EAO | Environmental Assessment Office

Application Information Requirements

Crown Mountain Coking Coal Project

Proposed by:

NWP Coal Canada Ltd.

April 26, 2018

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

BRITISH COLUMBIA

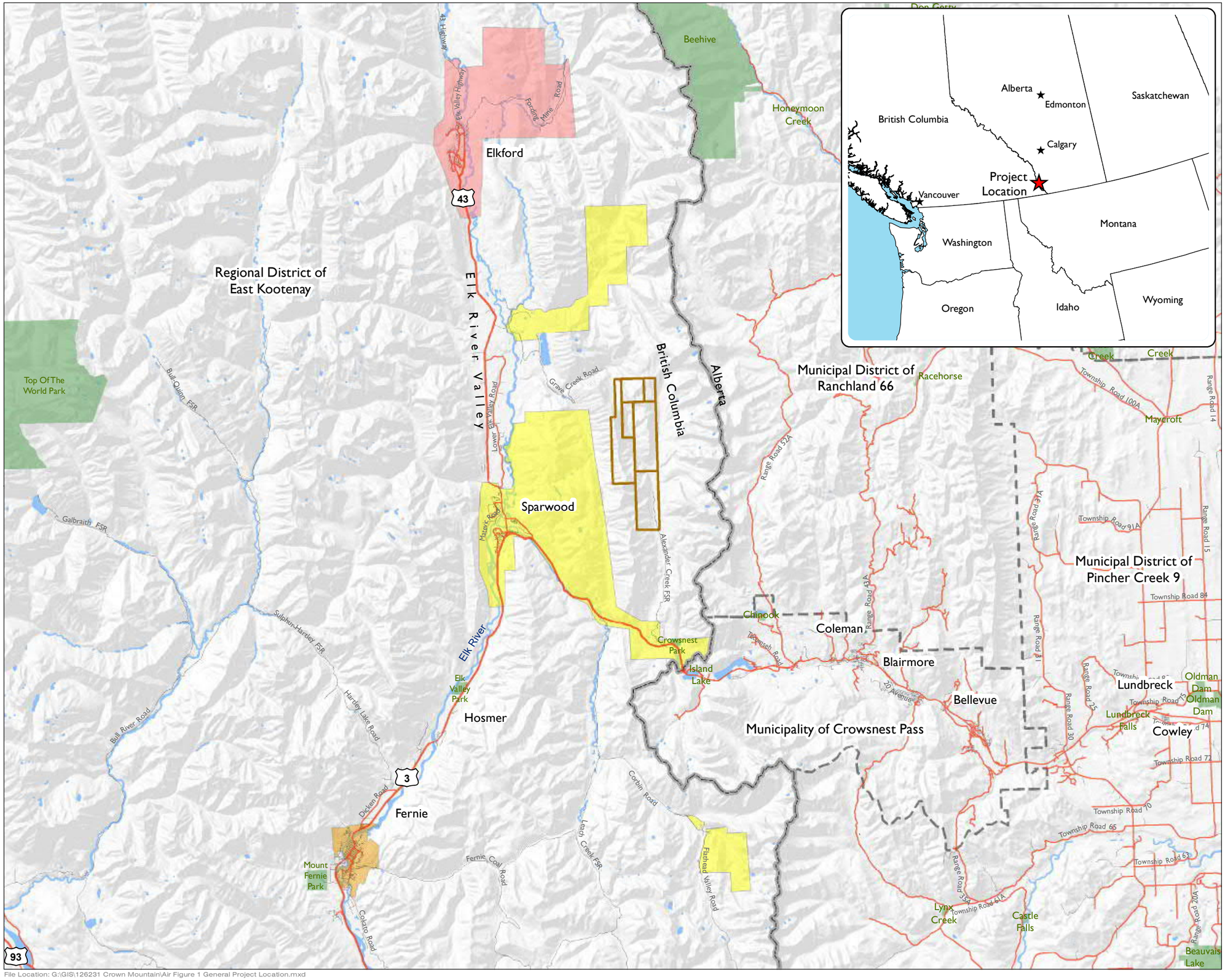
PREFACE TO THE AIR

The Application Information Requirements (AIR) specifies the information that NWP Coal Canada Ltd. (NWP Coal) and the Crown Mountain Coking Coal Project (the Proponent) is required to provide in their Application for an Environmental Assessment Certificate (Application) under the section 16(2) of *BC Environmental Assessment Act* (*BCEAA*).

The Proponent is proposing to develop the Crown Mountain Coking Coal Project (the proposed Project), as described in the Project Description. The proposed Project is an open pit metallurgical coal mine in the Elk Valley coal field in the East Kootenay Region of south eastern British Columbia (**Figure 1**). The site consists of five tenured coal exploration licenses covering a total area of 2,588 ha and one license application (975 ha). The Project occurs between several existing metallurgical coal mines in the Elk Valley and Crowsnest coal fields, the nearest being Teck Corporation's Elkview (8 km southwest) and Line Creek (12 km north) mines. The anticipated production capacity of the Project is 3.7 million run-of-mine tonnes (M ROMt) per annum (approximately 10,150 tonnes per day [tpd]) for 16 years (not including site decommissioning). Run-of-mine coal reserves are estimated at 56 million tonnes, of which 50 million tonnes are proven and 6 million tonnes are probable. Exploration activities to date indicate that the coal at the Crown Mountain site is typical of the coking coals produced from existing mines in the Elk Valley. The high quality metallurgical coal would be transported via railway to the Port of Vancouver and subsequently shipped overseas for use in steelmaking.

The estimated capital costs of the proposed Project are $370 million based on the Project's Pre-feasibility Study (Northwest Corporation 2014). The number of employees during Project operation is estimated to average 240 hourly full-time positions and approximately 58 salaried staff. With an expected 16 year operating life, these positions equate to a total of approximately 4,768 person years (PY) of employment. The number of employees during construction is estimated to range from 50 to over 200 people, including both hourly and salaried personnel, depending on the season and the amount of work in progress. Final numbers will be determined as part of further socio-economic analyses.

NWP Coal's intent is to design and construct a state-of-the-art coal operation on a greenfield site utilizing industry best practices in full compliance with all applicable regulations and governing documents, such as, but not limited to, the Elk Valley Area-Based Management Plan known as the Elk Valley Water Quality Plan (2014).



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 1
Project Location

- Highways
- Arterial Roads
- Local/Resource Roads
- Regional District/Regional Municipality
- District of Elkford
- City of Fernie
- District of Sparwood
- Rivers/Lakes
- BC/Alberta Parks and Protected Areas
- Coal Licences
- BC/Alberta Border

SCALE 1:292,339

0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 7/6/2017

File Location: G:\GIS\126231 Crown Mountain\Air Figure 1 General Project Location.mxd

Key project components include:

- Surface extraction areas (three pits - north pit, east pit, and south pit);
- Waste rock management areas;
- Plant area (includes raw coal stockpile area, a processing plant, and site support facilities);
- Clean coal transportation route (overland conveyor and haul road);
- Rail load-out facility and rail siding (includes various auxiliary facilities such as a guard house; light vehicle wash; drug and alcohol testing/orientation building; and a small dry);
- Power supply;
- Natural gas supply;
- Explosives storage;
- Fuel storage;
- Sewage treatment; and
- Water supply.

The conceptual layout anticipated at mine closure is illustrated in **Figure 2** and is based on the current preferred site configuration which was chosen to minimize the footprint of the Project as much as possible while maximizing access to the coal resource.

Since the proposed Project is a coal mine with a proposed capacity greater than 250,000 tonnes per year of clean coal and will result in a disturbance greater than 750 hectares (ha) that was not previously permitted for disturbance, it is subject to a provincial environmental assessment (EA) under Part 3 of the Reviewable Projects Regulation (BC Reg 370/02) of the Act.

The BC Environmental Assessment Office (EAO) issued a Section 10 Order to the Proponent on October 30, 2014 confirming that the proposed Project requires an Environmental Assessment Certificate (EAC), pursuant to Section 10(1)(c) of the *BCEAA*, before it may receive provincial permits to construct and operate the proposed Project.

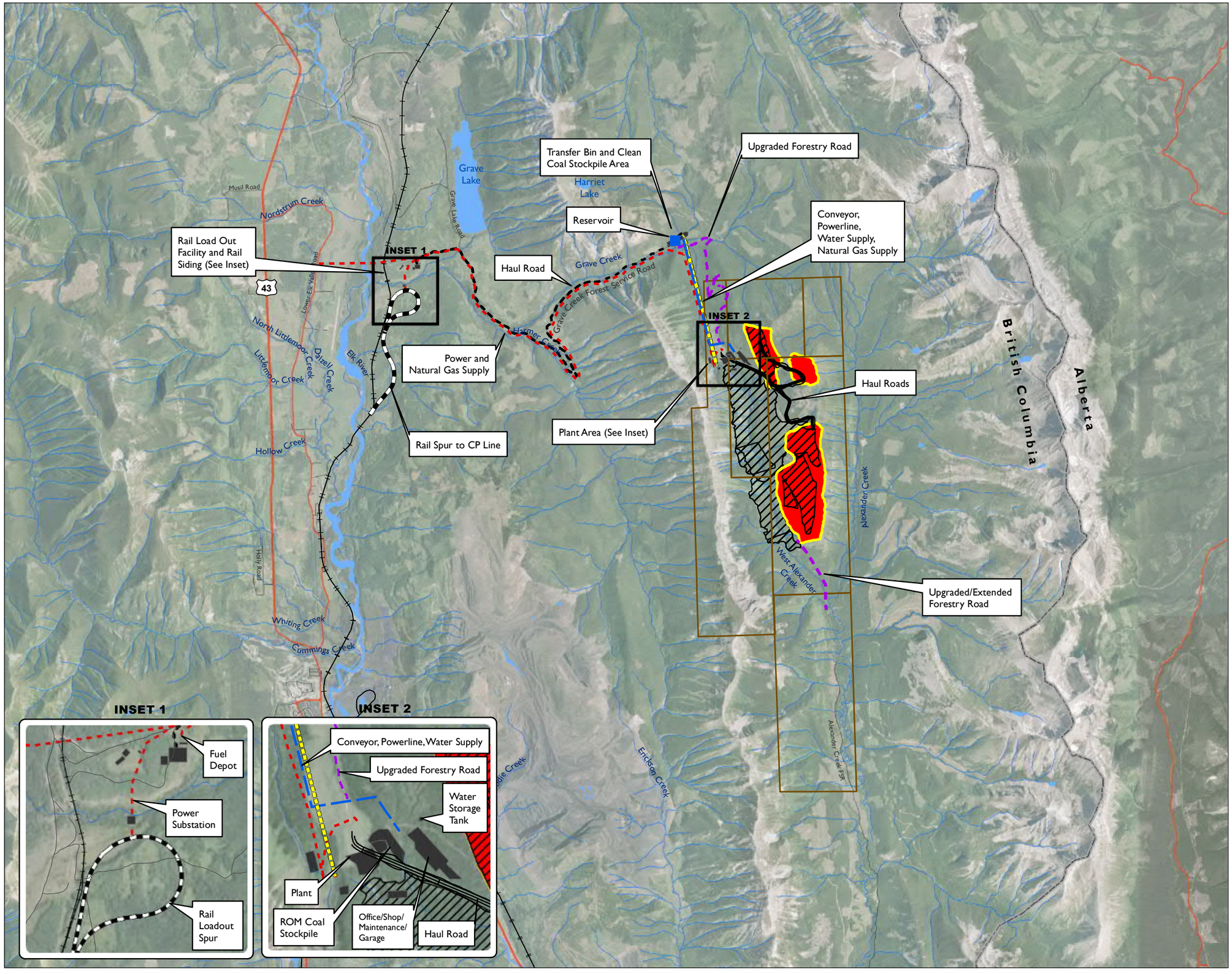
Canadian Environmental Assessment Act 2012 (CEAA 2012) Applicability

The proposed Project is subject to an EA under the *Canadian Environmental Assessment Act* (CEAA) 2012. Federally, the Project is considered a Designated Project under the CEAA 2012 Regulations Designating Physical Projects as the mine will have a production capacity of more than 3,000 tonnes per day.

The Project will undergo a coordinated provincial - federal review.

List of Reviewing Agencies

The following government agencies, municipal and regional agencies, local Aboriginal Groups and the public have had the opportunity to review and comment on the draft Valued Component Selection Document or the draft AIR:



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Crown Mountain Coking Coal Project

Figure 2
Conceptual Project Layout and Infrastructure

- Reservoir Location
- Access Road
- Conveyor
- Upgraded/Extended Forestry Road
- Powerline/Natural Gas Supply
- Rail Spur
- Water Supply Line
- Haul Road
- Existing Rail Line
- Surface Extraction Areas
- Buildings and Areas
- Waste Management Areas
- Coal Licences
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Lake/River
- BC/Alberta Border

SCALE 1:85,902

0 250 500 1,000 Meters

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 12/21/2017

File Location: G:\GIS\2012 and Prior\126231 Crown Mountain\Air Figure 2 - Conceptual Project Layout and Components.mxd

Provincial Agencies:

- EAO;
- Ministry of Environment and Climate Change (ENV);
- Forests, Lands, Natural Resource Operations & Rural Development (FLNRORD);
- Ministry of Energy and Mines (MEM); and
- Interior Health Authority.

Federal Agencies:

- Canadian Environmental Assessment Agency (CEA Agency);
- Department of Fisheries and Oceans (DFO);
- Environment and Climate Change Canada (ECCC);
- Health Canada (HC);
- Natural Resources Canada (NRCan); and
- Transport Canada (TC).

Municipal and Regional Agencies:

- Town of Fernie;
- Town of Sparwood; and
- Municipality of Crowsnest Pass.

Local Aboriginal Groups NWP Coal is engaging with are identified on Schedule B of the Section 11 Order:

- Tobacco Plains Band;
- St. Mary's Band;
- Lower Kootenay Band; and
- ?Akisq'nuk First Nation.

These First Nations are represented by the Ktunaxa Nation Council (KNC). In addition, input on behalf of the Ktunaxa has been provided by representatives of Columbia River Inter-Tribal Fisheries Commission (CCRIFC).

The Province will consult with the Shuswap Indian Band in the form of notification as per Part G: 12.1 of the Section 11 Order and referenced in Schedule C.

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TABLES

FIGURES

TABLE OF CONCORDANCE

A Table of Concordance will be included in the Application. The Table of Concordance will demonstrate where the requirements in the AIR are found in the Application, with volume, section, and page references and following the format of **Table 1**. A well-constructed Table of Concordance will assist in a timely application evaluation to determine whether the application contains the required information.

Table 1: Example Table of Concordance between AIR and Application

AIR Section & Page No.	AIR Title	AIR Section Language	Application Section Title	Application Volume Section, Sub-Section, Page Number	Relevant Appendix

ABBREVIATIONS AND ACRONYMS

AIR	Application Information Requirements
BC	British Columbia
BCEAA	*British Columbia Environmental Assessment Act*
BMP	Best Management Practice
CAC	Common Air Contaminants
CEA Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
CH_4	Methane
CO_2	Carbon Dioxide
CCRIFC	Columbia River Inter-Tribal Fisheries Commission
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
EAO	Environmental Assessment Office (British Columbia)
ECCC	Environment and Climate Change Canada
ENV	Ministry of Environment and Climate Change (British Columbia)
e-PIC	EAO Project Information Centre
EVWQP	Elk Valley Water Quality Plan (also known as the Elk Valley Area Based Management Plan)
GHG	Greenhouse gas
ha	Hectares
HC	Health Canada
km	Kilometre
KNC	Ktunaxa Nation Council
LSA	Local Study Area
FLNRORD	Forests, Lands, Natural Resource Operations & Rural Development (British Columbia)
M ROMt	Million run-of-mine tonnes
NO_2	Nitrogen dioxide
NRCan	Natural Resources Canada
PM	Particulate Matter
RSA	Regional Study Area
TC	Transport Canada

TEM	Terrestrial Ecosystem Mapping
tpd	Tonnes (metric) per day
VC	Valued Component

APPLICATION SUMMARY

The Application will include an Executive Summary, including the following:

- A summary of the proposed Project, including the project scope, project benefits and applicable permits. If the proponent has already requested or intends to request concurrent permitting, this will also be stated;
- A brief overview of the environmental assessment process including project reviewability, and the pre-application and application review stages of the EA;
- A brief overview of consultation activities with Aboriginal Groups, the public and government agencies to date;
- A summary of the key issues raised by local Aboriginal Groups, the public and government agencies;
- A summary of key adverse effects on local Aboriginal Interests and mitigation measures;
- A summary of key effects, proposed mitigation measures and residual and cumulative effects on Valued Components;
- A summary of how the proposed Project will support the goals of the Elk Valley Water Quality Plan including how the proposed Project is feasible within the confines of the Plan and a summary of environmental and operation management plans and compliance reporting planned for the Project; and
- Proponent's conclusions regarding the potential for significant adverse effects on Valued Components.

PART A - INTRODUCTION

1.0 Overview of Proposed Project Proponent Description

A description of the Proponent is included in the Project Description.

The Application will:

- Describe the Proponent, including history, type of company or organization, affiliations, management structure, and reporting structure;
- Provide contact information for the Proponent; and
- Include a list of parties involved in the preparation of the Application, their qualifications, and the section(s) for which they were responsible.

1.1 Description of Proposed Project

A description of the Proponent is included in the Project Description.

The Application will:

- Describe the purpose of the proposed Project from the perspective of the Proponent, and identify whether the objectives of the proposed Project relate to any broader private or public sector policies, plans, or programs;
- Describe the provincial and federal legislative requirements for submission of environmental assessment Applications under the BC *Environmental Assessment Act* and the *Canadian Environmental Assessment Act*;
- Describe the location of the proposed Project and the latitude and longitude coordinates of the site and include maps showing both regional context (identifying nearby communities and geographic features) and the specific location of the proposed Project;
- Describe the location of the proposed Project relative to local Aboriginal Groups' asserted traditional territories, and/or Treaty Nation territories;
- Describe the Project footprint and all phases of the proposed Project, including their duration and proposed scheduling;
- Describe all on-site and off-site components associated with the proposed Project, with figures (additional detail for selected Project components is provided in **Sections 1.1.1** to **1.1.4**);
- Describe the activities associated with the components and phases of the proposed Project, with figures (i.e., site preparation including timber extraction and land clearing, etc.);
- Discuss the relevant history of the proposed Project, including exploratory or investigative history;
- Describe the production schedule of the Project;

- Provide land use context and summarize existing and planned land use that overlaps or may be potentially impacted by the proposed Project components and activities, including:
  - Land ownership (e.g., private land [such as Teck lands], provincial Crown land, federal land [including Indian Reserves], Aboriginal rights, title, and interests [EVWQP, and the ABMP]);
  - Local government zoning or plans;
  - Land status and use as well as land capability;
  - Tenures (municipal, provincial, federal), licenses, permits, or other authorizations;
  - Non-tenured current land uses;
  - Current and planned land use plans;
  - Provincial land use plans (e.g., Land and Resource Management Plans) and provincial land use designations (e.g., Agricultural Land Reserve, Old Growth Management Areas, Forests and Range Practices Act designations) and provincial land use management objectives
  - Any other development or activities in the current or reasonably foreseeable future, whether or not directly related to the proposed Project;
  - Maps showing location of other uses referenced above in relation to the proposed Project; and
  - References to the Application section that assesses land use and potential overlaps/impacts in more detail.
- Describe the following features of the natural environment and relevant baseline studies:
  - Geology and deposit information (e.g., geochemistry, general geology and detailed geology);
  - Surficial geology, terrain and soils (surficial geology, terrain mapping, soil surveys, soil characterizations);
  - Air quality and climate;
  - Topography and surface drainage features;
  - Water quality;
  - Fisheries and aquatic resources;
  - Vegetation; and
  - Wildlife.
- Land status and use as well as land capability;
- Archaeological Resources;
- Describe the Project's economic benefits:
  - Capital construction cost estimates, including:
    - Breakdown of costs (e.g., land, buildings, equipment) associated with the proposed Project;
    - Estimated operating costs over the life of the proposed Project, including breakdown of costs by category (e.g., labour, supplies and materials, administration); and
    - Estimated costs for decommissioning/closure/abandonment/reclamation.
  - Employment estimates including:
    - Direct employment to be created, by job category, by Project phase, in number of person year (PY) jobs for construction and decommissioning and full-time equivalent (FTE) jobs for operations. Direct employment estimates will be broken down into full-

time, part-time and seasonal job categories;
    - Average wages, by major job category, for the construction and operating periods;
    - Breakdown of jobs that will be filled from local, provincial, national or international labour markets;
    - Indirect and induced employment to be generated, by project phase; and
    - Information about an employment strategy, if any.
- Contractor supply services estimates, including:
    - List of the major types of businesses/contractors to be used, broken down at the local, provincial, and national level, by project phase;
    - Value of supply of service contracts expected, by project phase; and
    - Information about a local purchasing strategy, if any.
- Annual government revenues, by type (e.g., income tax, license rent, property tax, mineral tax) and jurisdiction (e.g., local, provincial, federal), for all phases of the proposed Project;
- Any benefits the project may have to the five pillars of assessment (Environmental, Economic, Social, Health and Heritage);
- All Canadian dollar estimates will be provided in real dollars, with an explanation of how they are measured (e.g., discount rates); and
- State all assumptions and references for the above information.

1.1.1 Surface Extraction Area

The Application will describe the surface extraction areas (i.e., pits) to be developed as part of the Project. Information to be presented in the Application on surface extraction areas will include, but is not necessarily limited to:

- Feasibility level geotechnical investigation;
- Summary of proposed pit wall designs, design standards, and geological and hydrogeological considerations related to pit walls;
- Mining methods;
- Description of proposed approaches for water management including any required inflow diversions and dewatering methods;
- Hydrogeological environment (see **Section 4.1.3** for more information);
- Potential groundwater quantity and quality impacts of the Project over both time and space (see **Section 4.1.3** for more information);
- Consider and discuss the potential impacts of climate change to groundwater quality and quantity on the Project site (see **Section 4.8** for more information);
- Slope stability assessment;
- Description of conceptual instrumentation and monitoring of pit walls during operations;
- Description of any geohazard influences to the pits;
- Description of how the pit wall design follows the *Guidelines for Open Pit Slope Design* (Read and Stacey, 2009); and
- Description of the air quality and dust control management plan and monitoring program, which

will include mitigation measures on fugitive dust control as it relates to surface extraction activities.

1.1.2 Waste Rock Management Areas

The Application will include a discussion and detailed description of waste rock management areas, including the waste rock layering strategy being proposed for the Project. The layering strategy proposes to alternate layers of coal rejects and waste rock which will be illustrated in detailed figures. This approach is expected to:

- Decrease oxygen diffusion;
- Decrease or inhibit oxygen transport into storage area along valley walls;
- Limit water infiltration;
- Promote selenium sequestration; and
- Lower volumes of seepage for management.

