Draft Valued Components

Michel Coal Project

July 2019

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North Coal Limited

July 2019

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Michel Coal Project

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Preface for Public Comment

North Coal Limited (North Coal) proposes to construct and operate an open pit coal mine (the "Project") in the Elk Valley, British Columbia. The Project is undergoing a provincial environmental assessment (EA) led by the British Columbia Environmental Assessment Office (EAO).

The Proponent must obtain an Environmental Assessment Certificate (EAC) from the EAO before any work can be done on the Project. However, prior to submission of an Application for an EAC (Application), the EAO must first approve the proposed list of specific values to be studied (referred to as Valued Components).

This draft Valued Components proposal presents the proposed Valued Components that will be used to inform the EA and be included in the Proponent's Application. This draft incorporates preliminary feedback received from the EAO and its Working Group including government agencies (provincial, federal, and municipal) and the Ktunaxa Nation Council.

The EAO invites the public to comment on this draft Valued Components proposal that is available online at https://projects.eao.gov.bc.ca/p/58851215aaecd9001b82a8d3/commenting. The EAO also invites the public to an Open House related to this public comment period, information on which is available at the same web address. The public has from July 25 to August 29, 2019, to submit comments on the draft Valued Components proposal.

The EAO seeks public comments at this stage of the process to ensure that the specific values that might potentially be affected by the Project are identified for consideration in the EA. Comments received during the public comment period will be given to North Coal for consideration in the final Valued Components proposal that must be submitted to the EAO for approval. After considering North Coal's responses to public comments and how these comments were considered in the final Valued Components proposal, the EAO will post the approved Valued Components document to its website.

The approved Valued Components and related information presented in the approved Valued Components document must then be included in the Application Information Requirements (AIR). The AIR is a document that identifies the detailed information to be provided by North Coal in its Application. The AIR will also be posted to the EAO's website once approved by the EAO. Additional information on the EA process administered by the EAO is available at www.eao.gov.bc.ca.

Executive Summary

The Michel Coal Project (the Project) is a proposed open pit mine development in the Elk Valley in southeastern British Columbia (BC) located approximately 8 to 20 km southeast of the District of Sparwood boundary. The Project is subject to an assessment under the *British Columbia Environmental Assessment Act* (BCEAA) and federally, under the *Canadian Environmental Assessment Act* (CEAA).

This Valued Components (VC) document defines the scope of the impact assessment by determining the VCs that need to be assessed, identifying which endpoints or indicators will be used to assess each component, and the boundaries of the assessment. Potential (candidate) VCs were identified based on review of published information, meetings and discussions with indigenous and non-indigenous community members, interest groups, and regulators. These candidate VCs were then screened using standardized criteria followed by a review of the effects pathways to create a final proposed list of VCs and subcomponents that will lead to a comprehensive and meaningful assessment. Proposed endpoints, indicators and assessment boundaries were defined to fit within the Elk Valley regional planning and management frameworks.

The chosen VCs (and subcomponents) fall under physical environment, aquatic environment, terrestrial environment, economic, social, heritage, and health pillars, as follows:

- Physical environment – air quality and emissions, noise / vibration, groundwater, surface water quality, surface water quantity, sediment, terrain stability, and soil.
- Aquatic environment – aquatic health, algae, benthic invertebrates, fish (Westslope cutthroat trout, bull trout, longnose sucker and mountain whitefish) and fish habitat.
- Terrestrial environment – ecosystems (avalanche, grassland, wetland, riparian and flood, old and mature forest), rare or highly valued plants (limber pine, whitebark pine, other plants of conservation concern), and wildlife and wildlife habitat (mammals including American badger, American marten, Canada lynx, elk, moose, grizzly bear, bighorn sheep, bison, little brown myotis, wolverine, Columbia ground squirrel, river otter; birds including American dipper, olive-sided flycatcher, northern goshawk, cliff-nesting raptors, common nighthawk, woodpecker guild; amphibians including Western toad; insects including Gillette's Checkerspot; wildlife species of conservation concern; and migratory birds), and wildlife health.
- Economic – employment and income and economic activity.

- Social – education, skills and training, community infrastructure and services, community wellbeing, commercial land use, non-commercial land use / recreation, public safety, and visual aesthetics.
- Heritage – heritage resources.
- Health – human health (country foods, and community health).
- Ktunaxa VCs –Traditional Knowledge and Language; Lands and Resources; Economic; Social; Employment and Education.

These VCs will be integrated into the Application Information Requirements (AIR), which is the next step in the BC environmental assessment process.

Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

Abbreviation	Meaning
AIR	**Application Information Requirements**
BC	British Columbia
BCEAO / EAO	British Columbia Environmental Assessment Office
CEMF	Elk Valley Cumulative Effects Management Framework
CCME	Canadian Council of Ministers of the Environment
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EAC	Environmental Assessment Certificate
ECCC	Environment and Climate Change Canada
e.g./ etc.	For example / etcetera
ENGOs	Environmental Non-governmental Organizations
EVWQP	Elk Valley Water Quality Plan
GHG	Greenhouse Gases (CO_2, CH_4, N_2O)
Ha	Hectares
Hwy	Highway
km/km^2	kilometre length of road per square kilometre of land area
KNC	Ktunaxa Nation Council
LSA/RSA	Local Study Area / Regional Study Area
MCP	Michel Coal Project
NO_2, O_3, $PM_{2.5}$. PM_{10}, SO_2, TSP, H_2S.	Nitrogen dioxide, ozone, particulate matter less than 2.5 microns in diameter, particulate matter less than 10 microns in diameter, sulphur dioxide, total suspended particulates, hydrogen sulphide
Se, NO_3, Cd, SO_4	Selenium, nitrate, cadmium, sulphate
Raw Coal	Coal that is delivered from the mine to the processing plant, also known as run-of-mine coal
SARA	Species at Risk Act
Spp	Species
Tonnes	1000 kg
trc/day	tonnes raw coal per day
TRV	Toxicity reference value
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNFCCC	United Nations Framework Convention on Climate Change
VC	Valued Component

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1 Purpose

1.1 Introduction

North Coal Limited (North Coal) is a Canadian resource company based in Sparwood, British Columbia (BC), and is a wholly-owned subsidiary of North Coal Pty Ltd (North Coal Pty), a private Australian resource development company. North Coal is focused on the exploration and development of the proposed Michel Coal Project (MCP or Project), located in the Crowsnest Coalfield, British Columbia, Canada. North Coal holds the coal licenses that comprise the Project area which contain significant coking coal resources, referred to as the Loop Ridge, Michel Head and Tent Mountain deposits. These are located approximately 8-20 km southeast of the boundary of the District of Sparwood, BC.

North Coal, as the proponent, is conducting a comprehensive environmental assessment of the proposed Michel Coal Project. In general terms, the environmental assessment will be undertaken by completing the follow actions:

a. Describing the proposed Project;
b. Issues scoping;
c. Selecting Valued Components (VCs) representative of the range of values potentially impacted by the proposed project;
d. Establishing the assessment boundaries (temporal, spatial, technical and administrative for each identified VC);
e. Describing existing conditions;
f. Determining potential effects of the Project on individual VCs;
g. Determining potential effects of the VC on the Project (if present);
h. Identifying potential mitigation measures and their feasibility and likely success for implementation;
i. Evaluating residual effects (after implementation of mitigation measures);
j. Assessing cumulative effects (as required) and considering additional mitigation measures; and
k. Follow-up Program including management and monitoring plans.

To conduct the environmental assessment, North Coal is using a values-based framework to develop a comprehensive, focused, and understandable assessment of the potential effects of the Project over its life cycle (i.e., development, operation, decommissioning, reclamations and post-closure). To achieve this objective, the environmental assessment will address selected VCs representative of the range of values potentially affected as a foundation for the assessment.

This document has been prepared to provide a comprehensive list of the VCs to be considered during the environmental assessment and to provide a discussion of how and why each is chosen.

More specifically, the document:

- Describes the methods for selecting candidate VCs;
- Describes the methods employed to select the spatial and temporal boundaries used to collect baseline data/information and to be used in the assessment of potential Project effects;
- Identifies specific candidate VCs (intermediate and receptor) and why they are chosen;
- Presents the results of the evaluation of candidate VCs, and the VCs selected for the assessment;
- Provides anticipated assessment indicators and/or endpoints for each selected VC; and
- Identifies the measurement indicators to be used to predict and evaluate effects on VCs.

1.2 Definition of VCs

For the Michel Coal Project environmental assessment, VCs are defined as components of the natural and/or human environment that have been identified and are considered by the proponent, the public, Indigenous groups, scientists, technical specialists, and/or government agencies to have scientific, ecological, economic, social, heritage, archaeological, historical, aesthetic or other importance.

Appropriately chosen VCs will provide the foundation for the environmental assessment and the basis for the identification and assessment of potential negative (and in some instances positive) effects resulting from the Project. This in turn will allow for the development of effective and efficient mitigation measures/actions to reduce the identified impacts and provide the basis for an assessment of residual effects that remain after mitigative measures have been implemented.

1.3 North Coal's Environmental and Social Effects Assessment Approach

North Coal is proposing an integrated approach to assessing environmental and social effects for the Project. This approach ensures the five pillars (environment, economic, social, health, and heritage) are fully integrated as intended by the BC *Environmental Assessment Act*.

This integrated approach that links the mines ecological effects to human health via ecosystem pathways that consider how people work, transform and use that environment. The ecosystem components are not seen as isolated entities, but rather as components of a system that respond in unison to effects on the whole system. This approach recognizes the intricately linked ecosystems as well as the close association people have with the environment in the Project area. Note that this approach fully recognizes the intrinsic value of nature which also has cultural value contributing to human wellbeing.

Figure 1-1 illustrates this integrated approach. Human health is the ultimate receiver at the top of the triangle and the mine activities at the bottom of the triangle are the source of many of the changes to the ecosystems through air, soil and water pathways. Changes originating from the mine start at the bottom and flow through various physical, biological, social, economic and heritage pathways that ultimately link to human health.

In the effects assessment, each VC will not only be analysed for how it will be affected by the mine, but also how it relates to the broader environment and human health. As part of this approach, the environment will be viewed through an ecosystem lens that looks at broader associations of plants and animals and their association with the indigenous community and users of the environment. This perspective allows the assessment to look at broader landscape changes and assess the Project at a scale that is more meaningful for developing effective mitigations, setting reclamation objectives, and land use planning.

Following this approach has important bearings on what VCs are selected for the Project. The proposed VC list presented in this document are the key elements that flow through the environment to the ultimate receiver (i.e. human health). Receivers along the pathways are evaluated to determine where and how the proposed Project activities will influence them and how the whole system functions.

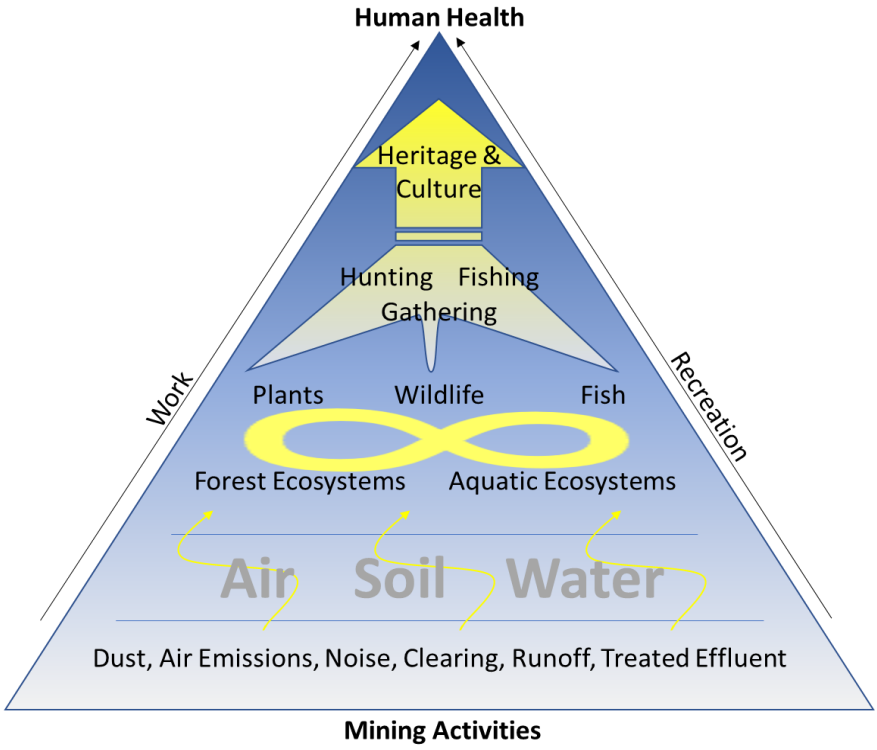


Figure 1-1: Integrated Effects Assessment

2 Project Overview

The Project Description is summarized below and is available at https://projects.eao.gov.bc.ca/api/document/5b86ded53f64cb00249e24e3/fetch/00Michel_PD_22Aug_2018_Rev03_FINAL.pdf.

2.1 Introduction

North Coal is proposing the development of the Project, which includes the Loop Ridge, Tent Mountain and Michel Head deposits. The Project is based on the following:

- As of March 2018, the Project has a measured and indicated resource of 92.6 million tonnes of Elk Valley quality hard coking coal;
- A mine life of up to 30 years, depending on final production rate;
- Annual production of approximately 2.3 to 4 million tonnes raw coal, based on plant throughput rates of 6,300 to 11,000 trc/day, using a 355-day calendar year; and
- An initial estimate of the project disturbance footprint over the 30-year life-of-mine of approximately 966 ha at Loop Ridge, 458 ha at Michel Head and 502 ha at Tent Mountain for a total project disturbance footprint of 1,926 ha.

Key features of the region surrounding the Project:

- The Project is located within the traditional territory of the Ktunaxa Nation, as represented by the Ktunaxa Nation Council (KNC);
- The nearest communities are Crowsnest, Coleman, Corbin, Sparwood, Hosmer, Fernie, and Elkford, all within approximately 40 km of the Project;
- The Project is located in Canada's Crowsnest Coalfield, one of the world's premier hard coking coal producing districts;
- The Project is located on fee simple lands with a main public access road maintained by the provincial government;

The north end of the Project area (

- Figure 7-2 to Figure 7-5) is approximately 2 km south of the Crowsnest Pass Highway (Hwy 3);
- An all-weather access road extends from the highway to the Project area. The US border is approximately 92 km south of the Project area, via Highway 3 and Highway 93 leading to northern Montana and Idaho;
- The Canadian Pacific Railway (CPR), connecting eastern Canada with western Canada, including Vancouver, BC, runs adjacent to the Project area;

- The nearest commercial airport is the Canadian Rockies International Airport, located in Cranbrook (population 19,000), approximately 125 km to the west. The major international airport of Calgary, Alberta is located 261 km to the northeast of the Project;
- The North end of the Loop Ridge deposit is a partial brownfield site that was previously mined in the 1960s, and again in 1993 and 1998 under a Mines Act Permit and Environmental Certificate issued 24 July 1996 to the former McGillivray Coal Mine;
- In the past, Tent Mountain was mined from the Alberta side of the deposit. North Coal is proposing restricting all mining to the BC side of the border;
- The Project is not located within any legally protected areas. The Michel Head deposit is located approximately 5 km north of the Flathead watershed conservation area and within the Yellowstone to Yukon corridor which is an area of interest for connecting protected habitat (Yellowstone to Yukon Conservation Initiative);
- No known old growth forests (greater than 140 years for Engelmann spruce, white spruce, and interior Douglas fir, BC Ministry of Forests, 2003) exist on the Project area. However, there is mature forest cover present that has at least some old-growth attributes (more snags, fallen trees, and layered canopy, BC Ministry of Forests, 2003) based on current surveys;
- Most of the Project area (most of the Michel Creek valley and specifically Loop Ridge and Tent Mountain, i.e. most of the Project footprint and the LSA) is reported to have been burned around 1900, due to railroad era fires (The Lethbridge Daily Herald, 1908-08-02) which will be detailed in the assessment;
- The Project area is covered by privately owned and actively managed forests and the Project area has previously been subject to harvesting in forestry operations; and
- Most of the Project area has been harvested by CanWel Building Materials Group Ltd. (CanWel) forestry operations over the last five years and more logging is planned by forestry operators before construction is anticipated to begin on the Project, which will be detailed as much as known in the assessment.

In general terms, the Project being proposed will consist of:

- Construction and upgrading of access roads and development of a product loading facility and railway siding connecting the Project area to the existing railway line;
- Construction of a laydown area, power corridors, fuel storage area and fuelling stations at each deposit;
- Water management systems at each deposit designed to be compliant with the Elk Valley Water Quality Plan (https://www.teck.com/media/2015-Water-elk_valley_water_quality_plan_T3.2.3.2.pdf) and take into consideration the issues and challenges of other operations in the Elk Valley;
- Construction of office, warehousing, maintenance and coal processing plant facilities with associated stockpile areas, water treatment and sewage facilities near the Loop Ridge deposit;
- Development of an explosives storage area and delivery system;

- Removal and temporary storage of soil in stockpiles for re-use during progressive reclamation and eventual decommissioning at all deposits;
- Development of mine pit excavations at Loop Ridge, Tent Mountain and Michel Head;
- Development of rock stockpile areas at each of the three mine areas;
- Production of dry stack tailings for co-deposition with rock in a purpose-built management facility at the Loop Ridge area near the processing plant;
- Progressive reclamation and eventual decommissioning by backfilling, where possible, of previously mined pit areas with rock as the Project proceeds at all deposits;
- Rehabilitation of areas where mining and backfilling have been completed during the life of mine to meet agreed final land use objectives at all deposits; and
- Final decommissioning and closure according to closure “endpoints” at all deposits that will be developed in consultation with applicable regulators, the Ktunaxa Nation, other interest groups and local communities.

