Appendix 4-V

Valued Components Document

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

DRAFT Valued Components for Environmental Assessment

May 2016

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GLOSSARY AND ABBREVIATIONS

AOA	Archaeological Overview Assessment
ATV	All-terrain Vehicle
BC	British Columbia
CEA Agency	Canadian Environmental Assessment Agency
CEAA	Canadian Environmental Assessment Act
CH_4	Methane
CO_2	Carbon Dioxide
CAC	Common Air Contaminants
COSEWIC	Committee on the Status of Wildlife in Canada
EA	Environmental Assessment
EAO	Environmental Assessment Office (British Columbia)
e-PIC	EAO Project Information Centre
GHG	Greenhouse gas
GDP	Gross Domestic Product
ha	Hectares
km	Kilometre
KNC	Ktunaxa Nation Council
LSA	Local Study Area
M	Million
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations (British Columbia)
MOE	Ministry of Environment (British Columbia)
M ROMt	Million run-of-mine tonnes
NO_2	Nitrogen dioxide
PM	Particulate Matter
ROMt	Run-of-mine tonnes
RSA	Regional Study Area
SARA	*Species at Risk Act*
TEM	Terrestrial Ecosystem Mapping
tpd	Tonnes (metric) per day

VC	Valued Component

1.0 INTRODUCTION

NWP Coal Canada Ltd. (NWP Coal) has initiated the environmental assessment for their Crown Mountain Coal Project (the Project) in the Elk Valley of British Columbia. The Project is subject to both the *Canadian Environmental Assessment Act* (CEAA) 2012 and the British Columbia *Environmental Assessment Act* 2002. Provincially, the Project is considered a Reviewable Project given that the production capacity of the mine will be 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. 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.

To promote a comprehensive and understandable assessment of the potential effects associated with a proposed project, environmental assessment in BC employs a values-based framework. A guideline was developed by the BC Environmental Assessment Office (EAO) in September 2013, entitled "Guideline for the Selection of Valued Components and Assessment of Potential Effects", to assist and inform the environmental assessment process and support environmental assessments that are transparent, participative, rigorous, credible, purposive, relevant, focused, adaptive and cost effective (BC Environmental Assessment Office, 2013). To achieve these objectives, the values-based framework relies on the use of Valued Components (VCs) to focus environmental assessments on aspects of the natural and human environment that are of greatest importance to society and have the potential of being impacted by a proposed project. The BC EAO (2013) defines a VC as:

> "…components of the natural and human environment that are considered by the proponent, public, Aboriginal groups, scientists and other technical specialists, and government agencies involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, historical, or other importance." (p. 4).

VCs serve as the foundation for the environmental assessment. The purpose of this document is to outline proposed VCs that will be evaluated during the environmental assessment and to describe the methods and assessment boundaries that will be used for conducting baseline studies. 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 (EAO, 2013).

In reference to the BC EAO (2013) guideline, the first three (3) methodological steps in an environmental assessment are covered in this document, particularly issues scoping, selection of valued components, and establishment of boundaries. The selection of VCs relevant to the Project first requires identification of all possible VCs (referred to as candidate VCs) that may be impacted based on issues scoping. The list of candidate VCs is refined through further issues scoping and analysis. The VC selection process also includes the identification and assessments of intermediate components and measurement indicators. Intermediate components are those components which may be impacted

along the effect pathway of a selected VC. The effect pathway refers to the cause and effect relationship between the Project/Project activities and a VC (EAO, 2013). For example, fish species have the potential to be impacted by changes in surface water and groundwater that are affected by Project activities that result in runoff and infiltration of contaminated water. Surface and groundwater serve as intermediate VCs for effects on fish which are the ultimate VC that may be impacted. Measurement indicators are characteristics of the environment that are used to evaluate potential changes (e.g., changes in trends or conditions) in a VC (EAO, 2013). Examples of measurement indicators that may be used to assess impacts to fish are surface water and groundwater quality and quantity.

The establishment of assessment boundaries define the spatial, temporal, or administrative areas within which a project is expected to have a potential effect on a VC. The BC EAO (2013) guideline was used to develop this document and will continue to be used over the course of the Project environmental assessment. Where appropriate, other Valued Components for Environmental Assessment documents have be used as examples, specifically documents related to mining projects in the Elk Valley (e.g., Teck Coal Limited's Baldy Ridge Extension Project).

2.0 PROJECT OVERVIEW

The Crown Mountain Coal Project (the Project) is a proposed new open pit metallurgical coal mine in the Elk Valley coal field in the East Kootenay Region of south eastern British Columbia (**Figure 1**). The Project proponent is NWP Coal Canada Ltd. (NWP Coal), a wholly owned subsidiary of Jameson Resources Limited. For additional information on the Project, please refer to the Project Description on the EAO's Project Information Centre (e-PIC) and the Canadian Environmental Assessment Agency Registry[1].

The Project consists of five coal tenure licences, including 418150, 418151, 418152, 418153 and 418154, covering a total area of 2,588 ha (referred to as the "Project property") and one license application. NWP Coal holds 90% interest in the five coal tenure licenses and 100% in the license application. Exploration activities undertaken in 2013 resulted in the definition of a total open pit coal resource of 99 million tonnes for the Project. 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 Project is located approximately 150 km line-of-sight and 300 km by road southwest of Calgary, Alberta and the centre of the Project's property (i.e., coal licences) is approximately 12 km northeast of the District of Sparwood, British Columbia at 114°43.6'W and 49°48.4'N (**Figure 1**). By road, the Project is situated approximately 30 km from Sparwood.

The footprint of the Project is estimated to be up to 1,100 ha. The Project consists of the following major components, which are shown in **Figure 2**:

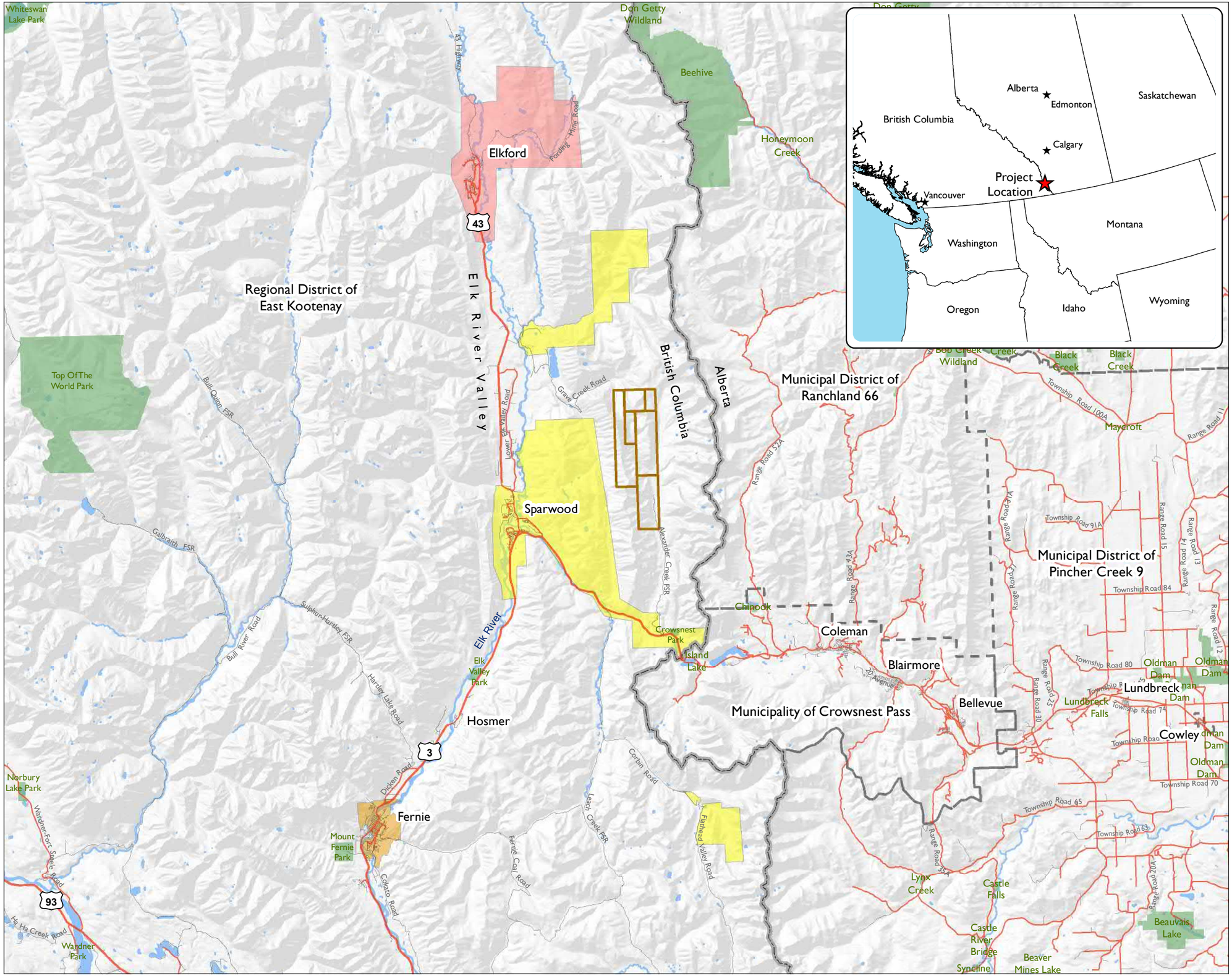
- Surface extraction areas;
- Waste management areas (includes waste rock and tailings, as well as associated diversion ditches, ponds, and access roads);
- Plant area (including shops, offices, and run-of-mine stockpile);
- Clean coal transportation route (overland conveyor, haul road, and access road);
- Transfer bin and clean coal stockpile area;
- Rail load-out facility, rail siding, and miscellaneous buildings;

[1] Crown Mountain Coal Project, EAO, e-PIC:
http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_index_427.html.
CEAA Registry: http://www.ceaa-acee.gc.ca/050/details-eng.cfm?evaluation=80087

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 Tenure Licenses and Application
- BC/Alberta Border