The Application will include a full description of the waste rock management strategy. Information to be presented in the Application will include, but not necessarily be limited to:

- Feasibility level geotechnical investigations including stability assessment;
- Details on groundwater quality and quantity as it relates to the proposed waste rock management strategy, including thresholds for successful implementation of the strategy (i.e., levels for measuring success or failure of the strategy) and field-based research to support implementation of strategy (see next bullet);
- Description of approach (i.e., tests, pilot studies, research, etc.) to be conducted to verify and prove effectiveness of the proposed layering strategy. In addition to tests and pilot studies, examples of sites where this technology has been implemented and any relevant monitoring data (e.g., water quality) will be provided;
- Assessment of water quality associated with site features including the layered waste rock storage areas;
- Description of waste rock management areas and/or stockpiles, including: location; maximum volume; maximum height; foundation material; cap material; and slope angles (foundation and dump face) with appropriate plans and cross-sections which illustrate the final design;
- Material properties, proposed method of disposal, and development sequence for each facility;
- Groundwater and surface water quality and quantity monitoring plans, including monitoring locations, to assess potential impacts (to include background monitoring locations);
- If engineered cover systems are proposed for the Project as part of the waste rock management, a conceptual design of the proposed cover system will be provided and include: a description of the design objectives and principles; the characteristics and volumes of cover materials required; construction methods; assessment of expected performance and long-term effectiveness under the expected range of climatic conditions; monitoring and maintenance requirements; contingency plans; and costs of constructing;

- Failure modes effects assessment for each facility including potential for generation of debris flows or flow slides;
- Assessment of deformations and effect of those deformations on objectives of coarse coal rejects and waste rock layering strategy;
- Description of proposed water management in and around waste rock management areas;
- Description of foundation preparation and stripping requirements to enhance geotechnical stability and support reclamation efforts;
- Conceptual plan for any proposed instrumentation or monitoring;
- Description of the waste rock management areas will include reference to how the Interim Guidelines of the British Columbia Mine Waste Rock Pile Research Committee were considered;
- Alternative strategies to proposed waste rock layering strategy will be discussed;
- If drainage collection and treatment is proposed as an alternative strategy to waste rock management, the Application will include a conceptual design for this alternative and outline the following information: location of the collection and treatment; characterization of influent and effluents; treatment and performance processes and their anticipated effectiveness; demonstration of the effectiveness of the drainage collection and conveyance system; predicted reagent use; assessed performance under the expected range of flow and climatic conditions; relevant mitigation and monitoring plans (which will include physical and geochemical characteristics of wastes and long-term geochemical stability); and anticipated capital and operating costs;
- If applicable, a description of the feasibility to segregate PAG and non-PAG mine waste materials during operations as well as describe the geochemical characterization and segregation during operations (i.e., geochemical surrogates, on site lab, procedures needed, etc.); and
- Contingency management measures will be presented and discussed.

1.1.3 Water Management Infrastructure

The Application will include a discussion and description of water management infrastructure. Information to be presented in the Application will include, but not necessarily be limited to:

- Feasibility level design of any diversion ditches/channels including depth, width, slope angles and materials;
- Description of hydraulic capacity and confirmation that all ditches/channels can safely convey the design flood without overtopping, cause side slope failure, or significant erosion;
- Description of any required lining or armouring;
- An assessment of geohazards that could influence the diversion channels and proposed mitigation measures;
- Estimated collection efficiencies (i.e., runoff intercepted by ditch/total runoff issuing from above ditch) of the diversion and collection ditches will be provided as well as information supporting the estimated values; and
- Details of monitoring programs, including locations of monitoring stations, to measure groundwater and surface water levels, such as upgradient and downgradient levels, during and

after pit pumping over the course of the Project.

At this point in time, the Project does not anticipate the use of impoundments. Should impoundments become a part of the proposed Project design, the following information will be presented in the Application:

- A description of embankment heights/excavation depths, slope angles, storage capacity, and method of construction for all dams and impoundments;
- Feasibility level geotechnical investigation;
- Foundation conditions including foundation angle and soil properties;
- Description of embankment construction materials and borrow source locations;
- Feasibility level geotechnical stability assessment including preliminary factors of safety;
- Describe potential impacts on groundwater levels across the Project site and related modelling used;
- Conceptual plan for any proposed instrumentation or monitoring;
- Reference to the *Canadian Dam Association, Dam Safety Guidelines* where appropriate including consequence classification, seismic design criteria, inflow design flood, and factors of safety for any dams or embankments; and
- Reference to the BC ENV (2015a) *Assessing the Design, Size and Operation of Sediment Ponds Used in Mining*, as applicable.

1.1.4 Mine Infrastructure and Support Facilities

The Application will describe the proposed mine infrastructure and support facilities, including reference to relevant standards and documents including the *Health, Safety and Reclamation Code for Mines in BC* and the Engineering Manual prepared by the Forests, Lands, Natural Resource Operations & Rural Development, as applicable. As a minimum, this description will include the following:

- Plant area (includes raw coal stockpile area, a processing plant, and site support facilities);
- Clean coal transportation route (overland conveyor and haul road);
- Rail load-out facility and rail siding (includes various auxiliary facilities such as a guard house; light vehicle wash; drug and alcohol testing/ orientation building; and a small dry);
- Power supply;
- Natural gas supply;
- Explosives storage (explosives storage will meet NRCAN requirements and applicable regulations);
- Fuel storage;
- Sewage treatment; and
- Water supply and estimated pumping/update rates (including Grave Creek water supply reservoir and potable water wells at the plant site).

1.2 Applicable Authorizations

A list of required authorizations, to the extent that was known at the time, is available in the Project Description.

The Application will:

- List in table format (see example below) all applicable licenses, permits and/or approvals that are already received or required for the phases of the proposed Project, and the associated responsible regulatory body; and
- State if the proponent has or intends to request concurrent permitting under the Act pursuant to the Concurrent Approval Regulation (BC Reg. 371/2002).

Table 2: Authorization Table

Name of Authorization	Statute and Authorizing Agency	Description Need for Authorization
[Name]	[Statute, Level of Government]	[Description]

1.3 Project Design and/or Alternative Means of Carrying out the Project

The Application will include:

- An assessment of the alternative means of carrying out the proposed Project that are technically and economically feasible including, but not limited to, the alternatives identified in the AIR;
- The rationale and criteria used to select the proposed means of undertaking the proposed project; and
- The methodology and criteria used in the assessment of alternatives including those environmental effects listed under section 5 of CEAA 2012 for Substituted EAs.

Alternative means of carrying out the proposed Project that will be considered in the Application include:

- Extraction:
  - Evaluation and analysis of various pit sizes and extraction scenarios, based on geological and engineering factors;
  - Pit sequencing;
  - Blasting versus ripping:
    - Maximize blasting (lowest cost); and
    - Maximize ripping (has a nitrate reduction benefit).
  - Contract mining versus company-operated mine; and

- Surface versus underground mining.

- Siting of wash plant:
  - Grave Prairie, near the Elk River;
  - At mine site;
  - Alexander Creek; and
  - Contract or 3rd party plant.
- Coal Transportation:
  - Transportation of coal from the processing area to the load-out, including the conveyor and road routes (both new road and existing road):
    - Truck along entire haul route (Grave Creek Road);
    - Combination truck and conveyor: convey from plant to bottom of Branch C road then truck to load-out along Grave Creek road;
    - Total conveyor (plant to load-out along power line right-of-way (ROW) and Grave Creek Road); and
    - Slurry pipeline (plant to load-out along power line ROW and Grave Creek Road).
  - Alternatives for rail load-out:
    - Grave Creek location;
    - Alexander Creek location; and
    - Off-site alternatives.
- Waste Rock and Plant Reject Disposal:
  - Pit backfilling; and
  - Valley Fill spoil pile:
    - West Alexander Creek; and
    - Alexander Creek.
  - Disposal Methods:
    - Separate spoil and refuse piles; and
    - Refuse alternatives:
      - Dispose of near Elk River (if plant near river);
      - Dispose of at mine site in separate pile;
      - Slurry pond versus combined fill; and
      - Combine pile (spoil and refuse), which has selenium mitigation benefits.
- Water Use:
  - Water sources:
    - Grave Creek:
      - Direct pump;
      - Impoundment storage reservoir;
      - Excavated storage reservoir; and
      - Supply and demand quotas for water extraction.
    - Alexander Creek:
      - Direct pump;
      - Impoundment storage reservoir;

        - Excavated storage reservoir; and
        - Supply and demand quotas for water extraction.
      - Wells:
        - Total supply; and
        - Supplemental supply.
    - Water disposal:
      - Open circuit plant (i.e., slurry ponds); and
      - Closed circuit plant:
        - Static thickener; and
        - Impoundment.
- Utilities:
  - Transmission lines (new and existing lines); and
  - Diesel generators.

Many of these alternatives have already been evaluated, at least initially, as part of conceptual mine planning activities during preparation of the pre-feasibility study. Additional alternatives, if identified, will be discussed in the Application. The Application will include relevant figures illustrating alternatives evaluated for the Project. In addition, the Application will discuss the feasibility of not carrying out the Project as an alternative. The Application will also discuss the implications of the alternative scenarios on the EVWQP and as part of this, discuss which alternatives meet specific objectives of the EVWQP.

1.4 Alternatives to the Proposed Project

The Application will include an assessment of the alternatives to the proposed Project that were technically and economically feasible including, but not limited to, the alternatives identified in the AIR.

Because NWP Coal is a junior mining company with very limited project holdings, there are no viable technically and economically feasible projects available to NWP Coal. The following alternatives were examined to reach this conclusion:

- NWP Coal's Dunlevy Project was drilled in 2014 and deemed to not be economically feasible at that time. Further, the Chief Gold Commissioner declared approximately 75 percent of the original Dunlevy project area off-limits to mining by creating a coal land reserve (name unknown) in late 2013. Seams in NEBC are typically thinner and lower in quality than the Elk Valley coalfield. When Dunlevy was acquired in 2011 there were four (4) operating open pit mines in NEBC. Today there are no operating mines, which support the Company's decision not to proceed further with Dunlevy;
- NWP Coal applied for 5 exploration licenses in northeast BC in 2011 which were not approved and ultimately cancelled due to the creation of a coal land reserve in 2016;
- The above 2 actions left NWP with only Crown Mountain as a technically and economically feasible project; and
- NWP has evaluated numerous other projects over the past several years and has not identified

and acquired any other than those described above.

2.0 Environmental Assessment Process

2.1 Provincial EA Process

The Application will include:

- A statement that the proposed Project is subject to review under the Act, identifying the trigger(s) for the review under the Act;
- A statement that the Application has been developed pursuant to the AIR approved by EAO and complies with relevant instructions provided in the section 11 Order and any other direction provided by EAO;
- A table documenting applicable milestones, including, but not limited to, issuance of section 10 and 11 Orders, working group meetings, any public comment periods or open houses and the issuance of the AIR), including links to documents on EAO's public website;
- A list of the government agencies and local Aboriginal Groups that participated in the EA; a summary of their participation; and, a list of the key issues raised by each party and the status of issue resolution.(The Proponent will cross-reference, as appropriate, other sections of the Application that deal further with consultation and issues raised); and
- A summary of public participation in the EA, a list of the key issues raised, and the status of issue resolution (with cross-references, as appropriate, to other sections of the Application that deal further with consultation and issues raised).

2.2 Federal EA Process

The Application will include:

- The relevant review threshold that has been met under the federal Regulations Designating Physical Activities;
- Whether the Canadian Environmental Assessment Agency has determined that a federal EA is required, including a link to the relevant documents on the CEAA Registry
- Whether the proposed Project is undergoing a substituted, coordinated, or other type of federal and provincial review process; and
- A table documenting applicable completed and upcoming federal milestones. Milestones include, but are not limited to, any public comment periods, notice of commencement, and finalization of the Environmental Impact Statement Guidelines.
- A table of concordance comparing the Guidelines for the Preparation of an Environmental Impact Statement issued by CEAA for Project in February 2015 (CEAA, 2015). Potential effects on VCs of federal interest will be evaluated including:
  - Fish and fish habitat;
  - Migratory birds;
  - Species at risk;

- Transboundary environment; and
- Aboriginal Peoples.

PART B – ASSESSMENT OF ENVIRONMENTAL, ECONOMIC, SOCIAL, HERITAGE AND HEALTH EFFECTS

3.0 Assessment Methodology

This section of the Application must describe the methods used to assess the potential adverse effects of the Project. The assessment methodology must be based on the EAO's *Guideline for the Selection of Valued Components and Assessment of Potential Effects* (2013).

A summary of methodological steps (see EAO 2013 for details) is illustrated below in **Figure 3**.

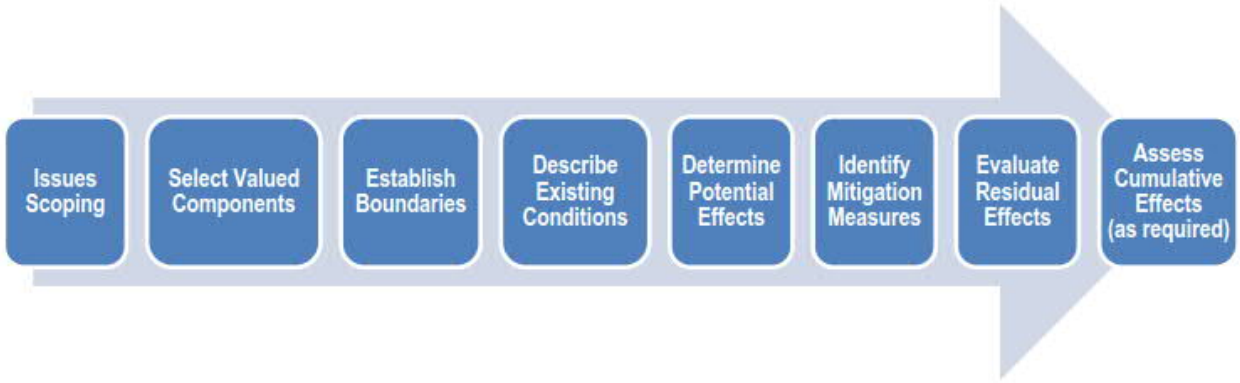


Figure 3: Summary of Typical Methodological Steps in an Environmental Assessment (BC EAO, 2013)

VCs serve as the foundation for the environmental assessment. The VCs selected for a project depend on the type of project (e.g., mining, transportation, oil and gas), the geographic region the project is located, as well as the potential effects on any of the five (5) 'pillars' noted by the EAO: environment, economic, social, heritage, and health (BC EAO, 2013).

3.1 Issues Scoping and Selection of Valued Components

The Application will summarize the process and methodologies used to identify and select the **intermediate Valued Components (VCs)** and **receptor Valued Components** for assessment. **Table 3** details the receptor VCs, and the intermediate VCs that have been selected for inclusion in the Application. Intermediate VCs are those environmental components of a natural system that are pathways to effects on receptor VCs (e.g., water quality is a pathway that carries potential contaminants that affect fish health).

The Application will also include the rationale for any differences in the list of intermediate VCs and receptor VCs presented in the Application from those listed in the final AIR.

Table 3: Receptor Valued Components Selected for the Environmental Assessment

Discipline	Intermediated Valued Component	Receptor Valued Component
Climate	• Air Quality	• GHG emission
Aquatic Health	• Groundwater quality • Groundwater quantity • Surface water quality • Surface water quantity • Sediment quantity • Sediment quality	• Benthic Invertebrates • Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and Kokanee) • Amphibians within the RSA (represented by Columbia spotted frog) • Waterbirds within the RSA (represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) • Westslope cutthroat trout • Bull trout • Kokanee • Burbot • Mountain whitefish • Longnose sucker
Landscapes and Ecosystems	• Terrain • Soil Quality • Soil Quantity	• Avalanche chutes • Grassland ecosystems • Wetland ecosystems • Riparian habitat • Old growth and mature forests
Vegetation	• Terrain • Soil Quality • Soil Quantity • Groundwater quality • Groundwater quantity • Surface water quality • Surface water quantity • Air Quality	• Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems
Wildlife	• Terrain • Soil Quality • Soil Quantity • Groundwater quality • Groundwater quantity • Surface water quality • Surface water quantity • Noise and Vibration	• American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad

Discipline	Intermediated Valued Component	Receptor Valued Component
		• Wolverine
Archaeological Resources		• Archaeological resources (materials and sites)
Economy		• Economic Conditions
Socio-economics and Community Health	• Air Quality	• Housing and community services and infrastructure • Community health and well-being
Land Use and Tenure	• Air Quality	• Land use and access • Recreation and tourism
Visual Aesthetics		• Visual quality
Human and Terrestrial Wildlife Health Risk Assessments	• Air Quality • Noise and Vibration • Groundwater quality • Groundwater quantity • Surface water quality • Surface water quantity	• People (including local communities, Indigenous groups, and temporary residents at recreation areas) • Wildlife

3.2 Assessment Boundaries

3.2.1 Spatial, Temporal, Administrative and Technical Boundaries

The Application will describe the methods used in identifying spatial, temporal, administrative and technical boundaries for intermediate VCs and receptor VCs. Information on spatial, temporal, administrative and technical boundaries for specific intermediate and receptor VCs will be included in the appropriate intermediate VC and receptor VC sections of this document and will encompass all relevant project phases, components and activities (including construction, operation, decommissioning, and post-closure timeframes [includes reasonably foreseeable projects and/or activities]). The Application will include the rationale for any differences in boundaries from those presented in the final AIR.

Details regarding assessment boundaries are provided in **Section 4.5** of the Valued Components for Environmental Assessment Document.

3.3 Existing Conditions

For each intermediate VC and receptor VC, the Application will:

- Describe the existing (or baseline) conditions within the study area in sufficient detail to enable potential interactions of the Project with intermediate VCs and receptor VCs (including interactions between intermediate components and receptor VCs) to be identified, understood, and assessed;
- Describe the quality and reliability of the existing (or baseline) data and its applicability for the purpose used, including any gaps, insufficiencies and uncertainties, particularly for the purpose of monitoring activities;

- Reference the natural and/or human-caused trends that may alter the environmental, economic, social, heritage and health setting, irrespective of the changes that may occur as a result of the proposed Project or other project and/or activities in the area;
- Explain if and how other past and present projects and activities in the study area have affected or are affecting each intermediate VC and receptor VC;
- Document the methods and data sources used to compile information on existing (or baseline) conditions, including any standards or guidelines followed;
- Where VC-specific field studies are conducted for intermediate VCs and receptor VCs, the scope and methods to be used will follow published documents pertaining to data collection and analysis methods, where these are available. Where methods used for the assessment deviate from applicable published guidance, the rationale for the variance will be provided in the Application; and
- Describe what Traditional Ecological Knowledge (TEK), including Aboriginal Traditional Knowledge, was used in the assessment.

The Application will contain the existing (or baseline) technical reports in the Appendices and will summarize key findings contained in these technical reports directly in the Application, in a manner that allows the reader to understand the effects assessment of each intermediate VC and receptor VC. All baseline studies completed for the Project will be led and completed by qualified professionals. A list of professionals will be provided in the Application.

3.4 Potential Effects

The Application will summarize the overall process and methodologies used to identify and assess the potential effects of the proposed Project on the identified intermediate VCs and receptor VCs.

For each intermediate VC and receptor VC, the Application will:

- Identify the potential interactions of the proposed Project with the considered and selected intermediate VCs and receptor VCs, and the interactions between intermediate VCs and receptor VCs;
- Identify and describe the potential adverse effects resulting from the proposed Project;
- Demonstrate how feedback from local Aboriginal Groups, the public, stakeholders and government agencies on VC selection and assessment was incorporated, as appropriate.

The Application will identify any interactions between Project activities, intermediate VCs and receptor VCs that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, local Aboriginal Groups, and the public regarding the exclusion.

To support the identification of potential effects on intermediate VCs and receptor VCs that may result from all phases of the proposed Project, a potential project effects matrix will be developed (see **Table 4**

for an example). The matrix will identify the potential interactions between the various physical works and activities of the Project and the selected intermediate VCs and receptor VCs.

Table 4: Potential Project Environmental Effects on [Intermediate VC or Receptor VC]

Project Components and Physical Activities	Potential Environmental Effects			
	Effect 1	Effect 2	Effect 3	Effect 4
Site Preparation and Construction				
Component or Activity 1				
Component or Activity 2				
Operation				
Component or Activity 1				
Component or Activity 2				
Decommissioning and Reclamation				
Component or Activity 1				
Component or Activity 2				

3.5 Mitigation Measures

For each intermediate VC and receptor VC, the Application will:

- Describe the approach to identify and analyze mitigation measures, including applicable legislative and policy requirements, any management and compensation plans proposed by the Proponent, which will be implemented to address potential effects;
- Describe the mitigation measures incorporated into the Project, including site and route selection, Project scheduling, Project design (e.g., the use of best available technologies, equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices;
- Describe any standard mitigation assumed or proposed to be implemented, including consideration of best management practices, environmental management plans, environmental protection plans, contingency plans, emergency response plans, and other general practices;
- Clearly indicate how the mitigation measures will mitigate the potential adverse effects on the intermediate VC or receptor VC;
- Where appropriate, identify potential situations where the implementation of a mitigation measure for one VC has the potential to adversely affect another VC. The assessment will discuss how these situations may be avoided and/or further mitigated;
- Provide the rationale for the proposed mitigation measures, including why further avoidance or reduction measures for adverse effects may not be considered feasible, and the need for and scope of any proposed compensation or offset;
- Evaluate the anticipated success of each mitigation measure and describe rationale and analysis

for these evaluations. If there is little relevant/applicable experience with a proposed mitigation measure and there may be some question as to its effectiveness, describe the potential risks and uncertainties associated with use of the mitigation;

- Include the time required for mitigation to become effective, to enable understanding of the duration of residual effects and the temporal characteristics of reversibility;
- Summarize the mitigation measures for potential Project effects by project phase and identify any mitigation measures that are in management or compensation plans; and
- Where relevant, the Application will discuss how the provincial Environmental Mitigation Policy was considered and applied to address potential impacts and mitigation measures.

3.6 Characterization of Residual Effects

To determine residual adverse effects on intermediate VCs and receptor VCs, the following criteria will be used: context; magnitude; extent; duration; reversibility; and frequency. The criteria are described as follows:

- **Uncertainty** – The confidence in the prediction made. Indicates how good our data and our understanding of the intermediate or receptor VC is, and whether we have confidence that the proposed mitigative measures will reduce/eliminate effects. Three categories are typically used: low, moderate or high.
- **Context** – The current and future sensitivity and resilience of an intermediate VC or receptor VC to changes caused by a Project. Determination of contexts relies on understanding and describing the existing conditions of the intermediate VC or receptor VC, which reflect cumulative effects of other projects, and activities that have been carried out, and information about the impact of natural and human-caused trends on the condition of the intermediate VC or receptor VC.
- **Magnitude** – The expected size or severity of the residual effect on the intermediate VC or receptor VC. The proportion of the intermediate VC or receptor VC impacted within the spatial boundaries and the relative effect is considered when evaluating the magnitude of residual effects.
- **Extent** – The spatial scale over which the residual effect on the intermediate VC or receptor VC is anticipated to occur.
- **Duration** – The length of time the residual effect is expected to persist.
- **Reversibility** – Whether or not the residual effect on the intermediate VC or receptor VC can be reversed once the physical activity or activity causing the disturbance ceases.
- **Frequency** – How often the residual effect occurs. The frequency is usually related to the frequency of the physical work or activity causing the residual effect and can be both frequent and infrequent.

Where feasible, these criteria will be described quantitatively in the Application for each intermediate VC and receptor VC. When residual effects cannot be characterized quantitatively, the Application will characterize these effects qualitatively. Definitions will be provided when qualitative terms are used.

The use of any qualitative terms (e.g., high, moderate, low, etc.) will be accompanied by distinct definitions for each of these rankings.

The Application will describe, in a table format, the residual effects using the residual effects criteria context, magnitude, extent, duration, reversibility, and frequency, as defined in EAO's *Guideline for the Selection of Valued Components and Assessment of Potential Effects*. An explanation will be included for the conclusion reached for each criterion used to characterize a residual effect

When residual effects on a VC are determined and the VC is also considered a "pathway" for potential effects on other VCs, the Application will identify the linkages between the VCs and the discipline-specific studies to which the information has been forwarded for further evaluation.

For each intermediate VC and receptor VC, the residual effects will be characterized in the Application and summarized using the table format shown in **Table 5**.

3.7 Likelihood

The Application will assess the likelihood for all residual adverse effects on intermediate VCs and receptor VCs using appropriate quantitative or qualitative terms and sufficient description to understand how the conclusions were reached. Definitions of any qualitative terms, such as 'low', 'moderate', or 'high' probability will be provided.

Table 5: Residual Effects on [Intermediate VC or Receptor VC]

Project Phase	Potential Environmental Effects						
	Ecological/Social Context	Magnitude	Extent	Duration	Reversibility	Frequency	Likelihood
Effect 1							
Site Preparation and Construction							
Operations							
Decommissioning and Closure							
Effect 2							
Site Preparation and Construction							
Operations							
Decommissioning and Closure							

Project Phase	Potential Environmental Effects						
	Ecological/Social Context	Magnitude	Extent	Duration	Reversibility	Frequency	Likelihood
Effect 3							
Site Preparation and Construction							
Operations							
Decommissioning and Closure							
KEY Ecological/Social Context: Magnitude:	Extent: Duration: Reversibility:				Frequency: Likelihood:		

3.8 Determination of Significance

Receptor VCs

The Application will evaluate the significance of residual effects for all receptor VCs and will present the process and methodology used to define and evaluate the significance of residual effects, including how the term "significance" has been used in relation to each receptor VC using quantitative and qualitative thresholds.