3 VC Selection Process

VC selection follows a rigorous three-step process which first identifies all potential VCs through an "issues scoping process", then evaluates the VCs, and finally selects the VCs to be assessed during the Project environmental assessment. This document and selection process conform to the guidance on VC selection presented in the *Guideline for Selection of Valued Components and Assessment of Potential Effects* (EAO, 2013).

3.1 Issues Scoping Exercise

Issues scoping was undertaken to compile and analyze available information to be used to identify environmental, economic, social, heritage, and health issues that may be related to, or impacted by, the Michel Coal Project. This was accomplished through:

- Documenting the physical works and activities associated with the development, operation, decommissioning and final closure (i.e. the entire life-of-mine) of the Project;
- Reviewing all relevant federal and provincial Acts, Regulations, guidelines, and management plans;
- Discussions with relevant provincial and federal ministries/departments including, but not limited to, the BC Environmental Assessment Office (EAO) and the Canadian Environmental Assessment Agency (CEA Agency);
- Discussions with representatives of local Indigenous governments;
- Discussions with relevant local and regional agencies/authorities;
- Reviewing publicly available information and data on the local and regional values, species, ecosystems, ecosystem services, socio-economic, and health information;
- Reviewing publicly available information on similar projects in the Elk Valley and BC. This included such things as environmental assessments undertaken by other projects in the region, issue specific management plans, and research publications;
- Review of existing baseline survey data;
- Consulting landowners, tenure holders, community and interest groups, the public, and other key local and regional stakeholders in the project area; and
- Consulting with and incorporating the professional expertise and judgement of a wide range of discipline specialists.

Each issue or aspect identified during the scoping exercise was attributed to one of five categories – environment, health, economic, social, and heritage – and a broad assessment of each was undertaken to confirm its relevance to the proposed Project.

3.2 Selecting Appropriate VCs

Each aspect identified in the "issues scoping exercise" was then subject to analysis to evaluate whether it was a credible VC for consideration in the environmental assessment.

Using the BCEAO Guidelines for the Selection of Valued Components (EAO 2013), a range of determinants in the form of questions was used to evaluate VCs. These questions help determine whether the aspects identified in the "issues scoping" exercise are relevant to the assessment and to focus the assessment in a manner that optimizes resources considering aspects that are not likely to be affected by the Project or that are already well managed by other government legal requirements. The key questions were as follows:

- Is the identified aspect present in the local or regional study area?
- Is the component particularly sensitive or vulnerable to disturbance?
- Does the proposed Project have the potential to impact (positively or negatively) the identified aspect at any point during the life-of-mine?
- Does the Project or the Project in combination with other activities or projects in the area have the potential to interact with and adversely affect the identified aspect?
- Is the identified aspect currently under stress by current ecological conditions, other projects or human activities in the area recognizing that the stresses may not currently be known?
- Does the identified aspect pertain to, or have special significance to local or regional Indigenous interests, including claimed or proven rights (including title) and Treaty rights?
- Does a government requirement (e.g., Act, regulation, management framework) exist to protect the identified aspect?
- Does the identified aspect reflect a legislative or regulatory requirement or government management priority (e.g., species at risk)?
- Is the identified aspect itself or a potential adverse effect to the aspect resulting from the Project of particular concern to the public, Indigenous groups, or government?

A list of candidate VCs was established driven by the responses to the questions above. Each was then subjected to an additional series of determinates to further evaluate validity for inclusion in the assessment. The key questions were:

- Can the potential effects of the Project on the VC be accurately measured and monitored?
- Is the candidate VC better represented by another VC?
- Can the potential effects on the candidate VC be effectively considered within the assessment of another VC?
- Is information about the candidate VC needed to support the assessment of potential effects on another VC? If there are linkages to other receptors, then the candidate VC becomes more important.

4 Issues Scoping

4.1 Ktunaxa Nation

North Coal recognizes that this Project is located within the traditional Territory of the Ktunaxa Nation. North Coal intends to continue to engage and consult with the Ktunaxa Nation Council in accordance with a signed Engagement Agreement which is intended, among other goals, to identify and address any potential environmental effects that may be caused by the Project.

4.1.1 Historical Perspective for VCs

From review of the Fording River Operations Swift EAC Application Section C document, various Archaeological Assessments conducted on the North Coal Site, consultation with the Ktunaxa and from Ktunaxa 101 training received by North Coal Staff, an appreciation of the Ktunaxa Creation Story, history and land use has grown during the course of the North Coal Project. This history has been used to identify culturally important species and resources as well as identify land and land use important to the Ktunaxa. The information presented herein is drawn from the references, but it is recognized that it is only a partial and limited depiction of the knowledge maintained by the Ktunaxa Nation and will be updated through the course of the Project with information provided by the Ktunaxa.

The Traditional Territory size of the Ktunaxa Nation is about 70,000 km^2 holds the Ktunaxa Creation Story, defines the traditional land districts according to the Creation Story and reflects key resources and stewardship of resources associated with Ktunaxa individuals or lineages. The lands, water, animals and plants that share the Ktunaxa traditional territory are under stewardship of the Ktunaxa who traditionally maintain valley bottoms as open forests and grassland (interior Douglas fir and Ponderosa pine ecosystem types) through fire cycles. The higher elevation valleys and slopes (Montane Spruce) with south and east facing slopes are of particular importance as they provide critical habitat for the culturally important elk, mountain sheep and goat, deer, and grizzly bear. The rivers, streams and creeks and their associated valleys are also important as they provide access to culturally important sources of waterfowl, plants and fish of which trout, salmon, sturgeon, suckers and whitefish of the area are notable (Flathead, 2017).

Of the species considered keystone species by the Ktunaxa, bison and anadromous salmon have almost completely disappeared and the grizzly bear are at risk due to highways, habitat fragmentation and human disturbance associated with development.

4.1.2 Pre-contact Ktunaxa Territory

Ktunaxa people were seasonally nomadic, travelling extensively throughout the mountains and valleys of the upper Columbia River drainage according to the location, timing, abundance, and

condition of animal and plant resources. Big game species, particularly deer, elk and sheep, were taken singly with bows and traps and in communal hunts, mostly in the spring and fall, and the meat dried and stored for winter consumption. From late spring through to early fall, game, fish, waterfowl and plant foods, such as roots and berries, were acquired. The main dwelling of the Upper Ktunaxa was the hide-covered tipi.

Cooking by stone boiling was the preferred method of preparing food for immediate consumption, except for roots such as camas and bitterroot (*Lewisia rediviva*), which were baked in earth ovens. Foods not eaten directly (e.g., berries), were dried for winter storage. The Ktunaxa employed a wide range of materials in their traditional technology, including quarrying chert and quartzite for tool making, mining iron oxide for paint and collecting soft argillite for making pipes.

4.1.3 Pre-contact Crowsnest Pass

In contrast to the Elk Valley, the Crowsnest Pass has some 10,000 years of continuous human inhabitation, due mainly to the presence of extensive ungulate resources, particularly bison. Ktunaxa history extends to 14,000 years in some places within the broader Ktunaxa traditional territory (Kumtuks, 2018). The relatively stable settlement pattern was named the “herd hunter” model, an adaptation that “concentrated primarily on exploitation of bison, particularly during late fall, winter and spring, when bison were the most accessible ungulate in the Crowsnest. At other times of the year, other ungulates, notably elk and sheep, were hunted. The reliance upon other ungulates during the summer can be explained by changes in the seasonal distribution and behaviour of all ungulates in the Pass” (Driver 1978).

Based on this model, winter occupancy of the Crowsnest Pass was focused on bison hunting, and in summer, groups from the Crowsnest Pass moved to higher elevations where bison were still the dominant ungulate hunted, but other species (i.e., sheep and deer) were also very important. In this pattern, pre-contact human settlement was concentrated along the main pass, while subsidiary occupation took place in creek valleys with the greatest areas of grasslands.

4.1.4 Post-contact

At the time of European contact, an ancestral group of the Ktunaxa Nation occupied the middle Elk River drainage. This group, known as the ḵaqawakanmituknik̓ or `river running into, out again, and back into another river', (referring to the confluence of Michel Creek and the Elk River) (Schaeffer, n.d.), was the Michel Prairie Band. The Michel Prairie Band was devastated by smallpox in the early 1800’s and the survivors left the Elk Valley and merged with the Ktunaxa Nation. The Michel Prairie Band ranged between Crowsnest Lake and Waterton Lakes and crossed to Michel Prairie by Crowsnest Pass, taking advantage of the increased ungulate capability west of the continental divide over 2,000 years ago. This settlement pattern was identified as part of the middle Elk River

drainage pre-contact land and resource use model, which identifies more seasonal inhabitation of the Elk Valley prior to this time (Choquette, 1979, 1999/2008, 2004).

4.1.5 Important Components

Species of historical and current interest are as follows:

- Grizzly Bear, furbearers, and ungulates habitat and movement corridors;
- Mountain Goat and Bighorn Sheep;
- Deer;
- Elk;
- Bison – (historical extirpation by industrial and human impacts); and
- Late spring through to early fall: game, fish, waterfowl and plant foods, such as roots and berries.

Land use

- Road and trail access issues;
- Crows Nest Pass;
- Stream/River/Creek Valleys;
- Water; and
- Higher elevation valleys and slopes with south and east-facing slopes.

Resources

- Good land quality;
- Good air quality; and
- Good water quality.

Concerns

- Free movement;
- Balancing economic use of land with Cultural and Spiritual Values;
- Biodiversity and rare or hard to find ecological communities;
- Cumulative effects from habitat destruction and selenium and other contaminants in waterways;
- Creation of risk or impediments for wild food harvesting and cultural use associated with language and knowledge transmission;
- Lack of confidence in reclamation;
- Deriving benefit from Ktunaxa land and resources;

- Preserving past heritage;
- Engagement of Ktunaxa capacity in defining reclamation and shaping mining related aspects of the conservation economy, where "human welfare and the natural environment interact over time, with an eye towards the future. Specifically, conservation economics can be defined as the valuation of maintenance and repair of the natural environment for opportunities in the future" (Conservation Economics Institute, 2019*)*; and
- Development of new connections with land and among Ktunaxa people.

4.2 Public Consultation

Various members of the public have offered informal feedback to North Coal, with the main points presented below.

General Themes:

- People welcome a new mine and see it as a boost for the local economy as it will create employment;
- Hunters have expressed concern about access to hunting areas and loss of the open range land on the property;
- Fishers have expressed concern about possible contamination of Michel Creek;
- General concern has been expressed about loss of access to the Michel Creek Valley as there already is a lot of linear development and the proposed mine would add to the space consumed by railways and roads;
- The requirement to be in compliance with the Elk Valley Water Quality Plan (EVWQP) and to protect water quality; and
- Ensuring that groups working on the Cumulative Effects Process are included in consultation.
- Lack of affordable housing for persons employed in the mining sector.

Environmental Concerns:

- Water quality:
  - Will North Coal adhere to the Elk Valley Water Quality Plan?
  - Where will the water for operations come from?
  - How will North Coal control water throughout its operations?
  - Selenium:
  - How will North Coal control selenium loadings?
  - Have those strategies been attempted at other mines?
  - What selenium target/threshold will North Coal be held accountable to?
- Cumulative effects:
  - Will North Coal be participating in the Elk Valley Cumulative Effects Management Framework (CEMF)?

  - What is the mine disturbance footprint?
  - Will North Coal be looking for opportunities for collaboration with other industrial players with operations in the Michel Creek Watershed to reduce the cumulative effects of its operation?
- Habitat connectivity:
  - How will North Coal ensure habitat connectivity?
  - Proposed North Coal operations are in critical wildlife corridors.
- Rock storage area design:
  - Will North Coal be building from the bottom up or the top down?
  - How will water be controlled in the rock storage areas?
  - Will cover and liner systems be incorporated into the designs?
- Active water treatment and tailings facilities:
  - How will semi-passive and active treatment facilities work?
- Air quality:
  - What measures will be used for dust suppression?

Socio-Economic Concerns:

- Job creation:
  - Will employees be locally sourced?
  - Has North Coal examined potential spin-off businesses?
  - Will North Coal offer incentives to keep employees local?
  - Will split shifts, daycare, second mortgages be options offered?
  - What is the proposed shift schedule?
- Mine life:
  - How many years will the mine be in operation?
- Visual aesthetics:
  - Will North Coal be conducting mountain-top mining operations?
  - What part of operations will be visible from Highway 3?
  - How will North Coal be controlling dirty traffic from its operations?
- Economic viability:
  - Can the North Coal operation still be profitable given the environmental constraints?
- Recreational access:
  - Will ATV and snowmobile trails access be lost?
  - Will hunting and fishing ground access be lost?
  - Will hiking and mountain bike access be lost?

4.3 Local Government Engagement

Key issues identified during engagement with local government representatives include the following:

- Land use and harvest plans for the Michel Creek watershed;
- Waste and water management details of the Project with selenium being of primary interest;
- Employment;
- Development schedule; and
- Terrain stability.

4.4 Provincial and Federal Government Engagement

Engagement with provincial and federal government agencies has generally centered around the following issues/aspects:

- Government regulations and processes;
- Land title;
- Baseline environmental studies;
- Project schedule; and
- Details related to waste and water management and treatment.

4.5 Applicable Laws and Regulations

Applicable BC legislation includes the following:

- BC Mines Act and Health, Safety and Reclamation Code for Mines in British Columbia;
- BC Coal Act;
- BC Environmental Assessment Act;
- BC Wildlife Act;
- BC Water Sustainability Act;
- BC Environmental Management Act and Waste Discharge Regulation;
- BC Drinking Water Protection Act;
- BC Fire Services Act;
- BC Highway Act;
- BC Public Health Act;
- BC Heritage Conservation Act;
- Wildlife Habitat Features Order (Kootenay Region); and
- BC Forest and Range Practices Act (FRPA).

Applicable federal legislation and policy includes the following:

- Canadian Environmental Assessment Act;
- Indian Act;
- Canadian Environmental Protection Act;
- Draft Coal Mining Effluent Regulations;
- Fisheries Act;
- Migratory Birds Convention Act;
- Species at Risk Act;
- Canadian Transportation Act;
- Natural Resources Act;
- Explosives Act;
- Navigable Waters Protection Act; and
- Federal Policy on Wetland Conservation.

4.6 Environmental Non-governmental Organizations

Key issues identified during engagement with local environmental non-government representatives include the following:

- Wildlife and wildlife habitat;
- Wildlife habitat connectivity; and
- Grizzly bear and grizzly bear habitat related to conserving riparian and stream channels for bear movement.

4.7 Regional Initiatives

4.7.1 Elk Valley Water Quality Plan

The Elk Valley Water Quality Plan was developed by Teck (2014) with the objective of carrying out sustainable mining in the Elk Valley watershed in a manner that protects aquatic resources. The plan has three main components: 1) to address increasing selenium and nitrate; 2) to track and assess cadmium and sulphate; and 3) to address calcite formation. Five Teck Coal mines in the Elk Valley were addressed when the plan was developed including Fording River, Greenhills, Line Creek, Elkview, and Coal Mountain. An implementation plan adjustment that will confirm Teck's plans to meet the EVWQP, for specific projects, is underway between Teck and ENV and is anticipated to be publicly available this summer.

The Project will need to be developed and operate in a manner that protects water quality in conformance with the EVWQP.

4.7.2 Elk Valley Cumulative Effects Management Framework

The Elk Valley Cumulative Effects Management Framework (Elk Valley CEMF) is a multi-stakeholder group that has come together to collaboratively assess cumulative effects in the Elk Valley in a transparent, consensus-based, and accountable manner (Elk Valley CEMF, undated). The outcomes are intended to help inform land and resource management and policy decisions. Stakeholders include industry, government, the KNC and non-governmental organizations. The CEMF is intended to integrate with the provincial cumulative effects framework.

Five priority VCs were identified for Phase 1 assessment by the CEMF working group and they include riparian habitat, old and mature forest, grizzly bear, bighorn sheep, and Westslope cutthroat trout (Elk Valley CEMF, 2015). During VC development workshops and the EVCEMF documents, it was acknowledged that a Phase 2 assessment would address additional priority VCs identified that could not all be considered in Phase 1 due to capacity and cost overruns. Indicators were developed for each CEMF VC and a regional cumulative effects assessment initiated based on the findings. Available results will be considered when determining the indicators for the Project VCs.

5 Candidate VCs and Screening

A list of candidate VCs was developed based on information collected from: baseline environmental studies; discussions with Ktunaxa members, government agencies, and stakeholders as presented in Section 4; regional land use plans and programs; and from assessed components from nearby projects. Appendix A presents a comparison of VCs for Coal Mountain Phase 2, Baldy Ridge Extension, Bingay Main Coal, Crown Mountain, and the Murray River Coal projects. Comparison of VCs was an important starting point for providing context for developing a list of VCs for similar projects with similar review processes and/or in similar regions. Each VC was then screened to determine which should be included in the effects assessment. Screening candidate VCs allows the effects assessment to be more effective and focused as it reduces the number of VCs and focuses the assessment on those that are most important or representative and cover the full breadth of important issues. The following criteria were applied to screen the VCs:

- Be present in the Project area;
- Potentially interact with the Project;
- Be required by legislation;
- Be relevant to government priorities;
- Be relevant to indigenous interests, including rights and title;
- Have the potential for cumulative effects;
- Be sensitive or vulnerable to disturbance; and
- Be measurable directly or by another VC.