SCALE 1:319,072

0 2.5 5 10 km

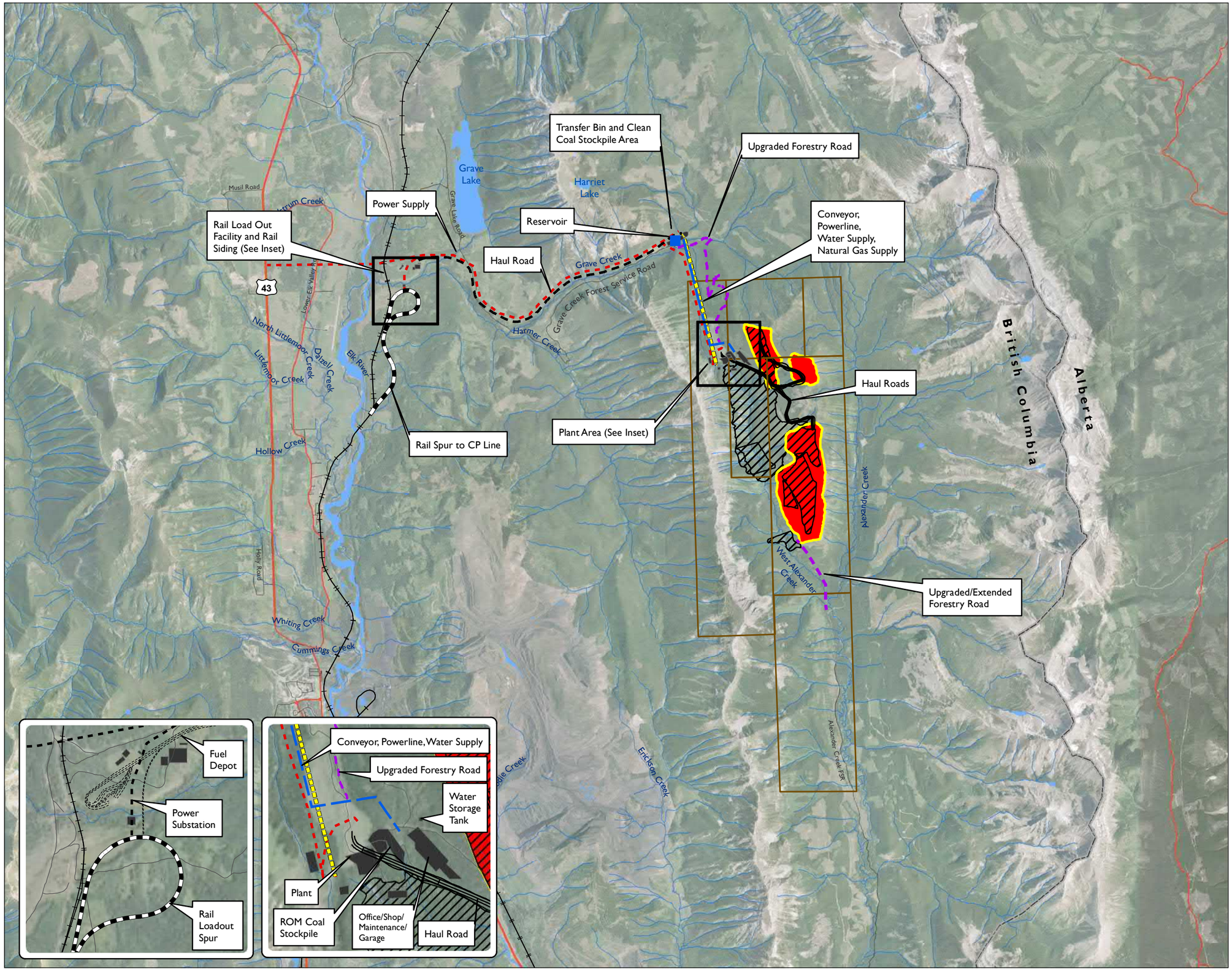
N W E S

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 1 General Project Location.mxd



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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 Tenure Licenses and Application
- 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: 5/25/2015

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

- Power supply;
- Natural gas supply;
- Explosives storage;
- Fuel storage;
- Sewage treatment; and
- Water supply (includes storage reservoir and associated infrastructure).

The Project is situated in an area of steep topography of the Front Ranges Rocky Mountains of BC and is accessed by several Forest Service Roads, including Grave Creek Road northwest of the northern coal license tenure and Alexander Creek Road from the south. The Project is in the Alexander and Grave Creek watersheds. Alexander Creek flows south from the Project area and subsequently joins Michel Creek. Michel Creek eventually discharges to the Elk River which flows generally southwest and discharges to Lake Koocanusa, a lake which partially occurs in the State of Montana. Grave Creek flows in a westerly direction from the upper extent of the Project area and discharges to the Elk River. Harmer Creek, a tributary to Grave Creek, flows from the south and joins Grave Creek east of the Elk River.

The area in and around the Project is used for various recreation activities including fishing, hunting, ATVs, snowmobiles, camping, and hiking. The proposed Project would be located within the asserted traditional territory of the Ktunaxa Nation.

3.0 METHODS FOR SELECTING VALUED COMPONENTS AND ASSESSMENT BOUNDARIES

3.1 Valued Components

To select appropriate VCs for an environmental assessment, the BC EAO (2013) identifies the following steps:

- Issues scoping;
- Identification of candidate VCs;
- Evaluation of candidate VCs; and
- Selection of appropriate VCs.

Sections 3.1.1 to **3.1.4** discuss the methods used for implementing the steps and the selection of VCs relevant to the Crown Mountain Coal Project.

3.1.1 Issues Scoping

The issues scoping process involves researching, compiling, and analyzing information on issues related to the environmental, economic, social, heritage, and health fields that may be associated with the Project. The issues identified through this initial scoping exercise bring together regional and local values held by First Nations, the public, and other stakeholders groups throughout the Project thus far.

Issues scoping for the Project included:

- Review and compilation of available information on the existing biophysical and socio-economic baseline information in the local and regional areas, including previously conducted baseline studies, research and academic publications, provincial databases, and private sector studies;
- Review of the Project Description, which includes the proposed Project activities, scheduling, engagement activities, and potential effects;
- Initial engagement with the Ktunaxa Nation Council;
- Initial consultation with stakeholders, including meetings with the District of Elkford, Council of Crowsnest Pass, Fernie Committee of the Whole, Teck Coal Limited (Teck); and Sparwood Council;
- Review of publically available VC documents for other projects in the Elk Valley;
- Review of relevant provincial and federal guidance documents; and
- Use of professional judgment and engagement with specialists in a variety of disciplines with local knowledge.
- Evaluation of potential project-environment interactions and effects pathways.

Issues identified inform the selection of VCs for the environmental assessment. The results of this step in the VC selection process are described in **Section 4.1**.

3.1.2 Identification of Candidate Valued Components

Information gathered through the issues scoping phase was used to identify potential issues and interactions between the Project and the five pillars as well as the associated effects pathways of these interactions. This information was coupled with a variety of questions to identify VCs that are relevant to the Project. Questions used to identify appropriate VCs for the Project included:

- Is the VC present within the local or regional study areas of the Project?
- Does the VC potentially interact with the Project and is it sensitive to effects?
- Are there applicable legally-binding requirements to protect the component (e.g., regulation or management frameworks)?
- Do species have conservation status, regulatory requirements, or government management priorities (e.g., species at risk)?
- Is there relevance to Aboriginal interest, land claims, rights and title, and/or Treaty rights?
- Is there a potential for adverse effects on the public, traditional use and knowledge of Aboriginal groups, heritage resources, and the government?
- Is there a potential for significant adverse cumulative effects?
- Is the component particularly sensitive or vulnerable to potential disturbance?

A list of candidate VCs identified for the Project was created based on an assessment of these questions (see **Table 3** and **Section 4.0** for more information).

3.1.3 Evaluation of Candidate Valued Components

Following initial identification of candidate VCs, the VCs were then evaluated based on several criteria/attributes and additional scoping questions. The EAO (2013) notes that VCs selected for an environmental assessment should have the following attributes:

- **Relevant** to at least one of the five pillars and clearly linked to the values reflected in the issues raised in respect of the project.
- **Comprehensive**, so that taken together, the VCs selected for an assessment should enable a full understanding of the important potential effects of the Project (including all five pillars).
- **Representative** of the important features of the natural and human environment likely to be affected by the project.
- **Responsive** to the potential effects of the Project.
- **Concise**, so that the nature of the project-VC interaction and the resulting effect pathway can be clearly articulated and understood, and redundant analysis is avoided.

The EAO (2013) also notes several important questions to be addressed during the evaluation stage to evaluate the appropriateness of candidate VCs:

- Can the potential effects of the project on the VC be measured and monitored?
- Is the candidate VC better represented by another VC?
- Can the potential effects on the candidate VC be effectively considered within the assessment of another VC?
- Is information about the candidate VC needed to support the assessment of potential effects on another VC?

The selection of appropriate VCs helps to ensure a focused, meaningful, and effective assessment of potential effects on the environmental, economic, social, heritage, and health pillars. During the evaluation of candidate VCs, the VCs were evaluated to determine which VCs are intermediate or receptor VCs across the various potential effects pathways for the Project. As noted in **Section 1.0**, intermediate components are those components which may be affected along the effect pathway of a selected VC. Receptor or ultimate VCs represent those VCs at the end of an effects pathway. The EAO (2013) notes that an assessment should focus on VCs that are ultimate receptors or receptors of concern as opposed to including all intermediate components as selected VCs, as a way to focus the assessment and ensure clarity in determining effects. Effects to intermediate components are characterised as part of the VC selection and scoping process; however, significance of residual effects is conducted on receptor or ultimate VCs and not on intermediate components. An in-depth understanding of intermediate components is necessary and will be used to evaluate potential Project effects on selected VCs.

As mentioned in **Section 1.0**, measurement indicators are those characteristics of the environment that may be used to evaluate changes in the conditions or trends of a VC. Measurement indicators were also identified during the VC evaluation stage to determine ways in which changes to intermediate and selected VCs will be evaluated. For the purposes of the environmental assessment and associated effects assessments, measurement indicators and intermediate components will be important for understanding the potential effect pathways of an ultimate receptor VC (i.e., a selected VC).

3.1.4 Selection of Appropriate Valued Components

Based on issues scoping, identification of potential VCs, and evaluation of the potential VCs, VCs were selected for the Project. **Section 4.0** details the results of the VC selection process. **Table 3** details the candidate VCs that serve as intermediate components and **Table 4** outlines the list of appropriate VCs selected. It is important to note that as part of the VC selection process attention was given to the level of definition for VCs as some VCs will serve as indicators to assess potential effects on candidate VCs. For example, bighorn sheep has been identified as a VC and will be used to assess potential impacts and effects of the Project on mountain goat, a candidate VC.