A conclusion of significance of residual adverse effects will be provided for each receptor VC.

Intermediate VCs

The Application will evaluate the significance of residual effects for specified intermediate VCs. The specified intermediate VCs to be assessed for significance are: surface water quality, groundwater quality, and air quality. For each specified intermediate VC, the significance of residual effects will be a synthesis of the significance determinations for its receptor VCs. The significance determination for each intermediate VC will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on the intermediate VC.

3.9 Confidence and Risk

The Application will summarize the process and methodology used to evaluate the levels of confidence associated with residual effects predictions for intermediate VCs and receptor VCs and in particular, how any identified uncertainty may affect either the likelihood or the significance of the predicted residual

effect. The Application will also describe any measures to reduce uncertainty through monitoring, adaptive management, contingency measures, or other follow-up programs. Where thresholds are established, details (including relevant legislation or policies) will be provided for how they were determined and their applicability to the VC evaluated.

The Application will summarize the process and methodology used to determine if additional risk analysis is required. If additional risk analysis is required, the Application will summarize the process and methodology used for this analysis and the conclusions, including the range of likely, plausible and possible outcomes with respect to likelihood and significance.

3.10 Cumulative Effects Assessment

The Application will assess cumulative effects on intermediate VCs and receptor VCs for which residual Project effects are predicted.

3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities

The Application will identify impacts of past, present, or reasonably foreseeable projects and/or activities which have the potential to have residual effects on intermediate VCs and receptor VCs that overlap either spatially or temporally (or both) with the Crown Mountain Project. Relevant information will be summarized in both table and figure formats.

The following development categories will be considered in the Application:

- Projects or activities that have already been built or conducted for which the environmental effects overlap with those of the proposed Project (i.e., certain); and
- Projects that are either proposed (public disclosure) or have been approved to be built, but are not yet built, for which the environmental effects overlap the proposed Project (i.e., reasonably foreseeable).

Sources of information on past, present, and reasonably foreseeable projects in the area include, but are not necessarily limited to:

- Alberta Major Projects Inventory;
- BC Major Projects Inventory (BC Ministry of Jobs, Tourism, and Skills Training, 2015);
- Mining Association of British Columbia;
- Exploration and Mining in Kootenay-Boundary Region, British Columbia (Katay, 2014);
- Map of Operating Mines and Selected Major Exploration Projects in BC from Exploration and Mining in British Columbia (2014);
- MINFILE reports for operating mines;
- BC EAO Project Information Centre (e-PIC);
- Canadian Environmental Assessment Registry;
- Alberta Environment and Parks, Environmental Assessment/EIAs; and

- Input from the Elk Valley CEMF (cumulative effects management framework) committee.

Table 6 provides a preliminary list of past, present and reasonably foreseeable projects and activities that will, at a minimum, be included in the cumulative effects assessment.

Table 6: Preliminary Project and Physical Activity Inclusion List

Project or Physical Activity	Project / Activity Type	Proponent Description
Past		
Natural resource extraction	Mining	Past mining operations including Balmer, J-Area (Sparwood Operations), Natal Ridge, Michel Creek, Sparwood Ridge, and Hosmer Wheeler
Existing		
Elkview Operations	Mining	Operation of an open pit coal mine by Teck Coal Limited with an estimated mine life of 31 years (from 2015).
Line Creek Operations	Mining	Operation of an open pit coal mine by Teck Coal Limited with an estimated mine life of 22 years (from 2015).
Fording River Operations	Mining	Operation of an open pit coal mine by Teck Coal Limited with an estimated mine life of 73 years (from 2015).
Greenhills Operations	Mining	Operation of an open pit coal mine by Teck Coal Limited with an estimated mine life of 14 years (from 2014).
Coal Mountain Operations	Mining	Operation of an open pit coal mine by Teck Coal Limited with an estimated mine life of 3 years (from 2015) which a projected second phase of the project in the permitting stages.
Mount Brussilof Mine (Bay Mag Mine)	Mining	Operation of an industrial open pit mine by Bay Mag.
Elkhorn Quarry West (Windermere Mining Operation)	Mining	Operation of an open pit gypsum mine by CertainTeed Gypsum Canada Inc. with an estimated mine life of 7 to 12 years (from 2014).
Forestry	Forestry	Where information readily available, various active forestry activities on both Crown and private lands, including logging and roads. Current active companies include Canfor Corporation, Tembec Inc., and CanWel.
Sparwood Rifle Range	Recreation	Existing rifle range at Michel Creek along Highway 3.
Kootenay West Mine Project	Mining	Industrial mineral open pit mine by CertainTeed Gypsum Canada Inc. with an estimated mine life of 38 years (Permitting stage).
Proposed or Planned		
Baldy Ridge Extension Project	Mining	Proposed extension to the open pit coal mine at Elkview Operations operated by Teck Coal Limited. Estimated production capacity of 130 million metric tonnes.
Coal Mountain Phase 2 Project	Mining	Proposed open pit mine by Teck Coal Limited with a production capacity estimated at 2.25 million metric tonnes and a mine life of 34 years.
Michel Creek Coal	Mining	Proposed open pit mine by North Coal, currently in the pre-

Project or Physical Activity	Project / Activity Type	Proponent Description
		application phase of the EA process.
Bingay Main Coal	Mining	Proposed surface and underground coal mine by Centermount Coal Ltd with a production capacity of 2 million tonnes.

The Application will describe the methodology for identifying potential interactions between residual Project effects on intermediate VCs and receptor VCs and the effects of other developments, including a description of the following:

- The spatial boundaries for the cumulative effects assessment for each intermediate VC and receptor VC, including maps;
- The spatial and temporal boundaries of other developments; and
- The potential for interaction (spatial and temporal) and linkages (overlap) of intermediate VCs and receptor VCs with other developments.

The Application will include:

- A table of all past, present and reasonably foreseeable developments that will be included in the cumulative effects assessment, should one be required for a particular intermediate VC or receptor VC;
- A general description of the information sources used to identify reasonably foreseeable developments and activities; and
- A map showing the location of the projects and activities.

3.10.2 Conducting a Cumulative Effects Assessment

The Application will summarize the process and methodology used to conduct the cumulative effects assessment, including the identification of potential cumulative effects on intermediate VCs and receptor VCs, identification of additional mitigation measures, and evaluation of any (residual) cumulative effects on the intermediate VCs and receptor VCs using the same methodology described above in **Sections 3.6** to **3.9** with the exception of water quality, for which the cumulative effects methodology is outlined in **Section 4.1**.

3.10.3 Elk Valley Cumulative Effects Management Framework

The purpose of the Elk Valley Cumulative Effects Management Framework (EV CEMF) is to develop an approach to understand cumulative effects on the environment from various industries and natural events in the Elk Valley. Impacts are assessed using five region-specific valued components (VC) selected by the EV CEMF Working Group: west slope cutthroat trout, grizzly bear, bighorn sheep, old growth and mature forest, and riparian habitat.

To assist in the evaluation of cumulative effects for the Crown Mountain Coking Coal Project, the EV CEMF will be used as an additional tool. For relevant Project receptor VCs, cumulative effects predictor models developed by the EV CEMF will be used, including models for aquatics (west slope cutthroat trout and riparian habitat), grizzly bear, bighorn sheep, and old growth and mature forest. The results of the EV CEMF modelling will be presented and discussed for each applicable VC. This will be in addition to the project-specific cumulative effects assessments to be completed for each project VC. Cumulative effects of the Project on water quality will be considered separately in **Section 4.1.4** of the Application within the framework of the Elk Valley Water Quality Plan.

3.11 Follow-up Strategy

Where a residual adverse effect and/or cumulative effect has been identified for an intermediate VC or receptor VC, the Application will include a description of a follow-up strategy, where appropriate, that:

- Identifies the measures that will be used to evaluate the accuracy of the original effects prediction;
- Identifies the measures that will be used to evaluate the effectiveness of proposed mitigation measures; and
- Proposes an appropriate strategy to apply in the event that original predictions of effects and mitigation effectiveness are not as expected. This includes reference to further mitigation, involvement of key stakeholders, local Aboriginal Groups, government agencies and any other measures deemed necessary to manage the issue.

4.0 Environmental Effects Assessment

The Application will include an assessment of effects on environmental VCs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section.

This Section of the Application will include a description of the existing biophysical environment, including surrounding areas, to provide a general understanding of the area surrounding the proposed Project and within the Elk Valley. Additional details will be provided in the existing conditions Section of each intermediate VC and receptor VC Section of the Application.

4.1 Intermediate Valued Components

Intermediate VCs are the pathways to potential Project effects on receptor VCs as described in **Section 3.0** and identified for the Project in **Table 3**. The Application will include an assessment of Project effects on each identified intermediate VC and will include the rationale for any differences in the list of intermediate VCs presented in the Application from those listed in the final AIR.

The intermediate VCs, their measurement indicators, and those intermediate VCs for which a significance determination is required are shown in **Table 7**.

Table 7: Intermediate Valued Components

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
Air quality	Yes	• Common air contaminants, including: Fine particulates (PM10 and PM2.5); total suspended particulates; sulphur dioxide (SO2); nitrogen dioxide (NO2); carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall • Meteorology (e.g., wind speed and direction)	• Climate • Listed and sensitive plant communities and species • Limber pine • Whitebark pine • Culturally significant plants and ecosystems • Community health and well-being • Land use and access
Groundwater quality	Yes	• Groundwater quality measured through loadings and concentrations of metals and non-metal constituents in groundwater.	• Benthic Invertebrates • Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and Kokanee) • Amphibians within the RSA (represented by Columbia spotted frog • Waterbirds within the RSA

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
			(represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) • Westslope cutthroat trout • Bull trout • Kokanee • Burbot • Mountain whitefish • Longnose sucker • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine
Groundwater quantity	No	• Groundwater quantity measured through groundwater levels and flow rates.	• Benthic Invertebrates • Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and Kokanee) • Amphibians within the RSA (represented by Columbia spotted frog • Waterbirds within the RSA (represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) • Westslope cutthroat trout • Bull trout • Kokanee

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
			• Burbot • Mountain whitefish • Longnose sucker • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
Surface water quality	Yes	• Surface water quality measured through loadings and concentrations of metals and non-metal constituents in surface water (including constituents of interests from the EVWQP - selenium [Se], cadmium [Cd], nitrate [NO3], and sulphate [SO4]).	• Benthic Invertebrates • Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and Kokanee) • Amphibians within the RSA (represented by Columbia spotted frog • Waterbirds within the RSA (represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) • Westslope cutthroat trout • Bull trout • Kokanee • Burbot • Mountain whitefish • Longnose sucker • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine • Land use and access • Recreation and tourism
Surface water quantity	No	• Surface water quantity water levels and flow rates at selected watercourses.	• Benthic Invertebrates • Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
			Kokanee) • Amphibians within the RSA (represented by Columbia spotted frog • Waterbirds within the RSA (represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) • Westslope cutthroat trout • Bull trout • Kokanee • Burbot • Mountain whitefish • Longnose sucker • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine
Noise and Vibration	No	• Noise levels at receptors (e.g., wildlife habitat, residences [permanent and temporary]); and • Vibration levels at receptors (e.g., wildlife habitat, residences [permanent and temporary]).	• American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
			sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine
Soil quality	No	• Metal and non-metal concentrations in soil; and • Soil type and general soil properties.	• Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine
Soil quantity	No	• Depth and distribution of soil types.	• Avalanche chutes • Grassland ecosystems • Wetland ecosystems • Riparian habitat • Old growth and mature forests • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot

Intermediate Valued Component	Assessment of Significance Required?	Measurement Indicators Listed in the AIR	Receptor Valued Components for which the Intermediate Component is a Primary Pathway to Potential Project Effects
			• Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine
Terrain	No	• Terrain type; and • Slope and aspect.	• Avalanche chutes • Grassland ecosystems • Wetland ecosystems • Riparian habitat • Old growth and mature forests • Listed and sensitive plant communities and species • Limber pine • Whitebark • Culturally significant plants and ecosystems • American badger • American Dipper • American marten • At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat) • Bighorn sheep • Canada lynx • Elk • Gillette's checkerspot • Grizzly bear • Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers) • Moose • Northern Goshawk • Western toad • Wolverine

4.1.1 Air Quality

The assessment of Project effects on air quality will:

- Be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section; and
- Will describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of air quality and greenhouse gas emissions, and compare the residual effects of the Project to these.

The Application will define and describe the potential effects on air quality due to Project activities and include an evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

- Common air contaminants, including fine particulates (PM_{10} and $PM_{2.5}$), total suspended particulates, sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and volatile organic compounds (VOCs);
- Metals and PAHs in dust fall; and
- Meteorology (e.g., wind conditions, barometric pressure, air temperature, relative humidity, precipitation).

The Application will also identify those VCs for which air quality is the primary pathways to potential effects from the Project. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to air quality management, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the Ktunaxa Nation Council (KNC) was used in the identification of issues and the overall assessment process.

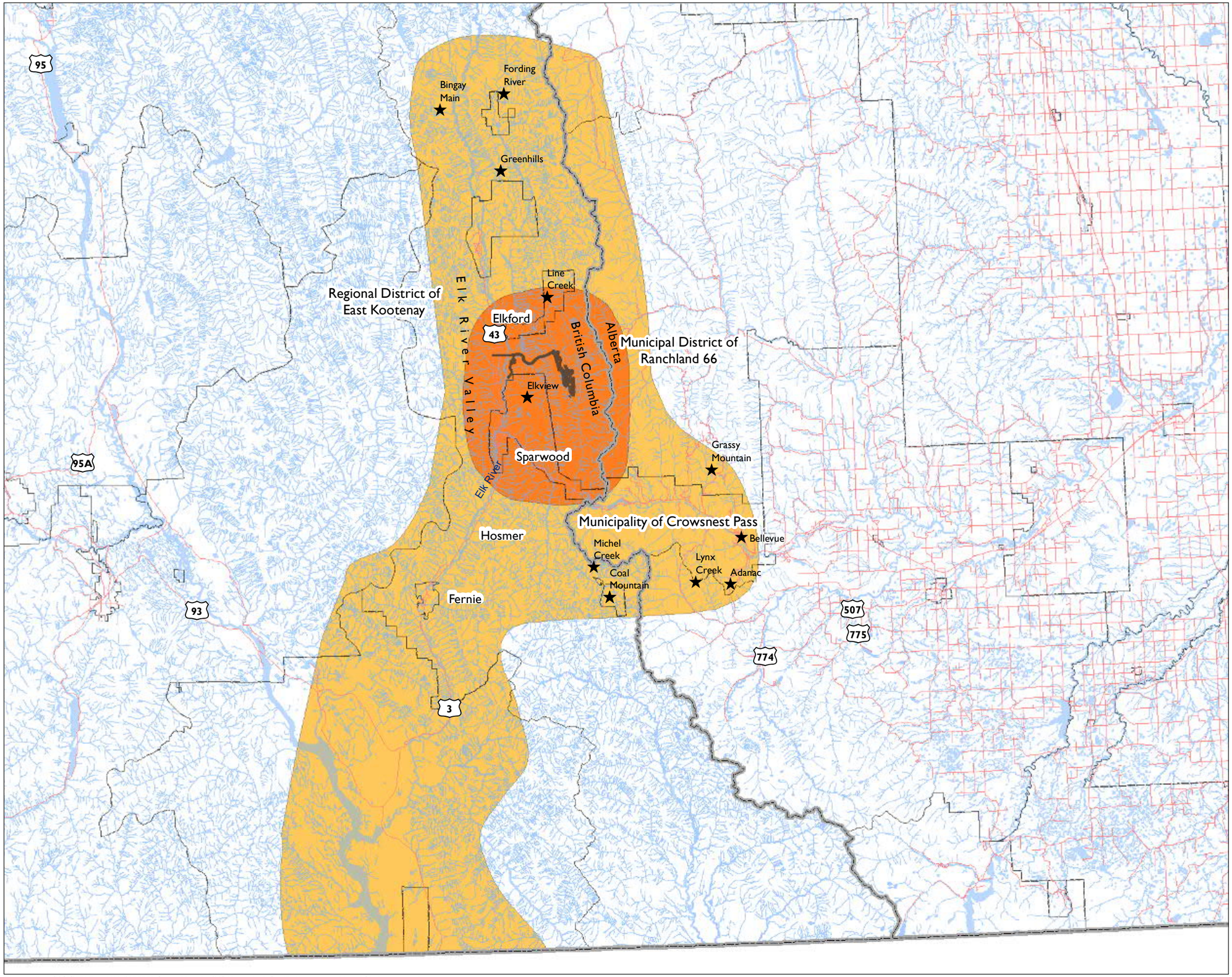
Additional common air contaminants, including those noted in the federal EIS guidelines will also be evaluated as part of the air quality assessment. This includes total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO_2), carbon monoxide (CO), and volatile organic compounds (VOCs). Meteorological data collected from the Project climate station and available regional and local data will be used in the assessment.

4.1.1.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the intermediate VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Proposed spatial boundaries to be used in the Application are illustrated in **Figure 4**. The assessment of air quality will be evaluated at the Local and Regional Study Area scales. Study areas will be driven by local air sheds as well as other operating mines in the area.

The air quality RSA (**Figure 4**) was selected based on the following reasons:

- It includes communities within the Elk Valley that may be regionally affected by changes in air quality as a result of cumulative effects;
- It includes operating and proposed mines within the Elk Valley that may be considered as part of the cumulative effects assessments; and
- Includes the Elk River Valley to the United States border to include potential areas that may also be regionally impacted.



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 4
Air Quality Regional and Local Study Areas

- Air Quality Local Study Area
- Air Quality Regional Study Area
- Existing Operating Mines
- Highways/Major Roads
- Watercourses
- Regional District/Municipal Boundaries
- Project Footprint
- Lakes/Rivers
- BC/Alberta Border

SCALE 1:583,788

0 5 10 20 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 11/17/2017

File Location: G:\GIS\2012 and Prior\126231 Crown Mountain\VC Figure 4 Air Quality Regional and Local Study Area.mxd

The air quality LSA (**Figure 4**) was selected based on the following reasons:

- Includes local communities that may be locally impacted by emissions generated by the Project;
- To be inclusive of towns within approximately 20 km of the centre of the Project including the District of Sparwood, the District of Elkford, the Municipality of Crowsnest Pass (Alberta), and the Municipal District of Ranchland 66 (Alberta);
- Allows for an evaluation of potential changes in air quality at selected receptors (receptor locations to be determined); and
- Includes operating mines near the Project area.

4.1.1.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of air quality as an intermediate VCs; provide a summary of additional data analyses required; and describe existing conditions of the intermediate VC based on available data.

The assessment of air quality for the Project will be based on guidance documents including:

- BC Ministry of Water Land and Air Protection (2013) *Air Monitoring Site Selection and Exposure Criteria*;
- BC Ministry of Environment (2011) *Meteorological Data and Sensing Requirements in the BC Ministry of Environment*;
- BC Ministry of Environment (2015b) *Air Quality Dispersion Modelling Guideline*;
- CEAA (2003) *Incorporating Climate Change Considerations in Environmental Assessment*;
- BC Ministry of Environment (2016) *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators*; and
- Province of British Columbia (2016) *British Columbia Ambient Air Quality Objectives*.

The Application will provide baseline information to characterize ambient air quality and meteorological conditions. Baseline ambient air quality conditions will be established from data collected from regional air quality monitoring stations operated by the BC Ministry of Environment and Climate Change Strategy (ENV), as well as from a site-specific air quality program. The air quality program will be developed in consultation with regulators. Results of the air quality program will be compared against compliance with the applicable provincial and federal ambient air quality objectives/standards.

The Application will provide baseline information to characterize current climatic conditions both at a regional and site-specific level. Regional and local data will be collected and summarized in the Application, primarily from existing Environment and Climate Change Canada meteorological stations (e.g., local station in Sparwood). Available regional data includes temperature and precipitation information. Site-specific data will be based on the Project climate station that was installed for the Project in 2013 to support the EA process and collect site-specific climatic data. The station location and

set-up was finalized based on input from the BC Ministry of Environment. Information collected at the Project climate station that will be summarized in the Application includes but is not limited to:

- Barometric pressure;
- Air temperature;
- Relative humidity;
- Solar radiation;
- Average wind speed;
- Wind direction;
- Precipitation rate; and
- Accumulated precipitation.

Photos and relevant maintenance records for the climate station will be appended to the Application. Collection of climatic data has followed, and will continue to follow, guidelines set out in the BC Ministry of Environment (2016) *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations*. As well, the BC Ministry of Environment (2011) *Meteorological Data and Sensing Requirements in the BC Ministry of Environment* will be used as guidance in the collection of climatic data.

4.1.1.3 Potential Effects

The Application will identify potential adverse effects to the air quality intermediate VC in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to air quality.

Table 8 provides a summary of anticipated VC interactions with specific project components or activities.

Table 8: Summary of Potential Air Quality Intermediate VC Interactions with Project Components or Activities

Activity	Air Quality
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X

Activity	Air Quality
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.1.1.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

For air quality, the significance of residual effects will be a synthesis of the significance determinations for those receptor VCs for which air quality is a primary pathway to effects from the Project. The significance determination for air quality will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on air quality.

4.1.2 Noise and Vibration

The assessment of Project effects on noise and vibration will:

- Be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section;
- Describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of noise and vibration levels, and compare the residual effects of the Project to these; and
- Describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

The acoustic environment will be assessed at sensitive receptors (nearby people/communities and wildlife) and include evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

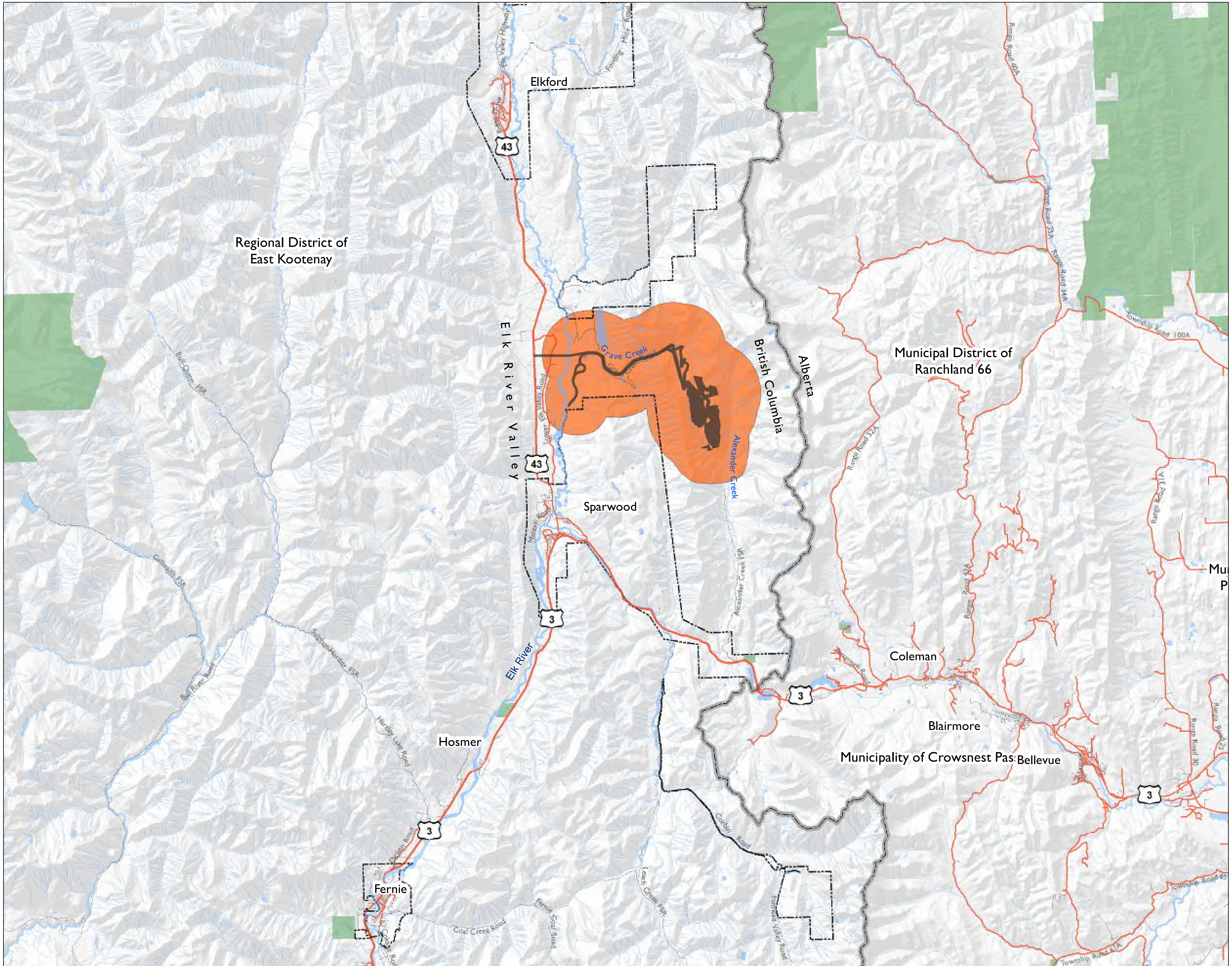
- Noise levels at receptors (e.g., wildlife habitat, residences [permanent and temporary]); and
- Vibration levels at receptors (e.g., wildlife habitat, residences [permanent and temporary]).