Table 5-1 presents the candidate VCs list, the rationale for why each VC is or is not proposed to be carried forward for the effects assessment, and whether the VC is an intermediate or a receptor. A VC is defined as intermediate if it subsequently causes effects in a receptor VC. Defining a VC as intermediate or receptor is not intended to imply a level of importance. Intermediate VCs may be assessed for significance, which will be specified in the AIR. The final chosen VCs must be comprehensive, representative, concise, relevant, and responsive (EAO, 2013).

As an aid to reading, the following columns are used in the table:

- Pillar - VCs fall under five pillars: environment, economic, social, health, and heritage;
- Candidate VC - The selected VCs based on issue scoping;
- Source – The source used to identify the VC;
- VC Status - Included, included valued subcomponent or excluded;
- Represented by another VC - Representative or surrogate VC for excluded VC; and
- Rationale - Further reasons for inclusion or exclusion.

Table 5-1: Candidate VCs, Source, and Screening

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
Environment / Physical Environment	Global Climate		Excluded	Covered under Air Quality and Emissions VC	Note that effects cannot be measured at the Project scale.
	Air Quality and Emissions	Importance noted from public comments (dust in particular). BC Environmental Management Act includes clean air provisions to control air emissions. BC ambient air quality objectives will be considered for NO_2, O_3, $PM_{2.5}$. PM_{10}, SO_2, TSP, CO and H_2S. Legislation administered by BC Ministry of Environment and Climate Change Strategy and Environment and Climate Change Canada. Mandatory reporting of greenhouse gases by Environment and Climate Change Canada (ECCC) under the Greenhouse Gas Emissions Reporting Program. United Nations Framework Convention on Climate Change (UNFCCC). Additional BC legislative requirements related to GHG emissions are being developed. Legislation administered by BC Ministry of Environment and Climate Change Strategy and Environment and Climate Change Canada.	Included VC		Measurable and regulated. Intermediate VC needed to assess receptor VCs (i.e., wildlife and wildlife habitat, community health, country foods). GHG reporting required. Will include consideration of global climate.
	Noise / Vibration	BC Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia. Legislation administered by BC Ministry of Energy, Mines and Petroleum Resources. BC OGC Noise Control Guidance (2009) and Health Canada Guideline for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017).	Included VC		Measurable and regulated. Intermediate VC needed to assess receptor VCs (i.e., wildlife and wildlife habitat, community health, non-commercial land use / recreation).
	Groundwater (Quality and Quantity)	Use of groundwater is regulated under the Water Sustainability Act and discharge to groundwater is regulated under Environmental Management Act. Legislation administered by BC Ministry of Environment and Climate Change Strategy.	Included VC		Measurable and regulated. Intermediate VC needed to assess receptor VCs (i.e., surface water, aquatic resources, fish and fish habitat, aquatic health, wildlife and wildlife habitat, wildlife health, community health). Will include consideration of drinking water.
	Surface Water Quality	High importance noted from public, Ktunaxa, and government comments. The Water Sustainability Act regulates the use of surface water while the Environmental Management Act regulates discharge to surface water. Fisheries Act prohibits discharge of deleterious substances to fish habitat. Protection of water resources is guided by the BC and Canadian Council of Ministers of the Environment (CCME) water quality objectives. Elk Valley Water Quality Plan sets water quality targets for the Elk Valley watershed for Se, NO_3, Cd, and SO_4 under Section 89 of the BC Environmental Management Act. BC Public Health Act [SBC 2003] C.23 and the Drinking Water Protection Act (SBC. 2001] C. 9 include requirements that the project must not cause or contribute towards any public health hazard or adversely contaminate any drinking water supply in any fashion during all phases of this project, in addition to obtaining approval for any on-site drinking water system.	Included VC		Measurable and regulated. Intermediate VC needed to assess receptor VCs (i.e., aquatic resources, fish and fish habitat, aquatic health, wildlife and wildlife habitat, wildlife health, community health). Will include consideration of drinking water.
	Surface Water Quantity	Fisheries Act prohibits destruction of fish habitat. Linked to high importance for water availability for fish and wildlife habitat and human use.	Included VC		Measurable. Intermediate VC needed to assess receptor VCs (i.e., aquatic resources, fish and fish habitat, wildlife and wildlife habitat, non-commercial land use / recreation, community health).
	Sediment	BC and Canadian Council of Ministers of the Environment (CCME) sediment quality objectives.	Included VC		Measurable with objectives and linked to benthic invertebrates and fish/fish habitat. Intermediate VC needed to assess receptor VCs (i.e., aquatic resources, fish and fish habitat, aquatic health).
	Terrain Stability	Interest from all levels of government for public safety. BC Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia. Legislation administered by BC Ministry of Energy, Mines and Petroleum Resources.	Included VC		Measurable through geotechnical studies and monitoring. Intermediate VC needed to assess receptor VCs (i.e., ecosystems, public safety).

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
	Soil	Legislated under the BC Environmental Management Act. BC and federal soil quality guidelines. Soil conservation required under the Health, Safety and Reclamation Code for Mines in BC administered by BC Ministry of Energy, Mines and Petroleum Resources.	Included VC		Measurable and linked to vegetation and wildlife resources. Intermediate VC needed to assess receptor VCs (i.e., ecosystems, wildlife health, community health, country foods).
	Surficial Geology	Considered in neighbouring project assessments.	Excluded		Surficial geology is an intermediate rather than a receptor VC and does not have associated legislated standards. Surficial geology is mapped for mine planning and influences soils, terrain stability, infiltration, groundwater flow, groundwater quality, surface water/ groundwater interaction, and vegetation communities.
Environment / Aquatic Environment	Aquatic Resources	Presented as a VC in neighbouring projects.	Included VC		Category is broad and not measurable directly. Represented by benthic invertebrate and algae as subcomponents.
	Algae (periphyton and plankton)	Presented as a candidate VC in neighbouring projects. Known bioindicator of water quality and aquatic resource health.	Included subcomponent		Periphyton response to water quality is less well documented than benthic invertebrates.
	Benthic Invertebrates	Presented as a VC in neighbouring projects. Known bioindicator of water quality and aquatic resource health.	Included subcomponent		Measurable using standard techniques and indices. Food source for fish.
	Aquatic health	Fish and fish habitat protected under the Fisheries Act. Concerns over potential effects to aquatic resources from contaminants.	Included VC	Also represented by benthic invertebrate and fish abundance and diversity	Assessed through the aquatic health risk assessment.
	Fish and fish habitat	Fisheries Act prohibits the destruction of fish and fish habitat without authorization or permit. Important to traditional and recreational fishing.	Included VC		Fish habitat and relative abundance are measurable within the Michel Creek watershed. Will include consideration of other fish species not included as subcomponents.
	Westslope cutthroat trout (*Oncorhynchus clarkia lewisi*)	Blue-listed in BC and Special Concern under COSEWIC. Valued component in Elk Valley CEMF. Fish species found in the Michel Creek watershed	Included subcomponent		Results can be compared and managed within the Elk Valley CEMF. Measurable within the Michel Creek watershed.
	Bull trout (*Salvelinus confluentus*)	Indicator species of ecosystem health (COSEWIC, 2012). Fish species found in the Michel Creek watershed.	Included subcomponent		Measurable within the Michel Creek watershed.
	Longnose sucker (*Catostomus catostomus*)	Fish species found in the Michel Creek watershed.	Included subcomponent		Measurable within the Michel Creek watershed.
	Mountain whitefish (*Prosopium williamsoni*)	Fish species found in the Michel Creek watershed.	Included subcomponent		Measurable within the Michel Creek watershed.
	Burbot, Northern pikeminnow, peamouth chub, Kokanee	Fish species found in receiving waters in the Elk Valley watershed.	Excluded	Represented by the other four fish species.	Regional study programs in place by others in region. Does not occur in Michel Creek Catchment
Environment / Terrestrial Environment	Rare or highly valued plants and habitat	Limber pine and whitebark pine are of conservation interest and known to occur in the Michel Creek watershed.	Included VC		
	Limber pine (*Pinus flexilis*)	Limber pine is listed in BC as S2, has a restricted range in SE BC and is known to occur in the Michel Creek watershed.	Included subcomponent		Measurable within the Michel Creek watershed.
	Whitebark pine (*Pinus albicaulis*)	Blue-listed in BC and known to occur in the Michel Creek watershed.	Included subcomponent		Measurable within the Michel Creek watershed.
	Other plants of conservation concern	Species protected by policy and/or legislation.	Included subcomponent		
	Ecosystems of conservation interest	Regional ecosystems of interest that are of high importance due to some features such as high diversity, rarity, etc.	Included VC		
	Avalanche	Indicator for grizzly bear in Elk Valley CEMF. Contains important grizzly bear habitat	Included subcomponent		Measurable within the LSA and RSA.
	Grassland	Important habitat for various species including winter elk habitat	Included subcomponent		Measurable within the LSA and RSA.
	Wetland	Important habitat used by many species and linked to potential effects on water quantity and quality changes	Included subcomponent		Measurable within the LSA and RSA.

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
	Riparian and Flood	Valued component in Elk Valley CEMF, government agencies, and ENGOs. High diversity and value for many species' life requisites and linkages between water and terrestrial resources.	Included subcomponent		Measurable and part of the Elk Valley CEMF.
	Old and Mature Forest	Valued component in Elk Valley CEMF. Contains habitat for various species and requires conservation since it cannot be replaced in the short or medium-term.	Included subcomponent		Measurable and part of the Elk Valley CEMF.
	Wildlife species of conservation concern	Species at Risk Act and BC species of conservation concern protected by the BC Wildlife Act.	Included VC		Project Reviews under Section 79(2) of the Species at Risk Act *must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them.* Will include consideration of species of concern even if excluded as specific subcomponents.
	Migratory birds	Migratory Birds Convention Act prohibits the destruction of migratory birds and nests and prohibits the discharge of detrimental substances to waters used by migratory birds. Legislation is administered by Environment and Climate Change Canada.	Included VC		Specific assessment required for migratory birds as a whole. Mitigation measures will be structured to manage all bird guilds (groups that exploit a resource in a similar manner).
	Wildlife and Wildlife Habitat	BC Wildlife Act protects wildlife, critical mammal habitat, and species of conservation concern. Migratory Birds Convention Act protects migratory birds and nests. Species at Risk Act protects species of conservation concern and their critical habitat.	Included VC		The general category allows for an overall ecosystem approach to assess overall wildlife habitat changes. Will include consideration of other wildlife species not included as subcomponents.
	Mammals				
	Grizzly Bear (*Ursus arctos horribilis*)	Valued component in Elk Valley CEMF	Included subcomponent		Measurable and part of the Elk Valley CEMF.
	Rocky Mountain Elk (*Cervus canadensis nelsoni*)	Candidate valued component in Elk Valley CEMF. Was not selected in CEMF. Important game species for hunters	Included subcomponent		Measurable in the LSA and RSA.
	Moose (*Alces alces*)	Important game species for hunters	Included subcomponent		
	Mule Deer (*Odocoileus hemionus*)	Important game species for hunters	Excluded	Represented by moose and elk	
	White-tailed Deer (*Odocoileus virginianus*)	Important game species for hunters	Excluded	Represented by moose and elk	
	Rocky Mountain Bighorn Sheep (*Ovis canadensis canadensis*)	Blue-listed in BC Valued component in Elk Valley CEMF	Included subcomponent		Measurable and part of the Elk Valley CEMF.
	Bison	Historically important species to Ktunaxa Nation that is being reintroduced to its historical range.	Included subcomponent		
	Mountain Goat (Oreamnos americanus)	Important game species for hunters	Excluded	Represented by bighorn sheep to assess magnitude of habitat change and effects on migratory corridors.	Will also be captured in the assessment of overall vegetation, ecosystem, and habitat changes.
	Cougar (Puma concolor)	Ecologically important for ecosystems.	Excluded	Represented by lynx and wildlife and wildlife habitat in general	
	Wolverine (*Gulo gulo*)	Ecologically important for ecosystems.	Included subcomponent		Representative species sensitive to human activity.
	Canada Lynx (Lynx canadensis)	Ecologically important for ecosystems.	Included subcomponent		Representative species of mammal linked to prey species.
	American badger (*Taxidea taxus*)	East Kootenay population listed as Endangered.	Included subcomponent		
	American marten	Representative of small furbearer.	Included subcomponent		
	River otter	Representative of small furbearer associated with aquatic habitat.	Included subcomponent		
	Furbearers included bobcat, gray wolf, coyote, red fox, fisher, striped	Ecologically important for ecosystems.	Excluded	Represented by wildlife and wildlife habitat in general and by lynx, marten and otter.	

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
	skunk, long-tailed weasel, short-tailed weasel, least weasel, American mink				
	Columbia ground squirrel	Representative of small mammal. Linkages to grasslands, badger, and some raptors.	Included subcomponent		
	Small mammals including red-tailed chipmunk, red squirrel, northern flying squirrel, snowshoe hare, voles, mice	Ecologically important for ecosystems.	Excluded	Represented by wildlife and wildlife habitat in general and by Columbia ground squirrel.	
	Little Brown Myotis (*Myotis lucifugus*)	Endangered under SARA.	Included subcomponent		The species is endangered. Also assessed in nearby projects.
	Northern Myotis (*Myotis septentrionalis*)	Listed under SARA. Indication of presence in Project area. Interest by Environment and Climate Change Canada due to conservation status.	Excluded	Assessed under species of conservation concern.	Assessed under species of conservation concern.
	Migratory bats (Hoary bat, Silver-haired bat, and Eastern red bat)	Indication of presence in Project area based on baseline acoustic surveys. Environment and Climate Change Canada interest in potentially listed and migratory bats.	Excluded	Represented by Little Brown Myotis.	Weak linkage on potential effects on migration from the project. If species become listed, they will be assessed under species of conservation concern.
	Birds				
	American Dipper	Regionally important indicator species for selenium toxicity	Included subcomponent		Measurable and monitored regionally for selenium.
	Spotted Sandpiper	Regionally important indicator species for selenium toxicity	Excluded	Assessed under Wildlife Health	Potential contaminant effects will be assessed for spotted sandpiper under Wildlife Health.
	Harlequin Duck	Wetland species	Excluded	Interacts with the project mainly via aquatic health effects pathways which are covered by the assessment of water quality effects, spotted sandpiper, American dipper, wetland, riparian and flood habitat effects, other aquatic species, and the aquatic health risk assessment.	
	Olive-sided Flycatcher (*Contopus cooperi*)	Blue-listed in BC; Threatened under SARA	Included subcomponent		Measurable, found within the Michel watershed, and an indicator for the aerial insectivore species.
	Northern Goshawk (*Accipiter gentilis*)	Raptor representative. Assessed in nearby projects.	Included subcomponent		Measurable, found within the Michel watershed.
	Common Nighthawk (*Chordeiles minor*)	Threatened under SARA	Included subcomponent		Measurable, found within the Michel watershed, and representative of drier, open habitats.
	Woodpecker guild	Cavity nesters	Included subcomponent		Measurable indicator of changes in forest cover. Relative abundance comparable to regional breeding bird surveys for tracking suitable forest cover over time.
	Bank Swallow (*Riparia riparia*)	Threatened under SARA	Excluded	Represented by birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Barn Swallow (*Hirundo rustica*)	Blue-listed in BC; Threatened under SARA	Excluded	Represented by birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Black Swift (*Cypseloides niger*)	Blue-listed in BC; Threatened under SARA	Excluded	Represented by birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Great Blue Heron (*Ardea herodias Herodias*)	Blue-listed in BC	Excluded	Represented by birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Lewis's Woodpecker (Melanerpes lewis)	Blue-listed in BC; Threatened under SARA	Excluded	Represented by woodpecker guild, birds and wildlife and wildlife habitat.	