3.2 Assessment Boundaries

Assessment boundaries were chosen based on the VCs selected for the Project and the spatial, temporal, and administrative boundaries in which the Project may interact and/or have a potential effect on the selected VCs. The three (3) assessment boundaries are discussed in detail in **Sections 4.5.1**, **4.5.2**, and **4.5.3**.

Three scales for the spatial assessment boundaries were be used for the Project and the selection of VCs: the Project footprint, the Local Study Area (LSA), and the Regional Study Area (RSA). The Project footprint encompasses the physical location of temporary and permanent works associated with the Project. The LSA is a larger area than the Project footprint and encompasses the zone of influence of the Project and those areas that may experience direct and indirect impacts, for example areas that may be impacted by air contaminants, noise levels, or water contamination (EAO, 2013). For the purposes of the Project, the LSA was selected to include specific watersheds or wildlife. The RSA is the largest of the three spatial scales and was selected to provide a regional context for assessing potential effects. Typically the RSA is used as the spatial boundary to assess cumulative effects of a project (EAO, 2013). In some cases, the RSA was selected to be the Regional Distract of East Kootenay, a delineation based on a political boundary given potential effects in various watersheds and municipalities.

4.0 IDENTIFICATION AND SELECTION OF VALUED COMPONENTS AND ASSESSMENT BOUNDARIES

The results of the VC selection process, in particular the results of the issues scoping, identification of candidate VCs, evaluation of candidate VCs, and VC selection are described in **Sections 4.1** to **4.4**. The assessment boundaries used for the Project and the EA are discussed in **Section 4.5**.

4.1 Issues Scoping

A high level assessment of existing information and preliminary gap analysis was completed in 2012. Information from this preliminary assessment assisted with the design of initial baseline studies in the Project area and allowed the identification of potential data gaps. Supplementary, more focused data assessments and gap analyses were also completed in late 2013 by NWP's local specialist sub-consultants (Keefer Ecological – Terrestrial Environment and Lotic Environmental – Freshwater Environment). The engagement of local specialist sub-consultants ensured that local experience from other projects in the Elk Valley was captured early and used to identify potential Project concerns. The background data analyses also supported the identification, review, and screening of potential Project-environment interactions that could result in effects. A Project interaction matrix is provided in **Appendix A**. In addition to the background reviews and gap analyses described above, there has, and continues to be stakeholder engagement to assist with the identification of potential Project concerns and the identification of VCs related to the Project. **Section 4.2.1** provides details regarding stakeholder consultation activities.

Table 1 summarizes specific issues or concerns identified for the Project. The table also identifies specific pillars (environment, economic, social, heritage, and health) that are considered applicable to the issues identified as well the source of the issues (e.g., Ktunaxa Nation Council, regulators, etc.).

Table 1: Issues Identified as part of the Issues Scoping Phase

Issue	Relevant Pillar (i.e., environment, economic, social, heritage, and health)	Source of Concern/Issue
Potential effects to water quality including specific concerns regarding: • Metals such as selenium • Calcite formation • Trans-boundary concerns	Environment, Health	• Ktunaxa Nation Council, Ministry of Environment (MOE), EAO, and CEA Agency • Issue also identified as part of other projects in the Elk Valley
Potential effects on water quantity (flow concerns)	Environment	• Ktunaxa Nation Council
Amphibians (including potential wetland areas along creeks)	Environment	• Ktunaxa Nation Council, MOE
Potential effects to fish and fish habitat	Environment, Social, Economic, Health	• Ktunaxa Nation Council • Issue also identified as part of other projects in the Elk Valley

Issue	Relevant Pillar (i.e., environment, economic, social, heritage, and health)	Source of Concern/Issue
Potential effects to wildlife including wildlife habitat and wildlife corridors	Environment, Social, Economic, Health	• Ktunaxa Nation Council • Issue also identified as part of other projects in the Elk Valley
Potential impacts to conservation lands	Environment, Social	• Ktunaxa Nation Council
Potential effects to Archaeological resources and traditional sites	Heritage	• Ktunaxa Nation Council, EAO • Issue also identified as part of other projects in the Elk Valley
Potential effects to traditional knowledge/traditional land use	Heritage, Environment	• Ktunaxa Nation Council
Potential dust (air quality) issues associated with blasting, haul road, and load-out facility. Potential air quality issues (all common air contaminants) associated with emissions from all aspects of facility operations (mobile sources, blasting, coal processing plant, load-out facility, etc.)	Health, Environment	• Local citizens • Agencies
Potential effects on recreational use as well as hunting, fishing, and guiding/outfitting opportunities in the area	Social, Economic, Health	• Local citizens • Ktunaxa Nation Council
Cumulative effects within the Elk Valley	Environment, Social, Economic Health, Heritage	• Ktunaxa Nation Council, CEA Agency
Community impact due to potential inflow of workers • Housing • Community services • Tax base • Traffic • Social impacts	Social, Economic, Health	• Ktunaxa Nation Council • Elkford and Fernie councils

4.2 Identification of Valued Components

4.2.1 Stakeholder Consultation

NWP Coal is committed to creating and sustaining constructive dialogue and relationships with local and regional stakeholders to support the environmental, social, and economic sustainability of the Project. Stakeholder engagement is considered to be an integral component of a Project as it involves those who may be potentially affected by, or have an interest in, the Project.

To date, a range of consultation activities have taken place including interaction with local regulators such as the MOE and Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO), regarding baseline programs. Other engagement activities (e.g., in person meetings and telephone conference calls) have also taken place with representatives from the EAO and the CEA Agency. Meetings with local municipalities have included presentations to the Councils for the Town of Fernie, the Town of Sparwood, and the Municipality of Crowsnest Pass.

NWP will continue to engage with regulators and local stakeholders regarding appropriate VCs for the Project. All comments/input received will be compiled and documented.

4.2.2 First Nations Engagement

To date, selected engagement activities have taken place with the Ktunaxa Nation Council. Most recently a meeting was held on November 17, 2014 in Cranbrook at the Ktunaxa Nation Council office to review the Project and obtain direct feedback from Ktunaxa Nation representatives.

NWP will continue to engage with the Ktunaxa Nation Council, regarding appropriate VCs for the Project. All comments/input received will be compiled and documented.

4.2.3 Candidate Valued Components

Table 2 outlines the list of identified candidate VCs for the Project environmental assessment. The list of candidate VCs has been developed based on the implementation of steps outlined in the EAO guideline document, Project activities completed to date (e.g., engagement with stakeholders and baseline studies), and feedback received from the Ktunaxa Nation Council and provincial and federal regulators. In addition, as noted previously, candidate VCs identified in publically available VC documents for other projects in the Elk Valley have been used for guidance.

Table 2: Candidate Valued Components Identified for the Project

Discipline	Candidate Valued Components
Atmospheric Environment	
Air Quality and Climate	• Air quality • Green house gas (GHG) emissions
Noise	• Noise and vibration levels at sensitive receptors (nearby people/residents, wildlife)
Aquatic Environment	
Hydrogeology	• Groundwater quality • Groundwater quantity
Surface Water Hydrology	• Surface water quantity • Sediment quantity

Discipline	Candidate Valued Components
Surface Water Quality	• Surface water quality • Sediment quality

Aquatic Health	• Benthic invertebrates
	• Periphyton
	• All fish species that occur within the Regional Study Area (RSA), represented by the following species to conduct effects assessments:
	  ○ Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*);
	  ○ Bull trout (*Salvelinus confluentus*);
	  ○ Mountain whitefish (*Prosopium williamsoni*);
	  ○ Longnose sucker (*Catostomus catostomus*);
	  ○ Burbot (*Lota lota*);
	  ○ Northern pikeminnow (*Ptychocheilus oregonensis*);
	  ○ Peamouth chub (*Mylocheilus caurinus*); and
	  ○ Kokanee (*Oncorhynchus nerka*)
	• 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 (*Rana luteiventris*)
	• All waterbird species within the RSA, represented by the following species:
	  ○ Harlequin Duck (*Histrionicus histrionicus*);
	  ○ Red-winged Blackbird (*Agelaius phoeniceus*);
	  ○ Spotted Sandpiper (*Actitis macularius*);
	  ○ Mallard (*Anas platyrhynchos*);
	  ○ American Dipper; and
	  ○ Higher level trophic species (e.g., Great blue heron [*Ardea Herodias*])

Fish	• Westslope cutthroat trout • Bull trout • Mountain whitefish • Kokanee • Longnose sucker
Terrestrial Environment	
Terrain, Surficial Geology, and Soils	• Terrain type, slope, and aspect • Soil invertebrates • Soil quality • Soil quantity
Landscapes and Ecosystems	• Avalanche chutes • Grassland ecosystems • Wetland ecosystems • Riparian habitat

Discipline	Candidate Valued Components
	• Old growth/Mature forests • Rock outcrops
Vegetation	• Listed and sensitive plant communities and species • Limber pine (*Pinus flexilis*) • Whitebark pine (*Pinus albicaulis*) • Culturally significant plants and ecosystems

Wildlife	• American badger (*Taxidea taxus*)
	• American Dipper (*Cinclus mexicannus*)
	• American marten (*Martes americana*)
	• Bighorn sheep (*Ovis canadensis*)
	• Bat species
	  o Little brown bat (*Myotis lucifugus*)
	  o Northern myotis (*Myotis septentrionalis*)
	  o Eastern red bat (Lasiurus borealis)
	• Canada lynx (*Lynx canadensis*)
	• Elk (*Cervus elaphus*)
	• Gillette's checkerspot (*Euphydryes gilletti*)
	• Grizzly bear (*Ursus arctos*)
	• Migratory birds
	  o Barn swallow (*Hirundo rustica*)
	  o Olive-sided flycatcher (*Contopus cooperi*)
	• Moose (*Alces alces*)
	• Mountain goat (*Oreamnos americanus*)
	• Mink (*Neovison vison*) or river otter(*Lontra Canadensis*)
	• Northern goshawk (*Accipiter gentilis*)
	• Owl species
	• Peregrine falcon (*Falco peregrinus*)
	• Pileated woodpecker (*Dryocopus pileatus*)
	• Wolverine (*Gulo gulo*)
	• Western toad (*Anaxyrus boreas*)
	• Reptile species
	• Wildlife tree users

Archaeological Resources	
Archaeology	• Archaeological resources (e.g., materials, sites)
Social and Economic Environment	
Economics[1]	• Economic conditions
Socio-economics and Community Health[1]	• Housing and community services and infrastructure • Community health and well-being
Land Use and Tenure[1]	• Land use and access

Discipline	Candidate Valued Components
Visual Aesthetics*	• Visual quality
Human and Terrestrial Wildlife Health Risk Assessment	• People (human health), including local communities, First Nations, temporary residents at recreation areas (e.g., trapping cabins) • Wildlife (receptors to be identified by Working Group)

Note: * To be assessed at both Ktunaxa Nation and non-First Nation communities.

