost every determinant of health in Canada, resulting in significantly poorer health outcomes compared to the rest of Canadians.

The legacy of residential schools in B.C. and the abuse experienced by Indigenous children attending these schools created intergenerational trauma which has disrupted First Nations communities' abilities to thrive. This means that for the HVC MLE environmental assessment, Indigenous Peoples' human health baseline is lower than non-First Nations people.

and/or depression. Members of the CNA Participating Bands felt that more supports were needed for mental health in their communities.

As with any other industrial activity, mining projects can lead to increased population and demand for these services, which in turn can decrease access for current residents. Social services are currently available to support youth, families, and the unhoused population, with specific supports for Indigenous Peoples. While residents can access indoor and outdoor community recreation infrastructure and services, infrastructure in First Nations communities can need repair or replacement.

Regional medical services, including local emergency care, ambulance and fire services, are strained due to challenges in retaining staff (particularly after the COVID-19 pandemic), the aging population's increased healthcare use, and increased need for mental health services. The CNA noted a lack of access to in-community culturally appropriate health care for CNA Participating Band members, and that First Nations peoples' health outcomes can be affected by systemic racism in the B.C. healthcare system.

More broadly, incidents of reported racism have increased for most racialized groups since the COVID-19 pandemic. Racism has also been reported at the mine site as experienced by Nlaka'pamux employees and local residents. Industrial projects have also been linked with negative public safety outcomes for local communities related to increases in crime and public disorder and have been established to be of particular concern for the personal safety of Indigenous women and girls.

The CNA shared information on the losses to Nlaka'pamux cultural continuity over the operation of the mine through loss of peaceful enjoyment of the land, loss of the ability to harvest food and to hold cultural and spiritual ceremonies, and reduced ability to remain connected to Tmic^w, Ƴwǵáp (fire), q^wú? (water), and snéw t (wind). Participating Band members value intergenerational knowledge transfer, knowledge of living on the land, language revitalization, reintegration of cultural practices into daily life, and cultural pride, and need additional supports to fully exercise their desired cultural self-determination.

13.8.3.2. Environmental Determinants of Health

In addition to the assessment of existing social determinants of health conditions, HVC added information about existing environmental determinants of health conditions, including information related to air quality, surface and groundwater quality, and the quality of traditional foods. HVC also considered existing noise conditions, noting that the only current noise exceedances are for nighttime sound level for the houses closest to the site, which are also close to the highway and experience higher highway noise.

The results of HVC's monthly air quality monitoring at the mine site between 2015 and 2018 indicated that the air quality around the mine is heavily influenced by the current mining operations and other industrial and agricultural activities. HVC noted high current levels of inhalable particulate matter (PM_{2.5} and PM₁₀) which can exceed ambient air quality objectives. Exceedances occur along Highway 97C, which runs between two active mining areas. The inclusion of a public highway through an active mine is very unusual in B.C. and results in elevated concentrations in an area that is accessible to the public. However, the area along Highway 97C where the maximum magnitudes exist has no sensitive receptor sites and only has a human presence during times when vehicles are transiting that portion of the highway.

In 2016, HVC and Nlaka'pamux organizations researched the effects of dust from the mine on key Nlaka'pamux traditional use plants. The study showed that dust produced from the mine contains metals and other elements (most strongly copper and molybdenum), which decreased in concentration the further the distance from the mine site. HVC reviewed scientific literature and concluded that the levels of these metals and other elements were within safe levels for animal consumption, based on the thresholds set out in the literature. The companion traditional plants study found that increased levels of copper in soapberries, a key Nlaka'pamux traditional use plant, were found within several km of the mine site. The study concluded that although mine dust has affected soapberry plants and the traditional products made

from them, such as tea and juice, the levels of metals and other elements in soapberry remain safe for human consumption. It is important to note that even with these conclusions, Nlaka'pamux community members still do not harvest in areas where they believe mine dust has contaminated soapberry plants.

In 2015, in response to Nlaka'pamux community member concerns about the safety of locally harvested game meat due to dust from the mine, HVC investigated the effects of the mine on moose and mule deer. Average molybdenum concentrations in vegetation on the HVC mine site were above the recommended level for cattle forage. HVC also examined tissues samples from animals harvested in 2013 in wildlife management units close to HVC mine site. For the most part, concentrations of molybdenum in moose and mule deer meat were below relevant toxicity thresholds for cattle and were deemed safe to eat. Similarly to the traditional plants study, Nlaka'pamux community members remain concerned about the effects of the mine on game animals.

Another key information input to the human health analyses is water, which is a potential pathway for contaminants to reach humans and influence human health. For groundwater used as drinking water, HVC sourced information from the District of Logan Lake, which uses an untreated groundwater supply for its water source (no treatment is needed since the water meets drinking water guidelines). Mining at the site has changed the characteristics of surface water on and around the mine site. HVC considered surface water and sediment quality information that it collected from its assessment of the surface water valued component, which indicated that some contaminants are often or sometimes above aquatic life, drinking water, or sediment guidelines. Changes to water at and around the mine site are a key concern of First Nations, as water is a central part of regional First Nations' culture.

13.8.4. Potential Project Effects by HVC

HVC assessed effects to human health from a western science perspective, informed by Indigenous knowledge shared by First Nations. The CNA's information provided included considerations of western science and Indigenous knowledge, from a Nlaka'pamux point of view. Significant socio-economic disparities, paired with the lasting effects of colonialism and environmental degradation due to resources extraction and industrial activity have significantly altered CNA Participating Band members' health baseline. Within the Participating Bands, some population groups (elders, caregivers of children, children living in lower socio-economic conditions) have additional barriers to achieving Balance, one of the four CNA Core Values. The CNA's [Nlaka'pamux Impact Assessment](#) provides more details about the specific and cumulative effects of HVC MLE on Participating Band members' interests.

HVC's assessment of how HVC MLE would change human health existing conditions included results for social and environmental determinants of health, which combine to influence overall human health.

13.8.4.1. Social Determinants of Health

Most effects were expected to occur in the local study area and generally these effects could be reversed when the mine closes in the future, if people move away from the area looking for work elsewhere, which would decrease population and in turn relieve pressure on social services and infrastructure. The additional jobs provided by HVC MLE would mean that more local people could access jobs at the mine site, but these jobs would be lost when the mine closes. The increase in jobs during Construction could lead to a temporary increase in population, which in turn could add pressure to the currently stressed healthcare system, to emergency services or to other infrastructure and services, and could make housing more inaccessible and/or more expensive, particularly during Construction. Increased traffic associated with HVC MLE could also decrease public safety through increasing risk of public disorder or traffic accidents.

Food security would increase for the additional staff working at the mine who would have more income to spend on food, but food security could decrease when the mine closes and jobs are lost. The increased population associated with HVC MLE could also put more pressure on food banks. The continuation of mining at the site would also continue the deterrence of First Nations people from being willing to harvest traditional foods nearby, which could decrease their food security. At mine Closure, pressures on housing, infrastructure and services would be reduced, but the municipal tax base

would also be reduced when tax payments by HVC end, which would reduce the amount of money that municipal governments have to spend on services and infrastructure.

Each of the effects above is generally expected to have increased effects on First Nations people, who experience additional barriers to good health, including access to good quality housing and access to good quality employment free of racism and discrimination.

13.8.4.2. Environmental Determinants of Health

HVC's human health risk assessment (see [Application Appendix 7.8-1](#)) was based on inputs of information related to air quality, water quality and noise through both the primary pathway (by inhaling air) and secondary pathways (by inhaling dust, eating food and drinking water, and through the skin) for the Construction, Operations, Closure, and Post-Closure project phases. The assessment considered three receptor groups: First Nations peoples, community residents, and agricultural residents.

The results of HVC's human health risk assessment for HVC MLE indicate that:

- Most short term inhalation risks (24-hours or less) were expected to be below health exposure thresholds outside the permitted mine area, and most modelled criteria air contaminant maximums were predicted in the permitted mine area along Highway 97 between the Valley Pit and Bethlehem;
- Short-term and long-term exposures to particulate matter and nitrogen dioxide have the potential to cause health risks for recreational users very close to the mine site but these were not expected to affect human health as recreational users generally spend time near the mine site occasionally and have shorter stays than permanent residents;
- Continuous exposures (also known as long term or chronic exposures) to most non-cancer-causing criteria air contaminants were less than health-based exposure limits;
- One community resident receptor had a slightly increased health risk due to higher predicted levels of fine inhalable particulate matter (PM_{2.5});
- Overall, although particulate matter and nitrogen dioxide are non-threshold contaminants (meaning that any exposure can be harmful), HVC expected the health risks of particulate matter and nitrogen dioxide from HVC MLE would not cause significant health risks;
- HVC's assessment of cancer risks which considered multiple pathways of exposure to contaminants concluded that incremental cancer risks for all receptor profiles were negligible or within the typical range for the Canadian population, other than for Indigenous People who consume wild game organ meats (e.g., moose kidney and liver – this effect was not unique to HVC MLE and is observed wherever organ meats are consumed regularly);
- HVC's assessment concluded that HVC MLE would not change human health outcomes for the CNA's community-based indicators which were considered as part of the human health risk assessment (changes in dust in air, on berries and all vegetation, changes in air quality, and changes to land and water); and
- Noise associated with HVC MLE would not negatively affect human health.

13.8.5. Proposed Mitigation Measures by HVC

HVC committed to implementing or continuing the following key measures for social and environmental determinants of health to reduce the effects from HVC MLE on human health.

- Continue to train staff and plan for emergency situations and risk prevention, including through internal planning and use of HVC's Emergency Preparedness and Response Plan, to coordinate with governments and agencies, and to maintain on-site emergency services;

- To continue to support community initiatives and food banks related to food security;
- Work with local governments regarding planning for infrastructure, services and housing;
- Continue to prioritize hiring local people, including First Nations members to increase local employment and reduce housing pressures from in-migration, provide career planning events, communicate with local governments and communities about training, jobs, and how to find work at the mine, and to continue to work towards greater diversity in HVC's workforce, including more women, Indigenous People, people of colour, persons with disabilities and LGBTQ2S+ community members;
- Develop and administer mandatory cultural awareness training for employees, establish a work culture where discrimination, violence or harassment are not tolerated, and use a process for employees to report such incidents, and implement a Social Management System to address feedback and complaints from local communities;
- Implement mitigation measures identified in the air quality and surface water quality valued component sections of the Application; and
- Continue current protocols for dealing with noise complaints.

13.8.6. Key Issues Raised

The following key concerns and issues were raised during the review of HVC's Application by the Technical Advisory Committee, including First Nations. All comments raised related to human health are available in the [HVC MLE Issues Tracking Table](#).

13.8.6.1. Effects of dust on foods

LNIB raised concerns about avoidance of traditional foods due to dust perceptions and pollution and noted community concerns about potential contamination of locally farmed food. LNIB noted that community members avoid harvesting from areas they perceive to be contaminated by mine dust, including in the Highland Valley. The CNA's view was that confirmation of HVC's conclusions in the human health assessment would need to be made via a monitoring plan.

HVC acknowledged that First Nations people may avoid harvesting in areas that they view to be contaminated and noted that this was acknowledged in the human health section of the Application. HVC agreed that more monitoring information is needed and is proposing a community-led assessment of the quality and safety of traditional foods harvested in the region to address concerns related to the perceived contamination of locally harvested foods (a Traditional Food Study) as a follow-up study to the 2016 Dust Mapping and Traditional Plant Study. Having the study led by the community would allow for better incorporation of Indigenous knowledge.

The EAO considered the concerns raised, HVC's response, HVC's commitment to a Traditional Food Study, and proposes Condition 12 Nlaka'pamux Foods Monitoring Plan.

13.8.6.2. Effects of inhaled particulate matter on human health

LNIB raised concerns about HVC's air quality modelling methods and the predicted incremental increase in PM_{2.5} and nitrogen dioxide, noting that these are not threshold contaminants, meaning that they can cause health effects at any level, and disagreed with HVC's conclusion that a small increase in criteria air contaminants would not cause a significant health effect.

HVC agreed that PM_{2.5} and nitrogen dioxide are non-threshold contaminants. HVC provided additional information to support its view that while HVC MLE would slightly increase criteria air contaminant levels, human health would not be altered. HVC explained that the studies it considered showed that negative health outcomes tend to be associated with larger increases in ambient levels of criteria air contaminants, and for this reason, the small increase associated with HVC MLE would not cause health effects.

The EAO has considered LNIB's concerns and HVC's response and notes the current air quality monitoring and adaptive management requirements under ENV permit PA-1557, which manage the effects to air quality at the mine site. The EAO's view is that a Certificate Condition is not necessary to manage the effects of air quality to human health, which are currently regulated under permit PA-1557.

13.8.6.3. Concerns regarding the assessment of social determinants of health and intersectionality

The CNA and LNIB raised various concerns about the assessment of social determinants of health, noting omissions in the Application and differences in opinion with respect to the social determinants of health and effects of HVC MLE on First Nations', including barriers to First Nations' employment at the mine. The EAO was concerned about intersectionality and how effects might be magnified for people belonging to more than one population subgroup.

HVC made substantial changes to the human health section of the Application in response to comments, changing the location of information and adding more information as necessary. HVC also provided a memo to explain how it considered intersectionality and distinct population groups, and how its Equity, Diversity and Inclusion Strategy is implemented to work to reduce barriers to economic participation and to create a safe workplace, and how it listens to its Indigenous employees' concerns via its Indigenous Council. HVC is also developing an Indigenous Employment Strategy to attempt to address barriers to Indigenous employment at HVC.

The EAO has reviewed the concerns raised by the EAO, LNIB and the CNA and is satisfied with HVC's responses and revisions to the Application.

13.8.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the human health valued component:

- Change to health and emergency response services and infrastructure;
- Change in food security, including to traditional foods;
- Change in employment;
- Change in access to affordable housing;
- Change to public safety; and
- Changes in environmental determinants of health and noise.

The EAO's characterization of the expected residual effects of HVC MLE on human health are summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 24: Summary of Residual Effects for Human Health

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Change to health and emergency response services and infrastructure</i> Additional staff hired for HVC MLE could put additional stress on health and emergency response services and infrastructure	Context (resilience): Low to Moderate Magnitude: Low to Medium Extent: Regional Duration: Medium-term Frequency: Continuous Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: Moderate	Not significant Health and emergency services such as hospital and ambulance services in some smaller communities in the region are currently under pressure and do not have high resilience to the added population associated with HVC MLE. The current availability of most social infrastructure is expected to adequately address the increase in population associated with HVC MLE, other than for health infrastructure in smaller regional communities such as Merritt, where health infrastructure is currently under stress due to inability to adequately staff facilities and higher than average hospital visits. This effect is expected to last as long as the increase in population associated with HVC MLE. First Nations peoples would be disproportionately affected by any effect to health infrastructure as they already are less able to access health infrastructure than the general population. There is a moderate level of uncertainty regarding this effect as it depends where new employees decide to live – should they mainly live in a larger centre such as Kamloops, where access to health infrastructure is improved, the effect would be lessened. Access to health and emergency services has been identified as an interest by First Nations.
<i>Change in food security, including to traditional foods</i> HVC MLE could affect access to food, including to traditional foods	Context (resilience): Moderate Magnitude: Low Extent: Regional Duration: Medium-term Frequency: Continuous Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant While those who gain employment at the mine would experience greater food security, increases in costs through the population added to the region by HVC MLE (particularly through increasing the cost of housing) could decrease the amount of money people have for food, increasing food insecurity and reliance on foodbanks. At mine closure, employees who are not able to find replacement employment may experience lower food security. Continued lack of access to traditional foods would continue under HVC MLE, where local community members are unable to harvest traditional foods in the mine footprint and choose to not harvest traditional foods near the mine site for fear of contamination. It is possible that the area will never be used again for traditional food harvesting. First Nations people would be disproportionately affected by the reductions in food security, as they are generally more food insecure than the general population and rely more heavily on traditional foods. Food security has been identified as an interest by First Nations.
<i>Change in employment</i> Additional staff and contractors would be hired for HVC MLE construction and operations	Context (resilience): Moderate Magnitude: Medium Extent: Beyond regional Duration: Medium-term Frequency: Irregular Reversibility: Partially reversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant HVC MLE would have a positive residual effect on employment in the region which would vary over time; the expected average of 500 temporary construction jobs and additional 350 permanent operations jobs would provide employment opportunities to people in the region and also people may choose to move to the region to work at these jobs. At first, effects would be positive (through the added jobs) then at mine closure, effects would be negative (as jobs are lost at mine closure). It is expected that most staff would find work at other regional workplaces after mine closure, so the effect is partially reversible. Risk is moderate and uncertainty is low related to HVC's employment predictions. Employment has been identified as an important interest by First Nations and the public.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Change in access to affordable housing</i> Additional staff hired for HVC MLE could affect access to affordable housing	Context (resilience): Low to moderate Magnitude: Low to medium Extent: Regional Duration: Long-term Frequency: Continuous Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: Moderate	Not significant Affordable housing in the region is limited, particularly for First Nations people. The increased numbers of workers associated with HVC MLE, particularly during Construction, would further reduce access to affordable housing across the region. The continuous effect would be most pronounced during Construction when the workforce would be largest but would last through the life of HVC MLE. First Nations people and people with lower-income or who rent their homes would be disproportionately affected by additional pressure on affordable homes. Increased demand for housing is expected to occur (high likelihood) and the consequence would be low to moderate, resulting in a moderate risk rating. There is a low level of uncertainty in the demand for housing, as workers are certain to need housing and it is clear that there is currently not enough housing stock in the region to ensure access to affordable housing. Housing demand and affordability has been identified as an interest by First Nations.
<i>Change to public safety</i> The expanded HVC MLE workforce could result in a decrease in public safety	Context (resilience): Low Magnitude: Low Extent: Regional Duration: Short-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Low Uncertainty: Moderate Importance: Moderate	Not significant While decreases in public safety may result from HVC MLE due to potential for increased traffic accidents and public disorder from non-residents working during the Construction phase, existing policing levels and public safety mechanisms are expected to be sufficient to address this effect which could be felt in communities across the region. First Nations people would be more affected by changes to public safety, particularly risks from public disorder related to non-resident construction workers, as Indigenous women and girls are at higher risk of gender-based violence from transient workforces. The likelihood of changes in public safety is low and consequences are moderate, so the risk is considered low. Uncertainty is moderate as it is not uncertain what level of public disorder might result from HVC MLE. HVC also has policies in place to help reduce the likelihood of traffic accidents. First Nations have identified public safety as a concern.
<i>Changes in environmental determinants of health and noise</i> Changes to the environment and to noise levels could affect human health	Context (resilience): Moderate Magnitude: Medium Extent: Local Duration: Long-term Frequency: Continuous Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant HVC MLE would continue or expand current effects to air quality, water quality and other environmental determinants of health which are already affected by mining operations. Noise is not expected to cause effects to human health but may disturb the peaceful enjoyment of the land and cultural activities around the mine by First Nations people. Changes to environmental determinants of health may be partially reversed once the mine closes, but some changes may be irreversible. First Nations people would be more affected by changes to environmental determinants of health as they are on the land more often and consume more traditional foods than the general population. Risk from changes to environmental determinants of health is moderate. As HVC's analysis of environmental determinants of health relied on air and water quality modelling, there is some uncertainty about the nature of residual effects to the human health valued component. Changes in environmental determinants of health was identified as a key area of interest for First Nations.