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
				Addressed under wildlife of conservation concern.	
	Williamson's Sapsucker (*Sphyrapicus thyroideus nataliae*)	Blue-listed in BC; Endangered under SARA	Excluded	Represented by woodpecker guild, birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Western Screech-Owl (*Megascops kennicottii macfarlanei*)	Red-listed in BC; Threatened under SARA	Excluded	Represented by Northern goshawk, birds and wildlife and wildlife habitat. Addressed under wildlife of conservation concern.	
	Passerines (e.g. juncos, sparrows, finches, chickadees, flycatchers, jays, etc.)	Ecologically important for ecosystems.	Excluded	Represented by olive-sided flycatcher, red-breasted nuthatch, and migratory birds, and wildlife and wildlife habitat.	
	Cliff-nesting raptors	Ecologically important for ecosystems. Potential nesting habitat interacts with Project activities.	Included subcomponent		Environment and Climate Change Canada requested more attention to potential effects on raptors.
	Upland Game Birds (e.g. grouse)	Ecologically important for ecosystems.	Excluded	Represented by wildlife and wildlife habitat.	
	Waterfowl	Ecologically important for ecosystems.	Excluded	Represented by American dipper, Harlequin duck, riparian ecosystems and wildlife and wildlife habitat.	
	Amphibians				
	Western Toad (*Anaxyrus boreas*)	Identified within the Michel Creek watershed. VC for a neighbouring project. Special concern under SARA. Amphibians are a sensitive species to changes in habitat and water quality.	Included subcomponent		Measurable. Represents one of the more sensitive species in the watershed. Relies on both aquatic and terrestrial habitats.
	Columbia spotted frog (*Rana luteiventris*)	Identified within the Michel Creek. Considered sensitive to water quality contaminants.	Excluded	Potential contaminant effects will be assessed under wildlife health. Habitat effects will be addressed through wetland ecosystems.	The primary concern is potential effects from contaminants which are fully addressed by wildlife health.
	Pacific chorus frog, long-toed salamander		Excluded	Represented partially by Western toad, wildlife and wildlife habitat, riparian and flood habitat, and water quality.	Part of the riparian and flood assessment will look at changes to water levels affecting these habitats which will further discuss changes to these important habitat types.
	Rocky Mountain Tailed Frog (*Ascaphus montanus*)	Red-listed in BC; Threatened under SARA	Excluded	Represented partially by Western toad, riparian and flood ecosystems, and water quality.	Northern extent of range and not yet detected in LSA
	Insects (and other terrestrial invertebrates)	Ecologically important for ecosystems.	Excluded	Represented by wildlife and wildlife habitat in general. Direct effects on invertebrates covered by assessing soil quality.	Although, they have not been identified as a valued component during the scoping process. There are many other linked pathways and resources that will address effects on insects through minimizing and reclaiming habitat.
	Gillette's Checkerspot (*Euphydryas gillettii*)	Red-listed in BC; BC Wildlife Act protects critical habitat and species of conservation concern.	Included subcomponent		Some specific habitat for Gillette's checkerspot but they have not been observed recently during directed baseline studies in the LSA. Insect representative.
	Wildlife Health	Concern for wildlife health from potential contaminants.	Included VC	Also represented by air quality, water quality.	Wildlife risk assessment will be completed to assess potential risk of contaminants using a representative species from all ecological niches.
Economic	Employment and income	Important to the public and all levels of government.	Included VC		Will include consideration of demographics.
	Economic activity	Important to the public and all levels of government. Potential adverse effects.	Included VC		
	Local and BC Governments	Important to all levels of government. Taxes and economic activity related to the Project affects government finances, policies, and planning.	Excluded	No adverse effect	

Pillar	Candidate VC	Source	VC Status	Representative by Another VC	Further rationale for inclusion or exclusion
	Demographics	Changes in community demographics is important for local government planning.	Excluded	Represented by employment and income and community infrastructure and services	The change in demographics is a pathway to the social effects, but there are no comparisons for direct assessment.
Social	Education, skills and training	Typically, of importance to First Nations, governments and local communities.	Included VC		Specifically identified by Ktunaxa as being important.
	Community infrastructure and services	Mandate for local government to manage changing demographics and needs of the community. Funding requirements and planning coordinated with the BC government.	Included VC		Will include consideration of demographics.
	Community wellbeing	Identified as important from public comment. Required mandate for Health Canada and BC Ministry of Health.	Included VC		
	Commercial land use	Important for government land use planning at the local and regional scale. Important for users.	Included VC		
	Non-commercial land use / Recreation	Important for government land use planning at the local and regional scale. Identified as important by the public and hunters.	Included VC		Will include consideration of access.
	Public safety	Interest of all levels of government for public safety. BC Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia. Legislation administered by BC Ministry of Energy, Mines and Petroleum Resources, policing, and local governments.	Included VC		Also of importance to North Coal to ensure public safety.
	Access	Identified as an issue by the public and hunters.	Excluded	Represented by non-commercial land use.	
	Visual Quality	Identified as an issue from public comments.	Included VC		Land changes from open pit mining and reclamation will change the visual quality of the watershed over time which is linked to non-commercial land use (e.g., tourism) / recreational use and community wellbeing.
Heritage	Archaeological and heritage sites	BC Heritage Conservation Act protects archaeological and heritage resources. Ktunaxa historical resources have high importance.	Included VC		
Health	Community health	BC Public Health Act [SBC 2003] C.23 and the Drinking Water Protection Act (SBC. 2001] C. 9. Requirements that the project must not cause or contribute towards any public health hazard or adversely contaminate any drinking water supply in any fashion during all phases of this project, in addition to obtaining our approval for any on-site drinking water system. BC Ministry of Health is responsible for community and indigenous health through the Public Health Act.	Included subcomponent		A human health risk assessment will be completed to assess community health. Will include consideration of drinking water.
	Country foods	Health Canada provides guidance on how to assess the effects (chemical contamination) to country foods that includes completing a human health risk assessment (HHRA).	Included subcomponent		
	Drinking water	BC Ministry of Health and Health Canada mandated to ensure safe drinking water. The aquatic life guidelines that need to be met for surface water for the Project are more stringent than the drinking water guidelines. In addition, there are no groundwater drinking wells that will be affected by the Project.	Excluded	Represented by groundwater and surface water and part of community health assessment	Health is already managed by requirements to comply with drinking water standards for use of water at the mine and related to any discharges from the Project.

Part C of the future AIR will include information required for the EAC Application, including methodology, for assessing potential project impacts to the following Ktunaxa VCs identified in Table 5-2:

Table 5-2: Proposed Ktunaxa VCs

Ktunaxa Proposed VCs	Rationale for Inclusion	Status
Traditional knowledge and language	Section 35 of the Constitution Act, 1982, the Royal Proclamation, and Canadian common law. Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) which states, Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. Article 13 of UNDRIP which states, Indigenous peoples have the right to revitalize, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures, and to designate and retain their own names for communities, places and persons.	Included VC – Part C of AIR
Lands and resources	Section 35 of the Constitution Act, 1982, the Royal Proclamation, and Canadian common law. Article 26 of UNDRIP which states, *Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired*.	Included VC – Part C of AIR
Economic	Section 35 of the Constitution Act, 1982, the Royal Proclamation, and Canadian common law. Article 21 of UNDRIP which states, *Indigenous peoples have the right, without discrimination, to the improvement of their economic and social conditions, including, inter alia, in the areas of education, employment, vocational training and retraining, housing, sanitation, health and social security.*	Included VC – Part C of AIR
Social	Section 35 of the Constitution Act, 1982, the Royal Proclamation, and Canadian common law. Article 21 of UNDRIP	Included VC – Part C of AIR
Employment and education	Section 35 of the Constitution Act, 1982, the Royal Proclamation, and Canadian common law. Article 21 of UNDRIP	Included VC – Part C of AIR

6 Selected Intermediate and Receptor VCs

This section presents the proposed final selection of intermediate and receptor VCs, their effects pathways, and the indicators proposed to be used for the assessment. Table 6-1 lists the proposed VCs, valued subcomponents, potential effects, and the indicators and/or endpoints for the Project assessment. Table 6-2 lists proposed Ktunaxa VCs.

Following the table, Figure 6-1 to Figure 6-3 illustrate potential aquatic, terrestrial, and social effects pathways of effects for many of the selected VCs. The figures help to show how the relationships between intermediate and receptor VCs and how they will be interpreted in the assessment. Note that intermediate VCs are pathways to receptor VCs. Intermediate VCs will be assessed for context, magnitude, extent, duration, reversibility, and frequency; intermediate VCs may be assessed for significance where they can be measured using established criteria, objectives or guidelines, which will be defined in the AIR.

Table 6-1: Selected Valued Components, Subcomponents, and Indicators or Endpoints

Pillar	Valued Components	Valued Subcomponents	Type	Potential Effects	Recommended Indicators / Endpoints
Environment / Physical Environment					
	Air Quality and Emissions		Intermediate	Air emissions from blasting, ore transport, equipment, wash plant, and vehicle traffic. Pathway to potential adverse effects on public, fish and aquatic resources, and wildlife health. Pathway to climate change and associated potential effects through emissions and land use change.	Changes in concentrations of PM_{10}, $PM_{2.5}$, NO_2, SO_2, TSP, relative to BC and Canadian ambient air quality objectives/standards. Qualitative changes for non-threshold contaminants in comparison to published literature. GHG emissions (CO_2, CH_4, N_2O) with respect to BC and Canadian emission goals.
	Noise / Vibration		Intermediate	Noise and vibration emitted from mining, processing, and transport activities. Pathway to potential adverse effects on public and Indigenous receptors, fish, and wildlife health and public wellbeing.	Changes in daytime and nighttime noise, tonal and impulsive noise, low frequency noise and vibration levels relative to potential human and wildlife receptors for all Project phases. Compliance with threshold noise level for sleep disturbance and long-term annoyance from noise to impacted receptors, including Indigenous Peoples.
	Groundwater (Quality and Quantity)		Intermediate	Seepage to groundwater of contaminants generated from coal mining. Pathway to potential adverse effects on the public and Indigenous receptors, fish, and wildlife health.	Changes in groundwater quality relative to BC and Canadian water quality guidelines and the quality objectives set in the Elk Valley Water Quality Plan. Compliance of groundwater quality with BC Environmental Management Act, Contaminated Sites Regulation (CSR).
	Surface Water Quality		Intermediate	Discharge to surface water of contaminants generated from coal mining and equipment and vehicle operations. Pathway to potential adverse effects on human and wildlife drinking water. Pathway to potential effects on fish habitat and fish, wildlife, and human health (including via recreational water use).	Changes in quality and quantity relative to BC and Canadian and/or site-specific standards consistent with the Elk Valley Water Quality Plan, any other regional plans to protect downstream water quality.
	Surface Water Quantity		Intermediate	Changes in flows from changes in landforms and mine water use quantity and timing. Pathway to potential effects on fish and wildlife habitat and human use.	Changes in quantity. Maintenance of environmental flow needs in streams and tributaries.
	Sediment		Intermediate	Discharge of particulates and potentially associated contaminants in the water column of streams or settling on stream substrates. Pathway to potential adverse effects on habitat and health of aquatic plants, invertebrates, fish, and human health.	Changes in quality relative to BC and Canadian standards. Changes in quantity and distribution relative to pre-mine conditions.
	Terrain Stability		Intermediate	Decreased terrain stability from development of open pits and haul road construction and operation that could result in landslides. Pathway to potential effects on terrestrial and aquatic habitat, fish and wildlife. Potential increased risk to public safety.	Changes to terrain stability and assessed hazards.
	Soil		Intermediate	Changes in soil quantity, quality, and distribution when stripped for construction and replaced for reclamation. Potential loss of soil from erosion when soil is exposed, prior to reclamation. Pathway to potential changes in vegetation and wildlife communities, increased risk of invasive species, and potential adverse effects on human health.	Changes to quality, quantity, and distribution. Contaminated sites soil quality guidelines.
Environment / Aquatic Environment	Aquatic Health		Receptor	Potential effects on aquatic life health from potential contaminants.	Potentially significant acute or chronic effects on aquatic life based on the aquatic health risk assessment.
	Aquatic Resources	Benthic invertebrates	Receptor	Changes in water and/or sediment quality and quantity can result in reduced abundance, diversity, distribution, and/or fewer sensitive species of benthic invertebrates. Changes in benthic invertebrate species and populations as well as changes in the concentration of selenium and other contaminants in tissues.	Changes in distribution, diversity indices, EPT (Ephemeroptera/ Plecoptera/ Trichoptera) index, and community structure relative to baseline and local reference tributaries. Changes in water quality will be used to predict changes in tissue metals.

Pillar	Valued Components	Valued Subcomponents	Type	Potential Effects	Recommended Indicators / Endpoints
				Potential adverse effects on habitat, distribution, and health of aquatic plants, invertebrates, and fish.	
		Algae (periphyton and plankton)	Receptor	Changes in water and/or sediment quality and quantity can result in reduced abundance, diversity, distribution, increased abundance, introduction of invasive species (e.g., didymo), and/or fewer sensitive species of aquatic plants. Potential adverse effects on habitat, distribution, and health of aquatic plants, invertebrates, and fish.	Changes in relative abundance, distribution, and community structure relative to baseline and local reference tributaries. Changes in water quality will be used to predict changes in tissue metals.
	Fish and Fish Habitat	Westslope cutthroat trout, Bull trout, Longnose sucker, Mountain whitefish	Receptor	Changes in water and/or sediment quality, quantity, and distribution can result in reduced abundance, diversity, distribution, and/or fewer sensitive species of fish. Potential loss of fish and/or fish habitat in the Michel Creek watershed and downstream creeks or rivers depending on the magnitude of change.	Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability). 1) Fish population metrics (e.g., density, biomass, size-at-age, or related matrices), 2) Fish growth, survival, and reproduction, and 3) Metal concentrations in fish (if tied into regional monitoring program and doesn't harm fish populations).
Environment / Terrestrial Resources	Ecosystems	Avalanche, grassland, wetland, riparian and flood, old and mature forest	Intermediate	Clearing of land for mine construction and operations could result in loss or degradation of important ecosystems. Change in abundance and distribution of blue- and red-listed ecological communities. Changes in wetland function as it relates to migratory birds and species at risk. Changes in wetlands and wetland functions from selenium and other contaminants. Changes in the concentration of selenium and other contaminants in plant tissues, and their toxicity effects on plant health and growth. Pathway to potential changes of important vegetation and wildlife communities.	Changes in ecosystem availability, distribution, function/condition (i.e., changes to quality such as groundwater, surface water, soil, species richness, rare spp, invasive spp, wildlife trees, migratory bird relative abundance). Change in cover, size distribution of ecosystem patches, interior to edge distance, type of old growth, canopy closure, and seral stage for old and mature forests. Targets for old and mature forests in the Biodiversity Guidebook and in the Kootenay-Boundary Higher Level Plan Order in consideration of private land use constraints.
	Rare or Highly Valued Plants	Limber pine, Whitebark pine, other species of conservation concern	Receptor	Clearing of land for mine construction and operations could potentially result in loss of rare or highly valued plants and encroachment by invasive species.	Change in number, diversity and/or distribution of rare or important plant species and habitat. Changes to any critical habitat, including its extent, availability, and presence of biophysical attributes.
	Wildlife and Wildlife Habitat **(**Wildlife in general covering all large mammals, furbearers, small mammals, birds, amphibians and insects using an ecosystem/habitat-based approach**)**		Receptor	Attraction to waste, chemicals, and buildings. Disturbance and displacement of animals due to industrial activity during construction, operations transport, closure potentially causing direct or indirect habitat loss, changes in energy usage, activities, and movement patterns. Change in ecosystem types and habitat availability, suitability, and/or distribution. Effects on wildlife health from contaminant release, collision mortality, and changes in public access/use.	Changes to habitat availability, habitat distribution, and relative abundance (if available).
		Mammals: American badger, American marten, Canada lynx, elk, moose, grizzly bear (indicator of broad scale connectivity), bighorn sheep, bison, little brown myotis, wolverine, river	Receptor	Direct disturbance and displacement, reduced reproductive success, increased roadkill/train mortality, avoidance and altered movement patterns. Clearing of land for mine construction and operations could result in loss of wildlife habitat quantity or quality and/or changes in the connectivity and security of wildlife habitat. Loss of physical connectivity corridors needed to maintain populations, genetic variability, migration or movement. Potential habitat fragmentation. Changes in air, water, sediment and soil quality could affect wildlife health. Increased road/train mortality and changes in public access/use.	Changes to habitat availability, habitat distribution, relative abundance, habitat use, visual health indicators where practical (e.g. tick loads on moose). Changes in avalanche chute and alpine habitat, riparian and flood habitat, road density, mortality and conductivity for grizzly bear.

Pillar	Valued Components	Valued Subcomponents	Type	Potential Effects	Recommended Indicators / Endpoints
		otter, Columbia ground squirrel			Change in amount of grassland, suitable habitat, mortality, population, contact with domestic sheep and goats for bighorn sheep.
		Birds: American dipper, olive-sided flycatcher, northern goshawk, cliff-nesting raptors, common nighthawk, woodpecker guild	Receptor	Direct disturbance and displacement, reduced reproductive success and increased roadkill/train mortality and altered habitat use. Clearing of land for mine construction and operations could result in loss of wildlife habitat quantity or quality of wildlife habitat patches and nest predation/parasitism and edge effects. Changes in air and water quality could affect wildlife health and reproductive success.	Changes to habitat availability, habitat distribution, species richness, diversity and relative abundance.
		Amphibians: Western toad	Receptor	Direct disturbance and displacement, reduced reproductive success and increased roadkill/train mortality. Clearing of land for mine construction and operations could result in loss of wildlife habitat quantity or quality of wildlife habitat. Changes in air and water quality could affect wildlife health.	Maintenance of self-sustaining and ecologically effective wildlife populations; Changes to habitat availability, habitat distribution, relative abundance, habitat use.
		Insect: Gillette's checkerspot	Receptor	Clearing of land for mine construction and operations could result in loss of wildlife habitat quantity or quality of wildlife habitat. Changes in air and water quality could affect wildlife health.	Changes to habitat availability.
		Wildlife species of conservation concern (currently includes American Badger, Grizzly Bear, Wolverine, Little Brown Myotis, Northern Myotis, Swainson's Hawk, Bank Swallow, Barn Swallow, Black Swift, Lewis's Woodpecker, Williamson's Sapsucker,Western Screech-Owl, Northern Goshawk, Olive-sided Flycatcher, Common Nighthawk, Western Toad, Gillette's Checkerspot)	Receptor	Direct disturbance and displacement, reduced reproductive success and increased roadkill/train mortality. Clearing of land and changes in habitat could potentially result in loss and/or changes in quality or distribution of habitat for species if conservation concern.	Changes in habitat availability, distribution, and abundance for species of conservation concern, including those that are federally listed under SARA or assessed by COSEWIC, such as Northern Myotis, Bank Swallow, Barn Swallow, Black Swift, Lewis's Woodpecker, Williamson's Sapsucker, and Western Screech-Owl. Changes to any critical habitat, including its extent, availability, and presence of biophysical attributes.
		Migratory birds	Receptor	Direct disturbance and displacement, reduced reproductive success and increased mortality of migratory birds. Clearing of land and changes in habitat could adversely affect the availability, quality and/or distribution of breeding and/or migratory habitat for migratory birds.	Changes to migratory bird species richness and diversity and relative abundance.
	Wildlife Health		Receptor	Potential effects on wildlife life health from potential contaminants.	Potentially significant acute or chronic effects on wildlife based on the wildlife health risk assessment. Changes in exposure risks to selenium and other contaminants, and their toxicity effects on wildlife health and productivity.
Economic	Employment and Income		Receptor	Maintenance of or increased employment rates and income at various scales depending on available labour force. Aging population and flat or declining labour force growth.	Measures of employment opportunities and income generation.