The Application will also identify those VCs for which noise and vibration are the primary pathways to potential effects from the Project.

4.1.2.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with **3.2 Assessment Boundaries of the AIR Template**. Potential effects on the acoustic environment, including vibrations, will be assessed within the Project footprint and within an acoustic LSA (**Figure 5**). The boundary of the acoustic LSA is based on identified sensitive receptors, such as the District of Sparwood and environments within a 3-km radius of the Project footprint to be inclusive of terrestrial environments (e.g., wildlife habitat). As well, the acoustic LSA includes areas used for recreation (e.g., hunting) that could be impacted by noise and vibration levels.

Appropriate receptors will be selected within the LSA and Project footprint as part of baseline studies. The location of receptors will be selected based on consultation with appropriate federal and provincial agencies, as well as appropriate guidance documents and input from other stakeholders.



File Location: G:\GIS\126231 Crown Mountain\VC Figure 5 Acoustic Local Study Area.mxd

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 5
Acoustic Local Study Area

- Acoustic Local Study Area
- Watercourses
- Highways
- Arterial Roads
- Local/Resource Roads
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Parks and Protected Areas
- BC/Alberta Border

SCALE 1:260,000
0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec, Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

4.1.2.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. This Section of the Application will present information on the existing acoustic environment, summarize field surveys completed as part of baseline noise monitoring conducted to establish baseline conditions at the Project property, and provide additional data analyses (if available), and identify relevant data gaps.

To evaluate potential noise and vibration impacts, appropriate receptors will be established within the LSA and Project footprint as part of baseline noise studies. The rationale for the selection of receptors will be detailed in Application, including the results discussions with regulators, the KNC, other stakeholders.

4.1.2.3 Potential Effects

The Application will identify potential adverse effects to noise levels in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to ambient noise levels.

Table 9 provides a summary of anticipated interactions with specific project components or activities.

Table 9: Summary of Potential Noise and Vibration Intermediate VC Interactions with Project Components or Activities

Activity	Noise and Vibration
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X

Activity	Noise and Vibration
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.1.2.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance and 3.9 Confidence and Risk**.

For noise and vibration, the significance of residual effects will be a synthesis of the significance determinations for those receptor VCs for which noise and vibration are primary pathways to effects from the Project. The significance determination for noise and vibration will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on noise and vibration.

4.1.3 Groundwater

The assessment of Project effects on groundwater quality and quantity:

- Be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section; and

- Will describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of groundwater, and compare the residual effects of the Project to these.

The Application will define and describe the potential effects on groundwater due to Project activities and include an evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

- Groundwater quality measured through loadings and concentrations of metals and non-metal constituents in groundwater; and
- Groundwater quantity measured through groundwater levels and flow rates.

The Application will also identify those VCs for which groundwater are the primary pathways to potential effects from the Project.

4.1.3.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the intermediate VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Groundwater will be evaluated at the both the LSA and RSA scales. Proposed spatial boundaries to be used in the Application for the assessment aquatic habitat, including groundwater, are illustrated in **Figure 6** and **Figure 7** in **Section 4.2.2**.

4.1.3.2 Existing Conditions

Existing groundwater conditions will be described in the Application based on information gathered as part of baseline field studies. The methods and standards used to assess baseline groundwater conditions will be presented, as well as the location of baseline sampling locations and the relevant parameters assessed and analyzed.

As part of a baseline groundwater monitoring program, groundwater wells will be drilled, tested and sampled. Initial wells for the groundwater monitoring program were installed for the Project in September 2013 and October 2015 concurrent with the site drilling programs and located in and around the proposed plant and extraction areas. Guidance documents for the design of the baseline groundwater monitoring program included the BC Ministry of Environment (2016) *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators*, which will continue to be used if and when additional wells are installed.

Information to be presented in the Application to characterizes existing groundwater conditions includes, but is not limited to:

- Background information from published reference documents and hydrogeology reports;
- Baseline groundwater quality data obtained through the baseline program (e.g., field parameters and results of laboratory analyses);
- Seeps and springs present in the Project disturbance areas,

- Summary of existing groundwater characteristics (e.g., flow, direction, seasonal variations);
- Results of aquifer tests;
- Information on the current hydrogeological environment including hydrostratigraphic units/aquifers, flows through and between aquifers, gradients, groundwater/surface interactions fluxes (flux rates and locations), basic aquifer parameters derived from pumping test data, and geochemistry across and at the downgradient boundaries of the site;
- Potential groundwater quantity and quality impacts of the Project over both time (i.e., short-term, annual cycles, each project phase, long-term, etc.) and space (e.g., across the study area) at a scale appropriate to fully describe the impacts of individual and combined activities on watersheds, ecosystems, wildlife, and at key Project locations; and
- Assessment of surface and groundwater interactions at key watercourses, including characterizing the proportion of watershed yield occurring in the channel and beneath the channel.

The assessment will characterize potential interactions between surface waterbodies and shallow groundwater systems. This may include descriptions of recharge and discharge characteristics, groundwater seeps, and estimates of percent contribution to surface water flows. A groundwater/surface water numerical model will be used to analyse the potential impacts of Project activities (e.g., extraction methods) on groundwater quality and quantity. Seeps and springs within the waste rock management areas will be mapped, evaluated, and described in the Application.

4.1.3.3 Potential Effects

The Application will identify potential adverse effects to the groundwater quantity and quality intermediate VCs in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to groundwater. For example, the Application will describe the impacts of Project operations (e.g., plant operation, transportation, water supply) on groundwater quantity and quality, as well as contingency plans for accidents and potential conditions that require shutting down of the site.

Table 10 provides a summary of anticipated VC interactions with specific project components or activities.

Table 10: Summary of Potential Groundwater Intermediate VC Interactions with Project Components or Activities

Activity	Groundwater Quantity and Quality
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X

Activity	Groundwater Quantity and Quality
Construction of transmission line/power supply	
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	X
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.1.3.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures.** Relevant management plans will be referenced. Linkages to other Sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

For groundwater quantity and quality, the significance of residual effects will be a synthesis of the significance determinations for those receptor VCs for which groundwater quantity and quality is a primary pathway to effects from the Project. The significance determination for groundwater will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on groundwater.

4.1.4 Surface Water Quality and Quantity

The assessment of Project effects on surface water quality and quantity:

- Be conducted in accordance with the methodology specified in Section 3.0 of the AIR, using the organizational structure demonstrated in this Section; and
- Will describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of water quality, and compare the residual effects of the Project to these.

The Application will define and describe the potential effects on surface water due to Project activities and include an evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

- Surface water quality measured through loadings and concentrations of metals and non-metal constituents in surface water (including constituents of interests from the EVWQP - selenium [Se], cadmium [Cd], nitrate [NO3], and sulphate [SO4]); and
- Surface water levels and flow rates (e.g., maximum/minimum flows, seasonal and event driven flows).

The Application will also identify those VCs for which surface water are the primary pathways to potential effects from the Project.

4.1.4.1 Surface Water Quality

4.1.4.1.1 Existing Conditions

There is extensive historical surface water quality information for the Elk River watershed including sampling locations in the Elk River, Michel Creek, and Alexander Creek. Within the Application, existing water quality information in the public domain will be summarized and evaluated.

A site-specific water quality sampling program will be carried out to collect monthly water samples at watercourses within the LSA to gather background information for which to assess potential effects of the Project on aquatic life. The water quality program is anticipated to be conducted at nine (9)

locations across Alexander Creek, West Alexander Creek, Grave Creek, and Michel Creek. In addition to monthly sampling, freshet (high flow) and low flow sampling will be conducted to assess changes in water quality associated with seasonal variability. The water quality sampling program will follow guidance provided in Ministry of Environment (2016) *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations*. Monitoring stations will be established at key locations to allow the evaluation of potential receiving environments associated with the Project, such as at relevant onsite and receiving environment locations downstream of discharge points and to capture data on key flow conditions. These stations, as well as additional stations as necessary as the Project develops, will be monitored over the course of the Project, including operations through to post-closure.

The Application will describe the specific methods and standards used to collect baseline surface water quality data, including the sampling locations and analytical parameters (e.g., total and dissolved metals, inorganics, polycyclic aromatic hydrocarbons, general water chemistry). The Application will present results of the water quality program in table and figure form and compare these against relevant guidelines and criteria such as the BC Water Quality Guidelines (Ministry of Environment, 2018) and the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life (CCME, 1999).

The water quality program will collect data suitable to evaluate potential impacts related to EVWQP long-term water quality targets. As well, data collected as part of the surface water quality baseline program relevant to the EVWQP will be presented and discussed (e.g., concentrations of program constituents, including selenium, sulphate, nitrate, and cadmium). In addition, the model used to predict the concentrations of water quality parameters and assess potential effects, including residual effects, will be described in detail in the Application and provided in an Appendix to the Application. Surface water quality modeling data will also be provided in the Application.

4.1.4.1.2 Geochemistry

The Application will present baseline information on geochemistry investigations completed for the Project to characterize existing site conditions. Baseline geochemistry investigations are focused on the testing of materials from the Project area to evaluate the metal leaching/acid rock drainage (ML/ARD) potential to contribute to an understanding of how ML/ARD may impact aquatic health resources and water quality. The objective of the geochemistry program is to characterize the ML/ARD potential of all disturbed materials on site, including waste rock, raw coal, clean coal, CCR/tailings, pit walls, borrow sources, and overburden.

The Application will describe the following information of the geochemistry baseline program to characterize existing conditions as it relates to the Project:

- Methods of the baseline geochemistry program, as well as study locations;
- Characterization of the geological setting of the Project (including mineralogy);
- Results from static (i.e., acid-base accounting, elemental composition of major and trace elements) and mineralogical testing of drill core and cuttings;

- Assessment of short-term metal leaching properties;
- Seasonal and long-term analysis of existing water quality and loading estimates;
- Kinetic testing results, including discussion of longer-term kinetic testing to evaluate rates of acid generation (if any) and metal leaching;
- Lag time to ML/ARD onset and assessment for potentially ARD generating materials; and
- Incorporation of findings with the mine plan to predict geochemical source terms to be used for site wide water quality predictions and the development of site-specific management strategies as appropriate for the Project (see **Section 4.1.4** for details regarding surface water and modeling).

Relevant guidance documents and information sources used in development and completion of the baseline program will be described in the Application, with documents to include :

- Canadian Mine Environment Neutral Drainage (MEND) reports (MEND, 1991; MEND, 2009);
- *Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia* (Price, 1997);
- *The Guide for Acid Rock Drainage (GARD) produced by the International Network for Acid Prevention* (INAP 2010, http: //www.inap.com.au/);
- *Policy for Metal Leaching and Acid Rock Drainage at British Columbia Mine Sites* (MEM, ENV, and MELP, 1998);
- *Guidelines for Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia* (Price & Errington, 1998); and
- *Prediction Manual for Drainage Chemistry from Sulphidic Materials* (MEND Report 1.20.1, 2009).

The Application will cross-reference appropriate material related to the geochemistry baseline program to be included in an annex or appendix to the Application. In addition, the Application will present the development of geochemical source terms and geochemical modelling, assumptions and rational used to generate source terms, and relevant water quality estimates. Limitations associated with source term development will also be discussed and a sensitivity analyses will be provided where there are significant uncertainties of risk associated with the source terms.

The Application will also include, as appropriate, proposed mitigative measures and site-specific management strategies to address potential ML/ARD effects as well as prevention and management strategies that may be needed over the course of the Project, including temporary closure or early permanent closure scenarios. If applicable, the ML/ARD mitigation strategies and associated information will be presented in the Application if waste rock segregation is proposed, including:

- A description of the feasibility to segregate PAG and non-PAG mine waste materials during operations;
- Demonstration of adequate proportions of PAG and non-PAG wastes throughout mine life;
- Description of proposed geochemical characterization and segregation during operations (e.g., geochemical surrogates);

- Geochemistry of individual wastes and mixed wastes including metal release characteristics;
- Site-specific management criteria for blending;
- Waste handling and placement plans;
- Assessment of anticipated waste dump hydrology, if applicable;
- Proposed operation monitoring plans and contingency plans for seepage water quality management; and
- A sensitive analysis to assess the effects of waste rock segregation.

4.1.4.1.3 Assessment of Project Effects on Water Quality and Mitigation Measures

The Application will identify potential adverse effects to surface water quality intermediate VCs in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to surface water quality. The assessment of Project effects on water quality will:

- Include an evaluation of the predicted levels of water quality parameters including those specifically identified in the EVWQP for the life of the mine, including a comparison of the predicted levels of water quality parameters to BC's water quality guidelines;
- Indicate the disciplines of study to which the results of the assessment have been forwarded for further assessment in terms of the contribution that changes in surface water may have on receptor VCs selected for assessment of the Project;
- Include a consolidated summary of the predicted residual adverse effects to the receptor VCs of surface water quality. The summary will provide the results of the assessment of land use and access, human health, aquatic health and terrestrial wildlife health VCs, where a predicted change to water quality is considered a primary effect pathway. This summary will provide a synthesized assessment of the significance of the potential effects of changes to water quality, as represented by the above-noted assessments;
- Include both Project-specific and watershed modelling;
- Utilize existing watershed modelling being developed by Teck and other proponents in the Elk Valley (proponents to discuss watershed modelling with Teck);
- Demonstrate how Best Achievable Control Technology (BACT), contingency measures, and adaptive management will be used;
- Use an adaptive management approach to ensure the Project evolves in response to new information and scientific advances;
- Use an approach that responds to results of water quality target attainment monitoring or target revisions; and
- Demonstrate how the Project will meet BC's WQ guidelines (i.e., 2 ug/L for Se for protection of aquatic life).

Table 11 provides a summary of anticipated VC interactions with specific project components or activities.

Table 11: Summary of Potential Surface Water Quality Intermediate VC Interactions with Project Components or Activities

Activity	Surface Water Quality
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	X
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.1.4.1.4 Cumulative Effects Assessment for Water Quality

The Project is located with the designated area of the Elk Valley Area Based Management Plan, also known as the Elk Valley Water Quality Plan (EVWQP). The EVWQP is a plan to manage the cumulative effects of coal mining on water quality and was developed by Teck Coal Limited (Teck) in response to a Ministerial Order issued in April 2013 under the *Environmental Management Act* (EMA).

The Order directed Teck to develop a plan to stabilize and reduce water quality concentrations of selenium, cadmium, nitrate, and sulphate (the Order Constituents) and the rate of formation of calcite in streams. The plan was to include short, medium, and long-term water quality targets for the order constituents for specified locations in the Elk River, Fording River, and the Canadian portion of Lake Koocanusa. The EVWQP was developed with significant consultation with the First Nations, various levels of government, resource tenure holders, the public and other stakeholders.

The Minister of Environment approved the EVWQP on November 18, 2014, and the Minister's approval letter also set out Approval Conditions. The EVWQP and the Minister's Approval Conditions apply to all coal mines in the designated area of the Elk Valley, including the Crown Mountain Coking Coal Project.

Because the EVWQP is a cumulative effects management plan for water quality that was approved by the Minister of Environment under EMA, a typical cumulative effects assessment for water quality is not required for the Crown Mountain Coking Coal Project. Instead, the Application will:

- Demonstrate how the Project will meet:
  - BC's Water Quality Guidelines for selenium, nitrate, cadmium and sulphate for the protection of aquatic health at the property boundary;
  - The water quality targets at the downstream order stations and calcite management objectives of the EVWQP; and
  - The EVWQP Approval Conditions in the Minister's letter.
- Use project-specific and regional watershed models for surface and groundwater to predict concentrations of the Order Constituents. Teck's regional watershed model on which the EVWQP is based will be used, if available. If Teck's regional model is not used for the Application's predictions, the Application will summarize:
  - The Proponent's efforts to engage and work with Teck to secure use of the model; and
  - How the Proponent's model predictions compare to Teck's model predictions in the EVWQP.
- Identify how the following will be considered during the development and operation of the mine:
  - Best Achievable Control Technology (BACT) contingency measures;
  - Monitoring programs to assess water quality before construction, during construction, operation, closure and post reclamation, including potential trigger action response thresholds; and
  - Adaptive management to ensure that the Project evolves in response to monitoring information and scientific advances;
- Describe any differences in the water quality prediction and assessment approaches between the EVWQP and the Application along with the rationale for the differences.

4.1.4.2 Surface Water Quantity

4.1.4.2.1 Existing Conditions

The Application will provide an overview of existing hydrological conditions at key watercourses that may be impacted by the proposed Project, including Alexander Creek, West Alexander Creek and Grave Creek. Baseline field survey information on water flows at selected watercourses will be presented and summarized in the Application, including methods and standards used to collect baseline hydrology data and the location of hydrology monitoring stations established for the Project.

Site-specific baseline hydrology information presented in the Application for key watercourses will include but not be limited to:

- Continuous, daily stream flow records at all monitoring locations, which will include up-gradient and down-gradient monitoring sites;
- Development of long-term hydrology statistics based, at least in part, on site specific data. Statistics will include mean and median annual flow, monthly flow, variability of both monthly and annual flow, and return period high and low flows;
- The 'total watershed yield' from each watershed (runoff + groundwater flow), as established by the hydrologic analysis;
- Assessment of surface and groundwater interactions at key watercourses, including characterizing the proportion of watershed yield occurring in the channel and beneath the channel; and
- A review of available long-term data, if available, related to climate change to identify existing climate/hydrology trends in the region and how these trends may impact physical environments and associated effects on intermediate and receptor components.

Monitoring at the stations installed as part of baseline surveys continues and additional surveys will follow relevant provincial guidance documents, as noted, such as the guidance provided in *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations* (ENV, 2016) and the *Manual of British Columbia Hydrometric Standards* (Resource Inventory Standards Committee, 2009). In addition to site-specific information on baseline field surveys, regional hydrology data will also be presented and summarized primarily based on data from existing Environment and Climate Change Canada flow monitoring stations.

To support review of the Application, raw hydrology data from each of the monitoring stations will be provided in appendices to the Application, as applicable, and/or be provided to specific regulatory agencies in a useable format at the time of Application submission (e.g., provincial Ministry of Environment).

A water quantity model will also be developed for the Project site and described in detail in the Application. The water quantity model will be developed for incorporation into the water quality model, and will describe relevant model calibration and/or validation information. The model will operate on a

monthly or shorter time-step and be calibrated to the baseline hydrology data collected for the Project. The model will also incorporate all planned mine water management activities for all phases of the Project, and will incorporate hydrologic variability, such that receiving environment predictions can be generated for both wet and dry conditions. Climate station data relevant to understanding the hydrological conditions at assessed watercourses will also be presented (see **Section 4.1.1.2** for more information on the Project climate station).

4.1.4.2.2 Mitigation Measures for Surface Water Quantity

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

For water quantity, the significance of residual effects will be a synthesis of the significance determinations for its receptor VCs. The significance determination for water quantity will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on water quantity.

4.1.5 Soil Quality and Quantity

The assessment of Project effects on soil quality and quantity:

- Be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section; and
- Will describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of soil quality and quantity, and compare the residual effects of the Project to these.

The Application will define and describe the potential effects on soil quantity and quality due to project activities and include an evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

- Metal and non-metal concentrations in soil;
- Soil type and general soil properties; and

- Depth and distribution of soil types.

The Application will also identify those VCs for which soil quality and quantity are the primary pathways to potential effects from the Project.

4.1.5.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the intermediate VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. The assessment of soil quality and quantity will be evaluated at the Project footprint and Local Study Area scales. Study areas will be driven by terrestrial ecosystem VCs, such as those outlined in **Section 4.2.4**.

4.1.5.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of soil quality and quantity as an intermediate VCs; provide a summary of additional data analyses required; and describe existing conditions of the intermediate VC based on available data.

The Application will provide baseline information to characterize existing soil quality and quantity conditions.

4.1.5.3 Potential Effects

The Application will identify potential adverse effects to soil quality and quantity intermediate VC in a manner consistent with **Section 3.4 Potential Effects**. **Table 12** provides a summary of anticipated VC interactions with specific project components or activities.

Table 12: Summary of Potential Soil Intermediate VC Interactions with Project Components or Activities

Activity	Soil Quality and Quantity
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X

Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	
Transport of materials and equipment	
Site remediation	X
Reclamation of disturbed areas	X

4.1.5.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

For soil quality and quantity, the significance of residual effects will be a synthesis of the significance determinations for those receptor VCs for which soil quality and quantity is a primary pathway to effects from the Project. The significance determination for soil quality and quantity will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on soil quality and quantity.

4.1.6 Terrain

The assessment of Project effects on terrain:

- Be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section; and
- Will describe the regulatory requirements, policies, BMP, and guidance documents relevant to the management of terrain and compare the residual effects of the Project to these.

The Application will define and describe the potential effects on terrain due to project activities and include an evaluation of the following measurement indicators to determine changes in the environment as a result of the Project:

- Terrain type; and
- Slope and aspect.

The Application will also identify those VCs for which terrain are the primary pathways to potential effects from the Project.

4.1.6.1 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the intermediate VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. The assessment of terrain will be evaluated at the Project footprint and Local Study Area scales. Study areas will be driven by terrestrial ecosystem VCs, such as those outlined in **Section 4.2.4**.

4.1.6.2 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of terrain as an intermediate VCs; provide a summary of additional data analyses required; and describe existing conditions of the intermediate VC based on available data.

The Application will provide baseline information to characterize existing terrain conditions.

4.1.6.3 Potential Effects

The Application will identify potential adverse effects to the terrain intermediate VC in a manner consistent with **Section 3.4 Potential Effects**. **Table 13** provides a summary of anticipated VC interactions with specific project components or activities.

Table 13: Summary of Potential Terrain Intermediate VC Interactions with Project Components or Activities

Activity	Terrain
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	
Disposal of materials	
Transport of materials and equipment	
Site remediation	X
Reclamation of disturbed areas	X

4.1.6.4 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to intermediate VCs and relevant receptor VCs in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will also be identified, as appropriate.

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

For terrain, the significance of residual effects will be a synthesis of the significance determinations for those receptor VCs for which terrain is a primary pathway to effects from the Project. The significance determination for terrain will include a summary of the residual effects and their significance for each of the receptor VCs. If there is a significant adverse effect on any of the receptor VCs, then there will be a deemed significant adverse effect on terrain.

4.2 Receptor Valued Components

A **receptor VC** is a component of the natural or human environment that is measurably affected by the Project, directly or indirectly, and which forms an endpoint of a given effect pathway or intermediate VC. Receptor VCs for this Project are identified in **Table 3** and their assessment methodology is described below.