Residual Effect	Assessment Rating*	Significance and Rationale
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.8.8. Cumulative Effects Assessment

HVC identified two reasonably foreseeable projects that have the potential to act cumulatively with HVC MLE – the Mount Mabel Wind Projects and quA-ymn Solar Project. HVC determined that construction for both projects is expected to last less than a year and is not anticipated to overlap with HVC MLE construction. HVC did not expect each of these projects to significantly add to local risks to environmental or social determinants of health and HVC concluded that there are no predicted cumulative effects to the human health valued component. For a variety of reasons, including that the CNA's assessment was based on broader criteria than the Application Information Requirements, the CNA did not agree with HVC that it can be said conclusively that there would be no cumulative effects from HVC MLE on human health.

The EAO considered HVC's assessment of cumulative effects, the EAO's assessment of residual effects, the newly proposed projects that recently entered the B.C. environmental assessment process, such as the Highland Solar project which would be located directly to the north of the Highland Tailings Storage Facility, and the EAO's proposed Conditions, and agreed with HVC's assessment that there are no cumulative effects of HVC MLE interacting with the effects of other past, present and reasonably foreseeable future projects and activities for social determinants of health.

The likelihood of cumulative effects from HVC MLE related to environmental determinants of health is less certain, because of existing conditions and the reliance on modelling predictions to determine future states of air and water quality. As a result, the EAO is uncertain about whether HVC MLE would contribute to cumulative effects to human health but concludes that a minor cumulative effect to human health is possible, particularly in relation to the consumption of traditional foods by Nlaka'pamux Nation members. The EAO has proposed Condition 12 Nlaka'pamux Foods Monitoring Plan to verify the results of the human health risk assessment and the wider human health effects assessment.

13.8.9. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the human health valued component. This conclusion considers the information in HVC's Application, the information and analysis presented in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions, particularly Condition 12 Nlaka'pamux Foods Monitoring Plan.

13.9. Economic, Infrastructure and Services

13.9.1. Summary

A major project like HVC MLE can affect how local populations access services like healthcare and childcare, find jobs, and access housing, while bringing increased prosperity to local businesses and to municipal and provincial government revenues, and providing additional jobs and access to training opportunities. The assessments of effects of HVC MLE on the economic and infrastructure and services valued components are presented together in this Report because they are closely related and share mitigation measures. HVC's assessment for the economic and infrastructure and services components is in [sections 7.09](#) and [7.10 of the Application](#).

HVC's assessment for the economic and infrastructure and services valued components indicated that HVC MLE would have positive effects on the local population through increased jobs and opportunities to work at the mine site, with a longer operation of the mine leading to longer-term employment opportunities, as well as through increases in project spending, increased government tax income, and increased demand for education and training due to the need for additional employees.

HVC's assessment for the valued components showed that HVC MLE could influence changes to local population dynamics due to increased staffing needs during construction and operations, increased demand for housing and potential for reduced housing affordability for some communities in the local study area, increases in demand for health and emergency services, as well as other social services, increased demand on utilities, and increased traffic around the mine site, especially in construction.

Reviewers identified concerns about the following key issues: changes to employment and economic opportunities, and increased demands on housing and services, and effects to transportation infrastructure. To address these key issues, HVC proposed a Construction Workforce Accommodation Strategy for the short-term peak in construction workforce if it is determined that there is a temporary accommodation shortage during the period when peak construction would occur, and a Social Closure Plan in addition to existing mitigation measures and best management practices that HVC already implements at the mine site.

The EAO assessed the potential effects to the economic and infrastructure and services valued components and concluded that there would be a positive economic effect from extending the life of the mine and potential residual adverse effects due changes in demand for housing and housing affordability, capacity and availability of social infrastructure, and changes in traffic volume and patterns. The EAO proposed Condition 10 Construction Workforce Accommodation Plan to mitigate effects to the demand for housing associated with HVC MLE, and Condition 16 Social Closure Plan to address negative effects associated with the future closure of the mine. The EAO concluded that HVC MLE would not result in any significant adverse residual or cumulative effects to the economy and infrastructure and services valued components.

13.9.2. Assessment Boundaries

13.9.2.1. Spatial boundaries

The spatial boundaries include the Base Case footprint (the current extent of the disturbed area of the mine plus permitted disturbance), the Assessment Case footprint (the proposed expanded area of the mine due to HVC MLE), a local study area, and a regional study area.

The local study area includes the regional service centre of Kamloops as well as the District Municipality of Logan Lake, the City of Merritt, the villages of Ashcroft, Cache Creek, Lytton, and the unincorporated communities of Spences Bridge, Spuzzum, and Boston Bar. The local study area also includes all 15 member communities of the Nlaka'pamux Nation

The regional study area aligns closely to the Thompson-Nicola Regional District as HVC MLE lies within its political, financial, and administrative jurisdiction. The southern boundary of the regional study area was extended beyond the Thompson-Nicola Regional District to include three member communities of the Nlaka'pamux Nation—Boothroyd Indian Band, Boston Bar First Nation, and Spuzzum First Nation.

For the potential effects to the economic and infrastructure and services valued component for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.9.2.2. Temporal boundaries

The temporal boundaries used for both the HVC MLE economic and infrastructure and services assessments are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-closure phase: steady state 100+ years.

The temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.9.3. Baseline Conditions by HVC

13.9.3.1. Economic Existing Conditions by HVC

The existing HVC mine has been a significant contributor to the regional economy over its decades of operation through creating jobs, spending money on goods and services at local businesses, tax contributions, and creating training and support programs. HVC employs 1,320 staff and contractors who live mostly in the region, making it one of the largest regional employers over many years of operation. HVC operations support smaller businesses in the region, including those owned by First Nations, by spending hundreds of millions of dollars locally. HVC's economic output affects B.C.'s gross domestic product and taxes; in 2021, the total direct, indirect, and induced gross domestic product from HVC's operations was about \$425 million, and HVC directly contributed nearly \$200 million in taxes each year to municipal, provincial, and federal governments.

HVC has five long-term agreements with First Nations, which include terms of revenue sharing or other financial funding, along with its commitment to support First Nations employment, training and cultural support. For example, in 2021, HVC's payments under these agreements was \$10.4 million. Since 2013, B.C. has also shared millions of dollars of mineral tax revenue from the mine with the Nlaka'pamux Nation through Economic and Community Development Agreements.

In the Application, the CNA highlighted that, while direct and indirect employment opportunities associated with HVC MLE have the potential to enhance the socio-economic status, health, and overall well-being for current and future generations of members of the CNA Participating Bands, Participating Band members also face barriers to fully experiencing economic opportunities in their territory, including lack of social cohesion, ongoing effects from colonization and loss of culture such as exclusion from lands and lack of access to water, lack of access to cultural foods, and barriers to engaging in the traditional indigenous economy. For much of its operation, Participating Band members did not benefit economically from the operation of the HVC mine.

13.9.3.2. Infrastructure and Services Existing Conditions by HVC

As a major employer in the region, HVC influences population and demand for housing, social infrastructure, utilities, and traffic. Social infrastructure includes the infrastructure required to provide health services, education, childcare, social supports, emergency services, and recreational amenities. Infrastructure and services are used primarily by the local population.

Overall, the population of the regional study area, including First Nations, has been growing steadily, particularly since 2016. House values in the regional study area are lower than the rest of B.C., though these have increased by nearly 50 percent since 2016. First Nations are very concerned about the lack of housing availability both on-reserve and generally in the region. Temporary accommodation available in the region includes roughly 75 hotels, motels, inns, as well as bed and breakfasts, private residence rentals (Airbnb, VRBO, etc.), and campgrounds which are usually busiest over the summer when more tourists are in the region. Demand for housing is expected to continue to increase in the regional study area due to:

- migration of people from the Lower Mainland seeking lower cost of living; and
- recent destruction of existing housing stock by from floods and wildfires.

Health care for the region is administered by the Interior Health Authority. The recruitment and retention of health professionals are among the largest challenges facing the health system in the region, and local emergency departments have faced overnight closures in recent years in smaller communities such as Merritt. Overall, changes in demand for school services via enrollment levels have varied across school districts in the region. There is a shortfall in licensed and registered childcare spaces in the region and low-income, First Nations, immigrant, and refugee households do not have

adequate access to childcare services. In the HVC MLE Application, HVC describes the actions being taken (mostly by public sector bodies) to address the concerns about health care and infrastructure in the region.

In terms of utility systems, lack of access to internet services and poor internet quality (particularly in smaller and First Nations communities) and aging underground water distribution and collection systems are key concerns. Access to safe drinking water remains an issue for many First Nations in the region. The demand for emergency services in the region, including police, fire, ambulance, and emergency management services, have generally been steady while staffing and recruitment have been a challenge. The recent major floods and wildfires in the region have drawn upon the emergency services in the region, showing the need to have these services in place.

HVC currently uses trucks to haul concentrate to Ashcroft via Route 97C to Ashcroft, which would continue and increase slightly under HVC MLE. Traffic is lower on this highway compared to other similar two-lane highway segments in the region, and most traffic is believed to be associated with the mine. Accidents rates are not considered high; the Royal Canadian Mounted Police reports minimal incidents requiring its response on this section of Route 97C.

13.9.4. Potential Project Effects by HVC

As an operating mine seeking to extend its operations, HVC MLE would extend the duration of and increase the positive and negative potential project effects to economic and infrastructure and services. Additionally, it would delay the potential closure effects that are associated with the existing HVC mine.

HVC identified the following potential effects to the economic valued component due to HVC MLE:

- Changes to direct, indirect, and induced employment from added jobs at the mine, as well as other indirect jobs (induced employment) related to HVC expenditures at local businesses;
- Increased labour income for those working at the mine;
- Increased project expenditures and associated job creation, which have the potential to change levels of business activity in local or regional communities;
- Increased municipal, provincial, and federal tax income;
- Potential increased demand for education and training programs/services in local communities as a result of the need for additional employees; and
- Changes to provincial gross domestic product; during Construction, HVC MLE would spend approximately \$741 million which is estimated to support a total of \$435 million in total gross domestic product in B.C.

HVC identified the following potential effects to the infrastructure and services valued component due to HVC MLE:

- Change in local population – temporary increase during construction, increase during operations, decrease during closure;
- Increased demand for housing and reduced affordability of housing resulting from changes in population;
- Increased demand on social infrastructure, including health and emergency services from changes to population;
- Increased demand on utilities from increases in population; and,
- Increased traffic volumes due to construction traffic and incremental site traffic.

Indigenous knowledge included in the Application from the CNA indicated that the effects to the economic valued component were inextricable from the assessments to other relevant valued components, such as groundwater, wildlife and habitat. The CNA takes a holistic view, connecting effects to the economic valued components to its four CNA values (Tmix^w, Balance, Governance, and Teachings) and related community-based indicators. The CNA noted conflicts between non-Nlaka'pamux and Nlaka'pamux people related to areas such as overharvesting mushrooms for profit, lack of

education of non-Nlaka'pamux staff at the mine site about Nlaka'pamux cultural protocols, and that the limited flexibility of mine site employment has also limited Nlaka'pamux employees from fully participating in cultural ceremonies and activities.

The BASA Amendment is not expected to contribute any effects to the economic or infrastructure and services valued component.

13.9.5. Proposed Mitigation Measures by HVC

In addition to existing mitigation measures and best management practices, HVC identified and proposed the following new mitigation measures for HVC MLE:

- *Construction Workforce Accommodation Strategy* – to help address the effects of the short-term increase in construction workers if there is an accommodation shortage during the peak construction period;
- *Social Management Plan* - a site-specific plan to consolidate all related plans and actions to address specific social effects generated by HVC's Mine Site operations and HVC MLE. The Social Management Plan would be reviewed annually and align with the mine's five-year and life-of-mine planning cycles; and
- *Social Closure Plan* - to mitigate the socio-economic effects of the closure process, including support for employees to transition during Closure and to mitigate the expected business downturn in Post-Closure.

13.9.6. Key Issues Raised

The following key issues related to economic and infrastructure and services valued components were raised by First Nations, Technical Advisory Committee, and the EAO.

13.9.6.1. Potential effects on employment and the economy

During review of the Application the CNA, LNIB, and SSN expressed interest in potential economic opportunities, including First Nations' employment and partnerships with First Nations businesses. Concerns were expressed about how barriers to employment, including that educational requirements could be restrictive, that transportation to the mine site is a barrier, that there are limited training opportunities, and that racism has been reported by current and past First Nations employees. Employment barriers experienced especially by First Nations youth and women are limiting their opportunities for employment at the mine.

HVC responded that it would continue to support economic development through employment of First Nations people as well as contracting and procurement from First Nations businesses. HVC supports capacity building for all First Nations businesses that produce broader community benefits. HVC committed to continue to engage with First Nations through its established employment and contracting arrangements.

HVC committed to further exploring barriers to employment with First Nations through the development of its proposed HVC Indigenous Employment Strategy. HVC would directly involve First Nations in providing input and identifying priority items, including addressing barriers to employment and support for distinct populations. HVC stated that it offers multiple ways for staff who are members of marginalized and vulnerable subgroups to provide feedback that supports HVC in attracting and retaining members of these same groups. Specifically, the Teck Inclusion and Engagement Survey, Indigenous Council, Inclusion and Diversity Committee, Indigenous Cultural Awareness Training Working Group, and Mentorship Program are used by HVC to try to find ways to increase employees from disadvantaged groups.

Considering the effects on regional employment and the economy, HVC's agreements with First Nations and commitments to continue supporting economic development, and provincial revenue sharing agreements, the EAO's view is that there are positive effects from HVC MLE.

To mitigate the socio-economic effects of mine closure, which would occur with or without HVC MLE, the EAO has proposed Condition 16 Social Closure Plan, to support community transition.

13.9.6.2. Potential increased demand for housing, accommodations, and services

The CNA, LNIB, and SSN raised concerns about increased demand for housing due to HVC MLE's potential to increase the local population and the potential resulting effects to housing availability and affordability. LNIB, SSN, and the EAO emphasized the potential issues if the accommodations required for the peak construction workforce aligned with peak summer tourism demand. Cost of living was also raised as a key concern by LNIB. The CNA, SSN, and the EAO were concerned that increases in population from HVC MLE could result in increased demand for services, particularly healthcare services, which have been under significant pressure in local communities.

HVC acknowledged that some populations (older adults, and lower socioeconomic groups) could be affected by changes to housing availability. HVC's view was that given the dynamic and complex nature of housing markets and associated price trends, as well as potential settlement patterns and new inventory development across communities in the regional study area, it is not possible for HVC to estimate precisely how housing availability and affordability might change in various communities at a future point in time. Housing needs from HVC MLE are predicted to be 0.6 percent of the existing regional housing universe, or 6 percent of the total new unit demand expected in the regional study area by 2028, with the remainder of that demand being driven by other trends. HVC's analysis indicates expected HVC MLE effects to fall within the capacities of local communities based on several factors including historical start trends, municipal development planning, community aspirations to attract more homebuyers, and the multi-year timeframe over which HVC MLE's demand for housing would occur.

HVC committed to develop a Construction Workforce Accommodation Strategy for the short-term peak in construction workforce if it is determined that there is a temporary accommodation shortage during the period when peak construction would occur. The Construction Workforce Accommodation Strategy would be informed by ongoing local engagement, including local chambers of commerce, hoteliers, RV park managers.

HVC also acknowledged that there are challenges to accessing healthcare in smaller communities, particularly Merritt, and noted that the use of emergency services in Merritt is 75 percent higher than the Interior Health average. HVC provides supports to its employees to try to reduce effects to the wider healthcare system, including by offering onsite emergency, occupational, and medical services, implementing health initiatives for staff to help support management of chronic health conditions, by offering annual flu vaccine clinics, and by offering an Employee and Family Assistance Program operated by Telus Health.

The EAO considered the information provided by HVC and was satisfied with the response. The EAO proposed Certificate Condition 10 Construction Workforce Accommodation Plan to mitigate potential negative effects on housing associated with the HVC MLE Construction workforce.

13.9.6.3. Potential effects on transportation infrastructure

The CNA, the Ministry of Transportation and Transit (TRAN), and the EAO identified concerns about HVC MLE's potential effects on transportation infrastructure. The CNA raised the inclusion of wildlife interactions and wildlife-vehicle incidents on Highway 97C in the assessment. TRAN noted that all transportation infrastructure upgrades, including any potential Crown land acquisition, highway realignment or addition of access points, would be the sole responsibility of HVC. The EAO asked about potential effects construction traffic might have on road infrastructure and consideration of potential effects.

HVC responded that its assessment regarding wildlife is based on experiences reported by Royal Canadian Mounted Police detachments responsible for responding to collisions and other incidents on regional highways including 97C in the regional study area, which include animal strikes. HVC did not have more information to report on the proportion of collisions involving animals, though animal collisions were not specifically identified by the Royal Canadian Mounted Police as problematic on these highway stretches. HVC understood that all costs associated with the design and construction of

the highway relocation would be HVC's responsibility and looked forward to working with TRAN, MCM, and WLRS on permitting next steps. HVC has determined that the change to the highway would not need to be made until 2033.

HVC also noted that during the two-month peak construction period, HVC MLE would increase traffic volumes along segments of Highway 97C and Highway 5 by between 40 and 760 vehicle movements per day. Expected traffic effects for the remainder of the construction period would be lower (less than half the peak effects). During operations, the HVC MLE related effects on traffic volumes along segments of Highway 97C and Highway 5 would vary between an additional 15 to 155 vehicle movements per day higher than current traffic levels. The regional road network is built to accommodate these volumes and has done so before in previous periods of mine construction. Additional product shipments during operations to Ashcroft would likely contribute to road wear; however, the absolute volumes on that highway segment are low and considered well within the roadway's capacity.

The EAO considered the information provided by HVC and was satisfied with the response. The EAO does not believe a Certificate Condition is required to address potential effects associated with any highway realignment, noting that if realignment of Highway 97C is required, HVC would need to work closely with TRAN and other regulatory agencies.

13.9.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the economy and infrastructure and services valued components:

- Change to employment;
- Changes to economic benefits;
- Changes in demand for housing and housing affordability;
- Changes in capacity and availability of social infrastructure; and
- Changes in traffic volume and patterns.