4.3 Evaluation and Selection of Candidate Valued Components

Intermediate components and measurements indicators are important in the determination of the significance of effects on VCs selected for the Project environmental assessment. Several candidate VCs listed in **Table 2** have been chosen to represent intermediate components and measurement indicators as they form part of potential effect pathways of VCs that have been selected for assessment. **Table 3** details the intermediate components and the applicable measurement indicators that will support the assessment and significance determination of VCs selected as part of the Project environmental assessment.

VCs that will be assessed as part of the Project EA are presented in **Table 4**. The VCs selected represent those that may have a legislative or regulatory requirement for protection (e.g., species at risk), or those that have an Aboriginal, public, or scientific interest in their protection or consideration of potential impacts associated with the Project. In some cases, selected VCs serve as representative indicators for impacts to components that are not carried forward for individual assessment.

Those VCs that will not be evaluated as part of the Project EA are presented in **Table 5** in **Section 4.4**, which also includes a discussion of the rationale for exclusion.

Table 3: Candidate Valued Components to be used as Measurement Indicators for Intermediate Components

Intermediate Components[2]	Candidate Valued Components used as Measurement Indicators	Valued Components where Significance will be Determined	Rationale
Air	Air quality, as measured through: • Common air contaminants (CACs; e.g., fine particulate matter [PM10 and PM2.5], SO2, NO2), metals, polycyclic aromatic hydrocarbons [PAHs], and volatile organic compounds • Particulate deposition	• People (human health) • Aquatic health • Fish • Landscapes and ecosystems • Vegetation • Wildlife (wildlife health)	Construction, operation, and decommissioning of the Project have the potential to generate greenhouse gas (GHGs) emissions, other air contaminants, and the generation dust. Examples of air emissions from a coal mine include fine particulate matter (PM), carbon monoxide (CO), sulphur oxides (SOx), and nitrogen oxides (NOx). Changes in air quality and associated measurement indicators will be included in the assessments of relevant VCs such as aquatic health, vegetation, and wildlife. Dust generated through mining activities and road use can accumulate on plants, affect water quality, as well as visual aesthetics. Dust generation and particulate deposition will be evaluated through assessments of relevant VCs such as vegetation, ecosystems, water quality (e.g., potential event based runoff containing deposited particulates), soil quality, and socio-economics and community health.
Soil	Soil quality, as measured through: • Metal and non-metal concentrations in soil • Soil type and general soil properties	• People (human health) • Landscapes and ecosystems • Vegetation • Wildlife (wildlife health)	The quality and quantity of soils are important components of terrestrial ecosystems as this is the upper layer of the earth's surface in which plants actively grow. Soil quality can serve as an indicator of the characteristics of soils within an area (e.g., soil microbes as biological indicators within soils). Soil quantity to related to the amount, depth, and distribution of soil and is related to the closure phase of the Project when areas are reclaimed (e.g., using stockpiled soils to reclaime disturbed areas) Soil quality and quantity will be included in the assessment of ecosystems, vegetation, and wildlife.
	Soil quantity, as measured through: • Depth and distribution of soil types	• Landscape and ecosystems • Vegetation • Wildlife (wildlife health)	
Terrain	Changes in local terrain, as measured through: • Terrain type, slope and aspect	• Landscape and ecosystems • Vegetation • Wildlife (wildlife health)	Localized changes in terrain are expected to occur as a result of Project activities such as mining and pit development. Changes in terrain will be included in the assessments for the ecosystems, vegetation, and wildlife VCs. Changes in terrain can potentially impact wildlife movement and overall habitat connectivity.
Groundwater	Groundwater quality, as measured through: • Metal and non-metal concentrations in groundwater	• People (human health) • Aquatic health • Fish • Landscapes and ecosystems • Vegetation • Wildlife (wildlife health)	Groundwater quality and quantity are linked to the surface water environment, and as such, impacts to groundwater may result in changes in surface water resources. Groundwater may be impacted as a result of mine dewatering activities and the location of proposed mining areas, waste rock management areas, and mine infrastructure. Changes in groundwater quality and quantity may result in stream flow reductions or changes in the peak flow of watercourses, impacting surface water quantity and quality. Potential changes in groundwater quality can also adversely impact sources of drinking water. Groundwater will serve as a measurement indicator for changes in aquatic health (e.g., benthic invertebrates, fish) and wetland and riparian ecosystems.
	Groundwater quantity, as measured through: • Groundwater levels and flow rates		
Surface water	Surface water quantity, as measured through: • Surface water levels and flow rates	• People (human health) • Aquatic health • Fish • Landscapes and ecosystems • Vegetation • Wildlife (wildlife health)	Surface water quantity and sediment quality may be impacted by reduction in flow rates associated with water withdrawal and alteration of natural flow regimes. These impacts to surface water may result in changes to the aquatic health such as fish and benthic invertebrates as well as riparian and wetland ecosystems. Changes to surface water hydrology have the potential to impact several VCs and as such, surface water and sediment quantity will serve as indicators for impacts on selected VCs including humans, vegetation, and aquatic health. Potential changes to surface water quality can also adversely impact recreational water use.
	Sediment quantity, as measured through: • Yield and deposition of sediment		

[2]Effects to intermediate components will be carried forward to the effects characterization and significance determination of the VCs.

Intermediate Components[2]	Candidate Valued Components used as Measurement Indicators	Valued Components where Significance will be Determined	Rationale
Surface water	Surface water quality, as measured through: • Metal and non-metal concentrations in surface water		Surface water and sediment quality may be influenced by Project activities, including water withdrawal and waste rock management, resulting in water contamination or changes in flow regimes. Consideration of potential changes in surface water quality is of particular interest to a variety of Project stakeholders including regulators, the public, and First Nations. Changes in surface water quality and sediment quality will be incorporated into evaluating changes of several VCs, including aquatic health, vegetation, and wildlife.
Sediment quality	Sediment quality, as measured through: • Metal and non-metal concentrations in watercourse (i.e., representative streams) sediments		

Table 4: Selected Valued Components for the Project

Discipline	Selected Valued Components	Measurement Indicators	Rationale
Atmospheric Environment			
Air Quality and Climate	• GHG emissions • Common air contaminants (CACs)	• Greenhouse gas emissions (CO_2, CH_4, and NO_2) • Fine particulates [PM 10 and PM 2.5]	The Project may result in the generation of GHGs emissions, CACs, and dust, specifically through the operation of equipment, coal processing, the use of gravel access roads, and open pit mining (e.g., blasting activities). Coal mining can result in the generation of fugitive coal dust which can impact ambient particulate matter (PM) concentrations. Operation of equipment over the course of the Project can result in fugitive road dust and also CACs and GHGs. 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. Air quality will be measured over the course of the Project and compared against compliance with applicable provincial and federal ambient air quality objectives/standards and emissions targets.
Noise	• Noise and vibration levels at sensitive receptors (nearby people/residents, wildlife)	• Noise levels at receptors (wildlife habitat, residences [permanent and temporary]) • Vibration levels at receptors (wildlife habitat, residences [permanent and temporary])	In the localized area, Project construction and operation may result in increased noise levels. Increased levels of noise from equipment and mining activities can result in potential sensory disturbance to noise receptors, including human and wildlife receptors. Sensory disturbance may impact receptor health and quality of life (e.g., wildlife use of forage areas).
Aquatic Environment			
Aquatic Health	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	Benthic invertebrates, small organisms that live in sediment or on the bottom of waterbodies, are generally used as indicators of impacts to aquatic environments based on their limited movement and increased likelihood of exposure to pollution (Gaufin, 1973). In addition, benthics are an important source of food for fish and birds. Benthic invertebrates may be affected by changes in surface water quality and quantity, sediment quality, as well as groundwater (e.g., quality and quantity of groundwater flows). Because benthics are sensitive to changes in these aspects of the aquatic environment, changes in benthic invertebrates in aquatic environments within the LSA will be used to assess potential effects to the following candidate VCs: • Groundwater quality; • Groundwater quantity • Surface water quality; • Surface water quantity; • Sediment quality; and • Periphyton.
Aquatic Health	All fish species that occur within the Regional Study Area (RSA), for the purposes of assessing effects will be represented by: • Westslope cutthroat trout • Bull trout • Burbot • Longnose sucker • Mountain whitefish • Kokanee	• 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 quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and	Fish species within the RSA may be impacted by changes in surface water quality and quantity as well as sediment quality. Of concern to the Elk Valley is the release of selenium into watercourses, which can impact fish reproduction. Westslope cutthroat trout are listed as a species of Special Concern throughout their range in Canada under the federal *Species at Risk Act* (SARA) and are recognized by the Committee on the Status of Wildlife in Canada (COSEWIC, 2011a). Provincially in BC, westslope cutthroat trout are considered a species of Special Concern (i.e., blue-listed) (B.C. Conservation Data Centre, 2015). Similar to westslope cutthroat trout, bull trout are blue-listed in BC (B.C. Conservation Data Centre, 2015). Bull trout, longnose sucker, mountain whitefish, and kokanee are important fish species for recreational fishing in the Elk Valley.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		calcite formations, changes in habitat connectivity, and, changes in habitat availability) • Fish population metrics (e.g., density, biomass, size-at-age, or related matrices) • Fish growth, survival, and reproduction • Metal concentrations in fish	Additional information on westslope cutthroat trout, bull trout, mountain whitefish, longnose sucker, and kokanee are provided under the fish discipline. The effects assessment conducted for westslope cutthroat trout, bull trout, mountain whitefish, longnose sucker, and kokanee will also address the following candidate VCs[3]: • Northern pike minnow • Peamouth chub
Aquatic Health	• 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 • 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	Several amphibian species have the potential to occur within the RSA, including western toad, Rocky Mountain tailed frog, and the Columbia spotted frog. Of these species, two are considered sensitive – the western toad and the Rocky Mountain tailed frog. The western toad is provincially blue-listed, on Schedule 1 of the Species at Risk Act, and listed Special Concern under COSEWIC. The western toad has been recorded in wet ecosystem types in the Elk Valley and was also documented within the LSA during baseline surveys. The Rocky Mountain tailed frog is provincially red-listed, Schedule 1 of the *Species at Risk Act*, and Endangered under COSEWIC and has been confirmed to occur in the Flathead River drainage, south of the LSA. This frog's primary breeding habitat is comprised of the step-pools of permanent mountain streams and headwaters (Dupuis & Wilson, 1999) and may occur in the LSA. Columbia spotted frog are common in the Elk Valley and inhabit lakes, ponds, and slow moving waters, and often feed on aquatic invertebrates. Amphibians are particularly sensitive to changes in water quality/quantity and sediment quality, which could potentially occur due to site activities. As such, there is a potential for these species to be directly impacted by the Project as a result of changes in surface water and sediment quality and quantity. For the purposes of the assessment, impacts to amphibian species will be represented the Columbia spotted frog.
Aquatic Health	• Waterbird species within the RSA, which will be represented by the following species: o Harlequin duck o Red-winged Blackbird o Spotted Sandpiper o Mallard o 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	Waterbird species are likely to occur within the LSA in wetlands and other waterbodies (e.g., streams). Several waterbird species that may occur within the LSA include those that are protected under the federal *Migratory Birds Convention Act* (1984) such as Red-winged Blackbird, Mallards, Spotted Sandpipers, and American Dipper. Waterbirds have the potential to be affected by selenium concentrations in aquatic prey that is consumed, such as through the consumption of aquatic invertebrates (e.g., benthic invertebrates) that occur in wetlands and watercourses within the LSA. For the purposes of the effects assessments, these species will also address potential effects on higher trophic level bird species such as Great Blue Heron[4].
Fish	Westslope cutthroat trout	• Fish species presence/not detected as compared to baseline • Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability)	Westslope cutthroat trout are listed as a species of Special Concern throughout their range in Canada under the federal *Species at Risk Act* (SARA) and are recognized by the Committee on the Status of Wildlife in Canada (COSEWIC, 2011a). Provincially in BC, westslope cutthroat trout are considered a species of Special Concern (i.e., blue-listed) (B.C. Conservation Data Centre, 2015). Westslope cutthroat trout have been observed in the LSA, including Alexander Creek, West Alexander Creek, Grave Creek, the Elk River, Harmer Creek, and Michel Creek.