Pillar	Valued Components	Valued Subcomponents	Type	Potential Effects	Recommended Indicators / Endpoints
				Lack of affordable childcare limiting participation in training and choices about employment.	
	Economic Activity		Receptor	Retention in the area –loss of workers. Business environment –lack of basic services Lands and Facilities for businesses –lack of office and meeting space Cyclical nature of the mining industry –discourages investment Labour difficulties facing small businesses –difficult to attract qualified labour Proximity to USA and Alberta –outflow of business and retail activity Shift rotation –12-hour, 4-day shift rotation allows mine workers to live in other population centres.	Number of businesses and rates of economic development; Economic development assessed through training/skill development opportunities, goods and services purchased, local businesses, industry revenue, changes to visual character.
Social	Education, Skills, Training		Receptor	Increased demand for education and training, competition for available opportunities. Limited availability of post-secondary education and training.	Access to education and training opportunities required to facilitate employment with the Project.
	Community Infrastructure and Services		Receptor	Increased requirement for housing and community services and infrastructure. There are issues with housing adequacy and affordability in local communities A lack of rental housing limits options for seasonal/temporary workers as well as low-and modest-income permanent residents Low vacancy rates and rent increases are challenging housing options.	Community housing availability and affordability, and community services and infrastructure availability and access; Housing and community services and infrastructure indicated by population change, housing demand and supply, services and infrastructure demand, use and supply
	Community Wellbeing		Receptor	Potential for adverse social effects from increased income (e.g. alcohol and substance abuse, prostitution, domestic problems). Potential increased nuisance levels from noise, vibration, traffic, and dust. Potential increased recreational activity potentially increasing pressure on use of recreational facilities. Potential adverse social effects from shift schedules and the proportion of the population working on shift schedules, and increased housing pressure.	Maintenance or improvement in community wellbeing and healthy lifestyle; Measured through Project employment and income, skills, workforce composition, housing, shifts, behaviour, coping and wellbeing; Change in recreational opportunities and effect on wellbeing; Complaints due to changes in traffic, dustfall, noise and vibration.
	Commercial Land Use		Receptor	Increased commercial land use rates for the region requiring planning and application of objectives and policies.	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies.
	Non-commercial Land Use / Recreation		Receptor	Potential increased recreational activity and pressure on use of recreational facilities including back-country access for legal and illegal hunting, fishing, and gathering.	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies; Land uses; Access; Quality of recreation/tourism experience.
	Public Safety		Receptor	Increased risk to public safety from decreased terrain stability and vehicle traffic.	Public safety assessed through exposure of public to Project physical hazards including vehicle traffic.
	Visual Quality		Intermediate and Receptor	Temporary and permanent changes to the local landscape in the Michel Creek watershed from open pits, roads and the wash plant.	Maintenance of the visual character of Project site relative to the surrounding landscape in consideration of guidance on Visual Quality Objectives and private land use constraints. The project-specific objectives will need to be defined through the assessment and consultation process.
Heritage	Heritage Resources		Receptor	Increased risk to archaeological and heritage sites from land clearing and activity.	Protection of archaeological resources; Presence and number, type and location of archaeological materials or features of sites.
Health	Human Health	Country foods, community health	Receptor	Increased risk of health effects from deterioration in quality and quantity of food, air, water, sediment and soil quality, noise, and/or vibrations.	Changes in human exposure to mine-related COPCs related to changes to air, soil, surface water, groundwater, or sediment quality or changes in plant or animal tissue chemistry (quality)

Pillar	Valued Components	Valued Subcomponents	Type	Potential Effects	Recommended Indicators / Endpoints
					and compliance with drinking water standards; endpoints: hazard quotients (ratio of exposure estimate to tolerable levels of exposure defined by health departments), estimates of incremental lifetime cancer risks on the basis of estimates of cancer potency defined by health departments.

Ktunaxa Proposed VCs to be evaluated in Part C of the AIR and EAC Application and will include consideration of the information identified in Table 6-2.

Table 6-2: Ktunaxa Proposed VCs, Potential Effects, and Indicators or Endpoints

Ktunaxa Proposed VC	Valued Sub Components	Potential Effects	Recommended Indicators/EndPoints
Traditional Knowledge and Language	Ktunaxa Language, Knowledge Transmission	Potential for increasing dominance of English, and ongoing erosion of Ktunaxa language in the Michel Valley, and as an everyday language. Potential erosion of opportunities for Ktunaxa citizens to transmit knowledge and cultural practice to younger generations.	Consistency with Ktunaxa objectives regarding language revitalization, no-net-loss of opportunities for knowledge transmission.
Lands and Resources	Ktunaxa use of lands and resources; All living things (including bison, fur bearers, fish); Cultural ecosystems; Ktunaxa stewardship.	Increased risk to Ktunaxa relationships to water, and the ability of water to sustain ongoing and future practice of Ktunaxa rights, downstream of Project. Changes to the quantity and quality of plants, animals, and other resources that Ktunaxa rights and way of life depend on changes in the availability of conditions necessary for Ktunaxa rights, including preferred species, preferred places and preferred practices, risk to the ability of the Ktunaxa Nation to properly steward and protect Ktunaxa territory and all living things.	Consistency with Ktunaxa objectives regarding water, including eventual return of water quality to pre-disturbance levels. Consistency with Ktunaxa objectives regarding balanced conservation approach, biodiversity and stewardship decision making, no-net-loss of habitat for keystone or at-risk species.
Economic	Economic rights and mineral resources; Ktunaxa economy (subsistence and commercial) including contracting; Economic disparity	Removal of economic resources from Ktunaxa lands. Changes in commercial drivers that result in wealth creation and economic disparity, impacts on economic resources important to the Ktunaxa subsistence economy.	Consistency with Ktunaxa objectives regarding economic growth, achieve balanced economic return for Ktunaxa communities where economic resources are removed from territory, no-net-increase in disparity between Ktunaxa and non-Ktunaxa communities.
Social	Ktunaxa determinants of health including housing and community wellness; Confidence in wild foods	Changes in diet, health and community wellness for Ktunaxa communities on and off reserve.	Consistency with Ktunaxa social objectives regarding wellness and determinants of health.
Employment and Education	Employment; Education	Changes in Ktunaxa employment and education outcomes.	Consistency with Ktunaxa objectives regarding employment and education.

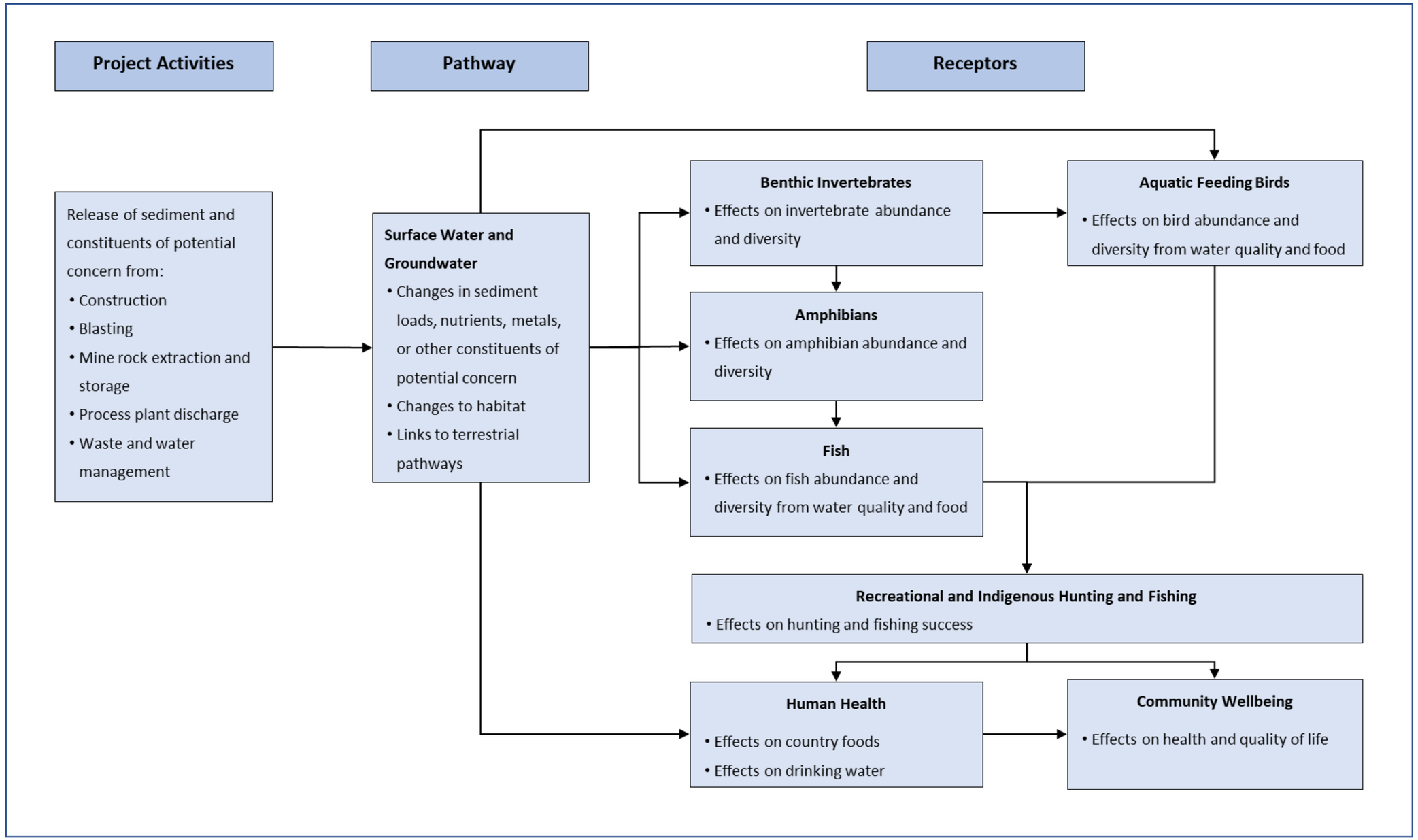


Figure 6-1: Simplified Aquatic Effects Pathways

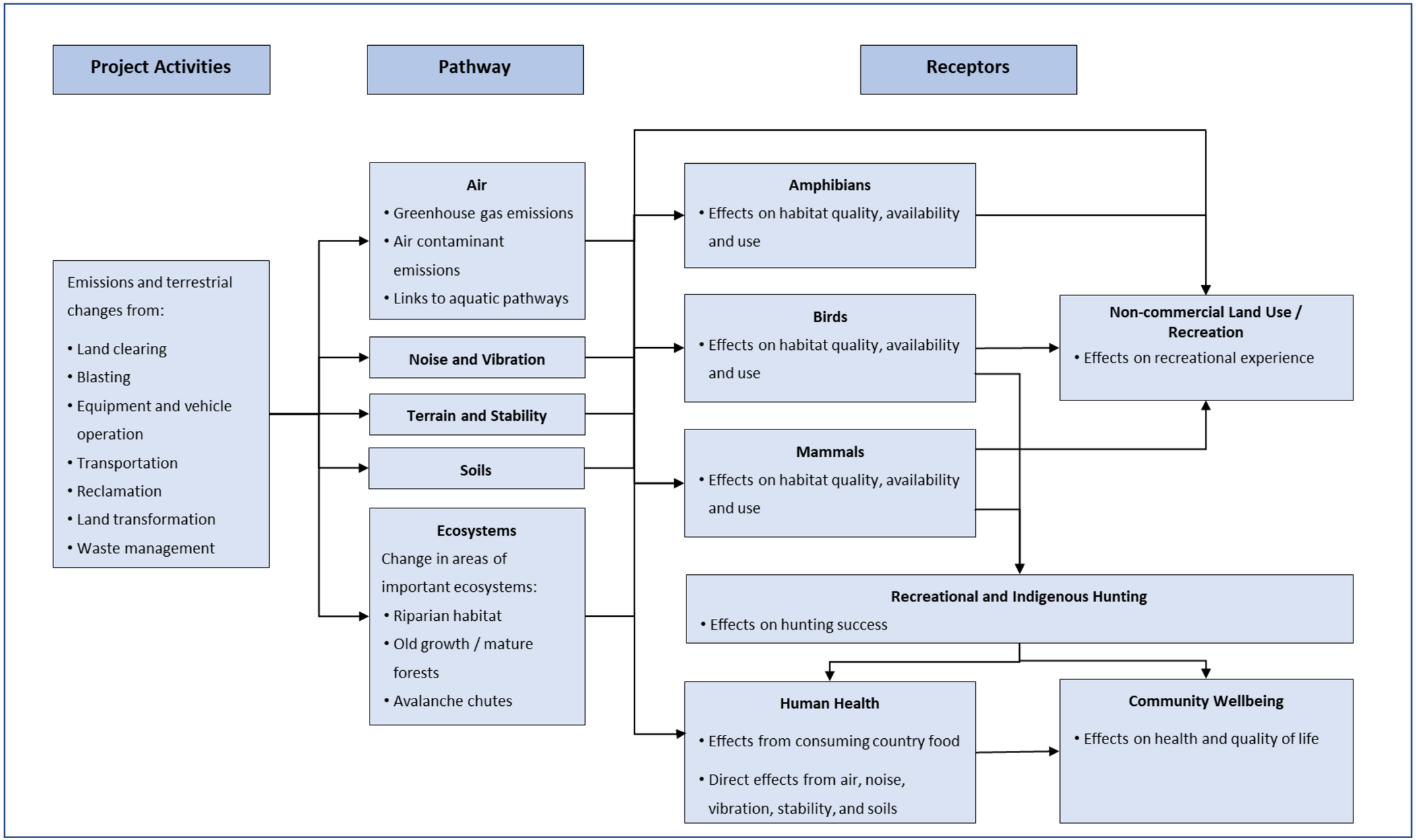


Figure 6-2: Simplified Terrestrial Effects Pathways

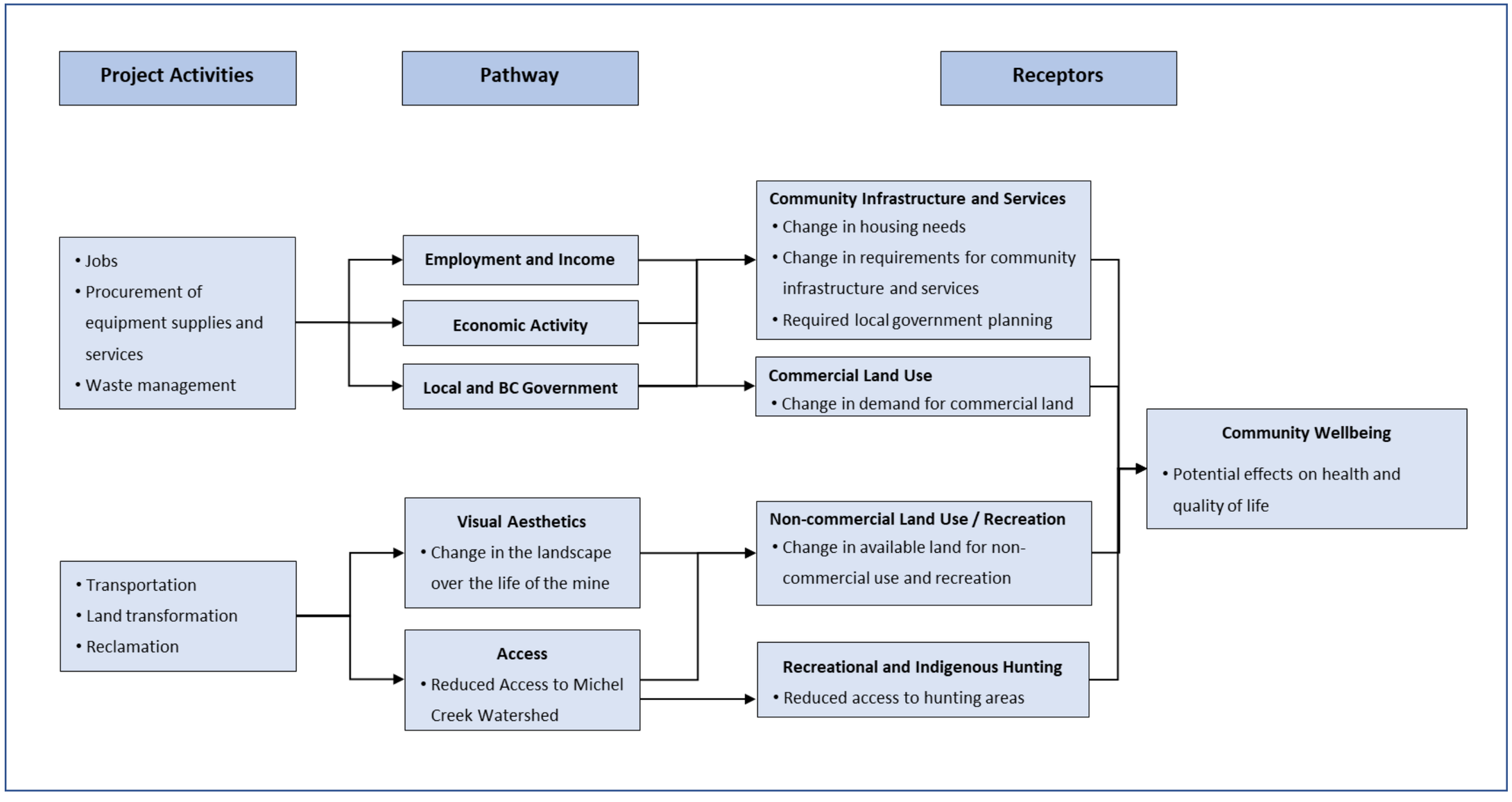


Figure 6-3: Simplified Social Effects Pathways

7 Assessment Boundaries

7.1 Introduction

Assessment boundaries define the geographic and temporal scope of anticipated Project effects and define where and on what the assessment will be focused upon. The boundaries encompass the area within (spatial boundaries) and times during which (temporal boundaries) the Project is expected to interact with the VCs. Assessment boundaries are confirmed through the assessment process; however, they may be modified during the process if the assessment identifies that particular effects exceed the established boundaries.