The EAO's characterization of the expected residual effects of HVC MLE on the economic and infrastructure and services valued components are summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 25: Summary of Residual Effects for Economic

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes to employment</i> HVC MLE would continue current jobs and add new jobs, which would end at mine closure Positive residual effect	Context (resilience): Moderate Magnitude: Medium Extent: Beyond regional Duration: Long-term Frequency: Irregular Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant HVC MLE would extend mine operation, having positive effects by extending employment for current staff, and would add an average of 500 construction jobs and about 350 additional permanent jobs available to people across B.C. These jobs would end at mine closure, and the EAO has proposed Condition 16 Social Closure Plan to support employees as they transition to other jobs. Some population groups could be better placed to take advantage of the employment opportunities; as noted by the CNA and others, First Nations people face barriers to working at the mine site, and so would be less able to take advantage of jobs associated with HVC MLE. The consequence of this effect is moderate (moderate magnitude and regional extent), and the likelihood is high, resulting in moderate risk. There is a low level of uncertainty as the mine is certain to first need more workers, should HVC MLE go ahead, and then to close in the future. Employment has been identified as a very important interest by First Nations, the public, and stakeholders.
<i>Changes to economic benefits</i> HVC MLE would generate additional economic benefits for governments and First Nations, which would end at mine closure Positive residual effect	Context (resilience): Moderate Magnitude: High Extent: Beyond regional Duration: Medium-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Even Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant HVC is a major contributor to regional economy and HVC MLE would have positive effects by generating tax revenue for all levels of government, as well as economic benefits to local businesses, First Nations people and their businesses, and First Nations governments. These economic benefits would end when the mine closes, but the regional economy is sufficiently robust that there is resilience to the mine's future closure. The consequence is moderate (moderate magnitude and beyond regional extent), and the likelihood is high, resulting in moderate risk. There is a low level of uncertainty about the economic benefits from HVC MLE. Economic benefits from the mine have been identified as a very important interest by First Nations, the public, and stakeholders.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

Table 26: Summary of Residual Effects for Infrastructure and Services

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes in demand for housing and housing affordability</i> The additional workforce required would increase the demand for housing and temporary accommodation (during Construction).	Context (resilience): Low to Moderate Magnitude: Medium Extent: Local Duration: Short-term to medium-term Frequency: Once Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: Moderate	Not significant The availability of housing and temporary accommodation in the region is limited and has recently experienced several pressures. Resilience to an increase in housing demand is low to moderate. The effect magnitude during Construction is moderate as an anticipated 1,000-person workforce (at peak times) would require temporary accommodation (short-term), resulting in on average 400 employees requiring temporary accommodation. The magnitude during Operations is low to moderate as an anticipated 395 additional housing units would be required (long-term). Changes to affordability would disproportionately affect First Nations people, who already have challenges accessing affordable housing, renters, and low-income individuals as well as the communities most likely to accommodate the additional workforce. Increased demand for housing is expected to occur (high likelihood) and the consequence would be low to moderate. This led to a moderate risk rating for effects of increased demand for housing and housing affordability. There is a low level of uncertainty in the demand for housing; however, housing markets can be unpredictable, and it is not certain in which communities people would choose to live. Housing demand and affordability has been identified as an interest by First Nations and the public.
<i>Changes in capacity and availability of social infrastructure</i> HVC MLE would result in more people moving to the area and more use of social infrastructure	Context (resilience): High to Moderate Magnitude: Low to Medium Extent: Regional Duration: Medium-term Frequency: Once Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Moderate Importance: High	Not significant The current availability of most social infrastructure is expected to adequately address the increase in population associated with HVC MLE, other than for health infrastructure in smaller regional communities such as Merritt, where health infrastructure is currently under stress due to inability to adequately staff facilities and higher than average hospital visits. This effect is expected to last as long as the increase in population associated with HVC MLE. First Nations peoples would be disproportionately affected by any effect to health infrastructure as they already are less able to access health infrastructure than the general population. Risk is moderate and there is a moderate level of uncertainty regarding this effect as it depends where new employees decide to live – should they mainly live in a larger centre such as Kamloops, where health infrastructure is more accessible, the effect would be lessened. Access to social infrastructure was identified as a very important interest by First Nations.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes in traffic volume and patterns</i> HVC MLE-associated vehicles would increase traffic volumes along segments of Highway 97C and Highway 5.	Context (resilience): High Magnitude: Low to Moderate Extent: Local Duration: Medium-term Frequency: Continuous Reversibility: Fully reversible Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Low Importance: Low	Not significant Existing traffic volumes on the relevant sections of Highway 97C and Highway 5 are within capacity and have accommodated marginal increases in traffic volume in recent years (high resilience). HVC MLE would continuously generate vehicle traffic in the local study area throughout the life of mine and depending on the phase, peak Construction traffic would increase traffic volumes by as much as 41 percent (low to moderate magnitude). Traffic generation would significantly decrease to a very low level in the Post-Closure phase. No population subgroup would be disproportionately affected by the changes to traffic volume and patterns. The likelihood is high, and consequences are low so risk is considered low. Uncertainty is low, although the anticipated volumes of traffic generated are estimates. No group identified changes in traffic patterns as a key interest.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.9.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, HVC assessed the cumulative effects from two reasonably foreseeable projects which have the potential to act cumulatively with HVC MLE – the Mount Mabel Wind Projects and quA-ymn Solar Project. HVC determined that construction for both projects is each expected to last less than a year and are not anticipated to overlap with HVC MLE Construction, and that during Operations each project is expected to require an ongoing workforce of only one to two employees. HVC concluded that there would be no cumulative effects for economic and infrastructure and services valued components.

The EAO considered HVC’s assessment of cumulative effects, the EAO’s assessment of residual effects, the newly proposed projects that recently entered the B.C. environmental assessment process since the Application Information Requirements was issued, such as the Highland Solar project which would be located directly to the north of the Highland Tailings Storage Facility, and concluded these projects would not interact cumulatively with HVC MLE for economic or infrastructure and services.

The EAO considered this analysis, HVC’s analysis, comments from the Technical Advisory Committee, and the EAO’s proposed Conditions, and concluded that the cumulative effects of HVC MLE interacting with the effects of other past, present and reasonably foreseeable future projects and activities for the economic or infrastructure and services valued components would be negligible.

13.9.9. Conclusion

The EAO concluded that HVC MLE would have positive residual effects on the economic valued component and would not have significant adverse residual or significant cumulative effects on the economy and infrastructure and services valued component. The EAO also concluded that the BASA Amendment would not affect the economy and infrastructure and services valued component. This conclusion considers the information in HVC’s Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and HVC’s proposed mitigation measures, the EAO’s proposed Condition 16 Social Closure Plan and Condition 10 Construction Workforce Accommodation Plan, and future regulatory requirements if highway infrastructure needs to be rerouted around the Highland Tailings Storage Facility.

13.10. Land and Resource Use

13.10.1. Summary

Land and resource use was selected as a valued component for the HVC MLE environmental assessment because the expansion and extension of the existing HVC mine site would continue existing effects on land and resource use activities and may contribute additional effects. The potential for changes to land and resource use activities due to HVC MLE was identified as a key concern by First Nations and subject matter experts.

HVC's assessment of the effects of HVC MLE on the land and resource use valued component is outlined in [Chapter 7.11 of the Application](#) and considered effects to the following subcomponents: private property; tenured, permitted, or licensed land uses (rangeland, timber harvesting, trapping, guiding, mining, and water use); public land uses (hunting, fishing and other outdoor recreation and tourism); parks and protected areas; land management planning; and visual resources (aesthetics and light conditions).

Indigenous knowledge included in the Application from the CNA indicated that effects to land and resource uses could further reduce the ability of Nlaka'pamux community members to connect with sacred places and stories, to conduct cultural and spiritual practices and to transmit land-based learnings, and on their perception of safety of the food, water and of being on the land.

During review of the Application, the CNA and FOR raised concerns about conclusions related to use of parks and recreation areas, and the effects of the expanding HVC mine site on old-growth forest.

HVC also proposed continue its current mitigation measures related to land and resource use, including communicating with license holders and communities, creating a plan for traffic management and continuing to monitor light scatter around the mine site.

The EAO concluded that while residual effects would occur to forest and range tenures, trapping licenses and to visual quality, and that a cumulative effect would occur to visual quality as a result of the changes in views due to HVC MLE, none of these adverse effects would be significant.

13.10.2. Assessment Boundaries

13.10.2.1. Spatial Boundaries

The four spatial boundaries assessed by HVC for the land and resource use valued component assessment included the Base Case footprint (the current extent of the disturbed and permitted area of the mine), the Assessment Case footprint (the proposed expanded area of the mine disturbed by HVC MLE), a combined study area for the private property, tenured land and resource use, public use of land and resource use and parks and protected areas subcomponents, and a separate study area for the visual resources subcomponent.

The combined study area is based on the boundaries of the following B.C. Landscape Units: Ashcroft, South Kamloops, Upper Guichon, Lower Nicola and Swakum. HVC considered feedback received from the CNA and LNIB when selecting the combined study area. The visual resources study area consists of a 30-km area surrounding the Assessment Case footprint, encompassing the locations around the HVC mine site from which a viewer could observe changes to the landscape.

For the potential effects to land and resource use for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.10.2.2. Temporal Boundaries

The four temporal boundaries used for the HVC MLE land and resource use assessment are:

- Construction/development phase: 3 years;

- Operations phase: 18 years;
- Closure phase: 10 years; and,
- Post-closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the construction and operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.10.3. Existing Conditions by HVC

HVC included both Indigenous knowledge and western science viewpoints in its assessment of existing conditions at the HVC mine site, and as required by the Application Information Requirements, separated First Nations land use into non-traditional, or conventional use, and traditional, or historical use.

First Nations community members and knowledge holders shared that traditional hunting, fishing, trapping, gathering, and grazing activities have been affected by access restrictions across their territory, including in the Highland Valley (i.e., due to fencing, gates), permanent alteration of the landscape, expansion of non-traditional land uses (e.g., tourism, recreation) and degradation of natural resources due to mining and other industrial activities in the region.

HVC's western science approach included consideration of Indigenous knowledge, spatial analyses, plan and policy review, key person interviews, and daytime and nighttime visibility field studies and identified the following land and resource uses in the area around the mine and in the study areas:

- Private property: About 10 percent of the combined study area is private land, with Halfway Trailer Park and dwellings along North Road being the nearest private land to the HVC mine site.
- Rangeland and timber harvesting: Cattle ranching is the dominant agricultural use, with 71 percent of the combined study area is covered by range tenures. Ranching is an important land use activity for both First Nations and non-First Nations land users in the region. The combined study area contains 27 active forestry tenures, and Old Growth Management Areas are located adjacent to the mine site.
- Hunting, fishing, trapping, and guiding: While there are no guide outfitting areas in the combined study area, recreational hunting and fishing remain popular activities, particularly for harvesting mule and whitetail deer. For safety reasons and to comply with the Health, Safety and Reclamation Code for Mines in B.C., there are shooting restrictions within the HVC mine site. Of the 45 lakes used as recreation sites in the combined study area, 36 are stocked with fish annually; some fishing restrictions exist on five of the lakes due to low fish stocks. There are 19 trapping licences in the combined study area, four of which overlap the HVC mine site.
- Mining: Mineral claims cover about 60 percent (279,000 ha) of the combined study area, of which 19 percent are owned by HVC. Mineral tenures occupy about 1 percent (5,200 ha) of the combined study area, mostly within the HVC mine site and owned by HVC. There are two additional mines, one quarry and one mill and tailings facility located in the combined study area.
- Water licences: Due to the very dry nature of the region, priority in water use rights is a recurring management challenge in the combined study area. Water licences issued allow for the diversion, storage, and use of specific quantities of water for one or more water use purpose, with preferential allowance according to the date of licence issuance. As of April 2023, HVC held 24 water licences on 22 waterbodies in the Pukaist Creek and Guichon Creek watersheds; both watersheds are considered fully allocated (no more water licenses can be approved, unless water flows are also replaced as per licence conditions, since there is no more water to allocate). Nlaka'pamux Nation groups hold seven nearby water licences.
- Recreation, tourism, and parks and protected areas: Outdoor recreation is a popular local activity, with 57 recreation sites and 22 recreational trail systems in the combined study area. The Bose Lake Recreation Site, a

popular fishing spot, is adjacent to the northern boundary of the HVC mine site. The combined study area also overlaps with 16 provincial parks, one protected area and one ecological reserve, though none are closer than 7 km from the mine site.

- Land management planning: HVC MLE falls within the bounds of the *Kamloops Land and Resource Management Plan* and zoning from the *District of Logan Lake Official Community Plan*. HVC has also established the *Highland Valley Copper End Land Use Plan* and complementary *Returning Land Use Plan* photobook. The *Returning Land Use Plan* was created collaboratively with Nlaka'pamux community members.
- Visual resources: HVC's analysis showed that the HVC mine site is generally visible from higher areas west of the Thompson River and the northeast slopes and ridgelines of Anvil Peak and Forge Mountain. In total, 11 percent (49,890 ha) of the area within the combined study area has a direct line-of-sight to some part of the current mine site. HVC used a 'landscape existing visual condition' rating for its 24 representative viewpoints, which was mostly low or moderate, with only one site rated high (Nicoelton Mountain). Light scatter surveys showed that night skies in the combined study area remain quite dark, and most locations reported the type of night sky views typical of rural areas with few human light sources.

The 2002 BASA assessment considered potential effects to private property, tenured land and resources, and public use of land and resources due to anticipated raised water levels and flow from the discharge of excess groundwater associated with BASA. The effects predicted during the BASA environmental assessment did not occur because the volume of groundwater extracted during dewatering was less than predicted. As a result, all extracted groundwater was used in mine processing since BASA dewatering began and has not been discharged to Witches Brook.

13.10.4. Potential Project Effects by HVC

HVC assessed the potential project effects of HVC MLE from both Indigenous knowledge and western science viewpoints.

The CNA's analysis of potential effects based on its Nlaka'pamux Impact Assessment Framework indicated that many community-based indicators of the four core values (Tmix^w, Balance, Governance, Teachings) could be negatively affected by HVC MLE further loss of sacred places, alterations to hydrology, change in access to the land, alteration of the landscape and increased noise, increased dust, and light pollution. These effects could reduce the ability of Nlaka'pamux community members to form connections to their traditional creation story (spték^wl) and sacred places, to conduct cultural and spiritual practices and to transmit land-based learnings, and on their perception whether food, water and of being on the land are safe, among other outcomes. Kanaka Bar Indian Band community members were concerned about traditional game species, such as goats and deer, being scared away from their natural habitats. LNIB community members shared concerns about losing access to preferred hunting and camping areas, effects to cultural teachings due to changes to the landscape, and effects of dust on wildlife, vegetation, water quality, and human health, and related consequences for land use.

For its western science analysis, HVC considered what changes to land and resource use activities would occur due to HVC MLE, as well as any changes to noise and air quality levels, to access, and to visual aesthetics due to construction and operations activities (e.g., extension of existing footprints, increased traffic, temporary road closures, changes in water flows and increased light scatter). HVC's assessment identified potential residual effects to the following land and resource use subcomponents:

- Rangeland and timber harvesting: Direct loss of about 710 ha, or 0.1 to 6.2 percent, of rangeland within six range tenures adjacent to the existing HVC mine site. Direct loss of about 1,350 ha of forested area within the Kamloops Timber Supply Area and 5.5 ha within the Merritt Timber Supply Area (less than 1 percent of the total forested area in both areas), including about 25 ha or 0.12 percent of Old Growth Management Areas in the Kamloops TSA.
- Trapping: Increase of about 1,525 ha of overlap with active traplines TR0318T003 (active since 2015) and

TR0319T003 (inactive). Both traplines already overlap the HVC mine site, and HVC MLE would represent an additional overlap of 4.07 percent and 0.11 percent for the two traplines, respectively.

- Visual resources: How noticeable HVC MLE would be relative to the rest of the landscape (i.e., the prominence of the mine site at the viewpoint) would change at seven viewpoints. Viewpoints at Highway 97C / VR-MS07, Cinder Hill and Forge Mountain West would experience a large prominence change while viewpoints at Forge Mountain OHV Trail, Laura Lake Road, Highway 97C / VR-MS21 and Glossy Mountain would experience a small prominence change. Most visual effects would be limited to locations closest to HVC MLE, particularly along Highway 97C, and to locations to the north that have elevated views of the mine.

HVC also examined the results from effects assessments of the air quality, noise, groundwater, surface water, fish and aquatic resources, vegetation and ecosystems, wildlife and wildlife habitat, human health, and culture assessment and determined that, relative to existing conditions, no adverse effects to private property owners, Crown lands, guide outfitting, commercial fishing, mineral tenures, water license holders, hunting, fishing, recreation and tourism, parks and protected areas, land management planning, or light scatter would occur during any phase of HVC MLE.

As the BASA Amendment does not propose new infrastructure to be built nor groundwater to be discharged into Witches Brook as part of ongoing BASA dewatering, the BASA Amendment is not predicted to change the previously assessed effects to the land and resource use valued component.

13.10.5. Proposed Mitigation Measures by HVC

In addition to the mitigations identified for air quality, noise, water quantity, fishing, and hunting as part of other valued component assessments, HVC committed to implementing the following existing or new mitigation measures to reduce the effects from HVC MLE on land and resource use:

- Use existing tools, policies and procedures, such as the Highland Valley Copper End Land Use Plan and Returning Land Use Plan, HVC's Cattle and Range Management Strategy and Disturbance of New Land or Water Procedure (5.05) to minimise the effects of the expansion on rangelands and animals, waterways and other habitats, and to guide mine reclamation and to restore the physical landscape and viewscape;
- Continue to implement conditions in water licence C52985 which manages the release of water in Pukaist Creek and the *Woods Creek Operation and Maintenance Plan*, including communicating with downstream communities regarding water quantity issues or shutdowns;
- Continue current ongoing communication with affected range and forest tenure holders to provide information about HVC MLE and potential changes to tenures, and would continue to provide advance notice of mine site activities and schedules prior to commencing activities that could have a potential effect on land users;
- Develop a traffic management plan to minimize the effects of HVC MLE construction traffic; and
- Continue to monitor light scatter as set out in HVC's updated *Light Scatter Mitigation Management Plan*.

13.10.6. Key Issues Raised

The following key concerns and issues were raised during the review of HVC's Application by the Technical Advisory Committee, including First Nations.

13.10.6.1. Effects on water availability from continued water use and groundwater extraction

During the review of the Application, multiple participants, including WLRS, raised concerns about the continued use of water at the HVC mine site and the proposed additional extraction of groundwater. The region surrounding the HVC mine is very dry and water scarcity is an ongoing challenge, particularly during the summer months. The EAO recognizes the importance of this issue and has considered the effects of HVC MLE on water quantity within the assessment of the

groundwater and surface water valued components. For more detail about the effects and proposed mitigations for surface and groundwater, please refer to [section 13.3](#) and [section 13.4](#) of this Report.

13.10.6.2. Effects on public land uses, parks and protected areas, and visual resources

During review of the Application, the CNA raised concerns about HVC's assessment of effects on public land uses, parks and protected areas and visual resources. Contrary to HVC's conclusions, the CNA felt that recreation sites and parks would experience residual effects from HVC MLE due to change in availability or access as more people would live and work in the area. The CNA also questioned whether residual effects from HVC MLE on visual resources would be reversible in Post-Closure considering the alterations to the landscape compared to pre-mining conditions.

HVC explained details regarding its assessment methods to respond to the CNA's disagreement about residual effects to recreation areas and parks and protected areas. HVC also clarified that the effects to visual resources were characterized as reversible in the long-term (over decades) compared to Base Case landscape conditions, not to pre-mining conditions; visual quality would not return to pre-mining conditions. HVC provided additional analysis and maps related to the replacement of affected old growth forest areas.

The EAO was satisfied with HVC's responses and determined that a Certificate Condition was not required to manage effects to Land and Resource Use.

13.10.6.3. Occupant License to Cut overlap with Deferred Old Growth Area polygons

FOR raised concerns that HVC's Application for a new Occupant License to Cut L52354 overlaps with eight old growth deferral area polygons identified through mapping-focused analyses. FOR wanted to ensure that HVC had selected ecologically reasonable replacements for the old growth management area that would be disturbed, and that First Nations had been thoroughly engaged on the selection of the replacement areas.

In response, HVC prepared a memo, spatial files, maps, and field verification survey reports to explain how it analysed the expected losses of old-growth forest areas. HVC reported that recent field assessments determined that six of the eight areas show overlap between old growth management area polygons and proposed HVC MLE cutblocks, and that 18.9 ha of the six areas met the criteria to be established as old growth forests. HVC's surveys also identified 39.1 ha of suitable old growth forest that could serve as Replacement Priority old growth deferral areas. HVC requested that FOR replace the old growth management area-HVC cutblock overlaps the areas of old growth forest identified as suitable replacements.

The EAO provided HVC's response materials to the Technical Advisory Committee for review and did not receive any additional concerns on the old growth management / deferral area issue. The EAO is satisfied that HVC has adequately responded to FOR's comments related to old growth management areas and has appropriately engaged with First Nations regarding replacement old growth deferral areas.