[3] Northern pike minnow and peamouth chub are proposed to be excluded as a VCs. Rationale is provided in **Table 5**.
[4] Higher trophic level bird species are proposed to be excluded as a VC. Rationale is provided in **Table 5**.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		• 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)	This species of trout is important for the recreational fishing industry, especially in the Elk Valley. Westslope cutthroat trout may be impacted by fish habitat loss and degradation and changes in surface and groundwater quality (e.g., presence of selenium) and quantity. Westslope cutthroat trout are identified as a VC by the Elk Valley Cumulative Effects Management Framework (Cumulative Effects Management Framework, n.d.).
Fish	Bull trout	• Fish species presence/not detected as compared to baseline • Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability) • 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)	Bull trout are recognized as a species of Special Concern by the COSEWIC (COSEWIC, 2011b) and provincially, the interior lineage is listed as Special Concern (i.e., blue-listed) (B.C. Conservation Data Centre, 2015). Bull trout have been observed within the Project LSA, in particular within Alexander Creek, the Elk River, Grave Creek, and Michel Creek. Similar to westslope cutthroat trout, bull trout are an important fish species for consumption and recreational fishing. This species may be impacted by changes in fish habitat quality and quantity, as well as changes in surface and groundwater quality and availability.
Fish	Kokanee	• Fish species presence/not detected as compared to baseline • Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability) • 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)	Kokanee have been observed in Grave Creek and Grave Lake according to provincial data sets for known fish observations (Province of British Columbia, 2013a). This species of fish is an important species for consumption and recreational fishing. This fish species may be impacted by changes in fish habitat quality and quantity, as well as changes in surface and groundwater quality and availability. Kokanee are also a key representative planktivore species, which will be important for the assessment of potential impacts to aquatic resources (ability to evaluate different trophic levels).
Fish	Mountain whitefish	• Fish species presence/not detected as compared to baseline • Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability) • Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metal • Fish population metrics (e.g., density, biomass, size-at-age, or related matrices)	Mountain whitefish are found throughout BC primarily in river systems and have been documented in the Project LSA in the Elk River, Grave Creek, Grave Lake, and Michel Creek. This species of whitefish is important for recreational and sport fishing in the Elk Valley and as such has been selected as a VC. There is also an existing harvest fishery for this species. This species may be impacted by changes in fish habitat quality and quantity, as well as changes in surface and groundwater quality and availability.
Fish	Longnose sucker	• Habitat quality and quantity relative to baseline (e.g., changes in channel morphology, substrates, and calcite formations, changes in habitat connectivity, and, changes in habitat availability)	As with mountain whitefish, longnose sucker are an important fish species for the sport fishing industry. Longnose sucker have been documented in the Elk River, Grave Creek, and Grave Lake. Longnose sucker may be impacted by changes in fish habitat quality and quantity, as well as changes in surface and groundwater quality and availability.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		• Water quality parameters (including but not limited to nutrient and potential contaminant concentrations, temperature, pH, conductivity, metal • Fish population metrics (e.g., density, biomass, size-at-age, or related matrices)	
Terrestrial Environment			
Landscapes and Ecosystems	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	Avalanche chutes provide important foraging habitat for a number of species during the spring and summer months (e.g., bighorn sheep, mountain goat, and grizzly bear) and are characterized by grasses, forbs, and shrub species. This type of ecosystem is found within the Project LSA and as such has the potential to be impacted by direct and indirect effects of the Project (e.g., direct loss of habitat, vibration and noise impacts reducing wildlife presence of ecosystem).
Landscapes and Ecosystems	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	Grasslands are present in the Project LSA, including the Grave Prairie area, at the southern extent of Alexander Creek, and in high elevation alpine areas. Grasslands provide important and unique habitat for a variety of species, including both provincially- and federally-listed species. Grassland ecosystems have the potential to be impacted as a result of the Project, specifically in areas of the proposed rail load out and as such, this ecosystem type is selected as a VC.
Landscapes and Ecosystems	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	Approximately 19 wetlands occur within the LSA, covering approximately 65 ha based on review of available provincial data (Province of British Columbia, 2013b). Majority of the wetlands within the Project LSA are lotic and provide habitat for a variety of terrestrial and freshwater species, including sensitive amphibian species such as the western toad and Columbia spotted frog.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
Landscapes and Ecosystems	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: -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	Riparian habitat occurs along Alexander and Grave Creeks and their tributaries, providing habitat for various wildlife species (including birds and mammals), plants, amphibians, fish, and invertebrates. Riparian habitat also functions as corridors for the movement of wildlife and links aquatic and terrestrial habitat. The Elk Valley Cumulative Effects Management Framework (n.d.) has identified riparian habitat as a VC. Given that the project may result in direct and indirect impacts to riparian habitat (e.g., direct removal of habitat in West Alexander Creek), this ecosystem type has also been selected as a VC for the Project.
Landscapes and Ecosystems	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)	This ecosystem is found within the LSA and was documented to occur in the Engelmann Spruce-Subalpine Fir biogeoclimatic zone during baseline surveys. Old growth/mature forests are important ecosystems as they provide habitat for several wildlife species, such as woodpeckers, sapsuckers, marten, owls, and Northern Goshawk, and contribute to biodiversity. Old growth forests also contain snags that are used by cavity nesters and other micro-habitats that develop over a long period of time and are not found in younger forested stands. The Elk Valley Cumulative Effects Management Framework identifies old growth/mature forests as a VC (Cumulative Effects Management Framework, n.d.). Given that this type of ecosystem has been impacted by previous activities in the Elk Valley (e.g., mining, agriculture, forestry), and that the Project may indirectly and directly impact the amount and accessibility of old growth/mature forests, this ecosystem is also considered a VC for the Project. Old growth/mature forests will be used to assess potential effects to the following VCs: • Wildlife tree users • Owls
Vegetation	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)	Listed and sensitive plant communities will be confirmed through the analysis of the Terrestrial Ecosystem Mapping (TEM) data set collected as part of baseline surveys. Several plant species, which are provincially red- or blue-listed, have the potential to occur within the Project area and LSA. Listed and sensitive plant species documented within the LSA include: • Bent-flowered milk vetch (*Astragalus vexilliflexus* var. *vexilliflexus*); • Compact grimmia (*Schistidium confertum*); • Drummond's milk vetch (*Astragalus drummondii*); • Ground plum (*Astragalus crassicarpus*); • *Lescuraea saxicola;* • Parry's townsendia (*Townsendia parryi*); • Purple oniongrass (*Melica spectabilis*); • Sandberg's desert-parsley (*Lomatium sandbergii*); • Shining penstemon (*Penstemon nitidus* var. *nitidus*); and • Welsh thread-moss (*Bryum gemmiparum*).