4.2.1 Climate

4.2.1.1 Introduction

The Application will identify the climate receptor VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages between the climate VCs and other VCs (e.g., human health).

4.2.1.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential Project effects on climate VCs due to project activities, specifically project emissions. The climate assessment will focus on the selected receptor VC as described in **Table 14**.

Table 14: Measurement Indicators for Climate

Valued Component	Measurement Indicators
Climate	Greenhouse gas emissions (CO_2, CH_4, and N_2O)

Specific to provincial and federal requirements and targets, the Application will include:

- Comparison of direct and indirect greenhouse gas emissions during various Project phases to

provincial and federal emissions targets;

- Estimate of direct and indirect greenhouse gas emissions associated with all phases of the Project, as well as any mitigation measures proposed to minimize greenhouse gas emissions; and
- Should residual greenhouse gas emissions remain after mitigation is applied, the Application will include an analysis of the relative contribution of the Project to provincial, national, and sector greenhouse gas emissions and the inclusion of applicable standards or targets.

4.2.1.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Proposed spatial boundaries to be used in the Application are illustrated in **Figure 4**. Due to the relationship of air quality and climate, the proposed study areas are the same for the assessments of both components. The assessment of climate will be evaluated at the Local and Regional Study Area scales. Study areas will be driven by local air sheds as well as other operating mines in the area.

The climate RSA (**Figure 4**) was selected based on the following reasons:

- It includes communities within the Elk Valley that may be regionally affected by climatic conditions as a result of cumulative effects;
- It includes operating and proposed mines within the Elk Valley that may be considered as part of the cumulative effects assessments; and
- Includes the Elk River Valley to the United States border to include potential areas that may also be regionally impacted.

The climate LSA (**Figure 4**) was selected based on the following reasons:

- Includes local communities that may be locally impacted by emissions generated by the Project;
- To be inclusive of towns within approximately 20 km of the centre of the Project including the District of Sparwood, the District of Elkford, the Municipality of Crowsnest Pass (Alberta), and the Municipal District of Ranchland 66 (Alberta);
- Allows for an evaluation of potential changes in climatic conditions at selected receptors (receptor locations to be determined); and
- Includes operating mines near the Project area.

4.2.1.4 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of the climate VC; provide a summary of additional data analyses required; and describe existing conditions of the receptor VC based on available data.

The Application will provide baseline information to characterize current climatic conditions both at a regional and site-specific level as it relates to the climate VC and the assessment of impacts to greenhouse gas emissions.

The Application will also include:

- Estimate of direct greenhouse gas emissions associated with all phases of the Project, as well as any mitigation measures proposed to minimize greenhouse gas emissions.
- Should residual greenhouse gas emissions remain after mitigation is applied, the Application will include an analysis of the relative contribution of the Project to provincial, national, and sector greenhouse gas emissions and the inclusion of applicable standards or targets.

Production of GHGs will be reported in accordance with provincial and federal regulations. Project emissions will be required to be in compliance with applicable GHG emission targets. GHG emissions will be measured over the course of the Project and compared against compliance with applicable provincial and federal standards and emissions targets.

A detailed technical report that describes existing climatic conditions will be appended to the Application. Raw data will be provided to the ENV following submission of the Application.

4.2.1.5 Potential Effects

The Application will identify potential adverse effects to the climate VC in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to the climate VC.

Table 15 provides a summary of anticipated VC interactions with specific project components or activities.

Table 15: Summary of Potential Climate VC Interactions with Project Components or Activities

Activity	GHG Emissions
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	

Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	X
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X
Post-closure/closed mine	X

4.2.1.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the receptor VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other sections in the Application will also be identified, as appropriate.

4.2.1.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.1.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed

Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;

- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.1.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.2 Aquatic Health

4.2.2.1 Introduction

The Application will identify aquatic health receptor VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages with other VCs (e.g., fish).

A number of intermediate components are primary pathways to potential Project effects on receptor aquatic health VCs including:

- Air quality
- Surface water quality;
- Surface water quantity;
- Groundwater quantity; and
- Groundwater quality

The Application will describe and discuss interactions between the intermediate VCs and the receptor aquatic health VCs. For example, interactions between benthic invertebrates and sediment quantity will be evaluated.

4.2.2.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential Project effects on aquatic health VCs due to Project activities. The assessment of aquatic health will focus on the following VCs:

- Benthic Invertebrates;
- Fish Species occurring within the RSA (represented by westslope cutthroat trout, bull trout, burbot, longnose sucker, mountain whitefish, and kokanee);
- Amphibians within the RSA (represented by Columbia spotted frog); and
- Waterbirds within the RSA (represented by Harlequin duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper).

The assessment will also include a description of the any regulatory requirements, policies, BMP, and guidance documents relevant the management and evaluation of aquatic health, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

The assessment of aquatic health will be based on a range of measurement indicators which are specific to each of the receptor VCs, as detailed in **Table 16**. Measurement indicators that will be used to evaluate changes in intermediate components are detailed in **Table 17**.

Table 16: Summary of Measurement Indicators for Aquatic Health VCs

Valued Component	Measurement Indicators
Benthic invertebrates	• Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, 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 benthic invertebrates • Sediment quality • Groundwater (quality and quantity) and surface water (quality and quantity) statistics at representative locations
All Fish species that occur within the RSA. For effects assessment will be represented by: ○ Westslope cutthroat trout ○ Bull trout ○ Burbot ○ Longnose sucker ○ Mountain whitefish	• Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metals), which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Sediment quality, which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Habitat quantity relative to baseline (e.g., changes in channel morphology, substrates and calcite formations, changes in habitat connectivity, changes in habitat availability, and riparian habitat) • Fish population metrics (e.g., density, biomass, size-at-age, or related metrics) • Fish growth, survival, and reproduction

Valued Component	Measurement Indicators
○ Kokanee	• Metal concentrations in fish muscle tissues • DELT surveys (visual assessment of deformations, erosions, lesions, and tumours on fish)
All amphibian species in aquatic environments within the RSA (e.g., Western toad, Rocky Mountain tailed frog, and Columbia spotted frog), which will be represented by Columbia spotted frog	• Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metals), which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Predicted water quality concentrations in comparison to contaminant concentrations relevant to the growth, survival, and reproduction of amphibians • Sediment quality, which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Amphibian presence/not detected as compared to baseline • Metal concentrations in tissue samples from a representative amphibian species (i.e., Columbia spotted frog)
Waterbird species within the RSA, which will be represented by the following species: ○ Harlequin Duck ○ Red-winged Blackbird ○ Spotted Sandpiper ○ Mallard ○ American Dipper	• Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metals), which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Predicted water quality concentrations in comparison to contaminant concentrations relevant to the growth, survival, and reproduction of Waterbirds • Sediment quality, which incorporates assessment of air, groundwater quality and quantity, and surface water quality and quantity • Waterbird survey information as compared to baseline • Metal concentrations in tissue and/or egg samples from representative waterbird species (e.g., Spotted Sandpiper)

Table 17: Summary of Measurement Indicators for Intermediate Components Related to Aquatic Health VCs

Intermediate Components	Measurement Indicators
Air quality	• Common air contaminants, including fine particulates (PM10 and PM2.5), total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall
Surface water quality	• Metal and non-metal concentrations in surface water
Surface water quantity	• Surface water levels and flow rates
Groundwater quantity	• Groundwater levels and flow rates
Groundwater quality	• Metal and non-metal concentrations in groundwater

4.2.2.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the receptor VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

Proposed spatial boundaries to be used in the Application for the assessment of aquatic health and other aquatic VCs are illustrated in **Figure 6** and **Figure 7**. Aquatic health will be evaluated at the both the LSA and RSA scales.

The aquatic RSA (**Figure 6**) covers approximately 4,380 km^2 and includes areas that may be indirectly or directly impacted by the Project and areas that will be assessed for cumulative effects on hydrology, fish and fish habitat, surface water and groundwater quality, and hydrogeology. The aquatic RSA includes the Elk Valley watershed and a portion of Lake Koocanusa, which the Elk River enters near southern BC at the State of Montana boarder.

The aquatic LSA (**Figure 7**) encompasses approximately 235 km^2 and includes areas that have the immediate potential to be directly or indirectly impacted by the Project, including Grave Creek, West Alexander Creek, and Alexander Creek. The aquatic LSA was selected based on the layout of the Project and anticipated Project footprint. Watercourses that have the potential to directly overlap with the Project footprint include West Alexander Creek and Grave Creek.

4.2.2.4 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions** of this AIR template. It will identify any important data gaps and how these gaps have been addressed for the assessment of aquatic health VCs; provide a summary of additional data analyses required; and describe existing conditions of the receptor VCs based on available data.

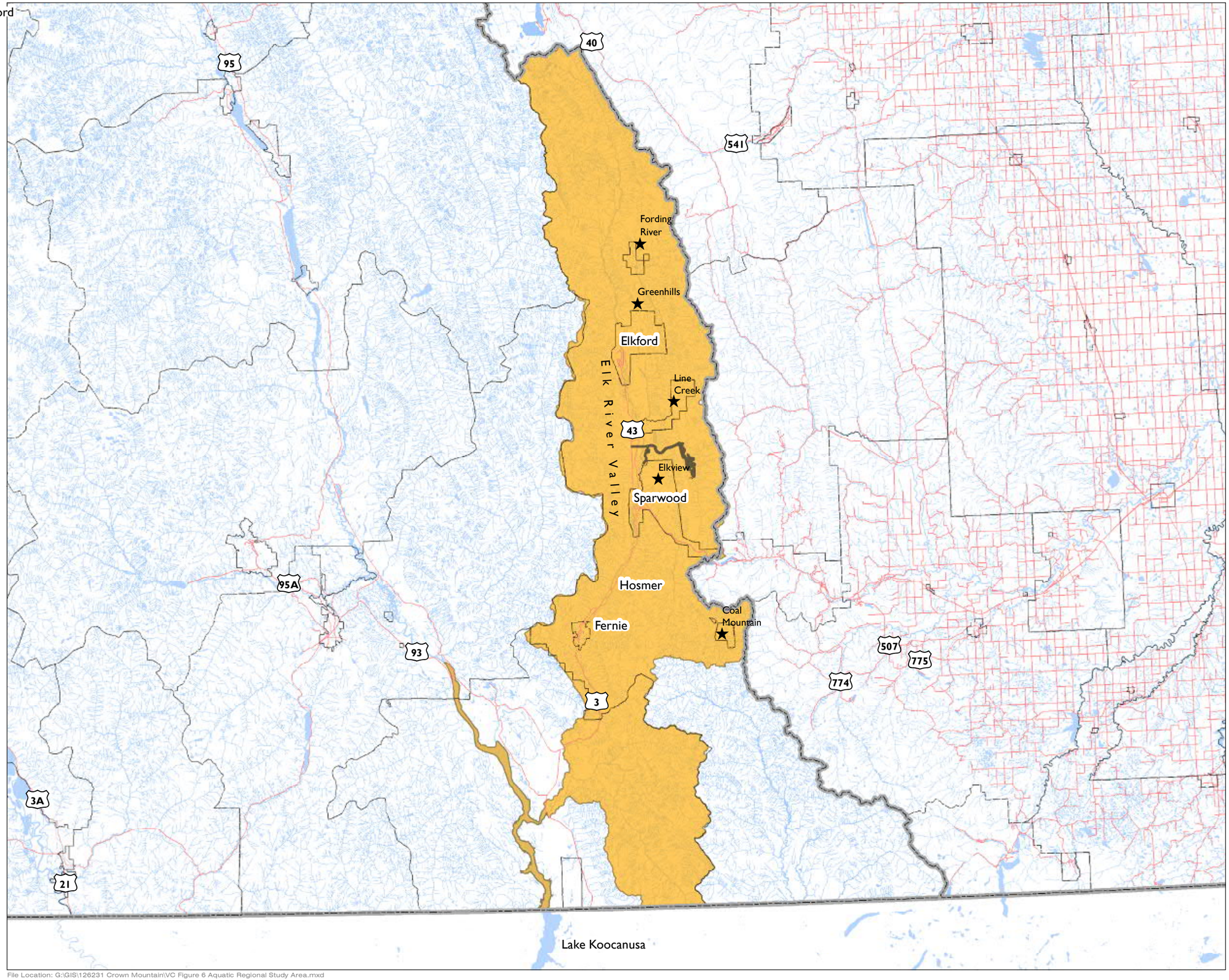
Following are details regarding approaches for the collection of baseline information required to support the assessment of potential impacts to aquatic health VCs.

BENTHIC INVERTEBRATES

The Application will present baseline information to characterize existing conditions within watercourses that may be impacted by the Project, in particular the benthic invertebrate communities present within these watercourses, and the existing conditions of relevant intermediate components (e.g., surface water quality).

Benthic invertebrate communities will be characterized through field surveys, which will include collection of invertebrate samples (habitat and taxonomy data) at key watercourses following the Canadian Aquatic Biomonitoring Network (CABIN) protocol. Relevant guidance documents will include:

- Environment Canada (2012) *Canadian Aquatic Biomonitoring Network field manual - wadeable streams* and



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 6
Aquatic Regional Study Area

- Aquatic Regional Study Area
- Existing Operating Mines
- Highways/Major Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- Regional District/Municipal Boundaries
- BC/Alberta/USA Border

SCALE 1:750,000

0 10 20 40 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 6 Aquatic Regional Study Area.mxd

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 7
Aquatic Local Study Area

- Aquatic Local Study Area
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Parks and Protected Areas
- BC/Alberta Border

SCALE 1:260,000

0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 7 Aquatic Local Study Area.mxd

- Environment Canada (2014) *CABIN laboratory methods: processing, taxonomy, and quality control of benthic macroinvertebrate samples.*

Should deeper, depositional areas be encountered that require sampling, other suitable methods will be used such as Ponar or Eckman dredge.

FISH

The Application will characterize existing conditions of fisheries, as they relate to aquatic health, to provide an overview of baseline conditions in watercourses that may be impacted by the proposed Project (e.g., West Alexander Creek, Alexander Creek, and Grave Creek). To characterize existing conditions, the Application will present the following:

- Methods of the baseline fish program, including a summary of baseline data collected and sampling locations;
- Results of the baseline fish program, with descriptions on the following data collected:
  - Fish communities;
  - Fish inventories and spawner surveys;
  - Fish habitat (e.g., geomorphological conditions, substrates, presence/absence of calcite formations, habitat connectivity, and habitat availability);
  - Instream flow studies, including discussion on the drainage and flow network of watercourses and winter fish flows;
  - Calcite mapping; and
  - Fish health (e.g., metal levels in fish muscle tissues).
- Relevant surface water quality and quantity and groundwater quality and quantity data as it relates to fish;
- Historical/background information on fisheries in the regional and local area available through provincial and federal reports and databases or other relevant EAs completed in the area;
- Transportation corridors under review (e.g., number of stream crossing locations [new and existing], type of crossing [culvert, bridge, etc.], fish species presence, and riparian habitat); and
- In relevant appendices, a summary of all fisheries data collected, including sample methods, timing, effort, and results at each location.

Standards and guidance documents used in the collection of baseline fisheries information will be described in the Application and include but are not limited to:

- BC Ministry of Environment's (2004) *Standards and Best Practices for Instream Works*;
- Government of Canada (2013) *Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations*;
- BC Ministry of Environment's (2016) *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations;*
- BC Ministry of Environment's (2003) *British Columbia Field Sampling Manual*;

- Johnston, N.T. and P.A. Slaney (1996) *Fish Habitat Assessment Procedures*;
- Lewis, A., T. Hatfield, B. Chilibeck and C. Roberts (2004) *Assessment Methods for Aquatic Habitat and Instream Flow Characteristics in Support of Applications to Dam, Divert, or Extract Water from Streams in British Columbia*;
- RISC (Resource Inventory Standards Committee; 2001) *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures*; and
- BC Ministry of Forests and BC Ministry of Environment (1998) *Forest Practices Code of British Columbia - Fish stream Identification Guidebook.*

NWP Coal may consider the use of technologies such as stable isotope analysis and eDNA analysis to assist in determining measurement indicators of aquatic health. The use of such technologies will depend on the availability and efficacy of such technologies during data collection. NWP Coal will work with the EAO, ENV, and KNC in determining the use of such technologies and their applicability in the Elk Valley for the Project.

AMPHIBIANS

The Application will provide an overview of existing amphibian habitat to understand the potential effects to amphibians and amphibian habitat as a result of the Project. To characterize existing conditions, the Application will describe the following:

- Methods and standards used in the collection of baseline information on amphibians;
- Survey locations;
- Parameters sampled or analyzed as part of the baseline program;
- Results of the baseline program (e.g., wetland habitat surveys, presences/not detected surveys, tissue and/or egg sample results);
- Relevant surface water quality and quantity and groundwater quality and quantity data as it relates to amphibians; and
- Relevant background information and studies completed for other EAs in the area, including regional reports on terrestrial habitat that support amphibians.

Standards and guidance documents relevant to the collection of baseline data will be described in the Application, such as the BC Ministry of Environment (1998) *RIC Inventory Methods for Pond-breeding Amphibians and Painted Turtle*.

WATERBIRDS

The Application will provide an overview of existing waterbird habitat to understand the potential effects to waterbirds as a result of the proposed Project. To characterize existing conditions, the Application will present the following:

- Methods and standards used in the collection of waterbird baseline information;
- Survey locations;

- Relevant surface water quality and quantity, groundwater quality and quantity, and air quality data as it relates to waterbirds; and
- Results of the baseline program (e.g., changes to the number of documented occurrences of waterbirds relative to baseline, changes in waterbird habitat availability and distribution, results of the surface water quality sampling program, results of tissue and/or egg samples collected as part of the terrestrial risk assessment); and relevant background information and studies completed for other EAs in the area.

Standards and guidance documents relevant to the collection of baseline data will be described in the Application, such as the BC Ministry of Environment (1998) RIC *Inventory Methods for Colonial-Nesting Freshwater Birds* and the *RIC Inventory Methods for Riverine Birds (Dippers and Harlequins)* (1999).

4.2.2.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. Potential adverse effects on intermediate components and associated measurement indicators will also be discussed in the Application as these form part of the potential effects pathways of receptor aquatic health VCs. The Application will also identify measures to avoid, manage or otherwise mitigate (including potential water treatment) potential adverse effects to aquatic resources and aquatic health for each phase of the Project (i.e., construction, operations, closure, and post-closure). For example, the Application will describe the impacts of Project operations (e.g., plant operation, transportation, water supply) on groundwater and surface water quantity and quality that may impact aquatic resources, as well as contingency plans for accidents and potential conditions that require shutting down of the site.

Table 18 provides a summary of anticipated aquatic VC interactions with specific Project components or activities.

Table 18: Summary of Potential Aquatic Health VC Interactions with Project Components or Activities

Activity	Aquatic Health
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	
Construction of water supply	X

Activity	Aquatic Health
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	X
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.2.2.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified.

4.2.2.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.2.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures** of this AIR template; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.2.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.3 Fish

4.2.3.1 Introduction

The Application will identify receptor fish VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages the fish VCs have in related to other VCs (e.g., aquatic health, human and wildlife health).

A number of intermediate components are primary pathways to potential Project effects on receptor fish VCs, including:

- Air quality;
- Groundwater quantity;
- Groundwater quality;
- Surface water quantity; and
- Surface water quality.

The application will describe and discuss interactions between intermediate components and receptor fish VCs. For example interactions between fish species and surface water quality will be evaluated.

4.2.3.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential effects on fish VCs due to Project activities. The assessment of effects will focus on the following fish VCs:

- Westslope cutthroat trout;
- Bull trout;
- Kokanee;
- Burbot;
- Longnose sucker; and
- Mountain whitefish.

The assessment of fish will be based on a range of measurement indicators which are specific to each of the VCs, as detailed in **Table 19**. Measurement indicators that will be used to evaluate changes in intermediate components are detailed in **Table 20**.

Table 19: Summary of Measurement Indicators for Fish VCs

Valued Components	Measurement Indicators
• Westslope cutthroat trout • Bull trout • Kokanee • Burbot • Longnose sucker • Mountain whitefish	• Fish species presence/not detected as compared to baseline • Habitat quantity relative to baseline (e.g., changes in channel morphology, substrates and calcite formations, changes in habitat connectivity, changes in habitat availability, and riparian habitat) • Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metals) • Fish population metrics (e.g., density, biomass, size-at-age, or related matrices)

Table 20: Summary of Measurement Indicators for Intermediate Components Related to Fish VCs

Intermediate Components	Measurement Indicators
Air quality	• Common air contaminants, including fine particulates (PM10 and PM2.5), total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall
Surface water quality	• Metal and non-metal concentrations in surface water including Constituents for the EVWQP
Surface water quantity	• Surface water levels and flow rates
Groundwater quantity	• Groundwater levels and flow rates
Groundwater quality	• Metal and non-metal concentrations in groundwater

The Application will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the management of fisheries, as well as describe how information

obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.2.3.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

Proposed spatial boundaries to be used in the Application for the assessment VCs are illustrated in **Figures 6** and **7**. Details regarding the rationale for the selection of the LSA and RSA boundaries are provided in **Section 4.2.2.3**.

4.2.3.4 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of fish VCs, provide a summary of additional data analyses required, and describe existing conditions of the VC based on available data.

Characterization of existing fish and fish habitat conditions in the Application will include:

- Methods of the baseline fisheries program, including a summary of baseline data collected and sampling locations;
- Results of the baseline fisheries program, with descriptions on the following data collected:
  - Fish communities;
  - Fish inventories and spawner surveys;
  - Fish habitat (e.g., geomorphological conditions);
  - Habitat use by species and life stages;
  - Benthic invertebrate communities;
  - Periphyton communities;
  - Instream flow studies, including discussion on the drainage and flow network of watercourses and winter fish flows;
  - Calcite mapping; and
  - Fish health (metal results of muscle plugs from spawning fish, DELT surveys, and evaluation of selected fish metrics such as length and weight data), including but not limited to:
    - Observations of collected fish - looking at presence of skeletal deformities, presence of lesions, fin erosion, etc.
    - Analysis of collected fish metric data such a lengths and weights to determine condition factors, length-weight relationships, etc.
    - Evaluation of metal levels in fish tissues and comparison to relevant guidelines (both for aquatic life and for human consumption).
- Historical/background information on fisheries in the regional and local area available through provincial and federal reports and databases or other relevant EAs completed in the area;

- Transportation corridors under review (e.g., number of stream crossing locations [new and existing], type of crossing [culvert, bridge, etc.], fish species presence, and riparian habitat);
- In relevant appendices, a summary of all fisheries data collected, including sample methods, timing, effort, and results at each location.

NWP Coal may consider the use of technologies such as stable isotope analysis and eDNA analysis to assist in determining measurement indicators of fish health. The use of such technologies will depend on the availability and efficacy of such technologies during data collection. NWP Coal will work with the EAO, ENV and KNC in determining the use of such technologies and their applicability in the Elk Valley for the Project.

Characterization of existing conditions for fish VCs will also include a description of intermediate components and related measurement indicators for baseline programs for surface water quality, hydrology, groundwater, and geochemistry.

4.2.3.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to fish and fish habitat. **Table 10** in **Section 4.2.2.5** provides a summary of anticipated fish VC and intermediate component interactions with specific project components or activities.

4.2.3.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

The Application will also include a draft offsetting plan, if appropriate. The draft plan would be developed with input from Fisheries and Oceans Canada and other interested parties.

4.2.3.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.3.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance and **3.9 Confidence and Risk**.

4.2.3.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.4 Landscapes and Ecosystems

4.2.4.1 Introduction

The Application will identify receptor landscape and ecosystems VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages with other VCs (e.g., wildlife).

A number of intermediate components are primary pathways to potential Project effects on receptor landscape and ecosystems VCs, including:

- Air quality;
- Soil quality;
- Soil quantity;
- Terrain;
- Groundwater quality and quantity; and
- Surface water quantity and quality.

4.2.4.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential effects on landscapes and ecosystems VCs due to Project activities. The assessment will focus on the following VCs:

- Avalanche chutes;
- Grassland ecosystems;
- Wetland ecosystems;
- Riparian habitat; and
- Old growth and mature forests.