13.10.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the land and resource use valued component:

- Changes to range and forest tenures;
- Changes to traplines;
- Changes to public use and access; and
- Changes to visual resources.

The EAO's characterization of the expected residual effects of HVC MLE on land and resource use is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 27: Summary of Residual Effects for Land and Resource Use

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes to range and forest tenures</i> HVC MLE activities would result in direct loss of rangeland within six range tenures and direct loss of forested tenure areas within the Kamloops and Merritt timber supply areas. Old growth forest would also be lost in the Kamloops timber supply area.	Context (resilience): High Magnitude: Negligible to low for range tenures; Negligible for forest tenures Extent: Limited Duration: Medium-term Frequency: Once Reversibility: Fully reversible Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Low Importance: Low to high	Not significant Range and forest tenures overlap with the HVC mine site, and HVC has an established engagement process with nearby ranchers and forest tenure holders. No comments or concerns about HVC MLE were received by the EAO from the ranching community or forest tenure holders, and the resilience of tenures to changes is considered high. HVC MLE would result in a negligible to low magnitude effect via direct loss of 0.1 to 6.2 percent of the total area of six range tenures and a negligible effect via direct loss of less than 1 percent of the total forested area in both timber supply areas, including a loss of less than 1 percent of the Old Growth Management Areas in the Kamloops timber supply area. The potential effects would be limited to the expanded HVC MLE footprint and medium-term in duration (continuous throughout Operations and into Closure). Due to the required reclamation of the mine site, changes to tenures are expected to be fully reversible because the reclaimed areas could be used for range or forest tenures again in the future. For effects to Old Growth Management Areas, HVC would continue to work closely with First Nations to select replacement areas for affected Old Growth Management Areas. No population subgroup would be disproportionately affected by the changes to range or forest tenures. The likelihood of the predicted effects occurring is high and their consequence is minor based on the ratings of negligible/low magnitude and limited extent, resulting in a low risk. Uncertainty is low as it is clear where mine expansion and disturbance would occur. The importance of changes to tenures due to HVC MLE ranges from low to high, as changes were not identified as a key concern by local communities and residents in the combined study area, so the importance is low, but these changes are a key concern for Nlaka'pamux tenure holders around the mine.
<i>Changes to traplines</i> Activities associated with HVC MLE would result in a direct loss of area within two traplines considered active in the combined SA.	Context (resilience): Moderate Magnitude: Negligible to low Extent: Regional Duration: Medium-term Frequency: Once Reversibility: Fully reversible Affected Populations: Even Risk (likelihood and consequences): Low Uncertainty: Low Importance: Low	Not significant Two traplines overlap with the HVC mine site and additional overlap would occur with HVC MLE; other trapping areas exist outside the mine site which could still be utilized (moderate resilience). There is no established engagement process between HVC and the registered trapline owners and no comments or concerns about effects to traplines were received by the EAO. HVC MLE would result in a negligible to low magnitude effect via loss of 0.11 percent and 4.07 percent of the total area of the traplines, respectively. HVC MLE would result in negligible habitat loss for small fur-bearing animals that are trapped (for details see section 13.6 of this Report). Effects would be regional (based on the effects to populations of fur-bearing species) and continuous throughout Operations and into Closure (medium-term). Based on mine site reclamation requirements, changes to traplines are expected to be fully reversible because the reclaimed areas could be used for traplines again in the future. No population subgroup would be disproportionately affected by the changes to traplines. The likelihood of the predicted effects occurring is high and uncertainty is low. The consequences of the effects are considered minor based on the negligible/low magnitude and regional extent of the predicted effects. The risk of the effects is therefore low (high likelihood and minor consequences). The potential for changes to traplines due to HVC MLE was not identified as a concern by local communities and residents in the combined study area.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Changes to public use and access</i> Activities associated with HVC MLE would result in a change in the area available for public use and access.	Context (resilience): High Magnitude: Low Extent: Local Duration: Long-term Frequency: Once Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Low Uncertainty: Low Importance: Low to moderate	Not significant As areas under active mining are not open to public access, the expansion of the mine footprint associated with HVC MLE would also expand the area currently unavailable for public use and access, however, many other recreation areas are available, and most recreation areas in the region are not located close to the mine. Some areas disturbed by HVC MLE would potentially be available for public access and use again in the long-term, after reclamation is complete (for those areas where disturbance is reversible). First Nations people would be disproportionately affected by the reduction in public access, as it would move public use to a reduced land base overall, which could then reduce their ability to use the land themselves for cultural or other uses. The likelihood of the predicted effects occurring is high and uncertainty is low. The consequences of the effects are considered minor based on the low magnitude and regional extent of the predicted effects, resulting in low risk. The potential for changes to public access due to HVC MLE was not identified as a concern by local communities and residents in the combined study area, though changes to public land use are a concern to First Nations.
<i>Changes to visual resources</i> Activities associated with HVC MLE would result in a change in the prominence of the mine site at seven of 24 selected viewpoints.	Context (resilience): Moderate Magnitude: Medium Extent: Regional Duration: Long-term Frequency: Once Reversibility: Partially reversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: Moderate	Not significant HVC MLE would continue the current views of the landscape around the mine which are dominated by the existing HVC mine site and forestry activities. Considering the range of land uses and locations which would have a view of HVC MLE, the resilience to further changes is moderate. HVC MLE would result in a large change in the prominence of the mine for three of the analyzed viewpoints and a small change for another four viewpoints, which represents a medium magnitude effect. Changes to visual resources due to HVC MLE would be regional and continuous throughout Operations and beyond Closure, so would be long-term effects. With required site reclamation, some effects to visual resources would be reversible over the long-term, while some would be irreversible as some features would not return to their pre-mining shape or state. Members of First Nations would be disproportionately affected by further changes to visual resources as these changes can affect cultural activities undertaken on the land and members' peaceful enjoyment of the land. The likelihood of changes to the viewscape due to HVC MLE is high, and the consequences are moderate based on medium magnitude and regional extent, resulting in a moderate risk (high likelihood and moderate consequences). Based on the results of HVC's visual simulations, there is a low level of uncertainty that the effects would occur. The potential for changes to visual resources was identified as a concern by First Nations and the importance of this residual effect was considered moderate.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

13.10.8. Cumulative Effects Assessment

As set out in the Application Information Requirements, HVC determined that there are two existing and reasonably foreseeable projects and activities that have the potential to act cumulatively with HVC MLE through spatial and temporal overlap within the Land and Resource Use regional study area, including the proposed Mount Mabel Wind Projects, the proposed quA-ymn Solar Project, and forestry.

The quA-ymn Solar Project would be located within the HVC mine site and its disturbance footprint was included as part of the HVC MLE assessment. HVC did not expect the proposed Mount Mabel Wind Projects to act cumulatively with HVC

MLE as it is 23 km from the HVC mine site. HVC expected that future forestry-related activities in the area around the mine would remain either constant within the Merritt timber supply area or decrease in the Kamloops timber supply area and would be the same as the levels captured in the Assessment Case. The CNA did not agree that there were no cumulative effects from HVC MLE to the land and resource use valued component.

The EAO considered HVC's analysis and the CNA's views, the EAO's residual effects assessment and potential changes from new solar projects which have recently entered the environmental assessment process, such as Highland Solar, which would be located directly to the north of the Highland Tailings Storage Facility. The EAO notes the minor nature of the expected residual effects on land and resource uses associated with HVC MLE and the reversibility of the residual effects assessed by the EAO, except for visual quality.

The existing conditions at the mine site, that is, a very large industrial project which occupies much of the Highland Valley, have altered the local viewscape since the 1960s. HVC MLE would further alter the viewscape, and it would take many years of reclamation for views to return to a more natural state, though some views would never return to a completely natural state. Considering these factors, the EAO concludes that HVC MLE would have a cumulative effect on visual quality.

The EAO acknowledges that effects to First Nations' Indigenous interests are closely linked to existing and proposed land use activities. More information about the predicted cumulative effects to each First Nation's Indigenous interests as a result of HVC MLE may be found in their respective sections of this Report.

13.10.9. Consistency with Land Use Plans

Land use planning in British Columbia sets the strategic direction for sustainable resource stewardship and management of provincial public land and waters that meets economic, environmental, social, and cultural objectives. Land use planning sets high-level direction and helps define 'what' can occur 'where' on the land base.

HVC MLE is located within an area governed by two land use plans/zoning:

- Kamloops Land and Resource Management Plan, and;
- District Municipality of Logan Lake zoning Bylaws 834, 625, and 675.

The Kamloops Land and Resource Management Plan is a sub-regional Strategic Land and Resource Plan that covers 2.2 million ha in south-central B.C. The Kamloops Land and Resource Management Plan was established in 1995 by the B.C. government and applies to Crown Lands and land that is held privately within tree farm or woodlot licenses. HVC MLE is located within a General Resource Management Zone which permits resource development in alignment with a set of basic objectives and strategies for land, water, ecosystem and resource management.

Under zoning bylaws for the District Municipality of Logan Lake, the HVC mine site is categorized as zoning area M3, which regulates land designated as Mining Operations. M3 zones permit land use related to mining operations and storage of explosives and related material, and the bylaw stipulates that mining operations in all stages of development from exploration to reclamation and abandonment are subject to the *Mines Act*.

Under existing agreements, HVC works with First Nations on an annual basis to plan on-site land management and would continue to collaborate on land use planning in the region with First Nations as they continue to develop land-use plans and policies related to their territories.

13.10.10. Conclusion

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual or significant cumulative effects on the land and resource use valued component. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new permit language and conditions.

The EAO also concludes that HVC MLE and the BASA Amendment are consistent with land use objectives under the KLRMP and Logan Lake District bylaws.

13.11. Heritage Resources

13.11.1. Summary

The heritage resources valued component includes archaeological, paleontological, and historic and cultural heritage sites which are the evidence of past human life and the development of other forms of life on Earth. They help to tell the story of the land over time and are important due to their value to First Nations, the local community, and the broader public. Heritage resource sites are finite in number and are sensitive since any disturbance cannot be reversed. In B.C., the Heritage Conservation Act protects pre-1846 heritage sites but does not provide automatic protection to sites that post-date 1846. In alignment with the Heritage Conservation Act, HVC used the term “archaeological” to identify protected pre-1846 sites, and “historical or cultural heritage” to denote unprotected, post-1846 sites. First Nations sites such as burials, pictographs and petroglyphs are protected regardless of age.

Past HVC mine operations have uncovered and disturbed archaeological, paleontological, and historic and cultural heritage sites in the current mine footprint. HVC MLE would result in the disturbance of additional paleontological, and historic and cultural heritage sites which would not be reversible and could result in the complete loss or removal from the land of sites which are especially important to First Nations. HVC would work to minimise these effects, including by properly documenting and helping to manage the contents of these sites, in coordination with First Nations and government agencies.

HVC would continue to be required to manage Heritage Resources in compliance with the M-11 permit Cultural Heritage and Archaeological Management Plan which would be updated for HVC MLE. HVC has prepared a Fossil Impact Assessment Plan and further studies required by the B.C. Fossil Management Office have been implemented by HVC in spring and summer 2024. A Paleontological Resources Management Procedure is also required for the M-11 permit amendment. Considering these regulatory requirements, the EAO’s view is that effects to Heritage Resources will be adequately minimized and that a Certificate Condition is not required. While HVC MLE would not result in a significant adverse residual effect, the EAO concludes that HVC MLE would contribute to existing significant adverse cumulative effects to Heritage Resources, particularly to cultural heritage resources due to uncertainty about areas lost in current mine footprint.

13.11.2. Assessment Boundaries

13.11.2.1. Spatial Boundaries

The four spatial boundaries selected for the Heritage Resources assessment included the Base Case footprint (the current extent of the disturbed area of the mine and permitted disturbances), the Assessment Case footprint (the proposed expanded area disturbed by HVC MLE), a local study area and a regional study area.

For its assessment, HVC selected a larger local study area than described in the AIR, to align with nearby watershed boundaries, allowing for the inclusion of cultural features and traditional use areas. The regional study area is also defined primarily based on watershed boundaries, but over a larger area than the local study area and includes the broad cultural landscape related to seasonal movements and activities linking the Highland Valley with the permanent First Nations’ occupation sites on and beyond the Thompson River and Nicola River, as well as major camps along Guichon Creek.

For the potential effects to heritage resources for the BASA Amendment, HVC selected a study area that includes the entire length of Witches Brook and Guichon Creek from the mouth of Witches Brook to Mamit Lake.

13.11.2.2. Temporal Boundaries

The four temporal boundaries used for the heritage resources assessment are:

- Construction/development phase: 3 years;
- Operations phase: 18 years;
- Closure phase: 10 years; and
- Post-Closure phase: steady state 100+ years.

The three temporal boundaries for the BASA Assessment are the same except the Construction and Operations phase is based on the start of work on BASA in 2002 and includes the subsequent operating phases of the mine.

13.11.3. Existing Conditions by HVC

First Nations shared their knowledge of the Highland Valley, which they consider culturally and spiritually significant area, and described how trails, creeks, and areas of habitation or of cultural importance such as petroglyphs are not only historically significant but are still used by the community today for subsistence, education, connection, and promotion of identity.

Industrial mining in the Highland Valley starting in the 1960s has led to large-scale disturbances, often resulting in the complete removal and loss of heritage resources. Though HVC did conduct some archaeological assessments at the mine site prior to 2010, until that time HVC did not formally identify archaeological and heritage sites, and it is probable that some sites were destroyed without being recorded in detail. As a result, there are gaps in understanding the full extent of the historical loss of and damage to heritage resources at the mine site. Areas proposed disturbed for HVC MLE are expected to contain more archaeological and cultural heritage artifacts and/or features.

Palaeontological sites in the Highland Valley are deeply buried and not often exposed unless disturbed by deep excavation, as in mining. HVC completed past field inspections concentrating on areas at the mine site and in the local study area where fossils were identified in the past. During these inspections, several hundred fossil specimens and large slabs of rock with fossils were recovered from the survey areas. Overlapping with the submission and review of HVC's Application, HVC conducted field studies through spring and summer 2024, as per the Fossil Impact Assessment Plan approved by the Ministry of Tourism, Arts, Culture and Sport's Fossil Management Office. These field studies included the areas listed in bullets on page 7.13-83 of the Application. Following preliminary analysis of the 2024 field results, additional field studies for one location were proposed for further mitigation (i.e., collection). An updated Fossil Impact Assessment Plan was approved by the Fossil Management Office in early September 2024 for this additional work, which is scheduled to occur in early October 2024.

13.11.4. Potential Project Effects by HVC

HVC identified potential negative and positive effects to archaeological and cultural heritage sites and palaeontological resources through the HVC MLE Construction and Operations phases. Any disturbance or destruction of sites would be irreversible. HVC did not anticipate any adverse residual effects, or cumulative effects on palaeontological sites.

Indigenous knowledge included in the application from the CNA indicated that many community-based indicators of its four core values (Tmix^W, Balance, Governance, and Teachings) could be negatively affected by the disturbance or destruction of cultural heritage sites and spiritually and ceremonially significant sites. The CNA described the importance of cultural heritage sites as tangible representations of past lives and land use that support cultural preservation, continuity, and revitalization. BFN also stated that its community values trails in the Highland Valley for their contribution to social, cultural, and economic well-being.

Ground disturbance as part of HVC MLE activities and developments could result in the following potential effects, all of which would happen only in mine disturbance areas and would not extend into the local or regional study areas:

- change to archaeological sites;

- change to historic and cultural heritage sites; and
- change to palaeontological sites.

HVC identified 64 known archaeological sites which could be affected by the mine expansion. While archaeological assessments have been conducted and are ongoing for HVC MLE, HVC anticipates that more currently undocumented sites would be identified during mining. Indigenous knowledge from LNIB, historical records and field surveys also noted a network of historic trails throughout the Highland Valley which would have provided passage through and access to resources. Historical and cultural heritage sites, cultural trail waypoints and segments, historical trail segments, and culturally modified trees all exist and could be altered or destroyed.

Most disturbance of fossil sites would be from active mining during the Construction and Operations phases though a few exposed fossil sites would also be covered with water when the Valley Pit is allowed to fill. While some new fossils may be discovered due to the ground disturbance, others may be destroyed by the excavations. Some of these fossils may be significant as they span an interval of time that is rarely preserved in North America and contain diverse plant and animal fossils.

The BASA amendment is not expected to contribute any effects to the heritage resource valued component.

13.11.5. Proposed Mitigation Measures by HVC

HVC's primary goal is to avoid sites where a find is significant, or avoidance would not affect mine operations. When this is not possible, HVC's existing mitigation strategies for heritage resources are as follows:

- Continue to conduct Archaeological Impact Assessment surveys prior to disturbance as required under the Heritage Conservation Act and HVC's M-11 permit.
- Conduct supplemental paleontological field studies in 2024 and report out on the findings to the Fossil Management Office and other interested parties.
- Have a qualified palaeontologist evaluate the 20 known notable fossil sites in the Assessment Case footprint and work with the Fossil Management Office to determine if these sites require additional data recovery and the best approach for mitigating effects to these sites.
- Continue to use HVC's Chance Find Procedure to manage chance finds at the mine site.
- Continue to provide training to mine site staff on the Chance Find Procedure, including on the requirement to contact the Archaeology Branch, the Nlaka'pamux Nation, and Stk'emlúpsenc te Secwépemc Nation when sites are found and again if disturbance of the sites cannot be avoided.
- Conduct systematic data recovery on newly discovered sites prior to disturbance, under Heritage Conservation Act permits or through HVC's own commitments for post-1846 sites.
- Continue to collaborate with First Nations to further refine mitigation protocols and on HVC's cultural heritage program including through annual cultural heritage assessments.

13.11.6. Key Issues Raised

No significant issues were raised by reviewers during Application Review. The CNA, SSN, and the Fossil Management Office (part of the Ministry of Tourism, Arts, Culture and Sport) asked largely editorial or procedural questions of HVC related to Heritage Resources. FOR's Archaeology Branch reviewed the Application and raised no issues or concerns with HVC's assessment.

13.11.7. The EAO's Characterization of Residual Effects

After considering HVC's proposed mitigation measures, comments received during review of the Application, current regulatory tools and their proposed amendments, and proposed Certificate Conditions, the EAO concludes that HVC MLE would result in the following residual adverse effects on the heritage resources valued component:

- Disturbance to archaeological sites;
- Disturbance to heritage sites; and
- Disturbance to palaeontological sites.

The EAO's characterization of the expected residual effects of HVC MLE on the heritage resources valued component is summarized below, as well as the EAO's level of confidence in the effects determination (including their likelihood and significance).

Table 28: Summary of Residual Effects for Valued Component

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Disturbance to archaeological sites</i> This effect would include disturbance to both known sites and sites that are uncovered during HVC MLE activities that conflict with planned developments. This effect would occur if no, or insufficient systematic data recovery occurs at a site.	Context (resilience): Moderate Magnitude: Low Extent: Limited Duration: Long-term Frequency: Once Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Minor Uncertainty: Low Importance: High	Not Significant Archaeological sites in the current mine site have been affected by past mine operations and additional sites would be disturbed by the expansion of the mine footprint. The disturbance would be confined to the project footprint and would occur once at the time of disturbance. These sites would be permanently altered once disturbed, but additional sites exist outside the project footprint and some of these sites are similar to those that would be lost. The frequency of effects is limited to once for each site, and the duration of residual effects would be long-term and irreversible. HVC's Chance Find Procedure would ensure that any discovered site is appropriately managed to the extent possible. Through comprehensive surveys and systematic data recovery done in consultation with First Nations, most archaeological data would be recovered and preserved prior to site disturbance. Although some chance find sites may suffer disturbance during discovery, before systematic data recovery can occur, these sites are expected to be minimal. The residual effects of HVC MLE on archaeological sites is expected to have a disproportionate effect on First Nations as these sites reflect primarily First Nations land use and occupation. Disturbance to archaeological sites would occur (high likelihood) and the consequence would be minor (moderate magnitude and limited extent), resulting in a low risk rating for the effect to archaeological sites. There is low uncertainty regarding residual effects as the area has been thoroughly surveyed and the location of sites and effects to them are well-understood. Archaeological resources in the Highland Valley of high importance as they have been identified as a key interest by First Nations, local communities, and government agencies.