The establishment of the assessment boundaries for application to the Michel Coal Project assessment has been influenced by a myriad of post-European contact activities/events that have historically impacted the local and regional environment. These include, but are not necessarily limited to:

- Regional and local mineral exploration (from 1897 to the present);
- Significant widespread fire damage (particularly during the early 1900s);
- Previous mining activities on and around the Project properties (in 1904, 1960, 1993 and 1998);
- The construction of the TransCanada Pipeline (commissioned in 1981) across the property; and,
- Historic and ongoing commercial forest harvesting on and around the Project property.

The assessment will take historical use and events into consideration with the baseline for the effects assessment necessarily being defined as the period during which environmental baseline studies were carried out, from 2014 to the submission of the EAC Application.

7.2 Spatial Boundaries

Spatial boundaries for the Project are proposed based on the components to be assessed, defined as aquatic resources, terrestrial resources, airsheds, socio-economic, and archaeology (

Figure 7-2 to Figure 7-5). For context, the anticipated project footprint boundary is also presented (

Figure 7-1).

7.2.1 Aquatic Environment Boundaries

Aquatic resource boundaries are defined by watershed boundaries where any effects will be measurable. The local study area (LSA) for aquatic resources is the Michel Creek watershed extending upstream into the Alexander Creek watershed enough to incorporate any variability in groundwater flow direction due to the potential for limestone karst bedrock geology. The regional study area (RSA) is the Elk River watershed where cumulative effects and objectives are determined by the Elk Valley Water Quality Plan. The aquatic LSA boundaries extend downstream to include areas that may be affected by the Project, but not by Teck mines other than Coal Mountain. North Coal has been provided data that will allow it to compute selenium loadings and concentrations at the inlet to Lake Koocanusa. Lake Koocanusa will be included in the RSA when considering potential cumulative effects and effects to fish.

Figure 7-2 shows the boundaries for the local and regional study areas for aquatic resources.

7.2.2 Terrestrial Resource Boundaries

The study/analysis areas were defined for habitat modeling and subsequent assessment of Project impacts for selected VCs. Consistent with standard methodology in defining project areas for application of wildlife habitat ratings (RIC 1999), a larger RSA was defined within which a smaller LSA was nested. However, there are wide ranging and small ranging species and as a results three wildlife boundaries have been defined, a RSA for wide-ranging species, a LSA for small-ranging species and an intermediate common boundary representing an LSA for wide ranging species and an RSA for small ranging species. Wildlife VC subcomponents considered wide-ranging species include lynx, wolverine, badger, elk, bighorn sheep, and grizzly bear. All others will be assessed at the study areas for small-ranging species. Implications of the scale of assessment relative to the study areas will be discussed in the EAC Application to provide context as needed specific to each species' ecology.

The RSA was defined to ensure that the larger regional population context was appropriately captured for each species addressed. Such context should be ecologically meaningful, reflecting population distribution and allowing for inferences of variation in population density, core habitat areas and landscape-level population connectivity. The RSA should also encompass an area over which a quantitative analysis can be carried out for comparison against established standards and thresholds. In this case, the RSA includes the Elk Valley Cumulative Effects Management Framework (CEMF; 3,314 km^2). It would also include the Flathead grizzly bear population unit (GBPU; 3,434 km^2) in which the Project falls. While satisfying these criteria, wildlife management units (WMUs) were selected within British Columbia and Alberta to encompass a regional area around WMU 4-23 in which the project falls. These include WMUs 4-1, 4-2, 4-22, and 4-24 in British

Columbia, and WMUs 404, 402, 303, 400, and Waterton Lakes National Park in Alberta. Based on these criteria, the multi-species RSA encompasses >6,000 km^2 that is not restricted by jurisdiction (Figure 7-3).

In addition to the RSA, a single LSA was selected for application in modeling and quantitative assessment of large and wide-ranging terrestrial mammals. Cumulative effects will be assessed for the RSA boundaries. An appropriate localized scale of assessment for these species was selected to equate to an occupied landscape area of 300 km^2, an area that is expected to encompass a female home range for the species being considered. A 10 km radius was applied as a buffer around the Project footprint to objectively delineate the LSA. Within this 10 km LSA, a very finer-scale LSA was also defined as a 1 km buffer around the Project footprint, limited on the western edge by the private and mineral land tenure limitations. This 1 km LSA is appropriate for small range VCs and provides potential for more detailed habitat modeling based on terrestrial ecosystem mapping (TEM) data. However, this scale of assessment is limited in understanding impacts for species that typically move and use resources over a much larger area. Quantitative analyses will be carried out across the 10 km buffer LSA for large mammals and wide-ranging species, and also possibly across the finer LSA.

As noted, the RSA and LSA and constituent units within them define the scale for predicting and understanding individual and cumulative impacts associated with the Project. This may involve both qualitative and quantitative assessment. However, outside the context of established management objectives or thresholds, or comparison to defined scenarios, it is acknowledged that measures of change related to Project impacts must be interpreted carefully to determine significance.

7.2.3 Airsheds

Air quality effects depend on weather patterns and typically center around defined airsheds. Air resources also need to consider sensitive receptors which generally include nearby communities such as Crowsnest, Sparwood, and Fernie. There is only one boundary (a combined LSA and RSA) determined for modeling air quality effects from the Project are shown in Figure 7-4. This boundary incorporates the limits where modeled air quality does not exceed 5% of the accepted guidelines, which is generally equivalent to a 50 km by 50 km area.

7.2.4 Socio-economic Boundaries

The local socio-economic and health boundaries include the communities where the majority of the labour force will likely be housed and where the socio-economic and health effects will be most noticeable. Regional boundaries then expand to capture broader communities. The proposed socio-economic and health boundaries are shown in Figure 7-5. The RSA follows the East Kootenay Regional District Boundary and the LSA is defined by the Elk Valley Subregion.

The boundaries for assessing health effects will also extend to the communities in Alberta within the boundaries shown in Figure 7-4 to account for cross-boundary biophysical impacts.

7.2.5 Archaeology Boundaries

The local study area boundaries for archaeology are the same as the local species local study boundaries for terrestrial resources shown in Figure 7-3. This represents the mine footprint with a 2.5 km buffer. No RSA is proposed for archaeology.

7.3 Temporal Boundaries

Generally, temporal boundaries for the Project assessment encompass three distinct phases during which potential effects resulting from the Project are anticipated to interact with the selected VCs. These boundaries are defined by the phases and include:

- Initial Project construction and commissioning;
- Operations: This phase will be somewhat fluid with some aspects (e.g., pits, waste rock and location specific water management regimes) being decommissioned as others are being constructed and commissioned and will be assessed at full extent or maximum disturbance; and
- Post-operational or closure: This period will encompass both decommissioning and the post-closure transition phase monitoring period. These time periods are combined due to progressive reclamation; however, effects will be separated into closure and post-closure periods where the activities could result in a large difference in specific valued component or subcomponent such as housing or employment. Post-closure includes the assessment of long-term effects.

In addition, the temporal characteristic of the species present (e.g., spawning, nesting, over-wintering) and economic/business cycles will define how certain VCs will be affected by the distinct phases over the life of the Project. Where relevant, VC-specific temporal boundaries relevant to the assessment will be documented.

The AIR will identify projects for consideration in a cumulative effects assessment (past, current and reasonably foreseeable) and will consider the temporal boundaries for past and reasonably foreseeable developments. The KNC has indicated through discussions with North Coal a preference for consideration of a range of conditions prior to anthropogenic disturbance and activities related to exploration, baseline data collection and project planning prior to mine development.

7.4 Administrative and Technical Boundaries

Administrative and technical boundaries are potential constraints that may limit the ability to predict the effects of the Project on one or more VCs. In the event they arise, such constraints may introduce some level of uncertainty into the assessment.

Administrative boundaries refer to the limitations imposed on an environmental assessment by political, economic, or social constraints. These may include such things as existing datasets collected on the basis of regional or provincial boundaries which differ from the spatial boundaries of the selected VCs, and therefore limits the assessment of potential effects in some way (BC EAO, 2013). Technical boundaries refer to constraints in the ability to fully assess effects of the Project to a particular VC due to an inability or limited ability to assemble the necessary data. For example, difficulties in accessing parts of a study area (e.g., in rugged or hazardous areas) or challenges associated with sampling reclusive species may result in insufficient data.

Where technical or administrative boundaries have constrained the identification and/or assessment of potential Project effects or introduced some level of uncertainty to the assessment, the nature of the boundary, its effect on the assessment and the significance of any resulting uncertainty will be clearly documented in the EAC Application.

It should be noted that administrative/ technical boundaries apply to some VCs as limitations to access to private lands for baseline studies, access to existing proprietary data in the region, and continual harvest within the Michel Creek watershed. These boundaries will be identified in the EAC Application. Helicopters were used to access alpine and subalpine areas not accessible by road.

Figure 7-1: Anticipated Project Disturbance Footprint Boundary

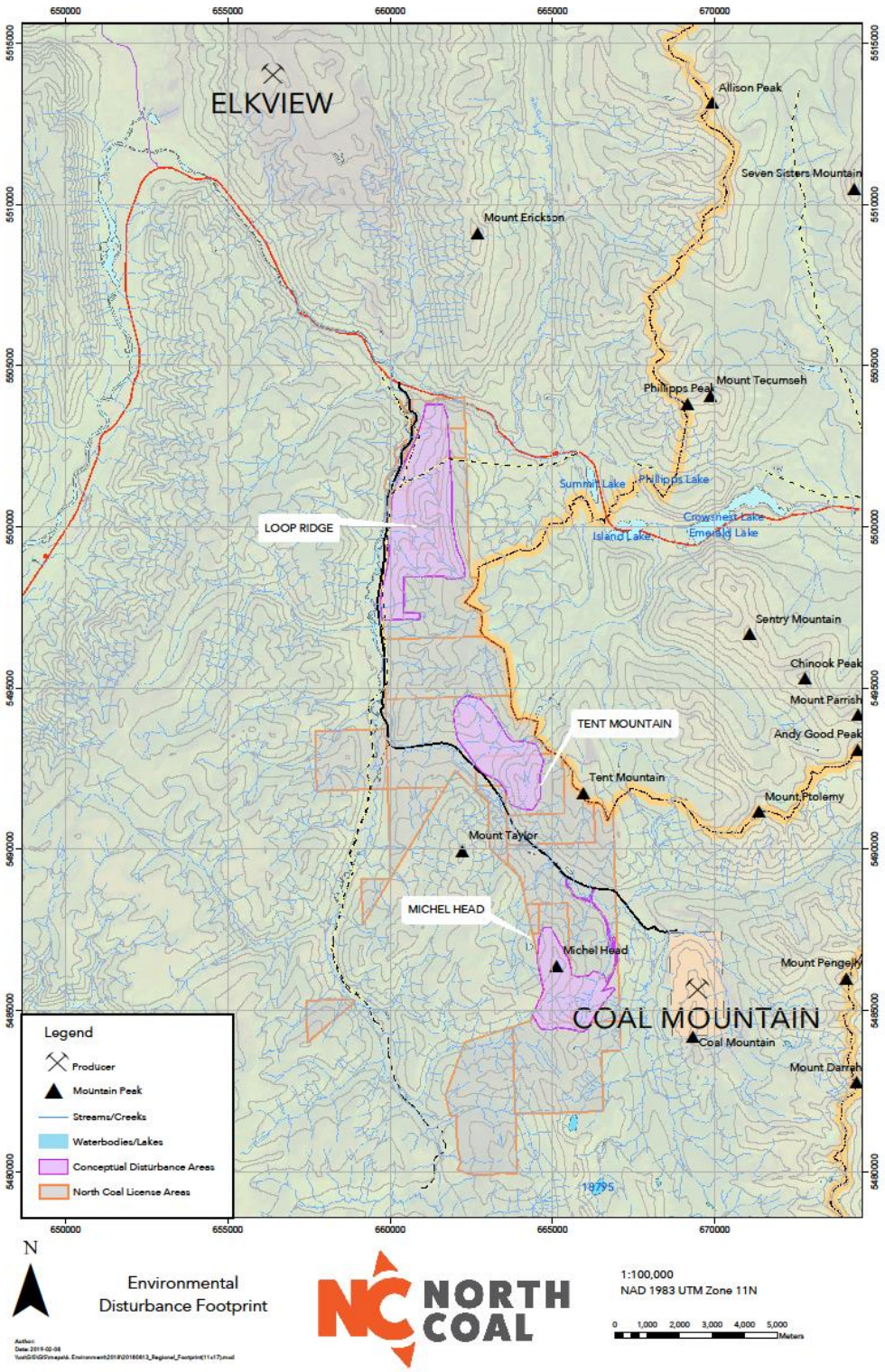


Figure 7-2: Local and Regional Study Boundaries – Aquatic Resources

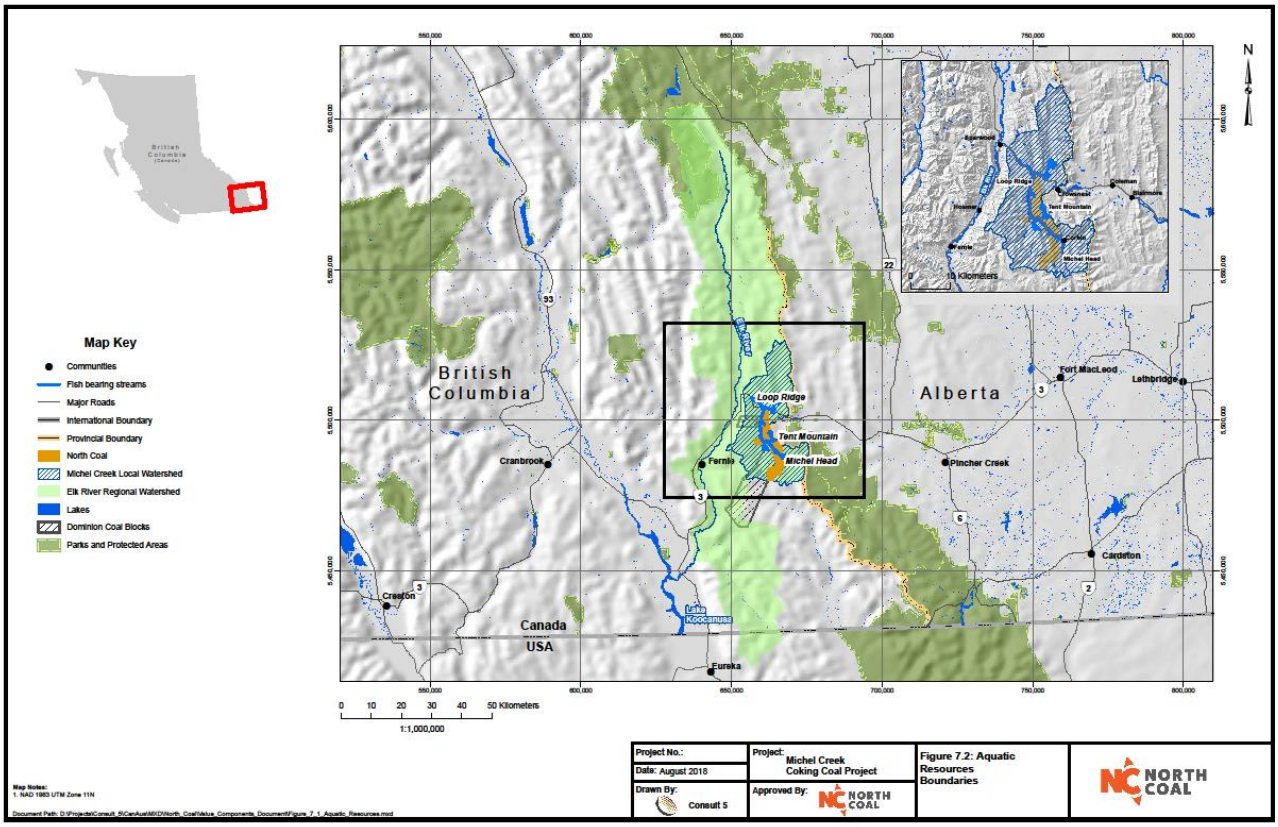


Figure 7-3: Local and Regional Study Boundaries – Terrestrial Resources

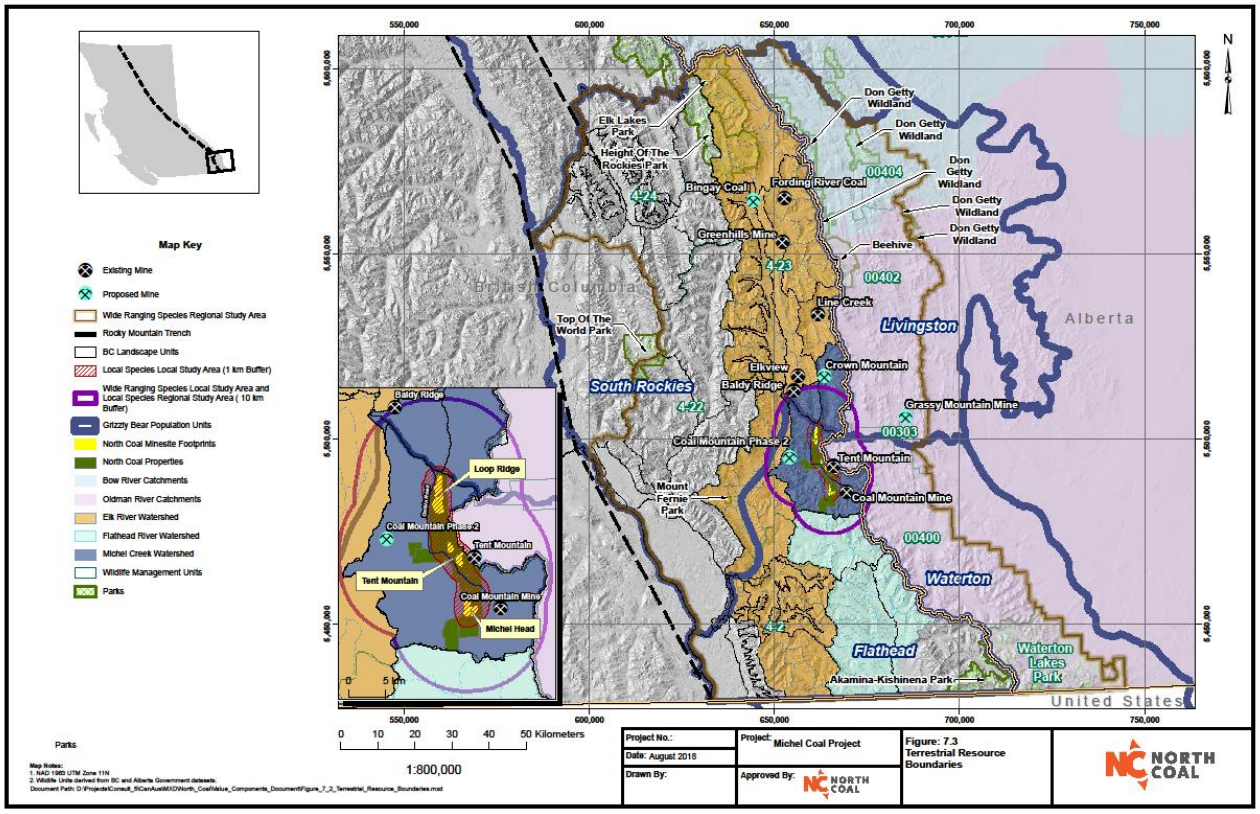


Figure 7-4: Local and Regional Study Boundaries – Air Quality, Noise and Vibration