The assessment of landscape and ecosystems VCs will be based on a range of measurement indicators which are specific to each of the VCs, as detailed in **Table 21**. Measurement indicators that will be used to evaluate changes in intermediate components are detailed in **Table 22**.

Table 21: Summary of Measurement Indicators for Landscape and Ecosystems VCs

Valued Component	Measurement Indicators
Avalanche chutes	• Ecosystem abundance and distribution relative to baseline conditions (e.g., amount of ecosystem present, connectivity of ecosystem, patch size) • Compositional and structural changes of the ecosystem through assessment of species richness, presence/absence of sensitive/listed plant species, and presence/absence of invasive species

Grassland ecosystems	• Ecosystem abundance and distribution relative to baseline conditions (e.g., amount of ecosystem present, connectivity of ecosystem, patch size)
	• Compositional and structural changes of the ecosystem through assessment of:
	  ○ species richness
	  ○ presence/absence/relative abundance of common native species
	  ○ presence/ absence/ relative abundance of sensitive/ listed plant species
	  ○ presence/ absence / relative abundance of invasive species
	  ○ structural stage information

Wetland ecosystems	• Ecosystem abundance and distribution relative to baseline conditions, including identification of red and blue listed communities where applicable (e.g., amount of ecosystem present, connectivity of ecosystem, patch size)
	• Compositional and structural changes of the ecosystem through assessment of:
	  ○ species richness
	  ○ presence/absence/relative abundance of common native species
	  ○ presence/ absence/ relative abundance of sensitive/ listed plant species
	  ○ presence/ absence / relative abundance of invasive species
	  ○ structural stage information
	• Changes in wetland function as it relates to migratory birds and species at risk
	• Presence/absence of fish

Riparian habitat	• Ecosystem abundance and distribution relative to baseline conditions (e.g., amount of ecosystem present, connectivity of ecosystem, patch size) • Compositional and structural changes of the ecosystem through assessment of:

Valued Component	Measurement Indicators
	○ species richness ○ presence/absence/relative abundance of common native species ○ presence/ absence/ relative abundance of sensitive/ listed plant species ○ presence/ absence / relative abundance of invasive species ○ structural stage information
Old growth and mature forests	• Ecosystem abundance and distribution relative to baseline conditions (e.g., amount of ecosystem present, connectivity of ecosystem, patch size, coarse woody debris, wildlife trees) • Compositional changes of the ecosystem measured through items such as canopy closure, changes in seral stage age class, distance of habitat edge, and type of old growth (as recommended by the Elk Valley Cumulative Effects Management Framework)

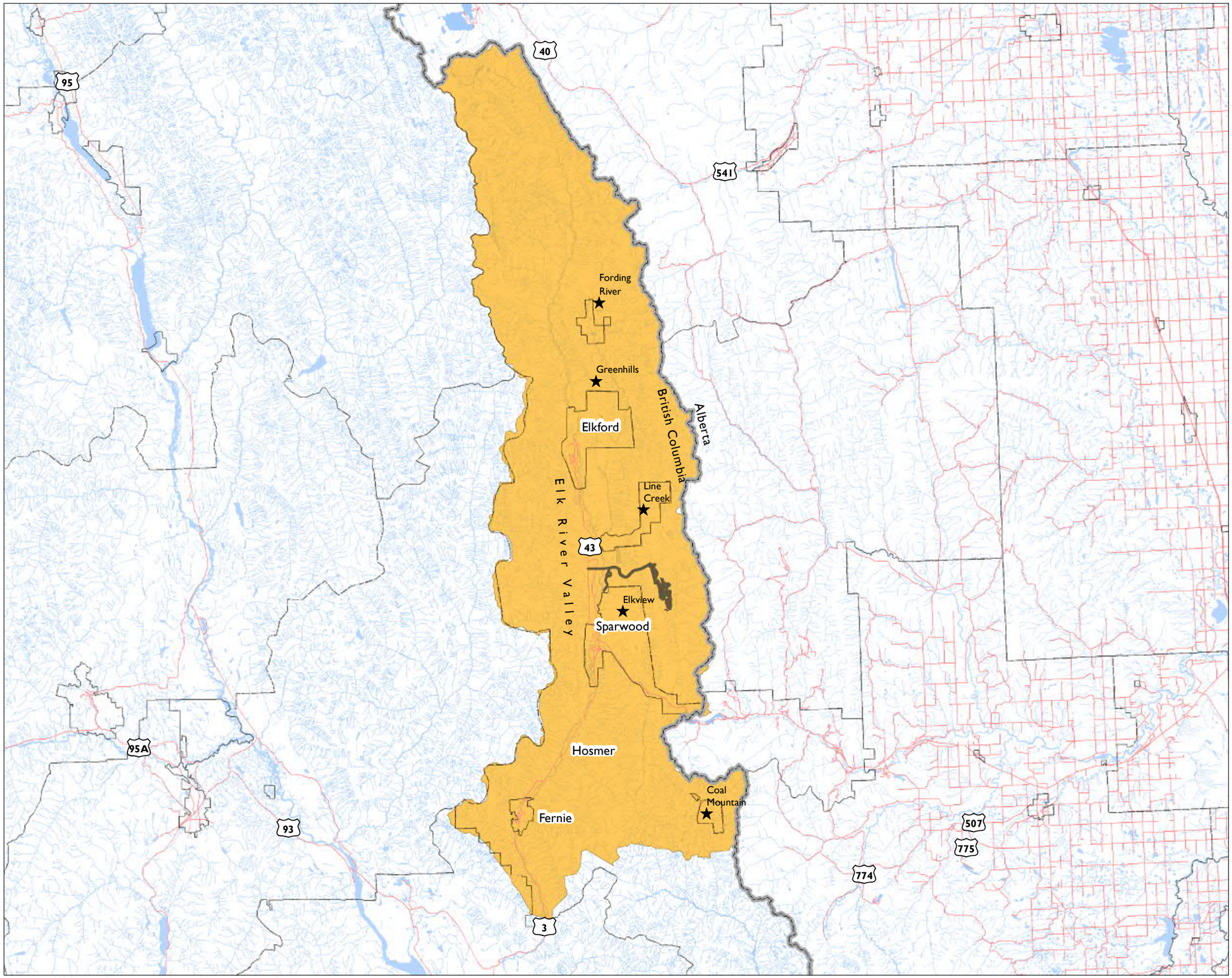
Table 22: Summary of Measurement Indicators for Intermediate Components Related to Landscape and Ecosystems VCs

Intermediate Components	Measurement Indicators
Air quality	• Common air contaminants, including fine particulates (PM10 and PM2.5), total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall
Soil quality	• Metal and non-metal concentrations in soil • Soil type and general soil properties
Soil quantity	• Depth and distribution of soil types
Terrain	• Terrain type, slope and aspect
Surface water quality	• Metal and non-metal concentrations in surface water
Surface water quantity	• Surface water levels and flow rates
Groundwater quantity	• Groundwater levels and flow rates
Groundwater quality	• Metal and non-metal concentrations in groundwater

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the management of key landscapes and ecosystems, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.2.4.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the landscape and ecosystem VCs, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Proposed spatial boundaries to be used in the Application to evaluate terrestrial resources are illustrated in **Figure 8** and **Figure 9**. Terrestrial resources will be evaluated at both the Local and Regional Study Area scales.



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 8
Terrestrial Regional Study Area

- Terrestrial Regional Study Area
- Existing Operating Mines
- Highways/Major Roads
- Watercourses
- Project Footprint
- BC/Alberta/USA Border
- Regional District/Municipal Boundaries
- Lakes/River

SCALE 1:575,000

0 7.5 15 30 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 8 Terrestrial Regional Study Area.mxd

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 9
Terrestrial Local Study Area

- Terrestrial Local Study Area
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Parks and Protected Areas
- BC/Alberta Border

SCALE 1:260,000

0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 9 Terrestrial Local Study Area.mxd

The terrestrial RSA covers approximately 3,370 km^2 and is based on the boundary of the Province of BC Fish and Wildlife Management Unit (MU) for south eastern BC, specifically the MU for the Kootenay Region, MU 4-23 (**Figure 8**). This boundary was chosen for the following reasons:

- It allows for an evaluation of potential cumulative effects to wildlife, landscapes and ecosystems (including vegetation), and the habitat that supports biodiversity within the Elk Valley;
- Similarity to study areas used for other EAs in the area;
- Includes operating and proposed mines within the Elk Valley (e.g., Teck's Fording River Operations, and Coal Mountain Operations) and features known to be important for movement of wildlife such as corridors and passes on the continental divide (e.g., Grave Creek Canyon); and
- Covers the ranges of several wildlife species of interest (e.g., grizzly bear, bighorn sheep).

The RSA for terrestrial VCs may change as a result of species-specific studies. For example, specific RSAs may be chosen to reflect migratory patterns and corridors for some wildlife species (e.g., bighorn sheep), or RSAs may reflect the stationary nature of some land-anchored species or populations (e.g., whitebark pine). Any changes, and the rationale for those changes, will be detailed in the Application.

The terrestrial LSA covers approximately 235 km^2 (**Figure 9**) and is based on the following reasons:

- The area surrounding the Project footprint that may experience potential direct and indirect impacts. The LSA includes terrestrial habitat that may experience changes at an ecosystem level as well as changes to connectivity between ecosystems and landscapes.
- Landscape features and known migration routes/movement corridors (e.g., Grave Creek Canyon).

Direct impacts to landscapes and ecosystems will be evaluated within the proposed Project footprint.

4.2.4.4 Existing Conditions

This Section of the Application will summarize existing conditions for landscapes and ecosystems in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of landscapes and ecosystems VCs; provide a summary of additional data analyses required; and describe existing conditions of the VC based on available data.

The Application will describe the following information on terrestrial habitat to characterize existing conditions of the VCs as it relates to the Project:

- Publically available information related to soils, terrain, and terrestrial habitats at local and regional scales;
- Historical/background information from relevant EAs completed in the area;
- Results of the site specific terrestrial ecosystem mapping (TEM) used to evaluate and classify ecosystems within the Project area, including:

  - Identification of sensitive ecosystems;
  - Modelling of potential rare plant habitats;
  - Modelling of wildlife habitat; and
  - Mapping of pre-disturbance ecosystems to guide reclamation practices.
- Identification and classification of wetland associations;
- Connections between riparian and wetland ecosystem habitat features;
- Summary of information on invasive plants; and
- Provincial Biogeoclimatic Ecosystems Classification mapping.

The final approach and methods the TEM was developed in consultation with the provincial regulators.

Standards and guidance documents used in the collection of baseline terrestrial data will be described in the Application and may:

- Resources Inventory Committee (1998), *Standard for Terrestrial Ecosystem Mapping in British Columbia;*
- Braumandl *et al.* (1992), *Biogeoclimatic Subzones and Variants of the Nelson Forest Region*;
- MacKenzie (2012), *Biogeoclimatic Ecosystem Classification of Non-Forested Ecosystems in British Columbia;*
- MacKenzie and Moran (2004) *Wetlands of British Columbia: A Guide to Identification*;
- MacKillop (2014) *Kootenay-Boundary BEC Revisions; and*
- Meidinger and J. Pojar (1991), *Ecosystems of British Columbia.*

The Application will cross-reference appropriate material related to the terrestrial baseline program to be included in an annex or appendix to the Application.

4.2.4.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to landscapes and ecosystems. Potential adverse effects on intermediate components and associated measurement indicators will also be discussed in the Application as these form part of the potential effects pathways of receptor landscape and ecosystems VCs. The Application will identify the spatial overlap between red- and blue-listed wetland communities and the spatial scope of any federal authorization or permit applicable to the Project.

Table 23 provides a summary of anticipated landscapes and ecosystems VC interactions with specific Project activities.

Table 23: Summary of Potential Landscape and Ecosystems VC Interactions with Project Components or Activities

Activity	Landscapes and Ecosystems
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	
Disposal of materials	
Transport of materials and equipment	
Site remediation	
Reclamation of disturbed areas	X

4.2.4.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application must be identified, as appropriate.

4.2.4.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.4.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will:

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activitie**s;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.4.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.5 Vegetation

4.2.5.1 Introduction

The Application will identify receptor vegetation VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages with other VCs (e.g., wildlife).

A number of intermediate components are primary pathways to potential Project effects on receptor vegetation VCs, including:

- Air quality;
- Soil quality and quantity;
- Terrain;
- Groundwater quality and quantity;
- Surface water quality and quantity; and
- Sediment quality and quantity.

4.2.5.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential effects on vegetation VCs due to project activities. The assessment will focus on the following VCs:

- Listed and sensitive plant communities and species;
- Limber pine;
- Whitebark pine; and
- Culturally significant plants and ecosystems.

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to vegetation management, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

The assessment of vegetation VCs will be based on the measurement indicators summarized below in **Table 24**. Measurement indicators that will be used to evaluate changes in intermediate components are detailed in **Table 25**.

Table 24: Summary of Measurement Indicators for Vegetation VCs

Valued Component	Measurement Indicator
Listed and sensitive plant communities and species	• Community abundance and distribution relative to baseline (e.g., amount of community present, distribution of, structure, connectivity of the community, patch size) • Community changes measured through species richness, sensitive/rare species, and presence of invasive species • Habitat availability and distribution relative to baseline (e.g., changes to the available habitat and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Limber pine	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)

Valued Component	Measurement Indicator
	• In the event any limber pine individuals are found during site development activities, health (e.g., presence of blister rust) will be assessed to determine viability of seed and cone collection
Whitebark pine	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations) • Whitebark pine health (e.g., presence of blister rust)
Culturally significant plants and ecosystems	• Community or species abundance and distribution relative to baseline (e.g., amount of community present, distribution of and connectivity of the community) • Community changes measured through species richness, sensitive/rare species, and presence of invasive species • Ecosystem abundance and distribution relative to baseline conditions (e.g., amount of ecosystem present, connectivity of ecosystem) • Compositional changes of the ecosystem measured through changes in the quality of the ecosystem as measured through indicators for air quality, groundwater quality and quantity, surface water quality and quantity (e.g., specific measurements including dust accumulation, species richness, sensitive/rare species, and presence of invasive species)

Table 25: Summary of Measurement Indicators for Intermediate Components Related to Vegetation VCs

Intermediate Components	Measurement Indicators
Air quality	• Common air contaminants, including fine particulates (PM10 and PM2.5), total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall
Soil quality	• Metal and non-metal concentrations in soil • Soil type and general soil properties
Soil quantity	• Depth and distribution of soil types
Terrain	• Terrain type, slope and aspect
Surface water quality	• Metal and non-metal concentrations in surface water
Surface water quantity	• Surface water levels and flow rates
Groundwater quantity	• Groundwater levels and flow rates
Groundwater quality	• Metal and non-metal concentrations in groundwater

4.2.5.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the vegetation VCs, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Proposed spatial boundaries to be used in the Application to evaluate vegetation VCs are

the same as those described for landscape and ecosystem VCs in **Section 4.5.6**, **Figures 8** and **9**. All terrestrial resources VCs will be evaluated at both the Local and Regional Study Area scales.

Direct impacts to the vegetation VCs will be evaluated within the proposed Project footprint.

4.2.5.4 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of vegetation VCs; provide a summary of additional data analyses required; and describe existing conditions of the VC based on available data.

The Application will describe the following information on vegetation to characterize existing conditions of the VCs as it relates to the Project:

- Publically available information related to the receptor vegetation VCs;
- Historical/background information from relevant EAs completed in the area;
- Results of the site-specific baseline vegetation surveys conducted as part of the TEM and rare plant surveys;
- Summary of information of listed plant or plant community occurrences based on federally and provincially available data (e.g., BC Conservation Data Centre);
- Summary of information on invasive plants; and
- Provincial Biogeoclimatic Ecosystems Classification mapping.

Standards and guidance documents used in the collection of baseline terrestrial data will be described in the Application and may include:

- Resources Inventory Committee (1998), *Standard for Terrestrial Ecosystem Mapping in British Columbia;*
- Braumandl et al. (1992), *Biogeoclimatic Subzones and Variants of the Nelson Forest Region;*
- MacKenzie (2012), *Biogeoclimatic Ecosystem Classification of Non-Forested Ecosystems in British Columbia;*
- MacKenzie and Moran (2004) *Wetlands of British Columbia: A Guide to Identification;*
- MacKillop (2014) *Kootenay-Boundary BEC Revisions;* and
- Meidinger and J. Pojar (1991), *Ecosystems of British Columbia.*

The Application will cross-reference appropriate material related to the terrestrial baseline programs to be included in an annex or appendix to the Application.

4.2.5.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate

potential adverse effects to vegetation. Potential adverse effects on intermediate components and associated measurement indicators will also be discussed in the Application as these form part of the potential effects pathways of receptor vegetation VCs.

Table 26 provides a summary of anticipated vegetation VC interactions with specific Project activities.

Table 26: Summary of Potential Vegetation VC Interactions with Project Components or Activities

Activity	Vegetation
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.2.5.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application must be identified, as appropriate.

4.2.5.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.5.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.5.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.6 Wildlife

4.2.6.1 Introduction

The Application will identify receptor wildlife VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed

in the final AIR. The Application will identify and describe linkages between wildlife VCs and other receptor VCs (e.g., landscapes and ecosystems and vegetation).

A number of intermediate components are primary pathways to potential Project effects on receptor wildlife VCs, including:

- Air quality;
- Soil quality and quantity;
- Terrain;
- Groundwater quantity and quality;
- Surface water quantity and quality; and
- Sediment quality and quantity.

4.2.6.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential effects on wildlife VCs as a result of Project activities. The assessment will focus on the following VCs:

- American badger;
- American Dipper;
- American marten;
- Wolverine;
- Canada lynx;
- Grizzly bear;
- Moose;
- Bighorn sheep;
- Elk;
- At-risk bat species (Little brown bat, Northern myotis, and Eastern red bat);
- Northern Goshawk;
- Migratory birds (Barn Swallow, Olive-sided Flycatcher and Woodpeckers);
- Western toad; and
- Gillette's checkerspot.

The assessment of effects to wildlife will use quantitative information obtained through habitat suitability models and relevant background studies. For some wildlife species, such as Western Toad, changes in intermediate components and measurement indicators such as surface water quality and quantity will also be assessed and used in the assessment of potential effects.

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to wildlife management, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

The assessment of wildlife VCs will be based on the measurement indicators summarized below in **Table 27**. Measurement indicators that will be used to evaluate changes in intermediate components are detailed in **Table 28**.

Table 27: Summary of Measurement Indicators for Wildlife VCs

Valued Component	Measurement Indicator
American badger	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat and distribution of habitat including connectivity and patch size for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
American Dipper	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat, distribution of habitat for this species, changes to quality of habitat such as water quality and benthic invertebrates) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
American marten	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat, connectivity, and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
At-risk bat species • Little brown bat • Northern myotis • Eastern red bat	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat and distribution of habitat for this species [including roost sites, hibernacula, and summering areas]) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Bighorn sheep	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat by season, connectivity, and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Canada lynx	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat, connectivity, and distribution of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Elk	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as species composition, richness and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Gillette's checkerspot	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species composition, and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)

Valued Component	Measurement Indicator
Grizzly bear	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species composition, cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Migratory Birds • Barn Swallow • Olive-sided Flycatcher • Woodpeckers	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species richness, composition and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Moose	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species richness, composition and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Northern Goshawk	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species richness, composition and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)
Western toad	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species richness, composition and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations) • Changes in intermediate components and measurement indicators such as surface water quality and quantity
Wolverine	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species richness, composition and cover, and distribution and connectivity of habitat for this species) • Known occurrence and abundance (e.g., changes to the number of documented occurrences relative to baseline, changes to individual populations)

Table 28: Summary of Measurement Indicators for Intermediate Components Related to Wildlife VCs

Intermediate Components	Measurement Indicators
Air quality	• Common air contaminants, including fine particulates (PM10 and PM2.5), total suspended particulates, sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and volatile organic compounds (VOCs) • Metals and PAHs in dust fall

Intermediate Components	Measurement Indicators
Soil quality	• Metal and non-metal concentrations in soil • Soil type and general soil properties
Soil quantity	• Depth and distribution of soil types
Terrain	• Terrain type, slope and aspect
Surface water quality	• Metal and non-metal concentrations in surface water
Surface water quantity	• Surface water levels and flow rates
Groundwater quantity	• Groundwater levels and flow rates
Groundwater quality	• Metal and non-metal concentrations in groundwater

4.2.6.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the VC, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**. Proposed spatial boundaries to be used in the Application to evaluate wildlife VCs are the same as those described for landscapes and ecosystems VCs in **Section 4.2.4.3**, **Figures 8** and **9**. All terrestrial resources VCs will be evaluated at both the Local and Regional Study Area scales.

4.2.6.4 Existing Conditions

The Application will summarize existing conditions in a manner consistent with **Section 3.3 Existing Conditions**. It will identify any important data gaps and how these gaps have been addressed for the assessment of wildlife VCs; provide a summary of additional data analyses required; and describe existing conditions of the VC based on available data.

The Application will describe the following information on wildlife habitat to characterize existing conditions of the VCs as it relates to the Project:

- Publically available information related to wildlife habitat at local and regional scales;
- Historical/background information from relevant EAs completed in the area as well as regional studies on wildlife habitat and movements within across the Elk Valley;
- Results of the site specific terrestrial ecosystem mapping (TEM) used to evaluate and classify ecosystems within the Project area, including:
  - Identification of sensitive ecosystems;
  - Modelling of wildlife habitat;
- Results of the baselines wildlife program, including results of site-specific baseline field studies conducted for:
  - Breeding birds and raptors
  - Amphibians (see **Section 4.2.2** for additional information)
  - American Badger
  - Gillette's Checkerspot

  - Furbearers
  - Ungulates
  - Bats;
- Results of wildlife suitability modelling; and
- Provincial Biogeoclimatic Ecosystems Classification mapping.

Standards and guidance documents used in the collection of baseline terrestrial data will be described in the Application and may include:

- Resources Inventory Committee (1998) *Standard for Terrestrial Ecosystem Mapping in British Columbia;*
- Resources Inventory Committee (1998) *Inventory Methods for Forest and Grassland Songbirds;*
- Resources Inventory Committee (1998) *Inventory Methods for Bats;*
- Resources Inventory Committee (1998) *Inventory Methods for Riverine Birds (Dippers and Harlequins)*;
- Resources Inventory Committee (1999) *Inventory Methods for Forest and Grassland Songbirds;*
- Resources Inventory Committee (1999) *Inventory Methods for Medium-Sized Territorial Carnivores - Coyote, Red Fox, Lynx, Bobcat, Fisher, and Badger;*
- Resource Inventory Committee (1999) *Wildlife Habitat Rating Standards*;
- BC Ministry of Forests and Range and BC Ministry of Environment (2010) *Field Manual for Describing Terrestrial Ecosystems, 2nd Edition;*
- BC Ministry of Forests and Range and BC Ministry of Environment (2010) *Wildlife Habitat Assessment and Suitability Modelling Field Manual for Describing Terrestrial Ecosystems*;
- Resources Inventory Committee (1998) *Inventory Methods for Swallows and Swifts;*
- Resources Inventory Committee (1999) *Inventory Methods for Woodpeckers;*
- Resources Inventory Committee (2001) *Inventory Methods for Raptors;*
- Resources Inventory Committee (1998) *Inventory Methods for Snakes;*
- Resources Inventory Committee (1998) *Inventory Methods for Nighthawks and Poorwills;*
- Resources inventory Committee (1999) *Inventory Methods for Waterfowl and Allied Species;*
- Resources Inventory Committee (1997) *Shorebirds;*
- Resources Inventory Committee (1998) *Inventory Methods for Marsh Birds: Bitterns and Rails;*
- Resources Inventory Committee (1998) *Inventory Methods for Pond Dwelling Amphibians;*
- Resources Inventory Committee (2000) *Inventory Methods for Tailed Frogs and Pacific Giant Salamanders;*
- Resources Inventory Committee (1998) *Inventory Methods for Terrestrial Arthropods;* and
- Hanson et al. (2009) *A Framework for the Scientific Assessment of Potential Project Impacts on Birds.*

The Application will cross-reference appropriate material related to the terrestrial baseline program to be included in an annex or appendix to the Application.