Residual Effect	Assessment Rating*	Significance and Rationale
<i>Disturbance to heritage sites</i> This effect would include disturbance to sites that conflict with planned developments through systematic data recovery as well as risk disturbance to unknown sites that are discovered during HVC MLE activities.	Context (resilience): Moderate Magnitude: Medium Extent: Limited Duration: Long-term Frequency: Once Reversibility: Irreversible Affected Populations: Disproportionate Risk (likelihood and consequences): Moderate Uncertainty: Low Importance: High	Not significant Historical and cultural heritage sites are moderately resilient as sites cannot return to their previous state after being disturbed, and some sites in the Highland Valley have been disturbed in the past without being documented and preserved. Most of the heritage sites in the area which would be disturbed under HVC MLE are culturally modified trees which are common in the Highland Valley. While mitigation measures would reduce the effect to heritage sites, further data recovery is not possible after disturbance. While any unknown sites uncovered during HVC activities would be recovered under a Chance Find Procedure, the integrity of any site would be compromised by the disturbance. The extent of disturbance would be limited to the HVC MLE development footprint and is limited to once for each site; however, duration of residual effects is expected to be long-term and irreversible as a site is permanently altered once disturbed. The residual effects of HVC MLE on cultural heritage sites is expected to have a disproportionate effect on First Nations as sites in the area reflect primarily First Nations land use and occupation. Disturbance to cultural heritage sites is expected to occur (high likelihood) and the consequence would be minor (moderate magnitude and limited extent). There is low uncertainty regarding residual effects as the area has been thoroughly surveyed and location of sites are well-understood. This uncertainty, together with the likelihood and consequence lead to a low risk rating for the effect to historic and cultural heritage sites. While some new sites may be discovered through Chance Find Procedures, these are likely to be minimal. Historical and cultural heritage resources in the Highland Valley are considered as high importance as cultural heritage has been identified as a top interest by First Nations, local communities, and government agencies.
<i>Disturbance to palaeontological sites</i> This includes loss of known and unknown paleontological sites	Context (resilience): High Magnitude: Low Extent: Limited Duration: Long-term Frequency: Once Reversibility: Irreversible Affected Populations: Even Risk (likelihood and consequences): Minor Uncertainty: Moderate Importance: Low	Not significant Fossil sites are located underground and not generally disturbed other than by deep excavation, such as through mining. The location of some fossils at the site is known, and further field work will help identify the locations of additional fossil sites. Fossils would only be lost in the area directly disturbed during the excavation at the mine site, and more fossils of the same type are expected to be present underground, though it is not certain how many. Any individual fossils lost through excavation are irreplaceable. No population would be more affected by any other by the predicted effects to fossil sites, and the risk of this effect is considered low with moderate uncertainty related to a lack of precise understanding of where fossils are located. HVC has committed to follow all assessment requirements and would work with the Fossil Management Office to mitigate effects to fossils to the greatest extent possible. No group raised effects to paleontological resources as a concern during the environmental assessment.
* Note: Criteria and assessment ratings are defined in Appendix 1 - Residual Effects Characterization Definitions		

The EAO understands that participating Indigenous nations in the environmental assessment may have different views of the potential effects of HVC MLE through the restriction of access to heritage resources and the potential for degradation and loss of sites. However, the EAO is satisfied that the proposed mitigations and existing regulatory requirements would reduce the effect of HVC MLE on Heritage Resources and would ensure that HVC works with First Nations when effects to cultural heritage sites are anticipated.

13.11.8. Cumulative Effects Assessment

HVC identified two existing and reasonably foreseeable projects and activities which have the potential to act cumulatively with HVC MLE: Mount Mabel Wind Project and quA-ymn Solar Project. HVC considered the effects it assessed for HVC MLE and potential effects from these two other projects and concluded that the cumulative effects of HVC MLE on heritage resources would be negligible. The CNA did not agree with HVC's assessment that HVC MLE would not cause cumulative effects to heritage resources.

The EAO considered the existing conditions at the mine site as described in the Base Case scenario, that is, a large, long-term mine which began operations in the 1960s and would have resulted in the loss of an uncertain number of cultural heritage, archaeological, and paleontological sites as the current regulations regarding protection of these sites would have varied over time, with less protection historically. Additionally, before 2010 HVC did not have a systematic way of tracking and dealing with disturbance of these sites, so it is not possible to know for certain how many sites have been disturbed in the past. From Indigenous knowledge shared during the environmental assessment, the Highland Valley is known to have been a place where First Nations historically hunted, fished, gathered plants, and conducted cultural activities. Considering that sites are common in areas around the mine footprint, it is safe to assume that many sites were lost in areas now disturbed as part of the mine site.

The EAO also considered that in the time since the Application Information Requirements was issued, several other solar projects have entered the environmental assessment process, including Highland Solar, which would be located directly north of the mine site along the Highland Tailings Storage Facility. These projects would have their own effects on heritage resources, which are expected to be managed in a similar manner to how HVC has proposed to managed heritage resources for HVC MLE (e.g., field studies and assessment to locate sites, avoidance where possible, implementation of a chance find procedure).

Given these considerations, the EAO concludes that HVC MLE would contribute to a cumulative effect on heritage resources, particularly to cultural heritage resources. The EAO determined there are adverse cumulative effects to cultural heritage and archaeological resources in the Highland Valley due to past mining. The full extent of losses is uncertain, however, the EAO understands that First Nations have felt a significant effect from these past losses, which led to the EAO's conclusion that HVC MLE would contribute to existing significant adverse cumulative effects to heritage resources. The effects from HVC MLE itself would be lessened due to the improved identification and protection of heritage resources

13.11.9. Conclusion

The EAO considered the information in HVC's Application, the information and analysis presented in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, the proposed mitigation measures identified in the current regulatory tools under the M-11 permit, and is satisfied that HVC MLE and the BASA Amendment would not have significant adverse residual effects on the heritage resources valued component. The EAO concludes that HVC MLE would contribute to existing significant adverse cumulative effects to heritage resources, particularly to cultural heritage resources.

14.0 DETAILED ASSESSMENT - CONSIDERATION OF OTHER MATTERS

14.1. Risks of Malfunctions and Accidents

14.1.1. Summary

Malfunctions or accidents at the mine due to failures of key equipment or human error could injure or kill people or harm the environment around the mine. HVC's assessment of the potential for malfunctions or accidents for HVC MLE is outlined in [Chapter 9 of the Application](#) and considered the possibility of spills or leakage of hazardous liquids, motor

vehicle accidents, failure of water management or treatment facilities, sediment releases into watercourses, fires or explosions, failures of rock dumps or stockpiles, prolonged power failure, harm to persons trespassing on-site, injuries from fly rock or excessive noise from blasting, ground instability or failure, and breach or failure of a tailings dam or other containment structure.

HVC developed general scenarios based on the HVC MLE Project activities and components for each category of general accidents or malfunctions. The HVC MLE Project activities and components associated with each category of general accidents or malfunctions were evaluated for potential interactions with valued components. Based on the potential for interactions, Reasonable Worst Case (RWC) scenarios were developed to further assess the risk to biophysical valued components and subsequently to Indigenous Interests.

To assess the risk from each scenario, HVC first assessed the likelihood of scenario, then assessed its consequence. When cross-referenced, likelihood by consequence corresponds to the risk of each scenario occurring. HVC assessed the potential likelihood and consequence of each accident and malfunction on valued components and their subsequent risk to Indigenous Interests and concluded that the scenarios which had at least a moderate risk to valued components were:

- motor vehicle accidents (low to high risk to human health, moderate to high risk to Indigenous interests); and
- discharge of off-specification effluent from water management systems or treatment plants due to freshet runoff and extreme precipitation from Highmont Creek to Witches Brook (moderate risk to land and resource use).

For some accidents or malfunctions, effects could extend to the environment outside the mine (e.g., such as effects to water quality), while others would be limited to the mine site. Indigenous knowledge included in the application from the CNA indicated that since accidents and malfunctions associated with HVC MLE could affect other valued components, such as water or wildlife, this could result in perceptions of risk that could in turn reduce the exercise of Nlaka'pamux nation rights.

As an operating mine, HVC is required to maintain a suite of detailed management plans and mitigation measures to use to manage risks of accidents and malfunctions at the mine site, such as the Mine Emergency Response Plan. HVC would continue to apply these management plans and would review and update them to add new activities and components related to HVC MLE. It is important to note that HVC's assessment includes risks to valued components and to members of the public, but not to staff onsite. HVC employees and contractors' occupational health and safety are regulated under B.C.'s Occupational Health and Safety Regulation B.C. Reg 296/97 and administered through WorkSafe BC and B.C.'s Health, Reclamation and Safety Code for Mines and are not included in the environmental assessment.

During review of the Application, reviewers identified a gap in the assessment of effects from accidents and malfunctions to Indigenous interests, as required by the EAO's Application Information Requirements. In response, HVC provided an assessment of the effects of accidents and malfunctions on Indigenous interests, which concluded that the following scenarios have at least a moderate risk to the culture valued component and/or Indigenous Interests;

- potential for motor vehicle accident on-site or off-site resulting in injury or fatality (moderate to high risk to culture and Indigenous Interests);
- potential on-site spill of diesel fuel being delivered to fuel depots or for mobile refueling (moderate risk to culture and Indigenous Interests);
- potential release of contaminants through fugitive dust (moderate risk to culture and Indigenous Interests); and
- potential release of freshet and extreme precipitation from Highmont Creek to Witches Brook (moderate risk to culture and Indigenous Interests).

The EAO's view is that HVC's assessment, including its mitigation and prevention measures, was reasonable and that no additional effects from accidents and malfunctions associated with HVC MLE are expected.

14.1.2. Potential Project Effects and Proposed Mitigations by HVC

For each potential accident or malfunction, HVC provided a description, considered how each valued component could be affected by the accident or malfunction, identified prevention and/or mitigation measures, and assessed the residual risk for each accident or malfunction. HVC ranked the risks of each accident and malfunction and created individual risk matrices for key areas of biophysical, heritage resource, human health, and human and community well-being.

Indigenous knowledge included in the Application from the CNA discussed how accidents and malfunctions associated with HVC MLE could variously affect each of its four Core Values, impacting Tmix^w, Balance, Governance and Teachings. Of particular concern to CNA Participating Bands, was a failure of water management systems resulting in a discharge of off-specification effluent, due to the importance of water, or q^{wú}?, to Participating Band members. As water is a core component of Nlaka'pamux culture, effects to water from an accident or malfunction would have knock-on effects to all aspects of Participating Band members' lives. The CNA also noted that since accidents and malfunctions can affect other valued components, such as water or wildlife, an accident or malfunction could result in perceptions of risk from the local community that could in turn reduce the exercise of Nlaka'pamux nation rights, such as hunting, fishing, or gathering plants in areas viewed as contaminated.

HVC's risk assessment followed the standard practice of evaluating the likelihood and consequence of each individual accident or malfunction to determine the resulting risk. The likelihood of each accident or malfunction assigned a rating between "rare" and "almost certain" while each consequence was assigned a rating between "slight" and "severe". Consequences were evaluated based on the effects to biophysical, heritage, human health, and community well-being valued components from each accident and malfunction. For example, for biophysical valued components, a "slight" consequence was an interaction with a negligible effect while a "severe" consequence was an irreversible effect to a rare / valued ecosystem element. For some accidents and malfunctions, HVC used its own records from mine site operations to determine the likelihood of an incident occurring.

HVC also considered mitigations and preventative measures as part of its risk assessment. As an operating mine, HVC is required through its M-11 permit to have detailed plans in place to prevent or reduce the likelihood or consequence of accidents and malfunctions of accidents and malfunctions. The most important of these is the Mine Emergency Response Plan, which outlines the response procedures, roles and responsibilities, documentation, and communications for accidents and malfunctions. In an emergency, employees are guided by the Mine Emergency Response Plan to know what actions to take at what time, who to involve, and who to communicate information to. HVC would continue to apply the required management plans and would review and update some management plans to add new activities and components related to HVC MLE.

In addition to these required management plans, HVC has also developed its own suite of preventative measures including policies, procedures, requirements, and training for staff and regular maintenance and inspections of infrastructure. HVC has also designed different site components to reduce the risk of accidents and malfunctions such as preparing water management infrastructure for high flows and locating it around key infrastructure to drain water away, locating sites with potential for spills such as Lubeland in specific areas to reduce the risk of spills entering watercourses, and designing rock dumps to be stable and not collapse.

After consideration of these preventative and mitigation measures, HVC's assessment showed that the consequence of most accidents and malfunctions to effects on biophysical valued components, human health, heritage resources and human and community well-being (excluding culture and Indigenous interests) were slight to minor risk for HVC MLE, including the following potential scenarios:

- Diesel fuel spill at Lubeland or while being delivered on-site;
- Release of contaminants from ore or waste rock stockpiles through fugitive dust or overflow of the water management system;

- Release of sulphates through Highland Tailings Storage Facility seepage to Pukaist Creek due to failure of water management or treatment infrastructure;
- Sediment release from construction areas;
- Fire or explosion at Lubeland or Xelas Explosives Storage Facility;
- Blockage of the water management system by a slope failure at a permanent or temporary waste rock dump;
- potential power loss due to prolonged power failure of transmission lines or transformer;
- Harm to persons trespassing on-site through unintentional access to the mine expansion area; or
- Harm to the public outside the mine site from fly rock or excessive noise from blasting.

HVC assessed the consequence to be greater than Minor for motor vehicle accidents and discharge of off-specification effluent from water management systems or treatment plants. HVC also separately assessed the risk of a failure of the H-H or L-L tailings dams.

The BASA amendment is not expected to result in any risk to the assessment of Malfunctions and Accidents.

14.1.2.1. Motor vehicle accidents

A potential motor vehicle accident on or off the mine site could result in injuries or death. In the case of a motor vehicle collision, the consequence to the human health valued component varied depending on the injuries sustained. Consequence severity affects the risk rating, which is assessed as 'low to high', for 'low' being where minor injuries would occur and 'high' if the collision were to result in death. With preventative measures in place, HVC estimated that the likelihood of a collision with another vehicle resulting in injury or fatality would be Unlikely. Between 2008 and 2023, no members of the public have been injured in a motor vehicle accident at the mine site. HVC would evacuate injured persons as required by the procedures detailed in its Mine Emergency Response Plan.

14.1.2.2. Discharge of off-specification effluent from water management systems or treatment plants

Water management infrastructure is widely used at the HVC mine site to keep non-contact (non-mine) water from mixing with contact (mine) water. If a large precipitation event were to combine with spring peak runoff (fresnet), this infrastructure could be overwhelmed, and mine contact water could be unexpectedly released to the environment outside the mine site.

An off-specification effluent discharge could affect from Highmont Creek which drains the eastern mine site including seepage to Witches Brook which receives non-contact water. HVC assessed the risk to valued components from this effluent release as "negligible to low", except for indirect effects to land and resource use, culture and Indigenous interests, which were rated as "moderate", since downstream water users could be affected by the discharge. The moderate rating and a likelihood of "possible" was assigned for the risk assessment because the discharge would be expected to happen over a short period of time and the discharge would be diluted by the large amount of runoff water. HVC considered this to be a conservative assessment of risk and consequence.

14.1.2.3. Tailings dam risk assessment

As part of HVC MLE, HVC would need to raise the height of both the L-L dam and the H-H dam which are part of the Highland Tailings Storage Facility to accommodate the expected additional billion tonnes of tailings from HVC MLE. The L-L dam at the West end of the Highland Tailings Storage Facility is currently 1,297 metres above sea level and would be raised 31 metres, while the H-H dam at the East end of the Highland Tailings Storage Facility is currently 1,293 metres above sea level and would be raised 33 metres.

Regardless of the actual on-site consequence classification, HVC elected to adopt the highest design and stewardship requirements equivalent to an Extreme consequence, which is the highest consequence rating available under the Code

for Health, Safety and Reclamation of Mines in B.C. This choice was driven by HVC's internal governance requirements for tailings risk management which align with the Global Industry Standard on Tailings Management 2020 and meets or exceeds requirements under the Code for Health, Safety and Reclamation of Mines in B.C.

HVC assessed the risk of a breach or failure of a tailings dam for both the L-L and H-H dams, including overtopping of tailings water over either dam, structural collapse of the tailings dam, or internal erosion of the tailings dam. HVC noted that for the H-H dam, it is physically impossible for water to overtop the dam given its relative height compared to the L-L dam, and that the North Dump would buttress and then cover much of the H-H dam, protecting against erosion or collapse. HVC concluded that the risk of failure of the H-H dam was Negligible (essentially impossible and not ever expected to occur).

For the L-L dam, HVC would continue to maintain the appropriate amount of dam freeboard to avoid tailings pond water overtopping the dam and expected that the dam would not settle further after construction, similar to previous dam raises. HVC would also continue to maintain its current dam management practices, such as regular observations of the condition of the dam to identify areas of concern, planning and scheduling of the raising of the crest of the dam and the rate and areas of tailings deposition to promote stability, calibrating the pond water balance to make sure it is as accurate as possible, and sticking to HVC's required tailings governance requirements (e.g., including reviews by the Independent Tailings Review Board that HVC is required to maintain by the M-11 permit). HVC also would continue to regularly consider and adjust HVC operations for optimal performance of the tailings dams (e.g., by adjusting the tailings beach shape and depth to reduce seepage and potential internal erosion within the dam). HVC concluded that the risk of failure of the L-L dam from various triggers or hazards ranged from Negligible (essentially impossible and not ever expected to occur) to Extremely Rare (very low likelihood but not impossible; unlikely to occur during the next 100 years).

HVC also concluded that the risk of any failure mode for either the L-L or H-H dam remained unchanged between HVC's current operations and under the HVC MLE case, although adjustments to operational procedures would need to be made from time to time to manage the additional stresses from the raising of the dams.

14.1.3. Key Issues Raised

The following concerns and issues related to Accidents and Malfunctions were raised by the Technical Advisory Committee, including participating Indigenous nations.

14.1.3.1. Lack of assessment of effects to the Culture Valued Component and to Indigenous interests, and revisions to the Application

The CNA, LNIB and the EAO noted that the Application Information Requirements require HVC to assess the effects of accidents and malfunctions to the culture valued component or to Indigenous interests, and that this assessment was not provided in the Application. The CNA and LNIB also raised many points of clarification on HVC's accidents and malfunctions assessment methods, analysis and risk ratings, and conclusions.

In response, HVC provided an analysis of effects to the culture valued component and to Indigenous interests, and concluded that all risks were "low" or less, other than risks to Indigenous interests from:

- On-site fuel spills, accidental releases of fugitive dust from waste rock dumps, and discharge of off-specification effluent from water management systems or treatment plants due to freshet runoff and extreme precipitation from Highmont Creek to Witches Brook are all estimated to be Moderate; and
- Motor vehicle accidents are estimated to be Moderate to High.