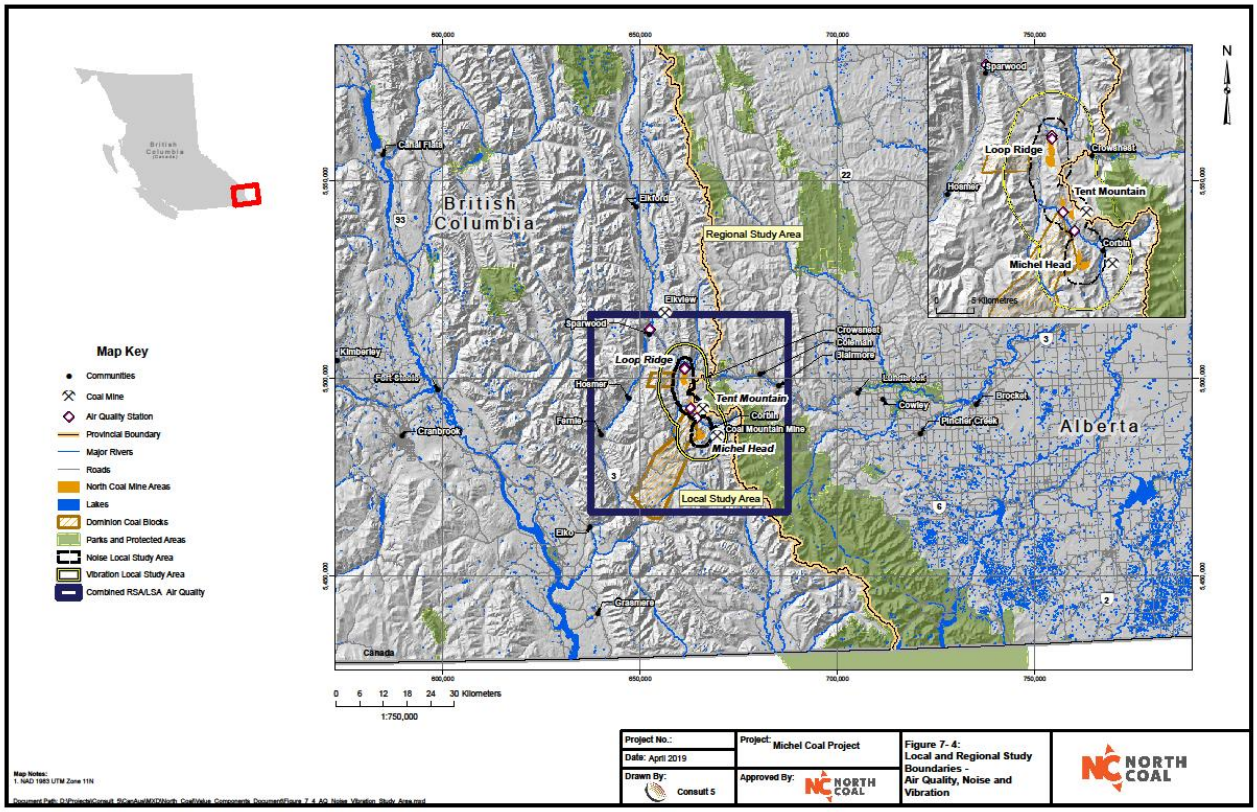
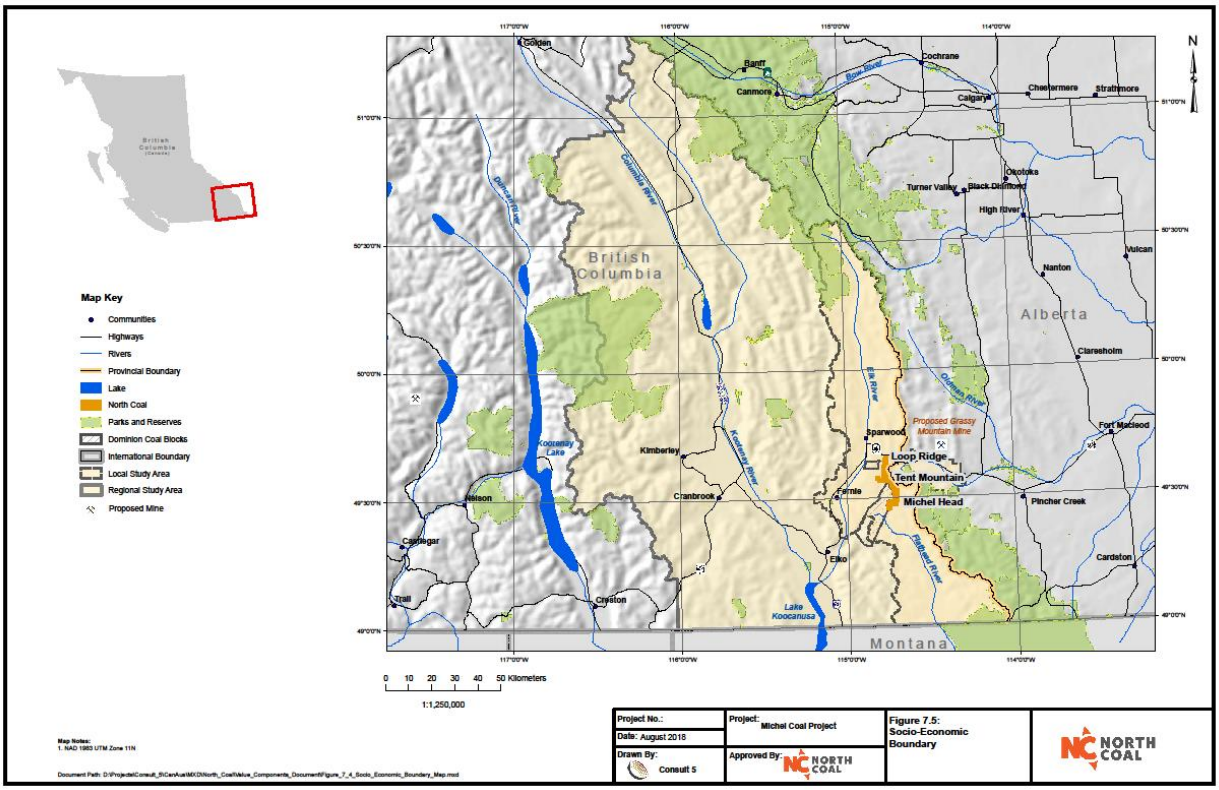


Figure 7-5: Local and Regional Study Boundaries - Socio-economic



8 Conclusions

The list of intermediate and receptor VCs and subcomponents is expected to provide a comprehensive and meaningful effects assessment. The VCs cover the breadth of the physical, aquatic environment, terrestrial environment, economic, social, heritage, and health components that have been identified to be important to indigenous and non-indigenous community members, interest groups, and regulators. Selected VCs are similar to those chosen for projects in the surrounding area and in recent EAs but have been adjusted to account for the area-specific aspects of the Michel Coal Project. Selected VCs also include those being assessed and monitored for the Elk Valley Water Quality Plan and Elk Valley Cumulative Effects Management Framework so that the Michel Coal Project can be effectively assessed and managed within the context of the regional planning and management programs. The selected VCs will be integrated into the AIR, which is the next step in the BC environmental assessment process.

Overall, the selected VCs and boundaries define the scope of the assessment that will be used to track future performance of project development, operations, closure, and reclamation.

9 References

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Appendix A

Comparison of Valued Components for Similar Projects

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
Climate / Atmosphere	**Global Climate**	Global climate	Project compliance with BC and federal GHG emission targets; GHG emissions (CO_2, CH_4, N_2O)	Global climate	Greenhouse gas emissions (CO_2, CH_4, and N_2O)	GHG	GHG emissions and Project compliance with provincial and federal GHG emission targets (CO_2, CH_4, and N_2O), black carbon, CO_2e	GHG emission	GHG emissions (CO_2, CH_4, N_2O)		
	Air	Intermediate component (PM, SO_2, CO, NO_2, metals, PAH, VC, dustfall)		Air quality	Air quality, measured through concentrations of criteria air contaminants in air (e.g., particulate matter, SO_2, CO, NO_2), metals, polycyclic aromatic hydrocarbons and volatile organic compounds; dustfall rate; linked to endpoints for human health, aquatic health, ecosystems, vegetation, wildlife, aesthetics, and socio-community VCs.	Intermediate VC: ambient air quality	Criteria air contaminants (TSP, $PM_{2.5}$, PM_{10}, SO_2, NO_X, and CO	Intermediate VC: air	Fine particulates (PM_{10} and $PM_{2.5}$); total suspended particulates; SO_2; NO_2; CO; VOCs; metals and PAHs in dustfall; meteorology (e.g. wind speed and direction)	Air	Change in air quality with criteria for NOx, CO, PM, SOx
	Noise / Vibration	VC plus an intermediate component	Maintenance of self-sustaining and ecologically effective populations; potential habitat availability and abundance due to changes in noise levels	People and wildlife	For people, compliance with the threshold noise level that can result in sleep disturbance and long-term annoyance from noise or vibration for residents; For wildlife, maintenance of self-sustaining and ecologically effective populations	Intermediate VC: noise and vibration	Equivalent continuous sound levels, A-weighted Day-Night levels, Peak overpressure	Intermediate VC: noise and vibration	Noise and vibration levels at receptors (wildlife habitat and permanent and temporary residences)		
Hydrogeology	**Groundwater**	Intermediate component		Hydrogeology (intermediate to be used in assessment of aquatic health, human and terrestrial wildlife health, ecosystem, vegetation, wildlife, and fish VCs)	Groundwater quality, as measured loadings and/or concentrations of metals and non-metal constituents in groundwater; and groundwater quantity measured through groundwater levels and rate of flow.	Intermediate VC: groundwater quality and quantity	Metals and non-metals concentrations; groundwater depth meters below ground surface and flow rate	Intermediate VC: groundwater quality and quantity	Groundwater quality measured through loadings and concentrations of metals and non-metal constituents in groundwater; groundwater quantity measured through groundwater levels and flow rates	Groundwater	Changes in quality and quantity
Surface Water and Aquatic Resources	**Surface Water**	Intermediate component		Surface water hydrology (intermediate to be used in assessment of aquatic health, human and terrestrial wildlife health, ecosystem, vegetation, wildlife, and fish VCs)	Surface water quantity measured through surface water levels and rate of flow; and sediment quantity measured through sediment yield and deposition	Intermediate VC: surface water quality and quantity, and sediment quality	Metals and non-metals concentrations; mean annual discharge and seasonal hydrograph	Intermediate VC: surface water quality and quantity	Surface water quality measured through loadings and concentrations of metals and non-metal constituents in surface water (in particular Se, Cd, NO_3, SO_4); surface water quantity water levels and flow rates at selected watercourses	Surface water	Changes in Quantity (flows and levels) and channel geomorphology
	Sediment	Intermediate component		Surface water and sediment quality (intermediate to be used in assessment of aquatic health, human and terrestrial wildlife health, ecosystem, vegetation, wildlife, and fish VCs)	Surface water quality measured through concentrations of metals and non-metal constituents in surface water; and sediment quality measured through concentrations of metals and non-metal constituents in stream sediments	Intermediate VC included with surface water		Intermediate VC: sediment quality and quantity		Sediment	Changes in quality and quantity

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
	Aquatic Resources					Benthic invertebrates and periphyton (chlorophyll a)	Area of habitat affected; habitat availability and distribution; abundance and distribution of fish lined to a commercial, recreational or Indigenous fishery; growth, survival and reproduction of fish linked to a fishery; changes in periphyton abundance (Chlorophyll a); changes in benthic invertebrate community and productivity; hazard quotients to benthic invertebrates and fish	Receptor VC (under aquatic health)	Water quality (including but not limited to nutrients, PCOCs, temperature, pH, conductivity, metals); Benthic invertebrate metrics (e.g., abundance, community structure); growth, survival and reproduction (based on comparison to applicable toxicological benchmarks), metal concentrations in benthics, sediment quality, groundwater and surface water statistics	Aquatic resources	Health of aquatic life; Persistence of abundance of aquatic resources
	Aquatic Health	Benthic invertebrates; All fish species; All amphibian species	Maintenance of self-sustaining and ecologically effective communities; Growth, survival, and reproduction of each assessed by comparison of predicted concentrations of water and sediment quality to screening values or benchmarks, derived from literature-based toxicity information and that are protective of aquatic life	Benthic invertebrates; All fish species (westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, kokanee); All amphibian species that breed in lentic environments in the RSA (represented by the Columbia spotted frog)	Maintenance of self-sustaining and ecologically effective communities; Growth, survival, and reproduction of each assessed by comparison of predicted concentrations of water and sediment quality to screening values or benchmarks, derived from literature-based toxicity information and that are protective of aquatic life			Receptor VCs: benthic invertebrates; fish species (Westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, Kokanee); amphibians (Columbia spotted frog); water birds (represented by Harlequin duck, red-winged blackbird, spotted sandpiper, mallard, and American dipper)			
	Aquatic Health cont'd	Selenium for all water birds represented by red-winged blackbird, spotted sandpiper, mallard	Maintenance of self-sustaining and ecologically effective communities; Growth, survival and reproduction of water birds assessed by comparison of predicted concentrations of selenium in water to screening values derived from literature-based toxicity information and that are protective of bird health	Selenium for all waterbirds represented by red-winged blackbird, spotted sandpiper, mallard	Maintenance of self-sustaining and ecologically effective communities; Growth, survival and reproduction of waterbirds assessed by comparison of predicted concentrations of selenium in water to screening values derived from literature-based toxicity information and that are protective of bird health						