4.2.6.5 Potential Effects

The Application will identify potential adverse effects to wildlife VCs in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to wildlife. Potential adverse effects on intermediate components and associated measurement indicators will also be discussed in the Application as these form part of the potential effects pathways of receptor wildlife VCs.

Table 29 provides a summary of anticipated wildlife VC interactions with specific Project activities.

Table 29: Summary of Potential Wildlife VC Interactions with Project Components or Activities

Activity	Wildlife
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X

Activity	Wildlife
Site remediation	X
Reclamation of disturbed areas	X

4.2.6.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will also be identified, as appropriate.

4.2.6.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**.

Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.6.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**.

4.2.6.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.2.7 Summary of Potential Environmental Effects

The Application will provide a summary table of predicted residual environmental effects of the proposed Project and their significance. A summary of cumulative effects of the proposed Project on the environmental conditions will also be provided.

4.3 Economic Effects Assessment

The Application will include an assessment of the economic conditions VC identified in the AIR. The assessment will be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section.

The Application will include a description of the existing economic environment to provide a general understanding of the region surrounding the proposed Project. Existing conditions and potential effects on economic conditions will be assessed at both the local Aboriginal (KNC) and non-Aboriginal community level.

4.3.1 Economic Conditions

4.3.1.1 Introduction

This Section of the Application will assess the potential adverse effects of the proposed Project on economic conditions. The Application will provide a description and rationale for the VC selection, as well as linkages with other VCs (e.g., Social VCs - Housing and Community Services and Infrastructure).

4.3.1.2 Scope of the Assessment

The Application will describe the scope of the assessment of potential effects on economic conditions including relevant regulatory requirements, policies, and guidance documents, and a discussion of how consultation with regulators, stakeholders, community members, and local Aboriginal Groups influenced the assessment. It will identify any important data gaps and how these gaps have been addressed for the economic conditions assessment.

The assessment of potential effects to economic conditions will be based on a range of measurement indicators, as detailed in **Table 30**.

Table 30: Summary of Measurement Indicators for Economic Conditions

Valued Component	Measurement Indicators
Economic Conditions	• Opportunities for training and skills development • Employment opportunities generated by the Project • Income generation • Revenue generation through goods and services purchased • Generation of business for local services and businesses • Industry revenue generation or loss (e.g., removal of potentially forested area)

Valued Component	Measurement Indicators
	• Local and provincial government revenue (e.g., GDP)

The Application will describe and discuss each of the specific measurement indicators used for the evaluation of potential effects on economic conditions.

4.3.1.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on economic conditions, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The economic conditions VC will be evaluated at local and regional scales to allow for an understanding of how the Project may potentially cause direct and/or indirect impacts on economic growth, income, employment, local residents, employees/workers, visitors, the Ktunaxa Nation, and recreation and tourism. The proposed assessment boundaries for the economic RSA and LSA are shown in **Figure 10**.

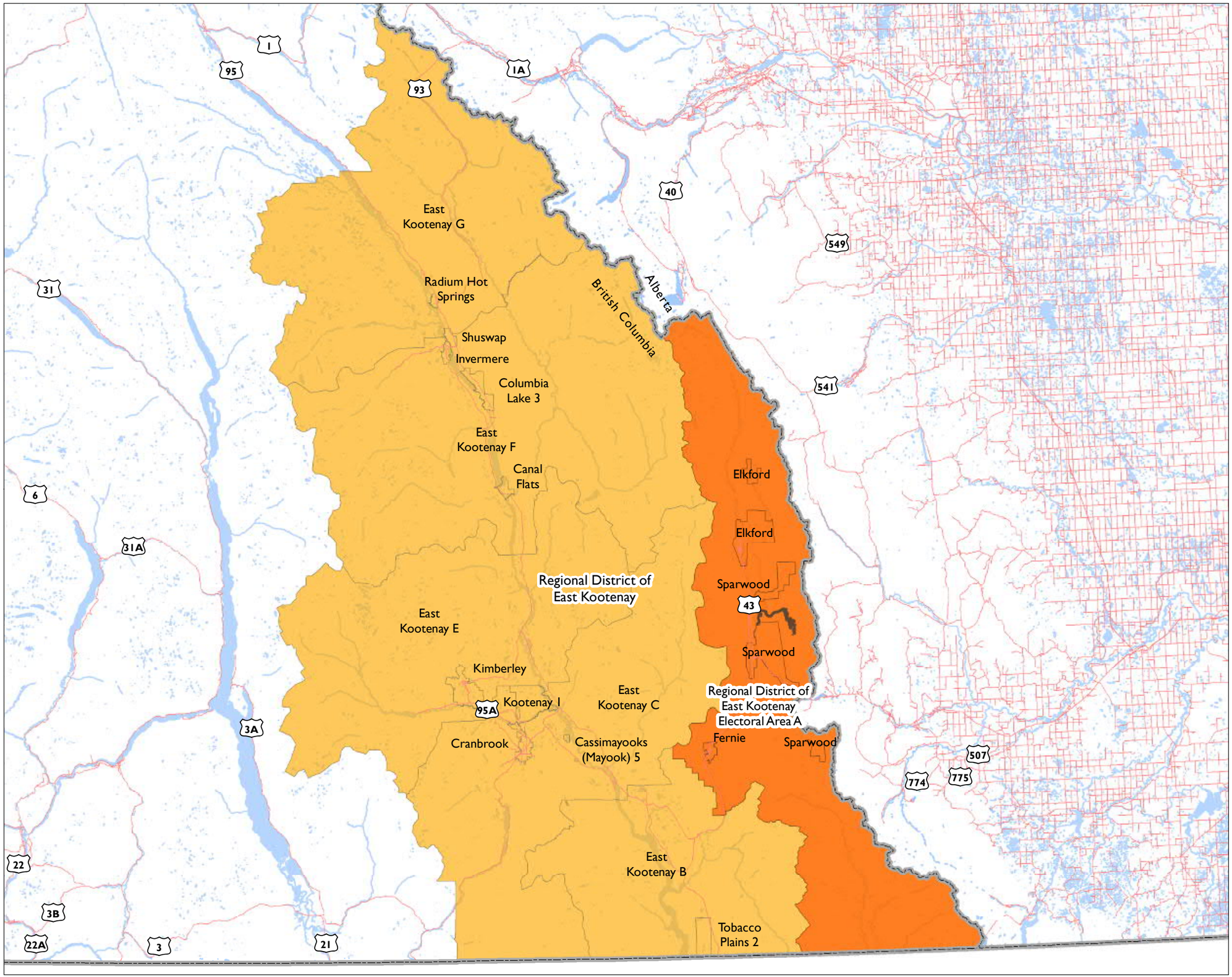
To assess potential regional effects of the Project on economic conditions, the boundary of the proposed RSA will be based on the extent of the Regional District of East Kootenay (RDEK). This boundary includes communities that may benefit economically from the Project, as well as areas that have the potential to be impacted by labour/employment needs. In addition, the Province of BC will also serve as an RSA to assess the impact on the provincial government and associated economic benefits and revenue generation.

The economic LSA is based on the extent of the Regional District of East Kootenay Electoral Area A. This area includes the communities of Sparwood, Fernie, and Elkford. The Electoral Area was chosen as a boundary for the LSA as it encompasses communities that have the potential to be directly and indirectly impacted by proposed Project activities, and will likely contribute the majority of the local labour force and good and services required for Project construction and operation (e.g., use of local business and industries).

4.3.1.4 Existing Conditions

The Application will summarize existing economic conditions in a manner consistent with **Section 3.3 Existing Conditions**. An understanding of the existing economic conditions within the Elk Valley will allow for the assessment of potential Project effects on economic conditions, including increased local demand for labour, opportunities for local businesses, and opportunities for capacity building with the Ktunaxa Nation.

The Application will describe the specific methods and standards used to collect baseline economic data required to support the assessment. Existing economic conditions will be characterized through the following, which will be summarized in the Application:



File Location: G:\GIS\126231 Crown Mountain\VC Figure 12 Economic and Socio-Economic Study Areas.mxd

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 10
Economic and Socio-economic Study Areas

- Economic and Socio-economic Local Study Area
- Economic and Socio-economic Regional Study Area
- Highways/Major Roads
- Project Footprint
- Lakes/Rivers
- BC/Alberta Border

SCALE 1:1,010,000
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Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

- Review of existing information from a range of sources expected to include local municipalities (e.g., regional development plans), provincial agencies (e.g., BC Stats), and federal agencies (e.g., Statistics Canada);
- Information and statistics on population distribution, demographics, education, labour force and employment, and income levels; and
- Interviews and discussions held with government and community representatives.

A summary of the regulatory context for managing economic conditions will be provided in the Application.

4.3.1.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment all Project activities requiring the presence of workers and/or expenditures have the potential to effect economic conditions. **Table 31** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 31: Summary of Potential Economic VC Interactions with Project Components or Activities

Activity	Economic Conditions
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line,	X

Activity	Economic Conditions
water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	
Transport of materials and equipment	
Site remediation	X
Reclamation of disturbed areas	X

4.3.1.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.3.1.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. Where an adverse residual effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.3.1.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.3.1.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.3.2 Summary of Potential Economic Effects

The Application will provide a summary table of predicted residual economic effects of the proposed Project and their significance. A summary of cumulative effects of the proposed Project on the economic conditions will also be provided.

4.4 Social Effects Assessment

The Application will include an assessment of social VCs identified in the AIR. The assessment will be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages between receptor social VCs and other receptor VCs (e.g., economics).

The Application will include a description of the existing social environment to provide a general understanding of the region surrounding the proposed Project. Existing conditions and potential effects on the social environmental will be assessed at both the Aboriginal (KNC) and non-Aboriginal community level. Additional details will be provided in the existing conditions sections of each of the social conditions VCs chapters.

Socio-economics and community health VCs include:

- Housing, Community Services and Infrastructure;
- Community Health and Well-Being;
- Land-use and Access;
- Recreation and Tourism; and
- Visual Quality.

4.4.1 Housing and Community Services and Infrastructure

4.4.1.1 Introduction

The Application will define and describe the scope of the assessment of potential effects on housing, community services, and infrastructure. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the VC, as well as describe how information obtained through engagement with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.1.2 Scope of the Assessment

The assessment of potential effects to the housing and community services and infrastructure VC will be based on a range of measurement indicators, as detailed in **Table 32**.

Table 32: Summary of Measurement Indicators for Housing and Community Services and Infrastructure

Valued Component	Measurement Indicators
Housing and community services and infrastructure	• Housing supply and demand • Communities services (e.g., education and emergency services) • Infrastructure (e.g., water, wastewater, and transportation infrastructure) • Population of communities based on demographic changes as a result of the Project

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to housing and community services and infrastructure, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.1.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on housing and community services and infrastructure, including maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The housing and community services and infrastructure VC will be evaluated at regional and local scales to allow for an understanding of how the Project may potentially cause direct and/or indirect impacts on the social environment, including housing supply and demand, community services and infrastructure, and population of communities. The RSA and LSA for this VC will be the same as the assessment boundaries identified for the economic effects assessments, shown in **Figure 10**.

The boundary of the proposed RSA is based on the extent of the Regional District of East Kootenay (RDEK), which includes communities that may benefit economically due to Project, as well as areas that have the potential to be impacted by housing and community needs. In addition, the Province of BC will also serve as an RSA for this VC to assess the impact on the provincial government and associated economic benefits and revenue generation.

The economic and social LSA is based on the extent of the Regional District of East Kootenay Electoral Area A, which includes communities that may be potentially directly and/or indirectly impacted by proposed Project activities, and will likely contribute to the majority of the local labour force and goods and services required for Project construction and operation (e.g., use of local business and industries).

4.4.1.4 Existing Conditions

The Application will summarize existing social conditions in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards used to collect baseline data required to support the assessment of existing social conditions and potential effects related to the Project.

Information used to characterize existing housing and community services and infrastructure conditions will be based on local and regional data from a variety of sources, including but not limited to:

- Regional demographics;
- Local demographics (e.g., growth rates, age profiles);
- Provincial data on road use and traffic volumes;
- Data on community accommodations (e.g., housing supply and demand, vacancy rates);
- Health care services (e.g., service programs, information from health authorities);
- Community infrastructure (e.g., water and waste water demand and capacity, airport and transportation information, traffic volumes); and
- Historical/background information from publically available sources and relevant EAs conducted in the area.

4.4.1.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment all project activities relating to housing or use of community services and infrastructure have the potential to affect social conditions. **Table 33** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 33: Summary of Potential Housing and Community Services and Infrastructure VC Interactions with Project Components or Activities

Activity	Housing and Community Services and Infrastructure
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X

Activity	Housing and Community Services and Infrastructure
Materials and equipment storage	
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.4.1.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.4.1.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.1.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of

past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;

- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.1.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.4.2 Community Health and Well-Being

4.4.2.1 Introduction

The Application will define and describe the scope of the assessment of the potential Project effects on community health and well-being. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the VC, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.2.2 Scope of the Assessment

The assessment of potential effects to the community health and well-being VC will be based on a range of measurement indicators, as detailed in **Table 34**.

Table 34: Summary of Measurement Indicators for the Community Health and Well-Being VC

Valued Component	Measurement Indicators
Community health and well-being	• 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., health and safety related to physical hazards or exposure to emissions at Project site or in vicinity, contaminated water sources)

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to community health and well-being, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.2.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on community health and well-being, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The community health and well-being VC will be evaluated at the same special scales as the economic conditions and housing and community services and infrastructure VCs (see **Figure 10**).

4.4.2.4 Existing Conditions

The Application will summarize existing social conditions in a manner consistent **with Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards used to collect baseline data required to support the assessment of existing social conditions and potential effects related to the Project.

Information used to characterize existing community health and well-being will be based on local and regional data from a variety of sources, including but not limited to:

- Information on employees well-being (e.g., working conditions, health and safety incidences, shift work, exposure to physical hazards);
- Company and corporate program and policies for employees of the Project to maintain and/or improve health and safety;
- Emergency services demand and capacity (e.g., data from local police and RCMP and emergency services providers);
- Health care services (e.g., service programs, information from health authorities);
- Historical/background information from publically available sources and relevant EAs conducted in the area; and
- Education services demand and capacity (e.g., enrolment in educational programs and access).

4.4.2.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment, all Project activities relating to community health and well-being have the potential to affect social conditions. **Table 35** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 35: Summary of Potential Community Health and Well-Being VC Interactions with Project Components or Activities

Activity	Community Health and Well-Being
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X

Activity	Community Health and Well-Being
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	
Fuel and explosives storage and handling	X
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.4.2.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.4.2.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood,

Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.2.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with Se**ction 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.2.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.4.3 Land-Use and Access

4.4.3.1 Introduction

The Application will define and describe the scope of the assessment of potential Project effects on land-use and access. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the VC, as well as describe how information obtained through engagement with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.3.2 Scope of the Assessment

The assessment of potential effects to the land-use and access VC will be based on a range of measurement indicators, as detailed in **Table 36**.

Table 36: Summary of Measurement Indicators for the Land-use and Access VC

Valued Component	Measurement Indicators
Land-use and access	• Implementation and consistency of land use designation • Implementation and use of land use policies • Access to resource harvesting areas for recreation purposes • Quality of recreational and tourism experiences

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to land-use and access, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.3.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on land-use and access, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

Potential changes in land-use and access as a result of the proposed Project will be evaluated within a land use and access LSA (**Figure 11**). The proposed land use and access LSA encompasses the following:

- Access management areas (i.e., Alexander Creek Access Management Area and Grave Prairie Access Management Area);
- Private land holdings (e.g., Teck Conservations Lands - Grave Prairie and Alexander Creek);
- Existing areas of Agricultural Land Reserve (ALR) land;
- Trapline areas and existing trapping cabins; and
- Area of the Sparwood Official Community Plan.

4.4.3.4 Existing Conditions

The Application will summarize existing land-use and access conditions in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards used to collect baseline data required to support the assessment of existing land-use and access conditions and potential effects related to the Project.

Information used to characterize land-use and access will be based on local and regional data from a variety of sources, including but not limited to:

- Existing constraints on the land base (e.g., Private land holdings, surface and sub-surface tenures and designations);
- Existing land use plans and policies;

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Figure 11
Land Use and Access Local Study Area

- Land Use and Access Local Study Area
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Parks and Protected Areas
- BC/Alberta Border

SCALE 1:260,000
0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

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DATE: 6/1/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 13 Land Use and Tenure Local Study Area.mxd

- Geospatial data and overlap of the Project to recreational or protected areas (e.g., parks) and land tenures;
- Intensity of use information collected from relevant background studies;
- Historical/background information on land-use and access in the area and relevant EAs; and
- Noise and air quality data collected as part of the Project (e.g., changes relative to baseline).

4.4.3.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment all Project activities relating to land use and access have the potential to affect social conditions. **Table 37** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 37: Summary of Potential Land-Use and Access VC Interactions with Project Components or Activities

Activity	Land-Use and Access
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X

Activity	Land-Use and Access
Disposal of materials	X
Transport of materials and equipment	
Site remediation	X
Reclamation of disturbed areas	X

4.4.3.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.4.3.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.3.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.3.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.4.4 Recreation and Tourism

4.4.4.1 Introduction

The Application will define and describe the scope of the assessment of potential Project effects on recreation and tourism. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the VC, as well as describe how information obtained through engagement with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.4.2 Scope of the Assessment

The assessment of potential effects to the recreation and tourism VC will be based on a range of measurement indicators, as detailed in **Table 38**.

Table 38: Summary of Measurement Indicators for the Recreation and Tourism VC

Valued Component	Measurement Indicators
Recreation and tourism	• Recreational use (e.g., hunting, ATV trails, fishing, hiking, etc.) • Quality of recreational and tourism experiences • Noise and air quality

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to land-use and access, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.4.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on recreation and tourism, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

Potential changes in recreation and tourism as a result of the proposed Project will be evaluated within the land use and access LSA discussed in **Section 4.4.3.3** (see **Figure 11**).

4.4.4.4 Existing Conditions

The Application will summarize existing land-use and access conditions in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and

standards used to collect baseline data required to support the assessment of existing recreation and tourism conditions and potential effects related to the Project.

Information used to characterize land-use and access will be based on local and regional data from a variety of sources, including but not limited to:

- Recreation and tourism activities and services;
- Geospatial data and overlap of the Project to recreational or protected areas (e.g., parks) and land tenures;
- Intensity of use information collected from relevant background studies;
- Historical/background information on land-use and access in the area and other relevant EAs;
- Noise and air quality data collected as part of the Project (e.g., changes relative to baseline);
- Data on the quality of recreational and tourism experiences from local outfitters, groups, and companies.

4.4.4.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment, all Project activities relating to recreation and tourism have the potential to affect social conditions. **Table 39** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 39: Summary of Potential Recreation and Tourism VC Interactions with Project Components or Activities

Activity	Recreation and Tourism
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	

Activity	Recreation and Tourism
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	
Site remediation	X
Reclamation of disturbed areas	X

4.4.4.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.4.4.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.4.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;

- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and 3.**9 Confidence and Risk**, respectively.

4.4.4.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.4.5 Visual Aesthetics

4.4.5.1 Introduction

The Application will define and describe the scope of the assessment of potential Project effects on visual aesthetics. The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the VC, as well as describe how information obtained through engagement with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

4.4.5.2 Scope of the Assessment

The assessment of potential effects to the visual aesthetics VC will be based on a range of measurement indicators, as detailed in **Table 40**.

Table 40: Summary of Measurement Indicators for Visual Aesthetics

Valued Component	Measurement Indicators
Visual aesthetics	• View corridors • Visual quality, including changes to air quality (e.g., dust accumulation through mining and vehicle traffic)

4.4.5.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on visual aesthetics, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The majority of the Project is located in a remote area that is not easily accessed by the public or in view of local municipalities. The area surrounding the Project is used by recreationists (e.g., snowmobiling, hiking, camping) as well as hunters. **Figure 12** shows the study area boundary for assessing changes in visual aesthetics. The visual aesthetics LSA is currently based on a 20 km buffer around the centre of the Project (i.e., at Crown Mountain) and this area may be revised as the Project progresses and receptor sites are chosen within the local area from which to assess visual impacts. The LSA includes areas that

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Figure 12
Visual Aesthetics Local Study Area

- Visual Aesthetics Local Study Area
- Watercourses
- Highways
- Arterial Roads
- Local/Resource Roads
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Parks and Protected Areas
- BC/Alberta Border

SCALE 1:260,000
0 2.5 5 10 km

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Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

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File Location: G:\GIS\126231 Crown Mountain\VC Figure 14 Visual Aesthetics Local Study Area.mxd

have the potential to serve as receptor sites and those areas in which changes to the visual landscape may be observed.

4.4.5.4 Existing Conditions

The Application will summarize existing social conditions in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards used to collect baseline data required to support the assessment of existing social conditions and potential effects related to the Project.

Information used to characterize visual quality will be based on a variety of sources, including but not limited to:

- Visual extent of the Project footprint as assessed from selected receptor sites;
- Air quality data collected for the Project and regionally;
- Regional and local landscapes and existing character of the area;
- Field studies and photographic inventories used to evaluate existing conditions; and
- Summary of data from selected receptor sites.

Standards and guidelines that will be used and referenced in the collection of baseline collection of data on visual aesthetics include the BC Ministry of Forests (2001) *Visual Impact Assessment Guidebook* and BC Parks (2005) *Draft BMP for Activities Adjacent to Parks and Protected Areas*.

4.4.5.5 Potential Effects

The Application will identify potential adverse effects to the VC in a manner consistent with **Section 3.4 Potential Effects**. For the purposes of assessment all Project activities relating to visual aesthetics have the potential to affect social conditions. **Table 41** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 41: Summary of Visual Aesthetics VC Interactions with Project Components or Activities

Activity	Visual Aesthetics
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X

Activity	Visual Aesthetics
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.4.5.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced and linkages to other Sections in the Application will be identified as appropriate.

4.4.5.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.5.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed

Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;

- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.4.5.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.4.6 Summary of Potential Social Effects

The Application will provide a summary table of predicted residual social effects of the proposed Project and their significance. A summary of cumulative effects of the proposed Project on the social conditions will also be provided.

4.5 Heritage Effects Assessment

The Application will include an assessment of archaeological resources in the AIR. The assessment will be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages between the receptor archaeological resources VC and receptor VCs (e.g., vegetation, wildlife).

The Application will include a description of archaeological resources to provide a general understanding of the region surrounding the proposed Project (i.e., East Kootenay and Upper Elk River regions). The archaeological resources VC includes archaeological materials and sites that may occur in the footprint of the Project.

4.5.1 Archaeological Resources

4.5.1.1 Introduction

The Application will identify archaeological VCs selected for assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also

include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages with other VCs.

4.5.1.2 Scope of the Assessment

The Application will define and describe the scope of the assessment of the potential effects on archaeological resources due to Project activities. The assessment will identify the presence, number, type, significance and location of known archaeological resources in the area that have the potential to be impacted by the proposed Project. The focus of the archaeological resources assessment will be on those features, such as archaeological sites, that are protected under the *Heritage Conservation Act* (RSBC 1996, Chapter 187) and have the potential to be disturbed as a result of the proposed Project, as well as historical burial sites that have the potential to occur in the area.

The assessment will also include a description of the regulatory requirements, policies, BMP, and guidance documents relevant to the potential disturbance of archaeological resources, as well as describe how information obtained through consultation with the KNC was used in the identification of issues and the overall assessment process, including proposed mitigation measures.

4.5.1.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative, and technical study area boundaries, as applicable to the evaluation of potential effects on archaeological resources, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The study area for archaeological resources includes the Project footprint and the LSA developed for the Archaeological Impact Assessment (**Figure 13**). The archaeological resources LSA includes and is bounded by:

- Natural geographical boundaries around anticipated areas of ground disturbance (e.g., Project infrastructure, mining areas);
- Grave Creek drainage, Elk River, and the Alexander Creek Valley;
- Existing known archaeological polygons that overlap with the proposed Project footprint; and
- Communities within the Elk River Valley, including Elkford, Sparwood, and Fernie.