Although HVC concluded that the likelihood of a dam breach or failure of the Highland Tailings Storage Facility was Negligible for the H-H dam and Negligible or Extremely Rare for the L-L dam, HVC did note that the consequence of such a failure would be Severe. If the L-L dam were to fail, major consequences such as loss of life and severe effects to

environmental, cultural, infrastructure, and economic values would occur to downstream populations, which include Nlaka'pamux communities.

HVC also made substantial edits to the Accidents and Malfunctions chapter of the Application in response to the many comments from the CNA and LNIB regarding assessment methods, analysis and risk ratings, and conclusions as documented in the [Application Review Issues Tracking Table](#).

14.1.3.2. Potential effects to environmental and human health valued components

The CNA and LNIB raised concerns about the assessment of effects to both biophysical valued components and to human health, noting concerns about the need for sediment control near watercourses, potential effects to cleanup crews from spills of hazardous substances, risk of effects to human health from a fire onsite, risks to wildlife from motor vehicle accidents, and the need for communication between HVC and local communities in the case of an accident or malfunction that could have effects beyond the permitted mine area.

HVC responded to each concern separately, noting that it has multiple management plans in place at the mine site to minimize the risk of accidents and malfunctions, including its Mine Emergency Response Plan which guides HVC's actions in the event of an emergency. HVC's view was that a site fire would be unlikely to affect human health due to the distance between potential fire locations onsite and locations of members of the public who are restricted to areas outside the permitted mine area (approximately 1.5 km distance).

HVC also noted that the risks to staff onsite from accidents and malfunctions, such as spills of hazardous materials, are not included in the environmental assessment and that staff working conditions are regulated under B.C.'s Occupational Health and Safety Regulation BC Reg 296/97 and administered through WorkSafe BC, and through B.C.'s Health, Reclamation and Safety Code for Mines.

14.1.4. The EAO's Assessment and Conclusions

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse effects due to Accidents and Malfunctions. This conclusion considers the information in HVC's assessment, the information and analysis in this chapter, the key issues raised by the Technical Advisory Committee, including First Nations, and HVC, and the existing and proposed new permit conditions.

The EAO understands the CNA's assertions that even if spills or other accidents or malfunctions do not affect valued components or have a minor effect, effects to Indigenous interests may still occur due to perceptions of contamination by community members.

14.2. Potential Changes to HVC MLE Caused by the Environment

14.2.1. Summary

One of the areas that must be considered in every environmental assessment in B.C. is the potential changes to the project that may be caused by the environment. Considering potential environmental variability and possible extreme weather events supports a thorough understanding of effects and makes sure that the project is as ready as possible to deal with any possible effects.

HVC MLE could be affected by extreme weather events, floods and droughts, terrain and seismic hazards and wildfires. Each of these types of effects could be affected by climate change, which may increase the likelihood and severity of the identified environmental factors. The EAO does not expect that that BASA Amendment would be affected by changes caused by the environment.

14.2.2. Assessment of effects by HVC

HVC identified the key potential effects of environmental events as:

- Extreme heat: Could affect operations through effects on human health and safety, equipment malfunctions and disruptions in power supply. At Closure, heat events could increase evaporation meaning that less water would be in the Tailings Storage Facility, resulting in decreased water quality. Reclamation could be less successful if plants died due to heat stress;
- Wildfire: Could affect human health and safety, disrupt the power supply and cause supply chain interruptions. Ember showers from nearby wildfires could ignite flammable materials and structures on site or could burn electrical transmission poles and lines. Loss of vegetation cover in local stream catchments could result in increased runoff with higher levels of total suspended solids entering watercourses; and
- Rainfall-triggered landslide: Moving debris or rockfalls could damage buildings and mine infrastructure and create unsafe working conditions.

HVC's assessment showed that climate change trends in the Highland Valley predict warmer temperatures, increased drought and more frequent and greater magnitudes of extreme weather events and wildfires. While less precipitation is expected overall, more will fall as rain rather than snow. Extended periods of low rainfall could reduce water availability, reducing stream flows and groundwater recharge. Under drier conditions, lighting is more likely to ignite wildfires. Increased wildfire intensity and severity have been observed in the area and are expected to continue, with the likelihood of wildfire affecting HVC MLE categorized as high through to 2080.

HVC identified the following potential effects of these climate change predictions on HVC MLE:

- Wildfires pose the risk of burning surrounding vegetation, thereby creating inhospitable conditions for reclamation;
- Increased wildfires would increase the risk to air quality, human health and safety, and GHG emissions;
- Increased wind speed can be contributed to by extreme heat and can increase wildfire intensity and entrain fugitive dust;
- Higher landslide potential and effects on surface water quality could result from increased temperature and precipitation;
- Increased hazards could directly and indirectly affect the health and safety of workers and affect emergency vehicle access; and,
- Hazards causing power outages could pause site operations.

HVC relies on guidance from provincial requirements and HVC's own site-specific management practices to mitigate the potential effects from natural hazards and extreme weather events. Key existing HVC mitigations and management plans include but are not limited to the following.

- Existing safety plans and employee training programs outline procedures to address reporting wildfires, thermal stress awareness, and safe zones and evacuation plans during electrical storms and extreme temperature events, and are backed up by HVC's Mine Emergency Response Plan which outlines emergency responses triggered by natural hazards and extreme weather events including climate influenced events;
- The Vegetation Management Plan (Appendix 18.2-7 of the Application) outlines the management and mitigation of wildfire fuel in compliance with the Wildfire Regulation under the Wildfire Act and vegetation clearing according to the Fire Danger Class activity restrictions in the Wildfire Regulation, and HVC would continue to complete infrastructure risk assessments for wildfire risk and hazard tree inspections as part of powerline right-of-way maintenance; and
- HVC is committed to communicating with the District of Logan Lake to identify opportunities for collaboration and coordination regarding wildfire.

New mitigation measures proposed by HVC to help manage HVC MLE effects include:

- Designing project components such as the Tailings Storage Facility, diversion ditches, water management infrastructure, and roads to withstand climate events;
- Building new site infrastructure in compliance with appropriate codes and accommodations to mitigate effects from lightning strikes, extreme temperatures, and drought conditions; and
- The HVC MLE Water Management Plan and the Erosion Sediment Control Plan include erosion and sediment control measures to be implemented during all phases of HVC MLE to reduce surface erosion risks on site.

14.2.3. Community Relief During Emergency Events

HVC recognized that during natural hazards and extreme weather events, surrounding communities are likely also experiencing the same effects. HVC is committed to continuing to support emergency relief for surrounding communities. HVC conducts annual Emergency Preparedness and Response Plan tabletop exercises with potentially affected communities of interest to capture components such as surveillance preventative contingency control measures, emergency preparedness and response and crisis response.

Under existing mitigation measures and management plans, HVC has committed to support emergency relief for surrounding communities in situations where emergency response is triggered due to natural hazards. HVC would continue to support emergency relief for surrounding communities should HVC MLE be approved.

14.2.4. Key Issues Raised

The following key issues were identified by the Technical Advisory Committee during the review of the Application.

14.2.4.1. Drought and water stress

The CNA noted that while HVC predicted that water supply and water stress conditions would remain near normal with very low effect on HVC MLE, drought spell duration and water demand are predicted to increase. The CNA requested clarity on where water would be sourced from for HVC MLE during drought conditions. HVC clarified that modelled projections are based on estimates of future competition for water and stated that “near normal” results indicate that there would be no material changes from current conditions. Physical climate risk screenings categorized future water supply climate hazards to HVC MLE as very low, as long as demand for water remains low. In the event of drought conditions, HVC MLE would source water from the Thompson River, which it retains a water licence for but has not used since 2018.

The CNA requested collaboratively developed mitigation and management plans to address effects to aquatic communities within the mine site during drought conditions. HVC committed to continuing engagement with Nlaka’pamux communities on these issues and is currently developing Emergency Drought Mitigation Options which include potential sources of water which could be released into creeks in the Highland Valley during emergency drought situations. HVC plans to continue utilizing existing plans such as the Mine Site Water Management Plan and initiatives such as prioritizing water conservation and repairs to existing water infrastructure to improve onsite water use and downstream resilience during drought conditions.

To support management of water in the region, mitigate the effects of HVC MLE on groundwater and surface water quantity, and support planning for drought events, the EAO proposed Condition 13 Watershed Management and Mitigation Plan, which would require HVC to consider drought management strategies.

14.2.4.2. Landslides and seismic hazards

LNIB was concerned with the lack of environmental effects management specifically for landslides. LNIB was also concerned about the frequency of site-specific seismic hazard assessments. LNIB’s view was that an updated assessment

should be conducted prior to finalizing design and construction of the waste rock dump, pit extensions, and expansion of the Tailings Storage Facility.

HVC clarified that while the risk of rainfall triggered landslides would likely increase, due to existing excavation there are limited potential effects from such landslides to environmental receptors, and as such, effects are expected to be low. HVC confirmed that information used as the basis for the Highland Tailings Storage Facility design include the seismic hazard assessment in accordance with the Health, Safety and Reclamation Code of British Columbia. HVC would continue to conduct seismic hazard studies in accordance to current standards and available information.

The EAO is satisfied with HVC's responses and that existing requirements for erosion and sediment control under the *Mines Act* M-11 permit will adequately manage any risk of landslides or seismic hazards on the mine site.

14.2.4.3. Wildfires

LNIB raised concerns regarding the possibility of non-compliant discharge caused by wildfire or on-site structural fires due to increased parameters in surface water on site and asked how these environmental effects would be mitigated. Additionally, LNIB expressed concerns regarding mitigating human-caused fires from onsite activities and site layout mitigations including the distance of site infrastructure from fuel and chemical storage.

HVC clarified that indirect biophysical effects on vegetation and ecosystems from a potential fire onsite are considered and addressed in the Accidents and Malfunctions chapter. Existing policies and practices at HVC are enforced to mitigate the ignition or cause of fire on site and include Teck's Hot Work Policy and fuel free and reduced fuel zones surrounding site infrastructure.

The EAO is satisfied with HVC's responses and has considered the effects of potential accidents and malfunctions in [section 14.1](#) of this Report.

14.2.4.4. Community involvement and support

The CNA requested that HVC include more community involvement in the Emergency Preparedness and Response Plan. Both the CNA and LNIB requested that commitments from HVC related to community contribution and emergency relief be incorporated into a Community Effects Management Plan.

HVC indicated that they would continue to provide opportunity for First Nations to review and comment on the Emergency Preparedness and Response Plan and intends to engage project effected communities on collaborative development of community-focused emergency preparedness measures under the Global Industry Standard on Tailings Management Requirement.

HVC noted that during emergency events, they do their best to support their First Nations partners and communities and have procedures in place to administer how funds are released however due to the reactive nature on this funding, HVC is unable to commit to how and when additional funding may be released. HVC and the CNA plan to continue to engage on this matter separate from the HVC MLE environmental assessment.

The EAO is satisfied with HVC's responses and existing requirements for an emergency response plan under the *Mines Act* M-11 permit and *Environmental Management Act* PE-376 permit.

14.2.5. Conclusion

To address key issues related to the potential effects of the environment on HVC MLE, the EAO has proposed Condition 13 Watershed Management and Mitigation Plan. This proposed Condition would require HVC to develop a plan to guide and inform water management and mitigation on the HVC mine site and would supplement existing and proposed new requirements under the *Mines Act*, *Environmental Management Act* and *Water Sustainability Act*.

The EAO is satisfied that environmental effects would not have significant adverse effects on the construction or operation of HVC MLE. The EAO does not expect that that BASA Amendment would be affected by changes caused by the

environment. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions.

14.3. Effects on Biophysical Factors that Support Ecosystem Function

14.3.1. Summary

One of the areas that must be considered in every environmental assessment in B.C. is effects on biophysical factors that support ecosystem function. Ecosystem function refers to the physical, chemical, and biological components of an ecosystem (for example, vegetation, water, soil, atmosphere, and biota) and how they operate and interact with each other within ecosystems and across ecosystems.

The Highland Valley has a long history of development that has influenced biophysical factors that support ecosystem function. Fragmentation from forestry, road infrastructure, agriculture and mining activities over time have created habitat patches and altered landscape connectivity and resulting biotic connectivity and interactions. Changes in structural complexity through anthropogenic activities alter the natural disturbance regime because of changes in ecosystem structure and water levels.

HVC MLE has the potential to affect biophysical factors that support ecosystem function through effects on habitats that support ecosystem function and wildlife, natural disturbances (such as wildfire, flooding, and pests) that maintain some ecosystems, biodiversity, and regeneration, hydrologic patterns which support the transfer of sediment and nutrients to downstream habitats, nutrient cycling, purification services from wetlands, and species interactions and genetic diversity.

14.3.2. Assessment of Effects by HVC

HVC MLE would increase the disturbance area of the current HVC mine site by 16 percent and therefore some effects related to surficial disturbance are expected. The greatest effect of HVC MLE would result from the extension of mining operations over a longer period, delaying the Closure and Post-Closure phases. HVC reported that progressive reclamation would continue to be undertaken however, restoration is expected to take more than 50 years and, in combination with the expected effects from climate change, would result in a different type, and abundance of vegetation, ecosystems, and habitats than what existed on the site prior to mining.

HVC identified the key potential effects on biophysical factors as:

- **Habitat supporting ecosystem function:** HVC MLE may affect habitat diversity and complexity through changes in vegetation communities and changes in habitat suitability for wildlife species or species groups, including aquatic habitats such as streams, lakes and wetlands. HVC MLE would also interact with listed ecological communities and plant species of interest (i.e., rare plants and traditional use plants).
- **Habitat patches:** overall, HVC MLE is not anticipated to result in a high degree of habitat fragmentation and HVC predicted that effects due to fragmentation would mostly occur in areas where clearing and alteration for HVC MLE results in small, isolated pockets of undisturbed ecosystems. HVC identified one 19 ha forested area that would be separated from adjacent forest by the powerline right-of-way realignment and may cause a change in localized movement of amphibians and small mammals.
- **Natural disturbance regimes:** HVC MLE is predicted to interact with natural disturbance regimes through activities such as fire suppression, flood control, and forest clearing. These interactions are already occurring and would likely increase in future due to climate change.
- **Structural complexity:** the areas associated with HVC MLE that present the greatest structural complexity are riparian areas and wetlands. HVC MLE-related land clearing and site extension is anticipated to temporarily reduce structural complexity through loss and alteration of wetland habitat. This may have additional effects on

fish and wildlife habitat as specific ecosystems that support life changes (e.g., breeding) for different species are potentially affected. However, HVC predicted that overall effects on structural complexity would be minor and that most effects in the area are associated with larger-scale activities such as forestry.

- **Hydrologic patterns:** the main effects of HVC MLE to surface water quantity are due to the continuation of current effects due to the extension of the Operations phase and subsequent delay in reaching the Post-Closure phase. Since HVC MLE would create a much larger Valley Pit, this would also increase the time to reach Post-Closure conditions for surface water because of the additional 80 years required to fill the larger Valley Pit, meaning that under HVC MLE, the Valley Pit would not fill until 2150 rather than in 2073 under current mine operations.
- **Nutrient cycling:** HVC MLE may affect nutrient loads through seepage and effluent discharges that have the potential to introduce nutrient loads to surface waters. Additionally, through potential changes to surface water flows and the removal of wetlands, HVC MLE may cause a change in the flow of nutrients through the receiving environments. The input of nutrients, including ammonia, nitrate and phosphorus, to receiving streams and lakes was evaluated for HVC MLE. Both nitrogen and phosphorus are predicted to remain either below guidelines or unchanged from current conditions. Therefore, the assessment concluded that there would be no effect to nutrient cycling due to HVC MLE.
- **Purification services:** HVC MLE may affect the accumulation of chemicals in the receiving environment through permitted air, seepage and effluent discharges and due to the removal of wetlands that offer purification services. Forests, wetlands, and watercourses can filter sediment or allow sediments to settle by increasing retention time, therefore increased chemical loading and the removal of purification services can negatively affect ecosystem function. Effects on hydrologic function and patterns from HVC MLE-related loss and alteration of ecosystems is anticipated to be minor for riparian ecosystems, and low to moderate for fens and swamps.
- **Biotic interaction:** HVC MLE may affect biotic interactions by changing the type and prevalence of habitat supporting movement and different life functions, for example the powerline right-of-way realignment may affect predator-prey relationships as linear features increase access for predators. However, HVC does not anticipate that biotic interactions at the wildlife level would change significantly between the existing conditions and HVC MLE.

HVC also assessed the effects on biophysical factors from the proposed BASA Amendment. The key findings were that compared to 2002 drought conditions, there have been some positive effects to Witches Brook flows but that extraction of groundwater through the Basal Certificate effects the factors identified above by disrupting natural groundwater flow and resulting effects on ecosystem functions.

14.3.3. Mitigation Measures by HVC

HVC proposed mitigation measures to avoid or reduce effects on individual biophysical valued components, which would also mitigate effects on biophysical factors that support ecosystem functions. See these chapters for a complete list of mitigation measures. The following strategies are examples of mitigation measures that HVC identified for valued components that support ecosystem functions:

- A fish habitat offsetting or compensation plan would be developed in response to the footprint extension and road realignments (i.e., Woods and Burr creeks, Woods Creek Tributary 1 and TSF09), as well as loss or alteration due to changes in flow (i.e., Pukaist and Highmont creeks, Witches Brook) if required ([section 7.5 Fish and Aquatic Resources](#) in the revised Application);
- The Water Stewardship Strategy ([section 7.4 Surface Water](#) in the revised Application)
 - Witches Brook Flow Augmentation and Habitat Improvements (Attenuation Pond), and

- Reclamation and Closure strategies, including the Returning Land Use Plan, strategies to reclaim soil and landforms, revegetation, and specific reclamation prescriptions as set out in the M-11 permit ([Chapter 16 Reclamation and Closure Plan](#) of the revised Application).

14.3.4. Key Issues Raised

During review of the Application, no issues were raised with HVC's assessment of potential effects specifically related to the effects on biophysical factors that support ecosystem functions. LNIB and SSN provided comments related to water quality monitoring while LNIB also expressed concerns with how the assessment considered changes between the Assessment Case and the Base Case and requested greater consideration of pre-mining conditions. Both matters are discussed in more detail in [section 13.4](#) of this Report.

14.3.5. The EAO's Assessment and Conclusions

The EAO's view is that HVC MLE and the BASA Amendment would result in residual effects to biophysical valued components, as assessed in other sections of this Report. However, the EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse effects on Biophysical Factors That Support Ecosystem Function. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions.

14.4. Effects on Current and Future Generations

14.4.1. Summary

One of the areas that must be considered in every environmental assessment in B.C. is effects on current and future generations. Understanding how a major project may positively and adversely affect communities and people now and into the future provides decision makers with greater insight into long-term effects and the sustainability of HVC MLE and BASA Amendment.

The EAO acknowledges that perspectives, definitions, and predictions about the effects of HVC MLE (and any Project) on future generations differ and appreciates that Indigenous views and decision making consider seven generations. The EAO has sought to incorporate Indigenous perspectives on the effects of HVC MLE to current and future generations throughout this Report and in sections 10 to 12 – Effects to Indigenous Interests.