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
Fish and Fish Habitat	**Species**	Westslope cutthroat trout, Bull trout, Longnose sucker, Mountain whitefish	Maintenance of self-sustaining and ecologically effective plant population; Changes to potential habitat availability, habitat distribution, known occurrences (numbers), abundance	Westslope cutthroat trout (Oncorhynchus clarki lewisi); Bull trout (Salvelinus confluentus); Longnose sucker (Catostomus catostomus); Mountain whitefish (Prosopium williamsoni)	Maintenance of self-sustaining and ecologically effective population; Habitat availability – all factors affecting the quantity and quality of available habitat, includes changes in channel morphology and calcite formation; Habitat distribution – including evaluation of changes to habitat distribution and effects to habitat connectivity; Abundance – including evaluation of changes to numbers of fish in the population as affected by the combined changes in the above and other measurement indicators such as groundwater quality and quantity, surface water quality and quantity, sediment quality, growth, survival and reproduction effects to fish food sources (e.g., benthic invertebrates)	Mountain whitefish, Longnose sucker, Westslope cutthroat trout, Bull trout		Receptor VCs (also included under aquatic health): Westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, Kokanee	Water quality (as for benthics), sediment quality, habitat quantity relative to baseline (e.g., changes in channel morphology, substrates and calcite formations, habitat connectivity, habitat availability, riparian habitat), fish population metrics (e.g., density, biomass, size-at-age), fish growth, survival and reproduction, metal concentrations in fish muscle tissue, DELT surveys (visual assessment of deformations, erosions, lesions, tumours)	Bull trout	Changes in health
	Fish Habitat					Fish habitat				Fish habitat	Changes in abundance; loss, alteration, or degradation of fish habitat; availability and use of habitat
Terrain / Surficial Geology	**Terrain Stability**	Intermediate component		Surficial geology, terrain, and soil (intermediate to be used in assessment of human health, ecosystem, vegetation, and wildlife VCs)	Surficial geology and terrain distribution measured through terrain type, slope, and aspect; soil quantity and distribution measured through depth and distribution of soil types; and soil quality measured through concentrations of metals and non-metal constituents in soil and soil type and general characteristics and properties of soil	Intermediate VC: terrain	Terrain type, slope and aspect; landform type and drainage	Intermediate VC: terrain	Terrain type; slope and aspect	Terrain stability	Terrain stability class ratings; effects on infrastructure resulting from subsidence
	Soil	Intermediate component				Intermediate VC: soil	Metals and non-metals concentrations; Soil type and properties by area	Intermediate VC: soil quality and quantity	Metal and non-metal concentrations in soil; soil type and general soil properties; depth and distribution of soil types	Ecologically valuable soil	Changes in soil quality and soil association quantity and distribution
	Surficial Geology					Intermediate VC: surficial geology	Potential acid rock drainage; total concentration of metals and metalloids				
Terrestrial Ecology	**Rare or highly valued plants and habitat**	Bent-flowered milk-vetch, Sandberg's desert parsley, Snow-white dimple lichen, Whitebark pine	Maintenance of self-sustaining and ecologically effective plant population; Changes to potential habitat availability, habitat distribution, known occurrences (numbers), abundance	Compact grimmia (Schistidium confertum); Lescuraea saxicola; Nine-leaved desert-parsley (Lomatium triternatum ssp. platycarpum); Purple oniongrass (Melica spectabilis);	Maintenance of self sustaining and ecologically effective plant populations; Potential habitat availability – changes to the amount of potential habitat for the listed plant; Habitat distribution – changes to potential habitat distribution and effects to habitat connectivity; Known occurrence – changes to the number of documented occurrences of	VC vegetation; Subcomponents: plant species at risk and culturally important plants	Abundance and distribution of individual plants from the species of interest; area of vegetation loss; abundance and distribution of invasive plant species; changes to critical habitat; metal concentrations in tissue	Receptor VCs: listed and sensitive plant communities and species, limber pine, whitebark pine, culturally significant plants and ecosystems	Community abundance and distribution; community changes; habitat availability; known occurrence and abundance of species of interest	Rare or highly valued plants and habitat	Loss or alteration of rare/important plant species / habitat

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
				Slender mannagrass (Glyceria pulchella); Welsh thread-moss (Bryum gemmiparum); Whitebark pine (Pinus albicalis)	rare plants; Abundance – changes to numbers of plants in the population within potential habitat and/or at known occurrence locations as affected by the combined changes in other measurement indicators such as air quality and dustfall rate, groundwater quality and quantity, surface water quality and quantity, soil quantity and quality, and number of invasive species						
	Ecosystems of conservation interest					VC sensitive ecosystems; Subcomponents: ecological communities at risk or of special management concern; and culturally important ecosystems	Abundance and distribution of sensitive ecosystems; area of affected sensitive ecosystem; changes in abundance and distribution of blue- and red-listed wetland ecological communities; changes in wetland function as it relates to migratory birds and species at risk.			Ecosystems of conservation interest	Loss or alteration of ecosystem function
	Ecosystems	Avalanche paths; grassland; wetlands; riparian habitat; mature and old growth forests	Maintenance of self-sustaining and ecologically effective ecosystems; ecosystem abundance; ecosystem distribution; ecosystem condition (changes to quality such as air, groundwater, surface water, soil, species richness, rare spp, invasive spp, wildlife trees)	Avalanche paths; Grassland ecosystems; Wetland ecosystems; Riparian habitat; Mature and old growth forests	Maintenance of self-sustaining and ecologically effective ecosystems; Ecosystem abundance – changes to the amount of the ecosystem present; Ecosystem distribution – changes to the distribution and connectivity of the ecosystem; Ecosystem condition – changes to the quality of the ecosystem as affected by other measurement indicators such as air quality and dustfall rate, groundwater quality and quantity, surface water quality and quantity, soil quality and quantity, and changes to: species richness, rare species, invasive species, wildlife tree users (mature and old growth forest)	Subcomponents: old growth forests, riparian habitat, rock outcrops, wetlands		Receptor VCs: avalanche chutes, grassland, wetlands, riparian habitat, old growth and mature forests	Ecosystem abundance and distribution; composition and structural changes (i.e., species richness, abundance of native species, listed species, invasive species, structural stage as applicable), and function as applicable	Alpine; Parkland; Forested ecosystems	Loss or alteration of ecosystem function
	Ecosystems cont'd									Wetlands	Changes in extent and function

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
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Wildlife and Wildlife Habitat	**Mammals**	American badger, American marten, Canada lynx, Elk, Moose, Grizzly bear	Maintenance of self-sustaining and ecologically effective wildlife populations; Changes to habitat availability, habitat distribution, abundance	American badger (Taxidea taxus); American marten (Martes americana); Canada lynx (Lynx canadensis); Elk (Cervus elaphus); Grizzly bear (Ursus arctos)	Maintenance of self-sustaining and ecologically effective wildlife populations; Habitat availability – changes to the amount or quality of habitat; Habitat distribution – changes to habitat distribution and effects to habitat connectivity; Abundance – changes to numbers of animals in the population as affected by the combined changes in other measurement indicators such as air quality and dustfall rate, groundwater quality and quantity, surface water quality and quantity, soil quantity and quality, and noise, as appropriate	VC wildlife and wildlife habitat; Subcomponents: American badger, American marten, elk, grizzly bear, little brown myotis, moose	Area of habitat affected; habitat availability and distribution; mortality risk; number of barriers to migratory movement; species abundance and distribution; growth, survival, and reproduction of species of interest; changes to critical habitat; hazard quotient for birds and mammals and food chain exposure	Receptor VCs: American badger, American marten, at-risk bats (little brown bat, northern myotis, Eastern red bat), bighorn sheep, Canada lynx, elk, grizzly bear, moose, wolverine	Habitat availability and distribution; known occurrence and relative abundance	Caribou, Elk, Moose, Mountain Goat, Grizzly Bear, Fisher, Bats (spp tbd)	Habitat loss; disruption of movements; sensory disturbance; direct and indirect wildlife mortality from Project activities; attractants for particular spp
	Birds	American dipper, Olive-sided flycatcher	Maintenance of self-sustaining and ecologically effective wildlife populations; Changes to habitat availability, habitat distribution, abundance	American dipper (Cinclusmexicannus); Great blue heron (Ardea herodias); Olive-sided flycatcher (Contopus cooperi)	Maintenance of self-sustaining and ecologically effective wildlife populations; Habitat availability, habitat distribution, and abundance (as above)	Subcomponents: American Dipper, aerial insectivores, Bald Eagle, Common Nighthawk, Olive-sided Flycatcher, shrub-nesting birds, waterfowl and water birds, woodpeckers		Receptor VCs: American dipper, migratory birds (barn swallow, olive-sided flycatcher, woodpeckers), northern goshawk; Receptor VCs for aquatic health include Harlequin duck, red-winged blackbird, spotted sandpiper, mallard, American dipper	Habitat availability and distribution; known occurrence and relative abundance. For aquatic health for water bird species: water quality, sediment quality, water bird surveys, metal concentrations in tissue and/or egg samples from representative water bird species (e.g., spotted sandpiper)	Raptors (spp tbd), Black-throated warbler, waterfowl (spp tbd)	Habitat loss; disruption of movements; sensory disturbance; direct and indirect wildlife mortality from Project activities; attractants for particular spp
	Amphibians and Reptiles	Western toad	Maintenance of self-sustaining and ecologically effective wildlife populations; Changes to habitat availability, habitat distribution, abundance	Western toad (Anaxyrus boreas)	Maintenance of self-sustaining and ecologically effective wildlife populations; Habitat availability, habitat distribution, and abundance (as above)	Subcomponents: western toad		Receptor VCs: western toad (document also says amphibians to be represented by Columbia spotted frog)	Habitat availability and distribution; known occurrence and relative abundance. For aquatic health: water quality, sediment quality, amphibian presence/not detected, metal concentrations in tissue samples from amphibian (i.e., Columbia spotted frog)	Western toad	Habitat loss; disruption of movements; sensory disturbance; direct and indirect wildlife mortality from Project activities; attractants for particular spp
	Insects	Gillette's Checkerspot	Maintenance of self-sustaining and ecologically effective wildlife populations; Changes to habitat availability, habitat distribution, abundance			Subcomponents: Gillette's Checkerspot		Receptor VCs: Gillette's checkerspot	Habitat availability and distribution; known occurrence and individual populations		

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	Wildlife Health	Wildlife that may be exposed to Project chemical constituents including American robin, Little brown bat, Masked shrew, White-tailed ptarmigan, Least chipmunk, Snowshoe hare, Bighorn sheep, Elk, Common raven, Deer mouse, Grizzly bear, Northern goshawk, American badger, American marten, Canada lynx, American dipper, Canada goose, Moose, Mallard, Common merganser, Northern river otter	Protection of terrestrial wildlife health; Hazard quotient from total exposure to different mediums with input from air quality (dustfall), groundwater, surface water and sediment quality predictions	Wildlife that may be exposed to Project chemical constituents including American robin, Little brown bat, Masked shrew, White-tailed ptarmigan, Least chipmunk, Snowshoe hare, Bighorn sheep, Elk, Common raven, Deer mouse, Grizzly bear, Northern goshawk, American badger, American marten, Canada lynx, American dipper, Canada goose, Moose, Mallard, Common merganser, Northern river otter	Protection of terrestrial wildlife health; Hazard quotient from total exposure to different mediums with input from air quality (dustfall), groundwater, surface water and sediment quality predictions			Receptor VC: wildlife (wildlife health risk assessment)	Hazard quotients; soil quality; noise and vibration; metals and PAHs in dustfall		
Economic	**Employment and income**	Workers	Continuation of employment opportunities and income generation; Employment; Income	Workers	Continuation of employment opportunities and income generation; Employment; Income					Employment and income	Access to job opportunities
	Economic activity	Workers, businesses, local and BC governments	Continuation of business and economic development; Economic development assessed through training/skill development opportunities, goods and services purchased, local businesses, industry revenue, changes to visual character	Workers, businesses, local and BC governments	Continuation of business and economic development; Economic development assessed through training/skill development opportunities, goods and services purchased, local businesses, industry revenue, changes to visual character	VC local economy; Subcomponents: labour force capacity, commercial land and water use	Amount, area or volume of lands and resources affected; indicators used for air, noise, fish, vegetation, visual quality, wildlife, etc.; wages in competing sectors in the region	Receptor VC: economic conditions	Opportunities for training and skills development; employment opportunities from the Project; income generation; revenue from goods and services purchased; generation of local business; industry revenue generation or loss; local and provincial government revenue	Economic activity	Access to business opportunities
	Local and BC Governments	Local and BC governments	Continued contribution to local and BC government finances; Gross domestic product; Local and BC government revenue	Local and BC governments	Continued contribution to local and BC government finances; Gross domestic product; Local and BC government revenue						
	Demographics									Demographics	Change in local community population

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
Social / Socio-community	**Education, skills and training**									Education, skills and training	Access to education opportunities
	Community infrastructure	Local residents and local and BC governments	Maintenance of community housing availability and affordability, and community services and infrastructure availability and access; Housing and community services and infrastructure indicated by population change, housing demand and supply, services and infrastructure demand, use and supply	Local residents and local and BC governments	Maintenance of community housing availability and affordability, and community services and infrastructure availability and access; Housing and community services and infrastructure indicated by population change, housing demand and supply, services and infrastructure demand, use and supply	VC services and infrastructure; Subcomponents: housing, health care services, roads	Cost of housing, health care capacity; road traffic volume on forest service road; other indicators of strain on services and infrastructure	Receptor VC: housing and community services and infrastructure	Housing supply and demand; communities services; infrastructure; local population changes	Community infrastructure	Access and use of infrastructure (e.g., utilities, roads/rail, power)
	Community services	(Captured in community infrastructure above)				(Captured in community infrastructure above)				Community services	Capacity, access and use of services (e.g., policing, hospitals, social services, community center, recreation facilities)
	Community wellbeing	Local residents, recreationalists, and workers	Maintenance or improvement in community well-being and healthy lifestyle; Project employment and income, skills, workforce composition, housing, shifts, behaviour, coping and wellbeing; Change in recreational opportunities and effect on wellbeing; Nuisance effects due to dustfall, noise and vibration	Local residents, recreationalists, and workers	Maintenance or improvement in community well-being and healthy lifestyle; Project employment and income, skills, workforce composition, housing, shifts, behaviour, coping and wellbeing; Change in recreational opportunities and effect on wellbeing; Nuisance effects due to dustfall, noise and vibration	VC community health and wellbeing; Subcomponents: adequate community services and infrastructure, healthy lifestyles, healthy living environments, social cohesion, sense of self-determination	Indicators used for other VCs pertaining to economic, environmental, and community conditions; qualitative data on social cohesion, healthy lifestyles, healthy living environments, and sense of self-determination	Receptor VC: community health and wellbeing	Health indicators (e.g. drug and alcohol abuse, shift work schedules, worker conditions, crime rates, consumption of contaminated water or food); public safety (e.g., exposure to physical hazards, air emissions, water contaminants)	Community wellbeing	Attitudes, values, goals, and practices of the region
	Commercial land use	Local residents, businesses, and local and BC governments	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies; Land uses; Access	Local residents, businesses, and local and BC governments	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies; Land uses; Access			Receptor VC: land use and access	Implementation and consistency of land use designations; implementation of land use policies; access to harvesting areas for recreation; quality of recreation and tourism experiences	Commercial land use	Changes in land use; persistence of land use opportunities

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
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	Non-commercial land use / Recreation	Local recreationalists, visitors, businesses, and local and BC governments	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies; Land uses; Access; Quality of recreation/tourism experience	Local recreationalists, visitors, businesses, and local and BC governments	Continued commercial land and resource use opportunities; Consistency with land use designations and plan objectives and policies; Land uses; Access; Quality of recreation/tourism experience	VC recreation; Subcomponents: motorized recreation, recreational hunting, recreational angling, local recreation sites and navigation	Amount, area, trail length, or volume of lands and recreational resources affected; indicators used for assessing air, noise, fish, visual quality, wildlife, etc.	Receptor VC: recreation and tourism	Recreational use; quality of recreation and tourism experiences; noise and air quality	Non-commercial land use	Changes in land use; persistence of land use opportunities
	Public safety	Local residents and recreationalists	Maintenance or improvement in public safety; Public safety assessed through exposure of public to Project physical hazards	Local residents and recreationalists	Maintenance or improvement in public safety; Public safety assessed through exposure of public to Project physical hazards						
Heritage / Culture	**Archaeological and heritage sites**	Archaeology and heritage sites	Protection of archaeological resources; Presence and number, type and location of archaeological materials or features of sites	Archaeology resource materials and sites	Protection of archaeological resources; Presence and number, type and location of archaeological materials or features of sites	Heritage and archaeological resources	Number of affected sites; location of known and unknown archaeological sites; site type and condition; changes to accessibility to archaeological sites, features and artifacts; measurable disturbance or loss of archaeological sites, features and artifacts	Receptor VC: archaeology and heritage sites	Presence, number, type of resources	Archaeology and heritage sites	Loss, alteration, and/or degradation of archaeological and heritage sites; protection of archaeological resources
Human health	**Human health**	People (residents of nearby communities, First Nations including the Ktunaxa, and temporary residents at recreation areas and hunting/trapping cabins)	Protection of human health; Hazard quotient to the selected toxicity reference value (TRV); Incremental Lifetime Cancer Risk, qualitative literature assessment for particulate matter, qualitative assessment from literature review of epidemiological studies associated with particulate matter related to dust and coal.	People (residents of nearby communities, First Nations including the Ktunaxa, and temporary residents at recreation areas and hunting/trapping cabins)	Protection of human health; Hazard quotient to the selected toxicity reference value (TRV); Incremental Lifetime Cancer Risk, qualitative literature assessment for particulate matter, qualitative assessment from literature review of epidemiological studies associated with particulate matter related to dust and coal.	Human health	Hazard quotient; incremental lifetime cancer risk; qualitative literature assessment for particulate matter	Receptor VC: people (including local communities, indigenous groups, and temporary residents at recreation areas; human health risk assessment)	Hazard quotients; Incremental Lifetime Cancer Risk; soil quality; noise and vibration; metals and PAHs in dustfall		
	Drinking water									Drinking water	Changes in drinking water quality; protection of human health
	Air quality									Air quality	Changes in air quality; protection of human health

		Coal Mountain Phase 2		Baldy Ridge Extension		Bingay Main Coal (Proposed VCs)		Crown Mountain		Murray River Coal	
Category	**VC**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**	**Proposed VC**	**Proposed Indicators**	**AIR Required VC**	**Indicators / Endpoints**	**AIR Required VC**	**Indicators / Endpoints**
	Noise	Noise is VC plus an intermediate component	Compliance with threshold noise level for sleep disturbance and long-term annoyance from noise for residents; noise levels			Intermediate VC: noise				Noise	Exposure to noise levels; protection of human health
	Vibration	Vibration	Compliance with threshold noise level for sleep disturbance and long-term annoyance from vibration for residents; vibration levels			Intermediate VC: vibration					
	Country foods									Country foods	Quality of country foods; protection of human health
	Visual aesthetics	Local residents, local recreationists and visitors	Maintenance of the visual character of Project site relative to the surrounding landscape; Visual quality assessed through visible extent of Project from receptor sites, rating of the scale and contrast including air quality	Local residents, local recreationists and visitors	Maintenance of the visual character of Project site relative to the surrounding landscape; Visual quality assessed through visible extent of Project from receptor sites, rating of the scale and contrast including air quality	Visual quality	Number of recreational or cultural viewpoints; number of viewers at viewpoints; qualitative data on air quality parameters	Receptor VC: visual quality	View corridors; visual quality including changes to air quality		

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