The archaeological resources LSA and Project footprint will be used to guide assessments of direct disturbance and potential impacts on archaeological resources as a result of Project development. The archaeological RSA is illustrated in **Figure 14**. It includes much of the Elk River Valley as well as the communities of Elkford, Sparwood, and Fernie. Available information for the RSA will be used to evaluate significance of potential impacts to archaeological resources.

4.5.1.4 Existing Conditions

The Application will summarize existing archaeological resources in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards

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Crown Mountain Coking Coal Project

Figure 13
Archaeological Resources Local Study Area

- Archaeological Resources Local Study Area
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- Municipal Boundaries
- BC/Alberta Border

SCALE 1:260,000

0 2.5 5 10 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

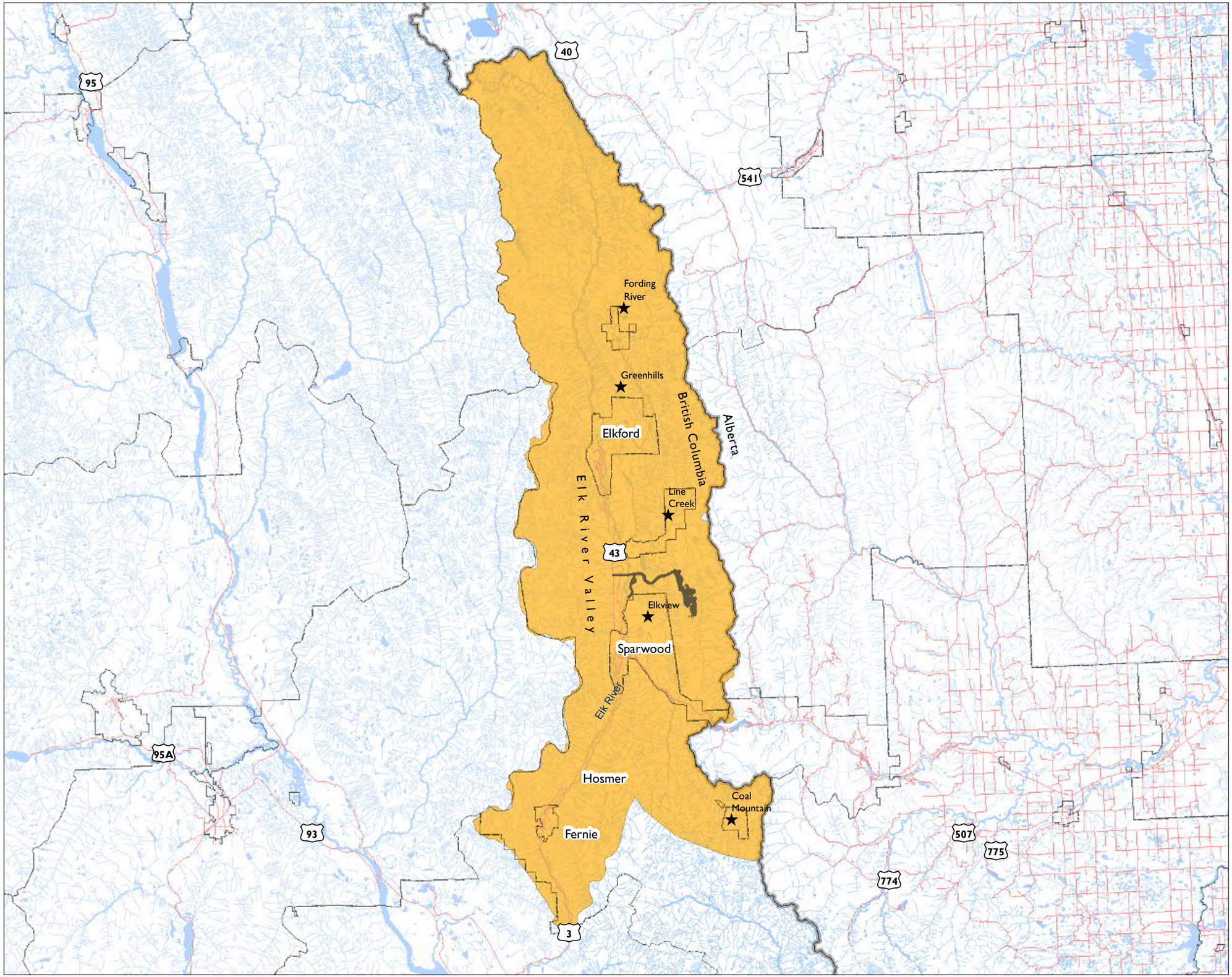
PROJECT: 12-6231
STATUS: FINAL
DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 10 Archaeological Resources Local Study Area1.mxd

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 14
Archaeological Resources Regional Study Area



- Archaeological Regional Study Area
- ★ Existing Operating Mines
- Highways/Major Roads
- Watercourses
- Project Footprint
- Lakes/Rivers
- BC/Alberta Border
- Regional District/Municipal Boundaries

SCALE 1:575,000

0 7.5 15 30 km

N W E S

Map Drawing Information: Province of British Columbia,NWP Coal Canada Ltd., Dillon Consulting Limited, ESRI Base Layers, GeoGratis, CanVec. Government of Alberta.

Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/3/2016

File Location: G:\GIS\126231 Crown Mountain\VC Figure 11 Heritage and Archaeological Regional Study Area.mxd

used to collect baseline data required to support the assessment of existing archaeological resources and potential effects related to the Project.

Sources of information on existing archaeological resources will include but not be limited to:

- Information obtained through the Archaeological Overview Assessment previously completed for the Project;
- Identification of, and information on, previously recorded and undocumented archaeological sites through surface surveys and subsurface inspection programs carried out as part of an Archaeological Impact Assessment;
- Registered archaeological and heritage sites;
- Relevant archaeological reports available through the Archaeological Report Library;
- Aerial photos and GIS data; and
- Traditional Use and Traditional Ecological Knowledge studies/information that is publically available or shared with permission of the KNC.

All baseline field studies conducted to assess existing conditions of archaeological resources will be conducted under an Archaeological Impact Assessment (AIA) permit. A Section 14 Inspection Permit (#2015-0098) under the *Heritage Conservation Act* (1996) has been obtained for the Project and expires December 20, 2018.

4.5.1.5 Potential Effects

The Application will identify potential adverse effects to archaeological resources in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects to archaeological resources. **Table 42** provides a summary of anticipated VC interactions with specific Project components or activities.

Table 42: Summary of Potential Interactions between Archaeological Resources and Project Components or Activities

Activity	Archaeological Resources
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X

Activity	Archaeological Resources
Construction of water supply	X
Materials and equipment storage	X
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	X
Disposal of materials	X
Transport of materials and equipment	X
Site remediation	X
Reclamation of disturbed areas	X

4.5.1.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.5.1.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.5.1.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed

Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;

- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.5.1.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.5.2 Summary of Potential Archaeological Effects

The Application will provide a summary table of predicted residual archaeological effects of the proposed Project and their significance. A summary of cumulative effects of the proposed Project on archaeological resources will also be provided.

4.6 Health Effects Assessment

The Application will include an assessment of human and wildlife health in the AIR. The assessment will be conducted in accordance with the methodology specified in **Section 3.0** of the AIR, using the organizational structure demonstrated in this Section. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages between the receptor human and wildlife health and receptor VCs selected for the Project.

4.6.1 Human and Wildlife Health

4.6.1.1 Introduction

The Application will identify the receptor VCs for the human and wildlife health assessment according to the methodology specified in **Section 3.1 Issues Scoping and Selection of Valued Components**. The Application will also include the rationale for any differences in the list of VCs presented in the Application from those listed in the final AIR. In addition, the Application will identify and describe linkages with other VCs.

The Application will provide an overview of the risk assessments conducted for the following health VCs :

- People, including local communities, local Aboriginal Groups, and temporary residents at recreation areas (e.g., trapping cabins) and
- Wildlife.

Risk assessments conducted for the Project are required at a provincial level to assess potential effects of the Project on human and wildlife health.

4.6.1.2 Scope of the Assessment

The health risk assessments will assess potential effects of the Project on people and wildlife. The assessment of health VCs will be based on a range of measurement indicators which are specific to each of the VCs, as detailed in **Table 43**.

Table 43: Summary of Measurement Indicators for the Human and Wildlife Health VCs

Valued Component	Measurement Indicators
People, including local communities, local Aboriginal Groups, and temporary residents at recreation areas (e.g., trapping cabins)	• Hazard Quotients with input from intermediate components and measurement indicators (e.g., air quality [particulate matter], noise and vibration levels, groundwater quality, surface water quality, sediment quality, soil quality, country food quality, preferred diet consumption data) • Incremental Lifetime Cancer Risk (ILCRs) • Soil quality • Noise and vibration • Metals and PAHs in dust fall
Wildlife	• Hazard Quotients with input from intermediate components and measurement indicators (e.g., air quality, groundwater quality, surface water quality, sediment quality) • Soil quality • Noise and vibration • Metals and PAHs in dust fall and dust fall accumulation

The health risk assessments will include a description of the regulatory requirements, policies, BMP, and guidance documents relevant the management and evaluation of health, as well as describe how information obtained through consultation with regulators, stakeholders, community members, and the KNC was used in the identification of issues and the overall assessment process.

Risk Assessments will follow appropriate methodologies and guidance documents such as Health Canada's Useful Information for Environmental Assessments (Health Canada, 2010).

4.6.1.3 Context and Boundaries

The Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable of the evaluation of potential effects on human health, which may include the use of maps, in a manner consistent with **Section 3.2 Assessment Boundaries**.

The health risk assessments rely on data collected as part of environmental effects assessment on those VCs that are consumed or used by people (including those in local communities, First Nations, and temporary residents at recreation areas) and wildlife or those aspects of the environment that people and wildlife may be exposed to (e.g., air [dust], water, soils). As such, the assessment boundaries for the risk assessments are based on the following studies areas:

- Air quality RSA and LSA (**Figure 4**);
- Acoustic LSA (**Figure 5**);
- Aquatic RSA (**Figure 6**);
- Aquatic LSA (**Figure 7**);
- Terrestrial RSA (**Figure 8**); and
- Terrestrial LSA (**Figure 9**).

As part of the wildlife and wildlife health risk assessment, specific species that may be assessed include, but are not limited to: Spotted Sandpiper, 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, common merganser, and river otter.

4.6.1.4 Existing Conditions

The Application will summarize existing human and wildlife health in a manner consistent with **Section 3.3 Existing Conditions**. In particular, the Application will describe the specific methods and standards used to collect baseline data required to support the risk assessments for human and wildlife health and potential effects related to the Project.

Sources of information on human and wildlife health will include:

- Results of environmental baseline assessments of VCs relevant to the risk assessments (e.g., air quality, fish, water quality, wildlife, vegetation);
- Results of Traditional Use, Traditional Knowledge, and Traditional Food studies, if provided and approved by the KNC;
- Information on the health of local communities, local Aboriginal Groups, and temporary residents (e.g., users of recreation areas); and
- Feedback received during engagement with the KNC and stakeholders.

Details of the risk assessments conducted for the Project will be provided in a technical data report appended to the Application.

4.6.1.5 Potential Effects

The Application will identify potential adverse effects to human and wildlife health in a manner consistent with **Section 3.4 Potential Effects**. The Application will also identify measures to avoid, manage or otherwise mitigate potential adverse effects. **Table 44** provides a summary of anticipated interactions between human and wildlife health and specific project components or activities.

Table 44: Summary of Potential Interactions between Human and Wildlife Health and Project Components or Activities

Activity	Human and Wildlife Health
Site Preparation and Construction	
Vegetation clearing and removal of overburden/soils	X
Construction of natural gas supply	X
Construction of transmission line/power supply	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X
Construction of haul roads and access roads	X
Construction of rail load-out facility and rail siding	X
Construction of water supply	X
Materials and equipment storage	
Operations	
Pit development (drilling and blasting of pit areas)	X
Resource extraction and processing	X
Waste rock management area (placement and development)	X
Onsite loading and hauling to rail load-out	X
Fuel and explosives storage and handling	
Sewage and wastewater treatment	
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X
Use of the rail line and load-out	X
Decommissioning, Closure, and Reclamation	
Removal of facilities and infrastructure	
Disposal of materials	
Transport of materials and equipment	X
Site remediation	
Reclamation of disturbed areas	

4.6.1.6 Mitigation Measures

The Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with **Section 3.5 Mitigation Measures**. Relevant management plans will be referenced. Linkages to other Sections in the Application will be identified as appropriate.

4.6.1.7 Residual Effects and their Significance

Where an adverse residual effect is identified, the Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in **Section 3.6 Characterization of Residual Effects**. If applicable, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance** and **3.9 Confidence and Risk**, respectively.

4.6.1.8 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Application will :

- Determine whether any cumulative interactions between residual effects of the proposed Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the AIR, are likely to occur, consistent with **Section 3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities**;
- Conduct a cumulative effects assessment consistent with **Section 3.10.2 Conducting a Cumulative Effects Assessment**;
- Identify any additional mitigation measures, consistent with **Section 3.5 Mitigation Measures**; and
- Where an adverse residual cumulative effect is identified, the Application will also describe the likelihood, Proponent's significance determination and predictive confidence, in accordance with **Sections 3.7 Likelihood, 3.8 Proponent's Determination of Significance and 3.9 Confidence and Risk**, respectively.

4.6.1.9 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Application will include a description of a follow-up strategy that is consistent with **Section 3.11 Follow-up Strategy**.

4.6.2 Summary of Potential Health Effects

The Application will provide a summary table of predicted residual health effects of the proposed Project and their significance. A summary of cumulative effects of the proposed Project on health conditions will also be provided.

4.7 Accidents and Malfunctions

The Application will include the following:

- Identification of potential accidents and malfunctions;
- The overall methodology for assessing the potential risk of an event (likelihood and consequence);
- Definitions of each category of likelihood;
- Definitions for each category of consequence;
- An assessment of the likelihood of the event occurring, based on historical trends and predictive models;
- Identification of proposed measures to reduce the likelihood of the event;
- Assessment of consequence of the event, in a manner consistent with the direct effects assessment;
- Identification of measures to mitigate the consequences to Valued Components and discussion on their expected effectiveness; and
- Conclusions on the potential risk (likelihood multiplied by consequence) of the accident or malfunction.

A preliminary list of potential accidents and malfunctions that could occur in any phase of the proposed Project is provided includes:

- Pre-Construction:
  - Vehicular accidents;
  - Wildlife encounters;
  - Forest fires;
  - Snow/ice events;
  - Lightning strikes;
  - Personal health emergencies;
  - Avalanche;
  - Rockslide; and
  - Flooding on lower elevation access roads.
- Construction, Operation, and Reclamation Period:
  - Slips/trips/falls;
  - Equipment incidents;
  - Substance abuse-related incidents;
  - Vehicular accidents;
  - Wildlife encounters;
  - Forest fires;
  - Snow/ice events;
  - Lightning strikes;
  - Personal health emergencies;

- Avalanche;
- Rockslide;
- Landslides;
- Flooding on lower elevation access roads;
- Accidents involving project personnel and the public;
- Accidental release of contaminants (sewage, fuel, sediment, chemicals, etc.);
- Spills of product during coal haulage/transfer;
- Explosives incidents;
- Material handling incidents;
- Structural failure of infrastructure;
- Silo fire or ignition;
- Plant thermal drier fire or ignition;
- Wind related incidents;
- Diversion ditch failure due to wash-outs or geotechnical reasons;
- Spoil pile failure/slip;
- Methane accumulation (plant/silo);
- Natural gas line leak;
- Chance find of archaeological items during mining;
- Rail-road related incident on loop/siding;
- Unexpected geologic hazard;
- Emergency evacuation of site due to above or other reasons;
- Mining into a pre-existing opening;
- Mining into a pre-existing oil/gas/water well; and
- Failure of a containment or treatment system.

The Application will assess each potential accident or malfunction.

4.8 Effects of the Environment on the Project

The Application will include:

- The environmental factors deemed to have possible consequences on the proposed project, including, but not necessarily limited to, consideration of natural hazards such as:
  - Extreme weather (e.g., extreme precipitation event);
  - Avalanches;
  - Seismic events; and
  - Forest fires.
- A description of any changes or effects on the proposed Project that may be caused by the above-mentioned environmental factors;
- The likelihood and consequence of the changes or effects to relevant VCs;
- An assessment and description of predicted climate change at the proposed Project site and how anticipated change may impact the Project;

- A review of available long-term data related to climate change to identify existing climate/hydrology trends in the region and how these trends may impact physical environments and associated intermediate and receptor components;
- Practical mitigation measures, including design strategies and environmental contingency plans, to avoid or minimize the likelihood and consequence of the effects of the environment on the proposed Project; and
- A conclusion about the potential risk of an effect of the environment on the proposed Project and to relevant VCs.

PART C – ABORIGINAL CONSULTATION

5.0 Aboriginal Consultation

5.1 Aboriginal Interest

The local Aboriginal Groups discussed in this section will include:

- Tobacco Plains Band;
- St. Mary's Band;
- Lower Kootenay Band; and
- ?Akisq'nuk First Nation.

Each of the above four communities are represented by the Ktunaxa Nation Council (KNC).

The Application will include:

- A summary of past and planned consultation activities;
- A summary of proposed changes to the Aboriginal Consultation Plan resulting from the feedback from the KNC, or experience from consultation to date, including any such changes which have been implemented;
- A summary of the key issues and concerns raised by the KNC relevant to the environmental assessment, the Proponent's responses to those issues and concerns, and the status of resolution;
- A map that identifies Indian Reserves and Aboriginal communities and the project location;
- Traditional Ecological Knowledge and Traditional Land Use information, as publically available or provided by the KNC, with a description of how Traditional Ecological Knowledge (TEK) and Traditional Land Use Studies (TLUS) information was gathered and incorporated into the assessment of impacts of the proposed Project on Aboriginal Interests;
- A description of Aboriginal Interests identified through secondary research techniques or provided directly through consultation activities. The description will include background information on ethnography, language, governance, economy and reserves;
- A description of potential adverse effects of the proposed Project on Aboriginal Interests;
- A description of intangible cultural heritage resources that have the potential to be impacted by the Project, using publically available information and/or information provided by KNC through consultation activities. Intangible resources may include areas of traditional use, significant spiritual or ceremonial sites and areas, trails and travel corridors, language, and place names;
- A description or summary of mitigation measures to avoid or reduce potential adverse effects on Aboriginal Interests consistent with **Section 3.5 Mitigation Measures**;
- A characterization of the residual adverse effects on Aboriginal Interests after mitigation using the methodology described in **Sections 3.6 Characterization of Residual Effects, 3.7 Likelihood**, and **3.9 Confidence and Risk** and incorporating the findings of the VC chapters in the Application that are relevant to Aboriginal interests;

- A summary of any outstanding Aboriginal Interests issues identified by the KNC; and
- A summary of publically available arrangements or agreements reached between the proponent and the KNC.

5.2 Other Matters of Concern to Aboriginal Groups

The Application will include:

- A list of other matters of concern raised by the KNC with respect to potential environmental, economic, social, heritage and health effects of the proposed Project, which have not already been considered in the discussion about Aboriginal Interests or in the statutory requirements under CEAA 2012 where applicable;
- A description (or summary if described elsewhere in the Application) of the mitigation measures proposed to address potential effects on other matters of concern to the Ktunaxa Nation;
- A characterization of the residual adverse effects after mitigation, in a manner consistent with assessment methodology in this AIR template; and
- A description of how these matters of concern have been addressed from the perspective of the KNC and the Proponent.

5.3 Issue Summary Table

The Application will include:

- A summary table (see example in **Table 45**) that identifies Aboriginal Interests or other matters of concern to the Ktunaxa Nation that may be impacted by the proposed Project, and the measures to avoid, mitigate or otherwise manage the effects; and
- An Appendix, the Aboriginal Consultation Report, which contains comments received from the KNC regarding this Section of the Application.

Table 45: Summary Table of the Results of Aboriginal Consultation related to Aboriginal Interests/Other Matters of Concern to Local Aboriginal Groups

Aboriginal Group	Consultation Stage / Information Source	Issue – Aboriginal Interest	Issue – Other Matters of Concern	Analysis of Potential Effect	Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects	Status of Issue *(e.g., resolved, ongoing resolution, referred to agency, etc.)*

PART D – PUBLIC CONSULTATION

6.0 Public Consultation

The Application will include a report on the results of implementation of the approved Public Consultation Plan including:

- Background information:
  - Identification of local governments, residents, property owners, and other rights holders who are potentially impacted by the proposed Project;
  - Maps of local government boundaries, private land, tenures/authorizations, or residences with respect to the proposed Project; and
  - Background information about each potentially affected municipality and/or stakeholder group.
- Public Consultation:
  - A summary of the past and planned consultation activities;
  - A summary of any proposed changes to the approved Public Consultation Plan as a result of feedback from local governments, stakeholders or individuals, or experience from consultation to date; and
  - A description of the key issues raised by the public that are relevant to the EA, the responses to those issues, and the status of their resolution.
- Summary Table:
  - Identification of concerns raised by the public and the measures to avoid, reduce or mitigate those impacts. This information will be provided in the form of a table.

PART E – MANAGEMENT PLANS AND FOLLOW-UP PROGRAMS

7.0 Management Plans

The Application will include:

- A list of Management Plans for all phases of the proposed Project, including but not limited to:
  - Environmental Management Plan, including such plans as:
    - Archaeological Resources Impact Mitigation Plan;
    - Biodiversity Management Plan;
    - Air Quality and Dust Control Management Plan;
    - Blasting and Vibration Management Plan (includes nitrate management);
    - Community Relations and Communications Plan;
    - Erosion and Sediment Control Plan;
    - Soil Management Plan;
    - Noise Management Plan;
    - Waste Management Plan;
    - Spill Prevention, Control, and Countermeasures Plan;
    - Wildlife Management Plan;
    - Invasive Plant Management Plan;
    - Vegetation Management Plan;
    - Fish and Fish Habitat Management Plan; and
    - Compliance Reporting Plan.
  - Aboriginal Engagement and Reporting Plan;
  - Mine Site Surface Water Management Plan;
  - Reclamation and Closure Plan;
  - Emergency Response Plan;
  - Traffic Control Plan; and
  - Health and Safety Management Plan.
- Detailed descriptions of each proposed management plan, including relevant mitigation measures that have been described for the VCs.

7.1 Monitoring & Follow-up Programs

The Application will include:

- A description of the monitoring and follow-up programs the Proponent will implement, including their activities, objectives and reporting;
- A description of how data collected through monitoring and follow-up programs established for VCs will be used to validate and calibrate models used to predict impacts to VCs; and
- Reporting structure as identified within the environmental management plans, monitoring plans and EA Certificate Conditions.

PART F – CONCLUSIONS

8.0 Conclusions

The Application will:

- Provide the Proponent's conclusions regarding the potential for significant adverse effects on VCs from the Project;
- Request an EA Certificate for the proposed Project; and
- Acknowledge the need, if applicable, to successfully complete a federal EA and subsequent permitting/authorization processes prior to proceeding with Project construction, operation and decommissioning.

8.1 Summary of Residual Effects

The Application will summarize all potential residual effects, including cumulative residual effects, in a table format that depicts the potential effect, project phases, project activity or physical work linked to the effect, proposed mitigation and significance of effect on VCs.

8.2 Summary of Mitigation Measures

The Application will include a table that identifies the proposed measures to mitigate potential impacts to VCs as shown in **Table 46**. This information provides the foundation for the development of a Table of Conditions for the proposed Project, which would be appended to an EA Certificate, should one be issued.

Table 46: Summary of Proposed Mitigation Measures

No.	VC and Effect	Proposed Mitigation Measure	Timing	Legal Requirement?	Responsible Agency
Environmental					
1.1					
1.2					
Social					
2.1					

9.0 Appendices

This Section will include the appendices referenced in the Application.

Information prepared by professionals and provided under their professional seal will be identified in the Application and the related sealed studies will be included in an Appendix.

10.0 References

The Proponent will provide a list of reference material used in developing the Application.

The following references were used in the development of the AIR:

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