14.4.2. Potential Project Effects by HVC

HVC provided a summary of effects on current and future generations in [Chapter 14 of the Revised Application](#). HVC established the current generation would span 30 years in order to encapsulate the Construction, Operations, and Closure Phases, and future generations would be beyond 25-30 years and would coincide with the Post-Closure phase. As part of project design and developing the Application, HVC engaged with First Nations, the public, local governments and provincial and federal government agencies. HVC modified the HVC MLE design to align with four key areas of concern raised by participating Indigenous nations and the public:

- Climate Change – Greenhouse Gas Reductions;
- Tailings Storage Facility Design and Safety Improvements;
- Water Management Improvements, and;
- Disturbance Footprint and Visual Impacts Reduction.

As HVC MLE would extend the operational mine life of the HVC mine site and postpone the Closure and Post-Closure phases, HVC determined that positive and adverse effects related to current HVC mine site Operations would continue for

the current generation and would delay the positive and adverse effects related to Closure and reclamation for future generations.

Environmental effects from HVC MLE-related activities include effects to air quality, GHG emissions, water quality and quantity, fish and wildlife health, and access to land. Overall, HVC anticipated the residual effects would not differ substantially from the Base Case⁵⁹, and that the primary effect of HVC MLE would be the continuation of current adverse effects and subsequent delay in any reduction of effects predicted to occur during the Closure and Post-Closure phases. Additional adverse effects may occur through the increased land clearance and water use associated with HVC MLE, which HVC would mitigate through progressive land reclamation in line with Returning Land Use objectives and water management strategies.

HVC predicted that HVC MLE would have positive and adverse residual effects on human and community valued components for the current generation such as changes to health and emergency response services and infrastructure, food security, employment, access to affordable housing, and public safety. Although the local population increase due to HVC MLE construction may cause temporary strain on health and community infrastructure, housing availability, and social services, HVC anticipated that the positive effects related to increased access to employment, and contributions to the local economy and local, provincial and federal revenue would balance out these adverse effects for current and future generations. There are also adverse effects associated with the Closure and Post-Closure phases when employment and economic opportunities associated with HVC MLE are expected to conclude. By extending the life of the mine, HVC MLE would delay these adverse effects for current and future generations.

Adverse effects on culture and Indigenous Interests related to historic and current HVC mining operations are expected to continue through HVC MLE and would affect current and future generations by delaying the reclamation of lands and return of flows to Pukaist Creek and Witches Brook. HVC also reported that adverse residual effects on harvesting and subsistence activities, and use of culturally and ceremonially important sites in and around HVC MLE are expected to extend to future generations. HVC concluded that the effects to environmental, biophysical, and socioeconomic valued components, would change First Nations community members' ability to exercise their Aboriginal rights to hunt, trap, fish, and engage in traditions and practices, as well as exercise self-governance systems, but that First Nations community members would continue to be able to exercise Aboriginal rights beyond the HVC MLE footprint within the Indigenous Interests local study area and within their traditional territories.

The greatest effects to current and future generations due to BASA are related to the continuation of Valley Pit dewatering and continuation of positive and negative effects and subsequent delay of effects related to Closure and Post-Closure.

To support the assessment of effects to current and future generations, HVC identified plans and strategies developed by the Province of B.C. relating to sustainable growth and economic development and demonstrate how HVC MLE would support and align with these goals.

14.4.3. Key Issues Raised

14.4.3.1. Consideration of Social and Cultural Effects

During Application Review, the CNA raised questions about the way in which HVC had captured the different effects current and future generations and felt there was a gap in the assessment and a missed opportunity to summarize effects holistically. The CNA was concerned that social and cultural effects hadn't been fully considered.

⁵⁹ This refers to the current extent of the disturbed area of the HVC mine and was used as a comparison to assess the effects of extending the life of the mine.

In response, HVC updated [Chapter 14 of the Application](#) to provide a better overview of effects to current and future generations, and separated effects into categories of biophysical valued components, human and community valued components, and culture and Indigenous Interests.

The EAO considered the information provided by HVC and the updated summary provided in the revised Application and was satisfied with the response.

14.4.3.2. Social and Economic Effects Post-Closure

The CNA raised concerns related to the effects on future generations resulting from the loss of employment and economic opportunities related to mine closure. HVC is one of the largest employers in the area, and the largest employer in Logan Lake and Ashcroft. Currently, HVC employs a five-year annual average of 1,320 people, including 130 contractors.

HVC MLE would extend mine closure from 2028 to approximately 2043. HVC estimated that approximately 200 people would be required during the first three years following closure, ramping down over 10 years post-closure, then stabilizing at 10 employees over the long-term. Closure of the HVC mine site would also ultimately result in a net loss in economic activity for future generations. The effect of HVC MLE on the economy in the regional study area has been assessed in greater detail in [section 13.9](#) of this Report.

The EAO considered the information provided by HVC and was satisfied with HVC's response. The EAO has proposed Condition 16 Social Closure Plan, which would require HVC to plan for the closure of the mine and support employee and community transition post-mining.

14.4.4. The EAO's Assessment and Conclusions

Mining has historically been, and continues to be, an important part of B.C.'s industrial landscape, contributing to provincial and municipal revenue and providing stable, high-wage jobs. Mining also has environmental and socio-economic costs, particularly for First Nations communities that have not historically benefitted financially and have experienced effects to their constitutionally protected Aboriginal rights.

During the HVC MLE environmental assessment, participating Indigenous nations identified the cumulative effects related to continued mining as a critical concern. For example, LNIB's highlighted in their Tmix[™] assessment that 33,000 ha of traditional land has been affected by the current mine, and that this is a critical negative effect to current and future generations. The EAO acknowledges that the loss of important cultural sites and areas for First Nations to exercise their Aboriginal rights in the Highland Valley is either irreversible or only reversible in the very long term. Current and future generations of First Nations will be affected by continued mining in the Highland Valley.

Over about the last decade, Nlaka'pamux Nation groups have signed agreements with both HVC, to share mine revenue, and with B.C., to share mineral tax revenue. The EAO understands that if HVC MLE proceeds, these agreements would continue to provide a positive financial effect to Nlaka'pamux Nation groups. HVC MLE would also provide access to new jobs and extend jobs already in place at the mine site. These effects would end when the mine closes.

The potential effects of HVC MLE and additional mitigation measures and proposed Conditions for human health, surface water, groundwater, the economy, land and resource use, and infrastructure and services, are assessed in more detail in the following sections of this Report: [section 13.8](#), [section 13.4](#), [section 13.3](#), [section 13.10](#) and [section 13.9](#). After considering these proposed mitigation measures and proposed Certificate Conditions, the EAO concludes that HVC MLE would have positive effects on First Nations revenues, local employment, and the provincial economy associated with the development of HVC MLE for future generations. The EAO also concludes that HVC MLE would continue the adverse effects on First Nations' Indigenous interests.

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse effects on Current and Future Generations. This conclusion considers the information in HVC's Application, the information and analysis in this

chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions.

14.5. Disproportionate Effects on Distinct Human Populations

14.5.1. Summary

One of the areas that must be considered in every environmental assessment in B.C. is the disproportionate effects on distinct human populations, including populations identified by gender. People may experience project effects differently based on factors that include, but are not limited to, sex, gender identity, age, disability, education, ethnicity, economic status, geography (including rurality), language, race, religion, and sexual orientation. HVC assessed the potential effects of HVC MLE and the BASA Amendment that may be experienced disproportionately by different human populations through the effects assessment framework for each valued component.

The following sections summarize the residual effects on valued components that are expected to be experienced disproportionately by different populations. The EAO notes that residual effects on the groundwater and surface water valued components are expected to have an even effect across population groups, so they have not been included in the summary below.

14.5.2. Assessment of effects by HVC

HVC assessed the interactions that HVC MLE may have on distinct population groups in [Chapter 13 of the Application](#). HVC identified the key potential effects as:

- Reduced ability to participate in economic opportunities due to barriers to employment (Indigenous people, single households, women, individuals with disabilities, seniors, youth, caregivers);
- Reduced access to affordable housing for those who are already unhoused or living in unsuitable housing due to increased demand for housing in response to added employees through HVC MLE (seniors, Indigenous people, women, low-income households);
- Increased demand for use of public lands for recreational and traditional purposes (residents of North Road / Halfway Trailer Park, local and traditional land users);
- Reduced access to healthcare or emergency response services, decreased food security, or reduced public safety (Indigenous people, traditional land users, seniors, households with children, individuals already lacking access to health services and healthy food, individuals who must travel through construction traffic areas).

HVC did not identify any disproportionate effects from the BASA Amendment.

To address these potential effects, HVC identified existing and new mitigation measures to address these potential effects:

- Prioritizing local hiring and providing career planning events for youth, especially Indigenous youth;
- Providing disability supports and following Teck's Equity, Diversity and Inclusion policy;
- Communicating regularly with local and First Nations governments and agencies about employment, staffing changes, expected need for housing, and emergency planning;
- Developing an Indigenous Employment Strategy and a Social Closure Plan;
- Developing a Construction Workforce Accommodation Strategy if needed during peak construction;
- Managing construction traffic around the mine site;
- Continuing to implement HVC's Emergency Preparedness and Response Plan;

- Maintaining HVC's onsite medical and emergency services and supporting staff as needed through HVC's employee and family assistance program;
- Continuing to support food banks and other charity initiatives;
- Working with First Nations to help support access to traditional foods and complete a Traditional Foods Quality Study to verify the results of HVC's Human Health Risk Assessment and to address concerns related to the perceived contamination of locally harvested foods;
- Providing mandatory cultural awareness training for all HVC employees, and working with First Nations to develop HVC's Indigenous Cultural Awareness Training;
- Establishing protocols to handle complaints and promote an inclusive work culture; and
- Continuing to implement HVC's Social Management System to guide engagement with local communities, including through handling grievances and complaints.

14.5.3. Key Issues Raised

The following key issues were identified by the Technical Advisory Committee during the review of the Application.

The CNA requested that HVC revise its assessment of effects to distinct populations, as it was concerned that the analysis was too general and did not fully use a GBA+ lens to examine effects on marginalised and vulnerable populations. The EAO also requested more information about intersectionality and how people who are part of more than one marginalised group might be affected by HVC MLE. SSN raised concerns regarding how the assessment was undertaken and whether Indigenous determinants of health were considered.

HVC responded by revising Chapter 13 of the Application to add detail about effects to marginalised and vulnerable populations, including by adding analysis considering intersectionality for people who are members of more than one marginalised group. HVC also responded directly to SSN to explain how its assessment adhered to the requirements set out in the Application Information Requirements, how it had gathered the information presented in this section of the Application, and how it assessed effects to Indigenous peoples' health in alignment with previous requests from SSN.

The EAO is satisfied that HVC's added analysis and information regarding effects to distinct populations, including through intersectionality, have addressed the concerns raised.

14.5.4. The EAO's Assessment and Conclusions

The EAO considered HVC's assessment in section 13 Community Well-being of the Application and the following residual effects from the valued component assessments which would disproportionately affect marginalised groups:

- **Air Quality** – Change in ambient concentrations of criteria air contaminants, namely dust, could cause a residual effect that would be disproportionately experienced by First Nations land users as they spend more time on the land and would be exposed to criteria air contaminants more frequently.
- **Noise** – While HVC's models indicated that noise levels would be below Health Canada guideline criteria at most receptors, slightly increased noise levels are an expected residual effect for HVC MLE as its activities would slightly increase current noise levels, which could cause effects to people, as well as displacement and sensory disturbance to wildlife. Noise effects would have a disproportionate effect on members of First Nations who peacefully enjoy the use of land near HVC MLE.
- **Fish and Aquatic Resources** – Loss and alteration of fish habitat from HVC MLE activity and changes in fish health due to constituents of potential concern causing changes in water quality and quantity would have a disproportionate effect on First Nations people who harvest fish and other wildlife consumers. Slightly elevated

levels of mercury in fish tissues could potentially occur during all phases of HVC MLE and could cause concern to those who depend on fish as a traditional food source.

- **Vegetation and Ecosystems** – Surficial disturbances, edge effects and fragmentation, alteration of hydrological connectivity, and introduction or spread of invasive plant species has the potential to cause loss and alteration to terrestrial ecosystem abundance and to traditional use plants. This would disproportionately affect First Nations who harvest and use traditional use plant species or spend time on the land as any further adverse effects to strained ecosystems can affect traditional stewardship of the land.
- **Wildlife and Wildlife Habitat** – Changes to wildlife as a result of HVC MLE, including to wildlife abundance, mortality, health and habitat would all have disproportionate effects on First Nations people who hunt and consume traditional foods.
- **Economy, infrastructure and services** – HVC MLE would require additional workers which would increase the demand for housing in the long-term and temporary accommodation in the short-term during Construction. While this is expected to have a regional effect, pressures on housing availability would be experienced disproportionately by renters, low-income individuals and communities most likely to accommodate the additional workforce, noting that First Nations people are more likely to be experiencing unstable housing than the general population, and would therefore be more affected by potential changes to housing availability.
- **Human Health** – Reductions in access to affordable housing and emergency and health services, reductions in food security, reduction in public safety would all disproportionately affect First Nations people who already have poorer access to health and emergency services, to healthy food, and are at higher risk from changes to public safety, particularly for First Nations women and girls. Changes to environmental determinants of health would disproportionately affect First Nations people who consume traditional foods and are on the land at a higher rate than the general population.
- **Land and Resource Use** – Activities associated with HVC MLE would result in a change in the prominence of the mine site at some viewpoints, causing changes to visual resources as a residual effect. First Nations community members would be disproportionately affected by further changes to visual resources which may affect First Nations' cultural heritage activities.
- **Heritage Resources** – Disturbance to archaeological sites and heritage sites is highly likely to occur during HVC MLE activities and would have a disproportionate effect on First Nations as archaeological and heritage sites near HVC reflect primarily First Nations land use and occupation.

The EAO is satisfied that HVC MLE and the BASA Amendment would not have significant adverse effects on distinct human populations. This conclusion considers the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, existing and new proposed permit conditions, and the EAO's proposed Certificate Conditions.

14.6. Alternative Means of Carrying out HVC MLE

A key component in each environmental assessment is understanding how different ways of carrying out each project could change the potential project effects. Both the technical and economic feasibility of each alternative must be considered. HVC provided its assessment of alternative means in [section 1.8.1](#) of the Application.

Because HVC MLE would expand the existing mine site where mine components are already in place on the landscape, the assessment of alternative means was more restricted for HVC MLE than would be for a new project undergoing an environmental assessment, where more options are available to place project components on the landscape.

HVC completed a detailed and extensive evaluation of alternatives for each key change related to HVC MLE (tailings technologies and storage sites, sourcing 'borrow' material and material for the L-L dam core, waste rock storage

alternatives, and power supply alternatives). HVC's evaluations included various scientific studies and, for some items, a workshop of HVC staff and consultants. HVC also sought feedback from First Nations on key alternatives items, particularly related to the waste rock dumps.

For the tailings technologies and storage sites alternatives, HVC considered five options, including slurried tailings (the current technology), thickening, filtered (dry-stack) tailings, tailings and waste rock co-disposal, sequential and concurrent deposition. HVC concluded that each option would have greater effects than the current slurried tailings option. HVC also examined eight tailings storage alternatives, including using combinations of the existing Highland Tailings Storage Facility and either one or two new facilities. HVC concluded that the preferred option which would minimise effects and was most cost-effective was to continue to deposit slurried tailings into the Highland Tailings Storage Facility, including by expanding the Highland Tailings Storage Facility to accommodate the new tailings from HVC MLE.

For the L-L Dam core and borrow materials alternatives, HVC examined options to source suitable materials to use in the L-L Dam core and for other uses at the site, such as reclamation. HVC determined that using a geomembrane core for the L-L Dam would reduce the need for borrow materials, which would reduce effects to land disturbance and thus to cultural and archaeological sites.

HVC also assessed alternatives for waste rock storage and conducted engagement with First Nations to include their preferences in the evaluations and footprints of the dumps. In particular, First Nations were concerned that a higher Valley North Dump would interfere with sightlines to high elevation land features, which have cultural and spiritual implications. HVC determined that a lower, wider Valley North Dump would be the preferred alternative. For the Valley South and Highmont West Dumps, no viable alternatives were available.

The final alternative assessment conducted by HVC examined power supply alternatives. The increased milling rate and increased tailings management needs resulted in an increase in the amount of power needed at the site. HVC's assessment considered four scenarios, a new 138 kilovolt transmission line, upgrades to conductors on the current line by B.C. Hydro, alternative renewable power supply, and liquified or piped natural gas. This evaluation concluded that the option for B.C. Hydro to upgrade the conductors on the current line would result in far less ground disturbance than the other options and would be the cheapest option and so are the most economically feasible. BC Hydro is seeking regulatory approval from the B.C. Utilities Commission for the work required to upgrade the current line.

Each of these alternatives have been discussed and explored throughout the Combined Process, and these alternatives have been accepted given the site-specific considerations.

14.7. Greenhouse Gas Emissions

14.7.1. Summary

All environmental assessments in B.C. must consider the project's greenhouse gas (GHG) emissions and the potential effects of those emissions on the Province's ability to meet its legislated GHG emission reduction targets. The Province's [Climate Change Accountability Act](#) (formerly the *Greenhouse Gas Reduction Targets Act*) establishes targets for reducing provincial GHG emissions. As an operating mine, HVC is also required to report annual GHG emissions under the [Greenhouse Gas Industrial Reporting and Control Act](#). HVC must also provide a credible plan for HVC MLE to achieve net-zero GHG emissions by 2050, per the Minister's letter to the Chief Executive Assessment Office about the provincial Net-Zero New Industry Policy.

HVC assessed the predicted GHG emissions for HVC MLE in [Chapter 8.0 of the Application](#) using the emission factors and methods required under [Canada's Greenhouse Gas Quantification Requirements](#). HVC MLE would generate GHG emissions through burning fossil fuels during construction and mining activities and indirectly through electricity use. HVC estimated that:

- Total cumulative GHG emissions during the operations of HVC MLE would be 7,017 kilotonnes (kt) of carbon dioxide equivalent (CO₂e);
- Maximum annual net GHG emissions during operations would be 436,998 tonnes of CO₂e per year in 2035;
- Closure GHG emissions would total 202,789 t CO₂e during the closure phase from 2043 to 2052; and
- Post-closure releases would be 9,165 t CO₂e / year from 2053 onwards.

Land use changes can also affect GHG emissions when vegetation clearing creates a GHG source or when re-vegetation and restoration efforts contribute to carbon sinks through natural carbon capture. HVC estimated that 1,481 ha of ecosystems would be lost or altered due to HVC MLE, resulting in a total carbon source of 316 kilotonnes of CO₂e which was averaged across the operation years of HVC MLE to calculate net annual emissions. HVC did not incorporate any of its required reclamation or revegetation activities in the GHG emission calculations to maintain a conservative GHG estimate.

Under the *Climate Change Accountability Act*, the Province has committed to reducing total provincial GHG emissions to 40 percent below 2007 levels by 2030, 60 percent below 2007 levels by 2040 and 80 percent below 2007 levels by 2050. Net GHG emissions from HVC MLE are estimated to be:

- 422,780 t CO₂e /year in 2030 representing 1.08 percent of the 2030 target,
- 292,126 t CO₂e /year in 2040 representing 1.13 percent of the 2040 target and
- 9,227 t CO₂e /year in 2050 representing 0.07 percent of the 2050 target.

HVC concluded that in 2030 and 2040, HVC MLE would have modest emission effects on a provincial scale that should not significantly affect the Province's ability to meet its targets. HVC MLE is expected to be in the closure phase in 2050 and have a very minor effect on the 2050 target.