Discipline	Selected Valued Components	Measurement Indicators	Rationale
Vegetation	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) • In the event any limber pine individuals are found during site development activities, health will be assessed	Limber pine is known to occur in the Project footprint and LSA. This species is red-listed in BC and listed as Endangered under COSEWIC (B.C. Conservation Data Centre, 2015). Limber pine and whitebark pine occupy similar habitats within the Project footprint and LSA, occurring on dry slopes in the subalpine. Both species are threatened by white pine blister rust (B.C Conservation Data Centre, 2015). Limber pine has potential to be directly and indirectly affected by the Project through vegetation removal, changes in drainage patters, dust accumulation, and invasive plant species. Given conservation status of this species and its known occurrence within the Project footprint, it has been selected as a Project VC. Limber pine will be used to assess potential effects to the following ecosystems: • Rock outcrop ecosystems[5]
Vegetation	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	Whitebark pine known to occur in the Project footprint and LSA. This species is blue-listed in BC and listed as Endangered under SARA and COSEWIC due to the combined threats of the introduced white pine blister rust, mountain pine beetle, fire and fire suppression, and global climate change (COSEWIC, 2010). Whitebark pine, which is a culturally important plant species, has the potential to be directly and indirectly affected by the Project through vegetation removal, changes in drainage patters, dust accumulation, and invasive plant species. As with limber pine, whitebark pine is a species of conservation concern and is known to occur within the Project footprint. Whitebark pine will be used to assess potential effects to the following ecosystems: • Rock outcrop ecosystems
Vegetation	Culturally significant plants and ecosystems	• Community 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)	Culturally significant plants and ecosystems include those species and ecosystems that have consumption/food, medicinal, and cultural/social importance to local First Nations. It is recognized at this time that the Ktunaxa Nation Council does not have a mandate to formally engage on the Crown Mountain Project; however, the Ktunaxa Nation Council has noted that should they decide to engage further in the future, they would complete the assessment of culturally significant plants and ecosystems

[5] Rock outcrop ecosystems are proposed to be excluded as a VC. Rationale is provided in **Table 5**.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
Wildlife	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 badger is a provincially red-listed species and is also listed as Endangered under SARA and COSEWIC (B.C. Conservation Data Centre, 2015). This sensitive species is known to occur in the Project LSA, with presence being reported in the lower Alexander Creek watershed. Given the conservation status of this species and its documented presence within the LSA, it is selected as a Project VC.
Wildlife	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 Dipper is likely to occur within the LSA. This species inhabits riparian habitat and its presences may be an indicator of water quality and riparian health as they return to the same locations year after year. Given that riparian habitat may be indirectly and directly affected by the Project, the American Dipper has been selected as a Project VC.
Wildlife	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)	Bat species, such as the little brown bat, northern myotis, and eastern red bat, have the potential to occur within the Project LSA. These species of bat are of special conservation concern and based on recent studies, the health of bat populations has been impacted by White Nose Syndrome. Both the northern myotis and the little brown bat are listed as Endangered by COSEWIC and blue and yellow-listed provincially (B.C. Conservation Data Centre, 2015). The eastern red bat is red-listed in BC (B.C. Conservation Data Centre, 2015). Given the conservation status of the bats and the potential threats to populations, they have been selected as a VC. Baseline surveys will be conducted to determine the presence of bats and their habitat within the Project footprint and LSA.
Wildlife	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)	Bighorn sheep inhabit the Project LSA and are known to use the Grave Creek Canyon as an important migration/travel corridor between Erickson Ridge and Sheep Mountain. Alexander Creek may also function as a natural corridor for ungulate movement within the LSA. Sheep use re-vegetation areas, natural grasslands, rocky areas, and other habitats for foraging. Bighorn sheep are blue-listed provincially (B.C. Conservation Data Centre, 2015). The Elk Valley Cumulative Effects Management Framework as identifies bighorn sheep as a VC (Cumulative Effects Management Framework, n.d.). The Project may result in direct or indirect impacts to bighorn sheep as a result of sensory disturbance, wildlife mortalities, and changes in habitat use and predation patterns. Bighorn sheep will be used to assess potential effects to the following VCs: • Mountain goat[6]
Wildlife	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	Canada lynx were documented in the Project LSA during baseline studies. The movement and abundance of this species is influenced by human activity and development. Canada lynx are an important species from a conservation perspective given that they are subject to regulated hunting and trapping. The presence of lynx within the LSA is also an indicator of ecosystem health.

[6] Mountain goat is proposed to be excluded as a VC. Rationale is provided in **Table 5**.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		baseline, changes to individual populations)	
Wildlife	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)	Ungulate Winter Range occurs across valley bottoms and warm aspect hillsides within the LSA, specifically along lower elevations of the Elk River, Alexander Creek, and Grave Creek. These areas, as well as areas of re-vegetation and riparian habitat, are inhabited by ungulate species such as elk over the course of the year. Elk are an important species in the Elk Valley for recreational hunting and sustenance. The Project may impact winter range habitat and also cause sensory disturbance to wildlife, wildlife mortalities, and changes in habitat use and predation patterns.
Wildlife	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)	Gillette's checkerspot was found to occur in the LSA during baseline surveys, in the Alexander Creek valley and in the southern LSA near the Crowsnest Highway. The Grave Creek area provides potentially high quality habitat for this species; although, no individuals were found during baseline studies at this location. This species is provincially red-listed (B.C. Conservation Data Centre, 2015). Given this species conservation status and known occurrence within the LSA, it is considered a Project VC.
Wildlife	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)	Grizzly bear were documented within the Project LSA during baseline surveys and are considered an important species both ecologically and socially. Grizzly bear are known to inhabit large ranges and be sensitive to human disturbance and development which can impact this species movement and utilization of habitats. Provincially, grizzly is blue-listed and under COSEWIC, they are listed as Special Concern (B.C. Conservation Data Centre, 2015). The Elk Valley Cumulative Effects Management Framework identifies grizzly bear as a VC (Cumulative Effects Management Framework, n.d.). Given the conservation status of the grizzly, and its importance as an umbrella species ecological indicator, grizzly has been selected as a Project VC.
Wildlife	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)	Two migratory birds, listed under the *Migratory Birds Convention Act*, have the potential to occur within the Project footprint, Barn Swallow and Olive-Sided Flycatcher. Olive-sided Flycatcher has been observed within the Project LSA, in both the Grave Creek and Alexander Creek drainages, during baseline studies. This species is provincially blue-listed and federally listed under SARA as Schedule 1 (Threatened) and Threatened by COSEWIC (B.C. Conservation Data Centre, 2015). Barn Swallow is blue-listed provincially and Threatened by COSEWIC (B.C. Conservation Data Centre, 2015). Woodpeckers are also included as a representative group for cavity nesters and will be used as an indicator of forest landbird species diversity.
Wildlife	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)	Moose use a broad range of ecosystems including valley bottoms, mountain sides, and riparian habitat and are an important ungulate species for recreational hunting and sustenance. Moose were documented within the LSA during baseline studies and the Project may result in direct or indirect impacts on this species.
Wildlife	Northern Goshawk	• Habitat availability and distribution relative to baseline (e.g., changes to the available habitat such as structural stage, successional status, species	Presence of Northern Goshawk has been confirmed within the LSA during baseline studies. This species is an indicator of old growth and mature forests and is yellow-listed provincially (B.C. Conservation Data Centre, 2015).

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		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)	
Wildlife	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	The western toad is provincially blue-listed, on Schedule 1 of the Species at Risk Act, and listed Special Concern under COSEWIC. The western toad has been recorded in wet ecosystem types in the Elk Valley and was also documented within the LSA during baseline surveys.
Wildlife	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)	Wolverine has been documented within the Project LSA during baseline surveys. This species is provincially blue-listed and is listed by COSEWIC as a species of Special Concern (B.C. Conservation Data Centre, 2015). Similar to lynx, wolverine is subject to regulated hunting and trapping in BC and is an important species from a conservation perspective.
Archaeological Resources			
Archaeology	Archaeological resources (e.g., materials, sites)	• Presence, number, type, significance, and location of resources	Archaeological resources may be uncovered or disturbed during the Project as a result of ground disturbance during construction. An Archaeological Overview Assessment (AOA) conducted for the Project identified several archaeological potential polygons within the LSA as well as areas of archaeological deposits, and as such, archaeological resources have been selected as a Project VC. Archaeological sites are protected by the provincial *Heritage Conservation Act* (1996).
Social and Economic Environment			
Economy	Economic conditions	• Economic conditions, as measured through: ○ 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) ○ Local and provincial government revenue (e.g.,	The Project is expected to contribute positively to economic development, both regionally and locally, through increased demand in goods and services to support Project development and operation, investment in local and regional businesses, and increase the potential need for skills development and training for employees. Development of the Project also has the potential to change the land use and access in the vicinity of the Project, which may impact local businesses such as tourism operators. The Project will likely result in an increase in localized labour demands over the course of the Project, especially during construction, resulting in an economic benefit for local communities through employment and income opportunities. Long-term employment is expected to be generated by the Project, benefiting local residents and communities. In addition, the generation of income is thought of as a benefit by local communities and businesses. The Project is expected to also generate tax revenue for all levels of government. In addition, the Project is expected to generate revenue for the Ktunaxa Nation through revenue sharing with the

Discipline	Selected Valued Components	Measurement Indicators	Rationale
		GDP)	provincial government.

Socio-economics and Community Health	Housing and community services and infrastructure	• Housing and community services and infrastructure, as measured by:
		  ○ 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
			An increase or influx of employees (and their families) for Project construction and operation may increase demand on local services such as housing, emergency services, and local infrastructure.

Socio-economics and Community Health	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)	Human health also has the potential to be impacted through direct and indirect sources. For employees of the Project, parameters of the position (e.g., shift work, working conditions) may impact employee health and well-being. Employees and residents may also be impacted by contaminated local water sources associated with the Project, such as seepage from waste rock management areas or discharges to local watercourses that are used for recreational purposes (e.g., recreational fisheries), as well as through the accumulation of dust on plants which are consumed by people. Local residents, employees, and visitors may be affected by changes in public safety as a result of the Project. Public safety is a concern over the course of the Project as the public may be impacted if exposed to physical hazards or emissions at the Project site (e.g., blasting activities during active mining and other industrial activities, dust generation on haul routes, increased traffic on roads and highways).
Land Use and Tenure	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 Project has the potential to change access to the existing land base as it will create an area of active resource extraction and change the land base to include components relevant for operation of the mine (e.g., haul roads, mine infrastructure, etc.). Changes in the land base may restrict access to areas used for recreational or tourism purposes, as well as for resource harvesting and extraction (e.g., forestry).
Land Use and Tenure	Recreation and tourism	• Recreational use (e.g., hunting, ATV trails, fishing, hiking, etc.) • Noise and air quality • Quality of recreational and tourism experiences	Community use of the existing land base may change as a result of the Project construction and operation. The Project is located in an area that is used for a variety of recreational purposes, including hunting, fishing, and hiking. As a result of the Project, the existing land use will change and areas once used for recreational purposes will be restricted or have controlled access to ensure public safety.
Visual Aesthetics	Visual quality	• View corridors • Visual quality, including changes to air quality (e.g., dust accumulation through mining and vehicle traffic)	The Project is located in an area that is used for recreational purposes and thus may cause localized changes to the visual landscape. Visual aesthetics for backcountry recreational users may change as a result of the Project. Construction and operation of the Project will change the existing landscape and associate view corridors in the Grave Creek and Alexander Creek watersheds, areas that are used for recreational hunting, fishing, and other recreational purposes.

Discipline	Selected Valued Components	Measurement Indicators	Rationale
Human and Terrestrial Wildlife Health Risk Assessment	People, including local communities, First Nations, 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], groundwater quality, surface water quality, sediment quality, country food quality) • Incremental Lifetime Cancer Risk (ILCRs)	Human health risks caused by the Project will be determined through risk assessments, which are required at a provincial level to assess the potential effects of the Project on humans and human health. The risk assessments will assess potential effects of the Project on, but not limited to, local residents, visitors, First Nations, and temporary residences utilizing trapping cabins in the area. The assessment of potential risks to human health would take into consideration, as appropriate, air quality, noise levels, drinking and recreational water quality, and quality of country foods. Guidance documents will include Health Canada's *Useful Information for Environmental Assessments* (Health Canada 2010).
Human and Terrestrial Wildlife Health Risk Assessment	Wildlife	• Hazard Quotients with input from intermediate components and measurement indicators (e.g., air quality, groundwater quality, surface water quality, sediment quality)	Risk assessments are required at a provincial level to assess the potential effect of the project on wildlife and wildlife health. Wildlife species to be assessed under the risk assessments will be chosen through the Project Working Group. Specific species that may be assessed as part of the health risk assessment include, but are not limited to: American Robin, little brown bat, masked shrew, White-tailed Ptarmigan, least chipmunk, snowshoe hare, bighorn sheep, elk, Common Raven, deer mouse, grizzly bear, Northern Goshawk, American badger, American marten, Canada lynx, American Dipper, Canada Goose, moose, common merganser, and river otter. Opportunistic information obtained from local communities, trappers, and guide outfitters is expected to be an important source of information for this assessment.

4.4 Rationale for Exclusion of Candidate Valued Components

Table 5 details the candidate VCs that were not selected for the environmental assessment as well as the rationale for excluding the listed candidate VCs.

Table 5: Rationale for Exclusion of Candidate Valued Components

Discipline	Excluded Valued Components	Rationale for Exclusion
Aquatic Environment		
Aquatic Health	Periphyton	Periphyton are an important food source for a variety of aquatic species, including fish, amphibians, and invertebrates. Changes in surface water quality and sediment quality may impact the health of periphyton in watercourses within the LSA. Potential impacts to periphyton will be considered through assessment of the benthic invertebrate VC.
Aquatic Health	Northern pikeminnow and peamouth chub	Impacts to fish species within the RSA will be evaluated through a selection of representative species, including westslope cutthroat trout, bull trout, burbot, mountain whitefish, and longnose sucker. These representative species were selected for their abundance in the Elk Valley and the potential use of available data to complete quantitative effects assessments on fish species.
Aquatic Health	Higher trophic level bird or mammal species (e.g., Great Blue Heron)	Higher level bird species such as Great Blue Heron have the potential to be affected by selenium concentrations if prey with elevated levels of selenium is consumed (such as fish). Waterbird species selected as VCs (i.e., Harlequin Duck, Red-winged Blackbird, Spotted Sandpiper, Mallard, and American Dipper) are abundant regionally and data is potentially available to conduct effects assessments to determine impacts, as such these species will act as representative species to assess potential impacts to higher trophic level birds. Higher trophic level mammal species are discussed under mink and river otter below.
Terrestrial Environment		
Terrain, Surficial Geology, and Soils	Soil invertebrates	Detailed information on soil invertebrates is not expected to be collected during the TEM baseline work; however, soil quality will be considered during proposed reclamation and closure activities to ensure appropriate quality soils are used during reclamation activities. Appropriate soil quality information will be collected to ensure that the relevant reclamation standards pertaining to growth medium and revegetation are met.
Landscapes and ecosystems	Rock outcrop ecosystems	Rock outcrop ecosystems provide habitat for sensitive plant species. Whitebark and limber pine are known to occur within the Project LSA and likely to be associated with rock outcrop ecosystems. Given that whitebark and limber pine have been selected as VCs, they will serve as the species to represent

Discipline	Excluded Valued Components	Rationale for Exclusion
		potential impacts to rock outcrop ecosystems.
Wildlife	American marten	Baseline studies for furbearers noted that very few marten are found within the LSA. Marten typically inhabit old-growth forests; however, they are known to use a variety of forest ages and structure types (e.g., forests with woody debris as well as shrubs and saplings) (Province of British Columbia, n.d.).
Wildlife	Mountain goat	Mountain goats inhabit alpine, subalpine areas, as well as other rugged areas, and are known to use the Grave Creek Canyon as an important migration/travel corridor between Erickson Ridge and Sheep Mountain like bighorn sheep. Mountain goat is hunted for recreational purposes in BC and within the Project LSA. Given that mountain goat utilize similar habitat as bighorn sheep, and are known to use the travel corridor in the Grave Creek valley, impacts to goat will be evaluated under the bighorn sheep VC.
Wildlife	Mink or river otter	Aquatic mustalids such as mink and river otter may occur within the LSA. These animals represent a fish-eating furbearer, a potential pathway for selenium uptake. The potential impacts and effects of changes to water quality and the potential bioaccumulation of metals such as selenium will be assessed through the aquatic, terrestrial, and human health assessments. In particular aquatic mustalids will be specifically assessed as part of the terrestrial wildlife health risk assessment.
Wildlife	Peregrine falcon	During baseline studies, Peregrine Falcon and their nesting habitat was not observed within the Project LSA. Further baseline studies for raptors will assess raptor presence within the LSA; however, Peregrine Falcon is not expected to inhabit or nest within the Project footprint or LSA as this species prefers large and wide open valleys such as the Rocky Mountain Trench.
Wildlife	Owl species	Owl species with the potential to occur in the LSA include Western Screech Owl and Boreal Owl. The Western Screech Owl is listed as Threatened under COSEWIC and Special Concern (Schedule 1) under SARA (Government of Canada, 2015). The likelihood of Western Screech Owl inhabiting the LSA is low; however, baseline studies will be conducted to determine the potential for owls within the LSA. Owls have not been selected as a separated VC as they will be represented by the old growth/mature forests VC, habitat which supports owl species. Changes in the old growth/mature forest ecosystem may be used to indicate changes in woodpecker abundance and distribution.
Wildlife	Reptile species	Sensitive reptile species, such as the western painted turtle, have a low potential of occurring within the Project footprint and LSA.
Wildlife	Wildlife tree users	Wildlife tree users include a variety of species such as birds, mammals, and amphibians (Province of British Columbia,

Discipline	Excluded Valued Components	Rationale for Exclusion
		1995). This broader category of wildlife tree users is not recommended as a VC as potential impacts to wildlife tree users will be assessed under the old growth/mature forests VC. Old growth/mature forests are important ecosystems as they contribute to biodiversity and structurally provide habitat features not found in younger forests. The Elk Valley Cumulative Effects Management Framework identifies old growth/mature forests as an important VC in the Elk Valley. Evaluating the impacts to old growth/mature forests at an ecosystem level will help to understand potential impacts to species that inhabit this ecosystem such as wildlife tree users.

4.5 Assessment Boundaries

Assessment boundaries define the spatial and temporal areas within which the Project may interact with a selected VC. Based on the VCs selected for the environmental assessment, assessment boundaries have been established to allow for an evaluation of the potential effects on VCs as a result of the proposed Project. Three (3) types of assessment boundaries will be used to evaluate effects on VCs, spatial, administrative, and temporal boundaries. These boundaries are discussed in **Sections 4.5.1** to **4.5.3**.

4.5.1 Spatial Boundaries

As noted in **Section 3.2**, three (3) general types of spatial assessment boundaries will be used, including the Project footprint, the LSA, and the RSA. **Table 6** details the proposed assessment boundaries to be used for each of the selected VCs as well as the rationale for evaluating impacts at the chosen spatial scales. It is important to note that the assessment boundaries may be revised as the Project progresses and the VCs are evaluated as part of the impact and effects assessments.

Table 6: Proposed Study Areas for the Project

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
Air Quality and Climate	Air Quality LSA (**Figure 4**) Air Quality RSA (**Figure 4**)	The assessment of air quality and climate will be evaluated at the Local and Regional Study Area scales. Study areas will be driven by local airsheds as well as other operating mines in the area. The air quality RSA is shown in **Figure 4** and this area 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

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
		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 air quality LSA is shown in **Figure 4** and this area was selected based on the following reasons: • Includes local communities, such as the District of Sparwood, 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; • 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.
Acoustic Environment	Project footprint (**Figure 3**) Acoustic LSA (**Figure 5**)	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) and areas used for recreation (e.g., hunting) that could be impacted by noise and vibration levels. Appropriate receptors will be established within the LSA and Project footprint as part of baseline studies. The location of receptors will be selected based on consultation with the BC Ministry of Environment and appropriate guidance documents, as well as input from other stakeholders.