HVC relies both on guidance from provincial requirements and HVC-designed site-specific management plans to mitigate emissions from HVC MLE operations. HVC would meet applicable GHG emissions regulations, policies and plan requirements and align with Teck's objective to achieve net-zero Scope 1 and 2 GHG emissions by 2050. HVC has considered GHG emissions in the design and operation plans for HVC MLE and has completed project design and activity changes to reduce potential adverse effects and emissions, including:

- The redesigned Valley North Dump site to shorten the distance from HVC MLE to reduce haul truck hours and associated GHG emissions;
- Strategic site selection for the New Lornex Landfill to be within proximity of the existing landfill and waste sources to reduce truck hauling of materials and associated GHG emissions; and
- Relocation and re-use of the existing tailing pipelines to accommodate HVC MLE's needs with ongoing piping replacement as needed.

Existing mitigation measures implemented to reduce GHG emissions on the HVC mine site would continue to be implemented for HVC MLE, including:

- Working with suppliers to certify renewable content contained in supplied blends and increase the percentage of renewable diesel in diesel blends in alignment with the B.C. Low Carbon Fuel Standard;
- Continuing the use of electrical power acquired through BC Hydro; and
- Reducing truck hauling and associated GHG emissions using core sampling and X-ray fluorescence-based sensors to identify ore or waste loads to direct transport locations.

HVC would consider opportunities to reduce GHG Emissions including traditional measures such as increasing energy efficiency, fuel switching, constructing more energy efficient buildings and increasing renewable energy use where

feasible. Evaluations of additional measures that may reduce GHG emissions would continue as new technologies and information become available.

The BASA Amendment is not expected to have any effects to GHGs.

14.7.2. Key Issues Raised

14.7.2.1. Net-Zero Plan

The B.C. Climate Action Secretariat expressed concerns regarding the lack of a Net-Zero Plan for HVC MLE operations. As the Province of B.C. continues its efforts to reduce provincial emissions, an approved Net-Zero Plan to achieve net-zero emissions in 2050 and every year thereafter is a requirement of reporting operations as defined in the *Greenhouse Gas Industrial Reporting and Control Act*.

14.7.2.2. Land Use Emissions

During review of the Application, the CNA and LNIB raised concerns about how land losses from previous activity and proposed new activities affects total GHG emissions. HVC clarified how GHG emissions were projected and captured in Application. HVC agreed with LNIB that the different stages of forest maturity contribute to carbon emissions and sequestration differently, however, current methodologies under the Strategic Assessment of Climate Change Technical Guide are still in draft and were therefore not used in this assessment. HVC took a conservative approach to calculating the GHG emissions from land use changes, including the exclusion of carbon sequestration from revegetation to achieve a reasonably accurate assessment.

14.7.2.3. Alternative Means of Carrying Out HVC MLE

The B.C. Climate Action Secretariat inquired about alternative means for carrying out HVC MLE which could reduce emissions including the implementation of a higher percentage of renewable fuel, in-pit crushing and conveying of waste and GHG reduction technologies. HVC explained the economic challenges of these alternate means. Increasing fuel costs make implementing a higher percentage of renewable diesel not economically feasible, however, HVC plans to continue engaging with fuel suppliers to explore options to increase renewable content in fuel. Similarly, in-pit crushing and conveying of waste was determined to be non-economical due to the high capital costs with estimated GHG emission reductions of approximately 31 kilotonnes of CO₂e annually. HVC stated that they are evaluating potential new material handling options and other GHG reduction technologies to explore and help develop options which would be considered for adoption when commercially proven and economically feasible.

14.7.3. The EAO's Assessment and Conclusions

To meet provincial requirements for net-zero GHG emissions by 2050, the EAO has proposed Condition 15 Greenhouse Gas Emissions and Net-Zero Plan. Considering the information in HVC's Application, the information and analysis in this chapter, the views of the Technical Advisory Committee, including First Nations, and HVC, and the EAO's proposed Certificate Condition, the EAO is of the view that HVC MLE would not affect the Province's ability to meet its commitments under the *Climate Change Accountability Act* or have a significant adverse effect on GHG emissions. The EAO does not expect the BASA Amendment to contribute to a change in GHG emissions.

14.8. Risk and Uncertainty

Each environmental assessment includes various risks and uncertainties, such as uncertainty related to the potential degree of air and water pollution, of habitat destruction, and of adverse effects to wildlife, which must be considered to ensure a comprehensive and reliable assessment. Predicting these effects accurately can be challenging due to the complexity of natural systems, the variability in site-specific conditions, and inherent uncertainty in selected assessment methodologies (for example, even standard modelling used to predict contaminant levels in air or water has an inherent level of risk associated with model accuracy).

In the assessment of each valued component, the EAO considered the risk and uncertainty associated with specific predicted effects from HVC MLE and the proposed BASA Amendment. The EAO also considered risks and uncertainties collectively. This section evaluates the risks and uncertainties present for HVC MLE and the proposed BASA amendment as a whole using the five pillars of the EAO's assessment approach: environmental, economic, health, social, and cultural effects.

Risk is the combination of how likely an effect is to happen (the likelihood or probability) and the outcome of the effect occurring (the consequence). The likelihood of a particular effect can be influenced by a variety of factors, such as the probability of the effect happening (for example, the likelihood of a small fuel spill versus a large wildfire) and the chance of mitigation being successful (for example, there is a higher likelihood of being able to mitigate the effects of a small fuel spill than a large wildfire). The consequences are the residual effect, positive or negative, on the values of concern. The magnitude and extent of the potential residual effect also provides information on the consequence. Consider our example of a small fuel spill versus a large wildfire – a small fuel spill is expected to only affect a few m², while a large wildfire could affect many km². An additional source of risk lies in the potential for cumulative effects of project activities combined with past, present or future activities on the land base. The inherent uncertainties in predicting long-term cumulative effects can make it difficult to develop effective mitigation strategies and to fully understand the potential for significant environmental harm.

Uncertainty represents the level of confidence in the assessment of effects. Uncertainty exists in predicting the effectiveness of mitigation measures used to address major project effects. The unpredictability of future events also introduces uncertainty into the environmental assessment, as natural disasters, such as floods or earthquakes, can have unforeseen effects on project operations and the surrounding environment, if they are not planned for adequately. Climate change further complicates this issue by altering weather patterns and increasing the frequency and intensity of extreme weather events, though this also can be planned for. These factors can affect project infrastructure, the effectiveness of mitigation measures, and the overall resilience of the ecosystem. Where possible, sources of uncertainty need to be reduced through additional studies or mitigation measures, or by the use of adaptive management techniques that allow reactions to changing or different than expected conditions.

Table 29: Risk Matrix

		Consequence		
		Major	Moderate	Minor
Likelihood	High	High	Moderate	Low
	Medium	High	Moderate	Low
	Low	Moderate	Low	Low

14.8.1. Environmental Effects

Some uncertainty is inherent in any study of or data collection from natural systems due to natural variability. Natural variability complicates modelling by creating a large number of inputs, unknowns, and other contributing factors. There may also be some uncertainty in the effectiveness of proposed mitigation measures if they have not been extensively demonstrated on other projects. The risk for environmental effects to a project may underestimate the effects of contributing factors to the environment such as climate change, disease, or additional development in the area which would undermine proposed mitigation measures. Following the EAO's assessments, the following environmental effects had a high uncertainty and/or risk rating:

- Groundwater: changes to groundwater and surface water quantity and quality, and changes to groundwater and surface water quantity due to BASA; and

- Surface water: changes to groundwater and surface water quantity and quality.

14.8.2. Economic Effects

Economic uncertainty is a factor of the broader economy. A poorly performing national or international economy as well as other global economic or political factors may affect the proponent's plans for the development of HVC MLE. This uncertainty cannot be easily accounted for in the assessment of effects to the local economy. The economic risks of HVC MLE for stakeholders and Nations would include financial benefits or employment opportunities being reduced or not realized, though this is considered unlikely due to the high expected future demand for copper as a critical mineral. No economic valued components had a high uncertainty and/or risk rating.

14.8.3. Health Effects

Risks related to health effects primarily relate to traditional harvesting and land use and air quality, for which human health risk assessment modelling carries a degree of innate uncertainty. Risks to human health could occur due to an increase in exposure to contaminants through the air or water, or to wildlife or vegetation which are then used as traditional foods. None of the effects to the human health valued component had a high uncertainty and/or risk rating.

14.8.4. Social Effects

Uncertainty for assessing the risks to social effects is primarily in unforeseen developments or activities in the region that could impose additional strain on land and resource use or infrastructure and services if they were to occur at the same time as HVC MLE. None of the social effects assessed by the EAO had a high uncertainty and/or risk rating.

14.8.5. Cultural Effects

Cultural effects to First Nations, including losses of irreplaceable cultural heritage resources, effects on traditional harvesting and species of cultural significance are intrinsically linked to the effects to the natural systems with the existing variability and risk. For HVC MLE, the EAO concluded that there is high uncertainty in the significance of the cumulative effects to Heritage Resources. The precise total loss of heritage resources in the Highland Valley from before mining began to current day is unknown, but any land in the Highland Valley has been covered by the mine site has also resulted in the loss of cultural heritage and archaeological sites. Going forward, permits issued by the provincial Archaeological Branch would require HVC to manage any sites which are discovered or disturbed.

For HVC MLE and BASA Amendment, the following potential effects to the Nlaka'pamux Nation's Indigenous interests had a high uncertainty and/or risk rating: hunting, fishing, trapping and engaging in Nlaka'pamux practices, customs, and traditions. The EAO has proposed Certificate Conditions to reduce the adverse effects to Nlaka'pamux land and resource use, including Condition 12 Nlaka'pamux Foods Monitoring Plan, Condition 13 Watershed Management and Mitigation Plan, and Condition 14 Wetlands and Riparian Mitigation and Offsetting Plan. Additionally, ENV, MCM, FOR and WLRS have considered how to minimize the effects of HVC MLE on Nlaka'pamux Nation's Indigenous interests and have proposed amendments to permit language and conditions to support this goal.

14.8.6. Interaction between effects

The EAO evaluated multiple potential effects of HVC MLE, including cumulative effects, which when assessed individually may not be significant but when considered together may be collectively significant. The EAO has considered both positive and negative interactions, interdependencies, and dynamics of the environmental, human health, social, economic, and cultural valued components, including:

- Additive cumulative effects, where cumulative effects from multiple sources affect a receptor valued component (e.g. surface water quality and air quality affecting human health);

- Synergistic cumulative effects, which occur when the interaction between two or more effects result in greater cumulative effects than the simple addition of effects; and,
- Compensatory cumulative effects occur when two or more physical activities (one a negative effect, the other a positive effect) offset each other. Cumulative effects assessment must consider that once the source of the compensatory (positive) cumulative effect is removed, an adverse cumulative effect may remain.

This analysis of cumulative effects for HVC MLE revealed sources of uncertainty between valued components (for example, the interactions between groundwater and surface water on and around the mine site), connections and dependencies between valued components (for example, changes to water quality may affect wildlife which may affect human health), and additive effects (for example, potential for changes to air quality, water quality, and the quality of traditional foods to affect human health). The EAO has proposed several Conditions to address these cumulative effects, including Condition 12 Nlaka'pamux Foods Monitoring Plan and Condition 13 Watershed Management and Mitigation Plan.

14.8.7. The EAO's Assessment and Conclusions

The EAO notes that although there are levels of uncertainty and risk associated with HVC MLE and with the proposed BASA Amendment, potential effects with moderate to high risk and/or uncertainty have resulted in proposed Certificate Conditions or updated permit conditions which would require monitoring and mitigation measures, including adaptive management, to manage potential effects. The EAO concludes that the risks and uncertainties associated with the potential effects of HVC MLE on valued components are not to a level that would impair the EAO from understanding the effects of HVC MLE or concluding on the overall effectiveness of mitigation measures and expected outcomes. The EAO is also of the view that the proposed Certificate Conditions and conclusions represent the key interactions between valued components, and that no additional significant interactions were identified or need additional mitigation.

APPENDIX 1 - RESIDUAL EFFECTS CHARACTERIZATION DEFINITIONS

Residual effects are usually described using standard criteria: context, magnitude, extent, duration, reversibility and frequency. These criteria, as well as likelihood, are summarized in the following table.

Table 30: Residual Effects Characterization Definitions

Criteria	General Description	Assessment Definitions
Context	Consideration of context draws heavily on the description of existing conditions (the environmental, economic, social, cultural and/or health setting) of the valued component, which reflect cumulative effects of other projects, and activities that have been carried out, and especially information about the effect of natural and human-caused trends in the condition of the valued component.	Low: the receiving environment or population has low resilience to imposed stresses and will not easily adapt to the potential residual effect. Moderate: the receiving environment or population has a moderate resilience to imposed stresses and may be able to respond and adapt to the potential residual effect. High: the receiving environment or population has high natural resilience to imposed stresses and can respond and adapt to the potential residual effect.
Magnitude	Magnitude refers to the expected size or severity of the residual effect. When evaluating magnitude of residual effects, consider the proportion of the Valued component affected within the spatial boundaries and the relative effect (e.g., relative to natural annual variation in the magnitude of the valued component or other relevant characteristic).	Negligible: no detectable change from existing conditions. Low: the potential residual effect will slightly alter or change the valued component without changing its role or function. Medium: the potential residual effect will alter or change the nature, role, or function of a valued component but will not affect its integrity. High: the potential residual effect will substantially alter or change the nature, role, or function of a valued component and may jeopardize the valued component's integrity.

Criteria	General Description	Assessment Definitions
Extent	The spatial scale over which the residual effect is expected to occur.	Limited: the potential residual effect is restricted to the HVC MLE project Footprint. Local: the residual effect will be within the local assessment area. Regional: the potential residual effect will be within the regional study area. Beyond Regional: the potential residual effect will be beyond the regional study area.
Duration	The period during which the potential effect persists and acts upon the valued component. This may be longer than the duration of the physical work or activity that produced the potential residual effect.	Short-term: the anticipated potential residual effect will be felt temporarily during the HVC MLE Project's construction or closure stages only. It also applies to any effect that will occur for less than two years in operations. Medium-term: the anticipated potential residual effect will be felt for a limited period of time greater than two years, generally corresponding to the operations phase and closure phase. Long-term: the anticipated potential residual effect will be felt beyond closure.
Reversibility	Whether or not the residual effect on the valued component can be reversed once the physical work or the activity causing the effects stop or mitigation measures take effect to eliminate the effect.	Fully reversible: may fully recover and return to its pre-Project state. Partially reversible: may partially recover from the HVC MLE project changes. Irreversible: will not recover and return to its pre-Project state.
Frequency	How often or how many times the anticipated residual effect may occur.	Once: the effect is confined to one discrete event. Regular: the effect occurs at consistent intervals. Irregular: the effect occurs at sporadic intervals. Continuous: effects occur constantly.

Criteria	General Description	Assessment Definitions																					
Affected Populations	A subset of the population being affected disproportionately by certain valued components. Examples of affected populations could include different groups within the Indigenous nation who may experience the effects in a different way, such as youth, Elders, or women.	Even: the potential effect is experienced by any or all sub-populations. Disproportionate: the potential effect is experienced only by certain populations or experienced more acutely by certain sub-populations.																					
Risk (likelihood and consequences)	The likelihood (probability) of an event (incident) occurring and its consequences. Likelihood is whether or not a residual effect is likely to occur. It may be influenced by a variety of factors, such as the likelihood of a causal disturbance occurring or the likelihood of mitigation being successful. The consequences are the residual effect, positive or negative. The magnitude and extent of the residual effect provides information on the consequence, which in conjunction with likelihood, informs the understanding of risk.	Low: less than 40 percent chance of effect occurring Medium: 40 to 80 percent chance of effect occurring High: more than 80 percent chance of effect occurring Consequence can be assessed as minor, moderate or major based on the combination of magnitude and extent. Risk is consequence multiplied by likelihood. <table><tr><th colspan="2" rowspan="2"></th><th colspan="3">Consequences</th></tr><tr><th>Major</th><th>Moderate</th><th>Minor</th></tr><tr><th rowspan="3">Likelihood</th><th>High</th><td>High</td><td>Moderate</td><td>Low</td></tr><tr><th>Medium</th><td>High</td><td>Moderate</td><td>Low</td></tr><tr><th>Low</th><td>Moderate</td><td>Low</td><td>Low</td></tr></table>			Consequences			Major	Moderate	Minor	Likelihood	High	High	Moderate	Low	Medium	High	Moderate	Low	Low	Moderate	Low	Low
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		Major	Moderate	Minor																			
Likelihood	High	High	Moderate	Low																			
	Medium	High	Moderate	Low																			
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Criteria	General Description	Assessment Definitions
Uncertainty	The natural variation in complex biophysical environments or the statistical variation in data sets and models that arises from the imperfection of unknown information. Where uncertainty is unable to be reduced, how it effects valued components needs to be described so that it can be considered in decision making	Low: there is a good understanding of the cause-effect relationship between HVC MLE and the valued component, and sufficient data is available to support the assessment. The effectiveness of the selected mitigation measures is moderate to high. There is a low degree of uncertainty associated with data inputs and/or modelling techniques, and variation from the predicted effect is expected to be low. Moderate: the cause-effect relationships between HVC MLE and a valued component are not fully understood (e.g., several unknown external variables or data for the HVC MLE area is incomplete). The effectiveness of mitigation measures may be moderate or high. Modelling predictions are relatively confident. High: the cause-effect relationships between HVC MLE and a valued component are poorly understood. There may be several unknown external variables and/or data for the HVC MLE project area that is incomplete. The effectiveness of the mitigation measures may not yet be proven. Modelling results may vary considerably given the data inputs. There is a high degree of uncertainty in the conclusions of the assessment. To consider when determining confidence: the reliability of data inputs and analytical methods used to predict Project effects, the confidence regarding the effectiveness of mitigation measures, and the certainty of the predicted outcome.
Importance	Have any issues been identified as an interest/priority by potentially affected Indigenous nations, local governments, provincial and federal government agencies, or stakeholders.	Low: previously identified by some individuals, but not by Indigenous nations, community members, or government agencies. Moderate: previously identified as an interest by Indigenous nations, community members, the public, local governments, and/or provincial and federal government agencies, but not stated as a top interest. High: identified repeatedly as a top interest by Indigenous nations, community members, the public, local governments, and/or provincial or federal government agencies.

APPENDIX 2 - LIST OF PARTIES ON THE COMBINED TECHNICAL ADVISORY COMMITTEE AND MINE REVIEW COMMITTEE

FIRST NATIONS

Nlaka'pamux Nation

- Citxw Nlaka'pamux Assembly, consisting of Ashcroft Indian Band, Boston Bar First Nation, Coldwater Indian Band, Cook's Ferry Indian Band, Nicomen Indian Band, Nooaitch Indian Band, Shackan Indian Band and Siska Indian Band
- Lower Nicola Indian Band
- Kanaka Bar Indian Band

Secwépemc Nation

- Bonaparte First Nation
- Stk'emlúpsmc te Secwépemc Nation, consisting of Tk'emlúps te Secwépemc and Skeetchestn Indian Band

PROVINCIAL AGENCIES, INCLUDING HEALTH AUTHORITIES

- Interior Health Authority
- Ministry of Agriculture and Food
- Ministry of Environment and Parks
- Ministry of Indigenous Relations and Reconciliation
- Ministry of Jobs, Economic Development and Innovation
- Ministry of Mining and Critical Minerals
- Ministry of Tourism, Arts, Culture and Sport
- Ministry of Transportation and Transit
- Ministry of Water, Land, and Resource Stewardship

LOCAL GOVERNMENTS

- District of Logan Lake
- Village of Ashcroft
- Thompson-Nicola Regional District