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
Aquatic Health Fish	Project footprint (**Figure 3**) Aquatic RSA (**Figure 6**) Aquatic LSA (**Figure 7**)	Aquatic resources that have the potential to be impacted by the Project span across several watersheds, including the Elk River, Grave Creek, and Alexander Creek watersheds. The aquatic RSA will cover 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 (**Figure 6**). 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 will encompass approximately 235 km^2 and include areas that have the immediate potential to be directly or indirectly impacted by the Project, including Grave Creek, West Alexander Creek, Alexander Creek, Michel Creek, and the Elk River (**Figure 7**). 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. Within the LSA, 11 surface water quality and four (4) hydrology monitoring stations have been established.
Landscapes and Ecosystems Vegetation Wildlife	Project footprint (**Figure 3**) Terrestrial RSA (**Figure 8**) Terrestrial LSA (**Figure 9**)	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 southeastern 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. • Includes operating and proposed mines within the Elk Valley (e.g., Teck's Fording River Operations, Coal Mountain Operations) and features important for movement of wildlife such as corridors and continental divides (e.g., Grave Creek Canyon). • Covers the ranges of several wildlife species (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

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
		sheep), or RSAs may reflect the stationary nature of some land-anchored species or populations (e.g., whitebark pine). The terrestrial LSA covers approximately 235 km^2 and is based on the following (**Figure 9**): • 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, wildlife, and vegetation will be evaluated within the proposed Project footprint (**Figure 3**). It is anticipated that the Project may result in a loss of existing vegetation and associated wildlife habitat. RSA and LSA boundaries will be adjusted, as necessary, to ensure accurate baseline data is collected on selected VCs.
Archaeology	Project footprint (**Figure 3**) Archaeological Resources LSA (**Figure 10**) Archaeological Resources RSA (**Figure 11**)	The study area for archaeological resources is based on the Project footprint and the LSA developed for the Archaeological Impact Assessment (**Figure 10**). 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; and • Existing archaeological polygons that overlap with the proposed Project footprint. The archaeological resources LSA and Project footprint will be used to guide assessments of direct disturbance and potential impacts on archaeological and heritage resources as a result of Project development. The archaeological RSA is illustrated in **Figure 11**. It includes much of the Elk River Valley as well as the communities of Elkford, Sparwood, and Fernie.
Traditional Use (TU) and Traditional Ecological Knowledge (TEK)	The TU/TEK assessment area will be determined in consultation with the Ktunaxa Nation	Potential impacts on Ktunaxa TU and TEK will be evaluated. The spatial scale used to evaluate potential indirect effects of the Project on TU/TEK will be determined in consultation with the Ktunaxa Nation.

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
		The assessment area may encompass: • Areas of the Elk River drainage to south of the City of Fernie to evaluate use and knowledge by the Ktunaxa within the region; • Active coal mining operations in the Elk Valley (e.g., Teck's Fording River Operations, Coal Mountain Operations); and • The communities of Sparwood, Fernie, and Elkford.
Economy Socio-economics and Community Health	Economic and Socio-economic RSA (**Figure 12**) Economic and Socio-economic LSA (**Figure 12**)	Economic and socio-economic and community health tenure VCs 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 assessment boundaries for the economic and socio-economic RSA and LSA are shown in **Figure 12**. To assess potential regional effects of the Project on economic and socio-economic considerations the boundary of the RSA will be based on the extent of the Regional District of East Kootenay (RDEK). This boundary includes communities that may be economically benefited by 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 and socio-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 to 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). The economic and socio-economic LSA will be used to assess localized direct and indirect effects of the Project on: population; employment; recreation and tourism; public safety; community services; and local revenue generation for municipalities.

Proposed Valued Component	Study Area(s)	Rationale for Assessment Boundaries
		Information gathered to support evaluation of these VCs and potential effects will also be obtained through administrative boundaries such as census areas within the RDEK. Types of information to be based on census areas includes, but is not limited, to changes in population, demographics, education, labour force and employment, and income levels.
Land Use and Tenure	Land Use and Tenure LSA (**Figure 13**)	Potential changes in land use and tenure as a result of the proposed Project will be evaluated within the land use and tenure LSA (**Figure 13**). The proposed land use and tenure LSA encompasses the following: • Access management areas (i.e., Alexander Creek Access Management Area); • Existing areas of Agricultural Land Reserve (ALR) land; • Trapline areas and existing trapping cabins; and • Area of the Sparwood Official Community Plan.
Visual Aesthetics	Visual Aesthetics LSA (**Figure 14**)	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., snowmobilers, hiking, camping) as well as by hunters. As such, potential impacts on the visual landscape of the area will need to be considered. **Figure 14** shows the study area boundary for 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 have the potential to serve as receptor sites and those areas in which changes to the visual landscape may be observed.

For several VCs, specific LSA and RSA spatial boundaries have been chosen to reflect specific life history characteristics of selected species or to allow for an evaluation of socio-economic areas of influence. The spatial boundaries were chosen to capture both the potential direct and indirect effects the Project may have on the selected VCs and subsequently on the environmental, social, economic, heritage, and health pillars. Spatial assessment boundaries for the LSAs were selected to encompass the zone of influence of the Project and those areas that may experience potential direct and indirect impacts. The RSA boundaries represent larger spatial boundaries used to evaluate potential cumulative effects and areas that may experience indirect effects beyond the LSA boundary. The Project footprint, shown in

Figure 3, will be used as a boundary to assess potential direct impacts to VCs that overlap with the anticipated footprint of the Project.

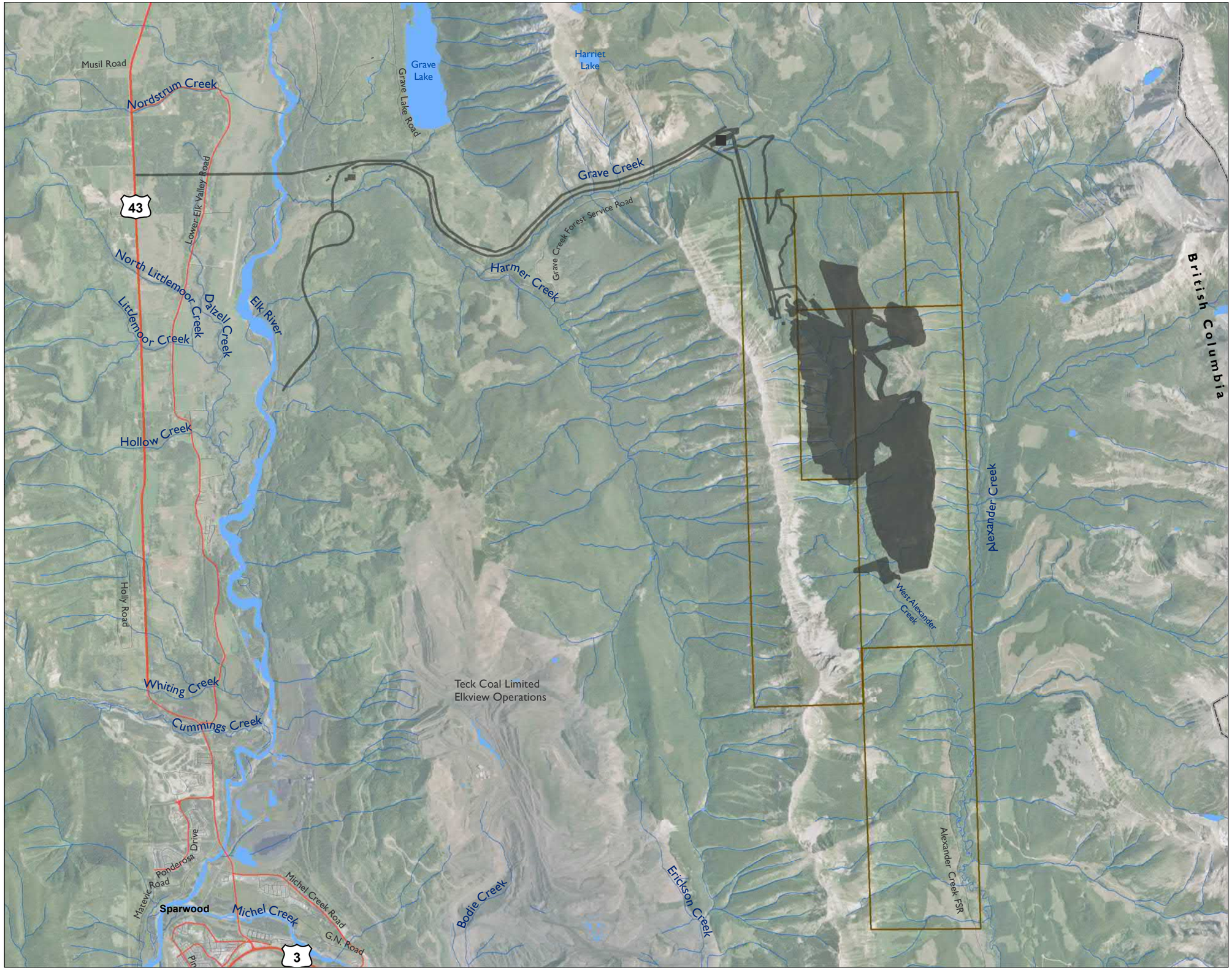
4.5.2 Temporal Boundaries

Temporal boundaries refer to the timeframes in which short term and long term changes in VCs may occur over the course of the Project. The EAO (2013) notes that two (2) types of temporal boundaries should be considered in an assessment: the temporal limits of the Project and the temporal characteristics of selected VCs.

For the purposes of the assessment, the temporal limits of the Project will be the key Project phases, including construction, operation, decommissioning and closure (which includes reclamation), and post-closure. There is expected to be overlap between the Project phases, as decommissioning of some areas may begin during active mining (i.e., progressive decommissioning and reclamation). Assessments for each VC, in particular selected aquatic and terrestrial VCs requiring fieldwork to evaluate baseline conditions, will be dependent on the biological characteristics of the VC to ensure data is collected during appropriate timing windows and life stages. For example, to assess potential impacts on overwintering habitat used by fish species within the LSA, an overwintering fish and fish habitat survey was completed to determine fish use during representative winter conditions. The selected temporal boundaries for each VC, along with the methods used to collect data of baseline conditions, will be defined in the assessment.

4.5.3 Administrative Boundaries

Administrative boundaries represent limitations imposed on data collected for an environmental assessment due to political, economic, and social constraints (EAO, 2013). Data to evaluate effects is collected at specific scales to provide information on VCs; however, for some VCs, different scales and boundaries may be required to ensure appropriate data is collected to evaluate impacts as a result of a project, which may not always be attainable through the spatial and/or temporal boundaries. For example, some datasets used to understand existing or changing conditions of an economic or socio-economic VC may be based on federal or provincial boundaries, such as Census subdivisions. For the assessment, it is anticipated that census data will be used to supplement information available to evaluate potential effects on the economic and socio-economic and community health VCs. As such, evaluation of the economic and socio-economic VCs will be completed at both the RSA and LSA spatial levels (as noted in **Table 6**) as well as at the census area level to ensure adequate information is collected to assess changes in these VCs as a result of the Project.



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 3
Project Footprint

- Project Footprint
- Coal Tenure Licenses and Application
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Lake/River
- BC/Alberta Border

SCALE 1:60,000

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.

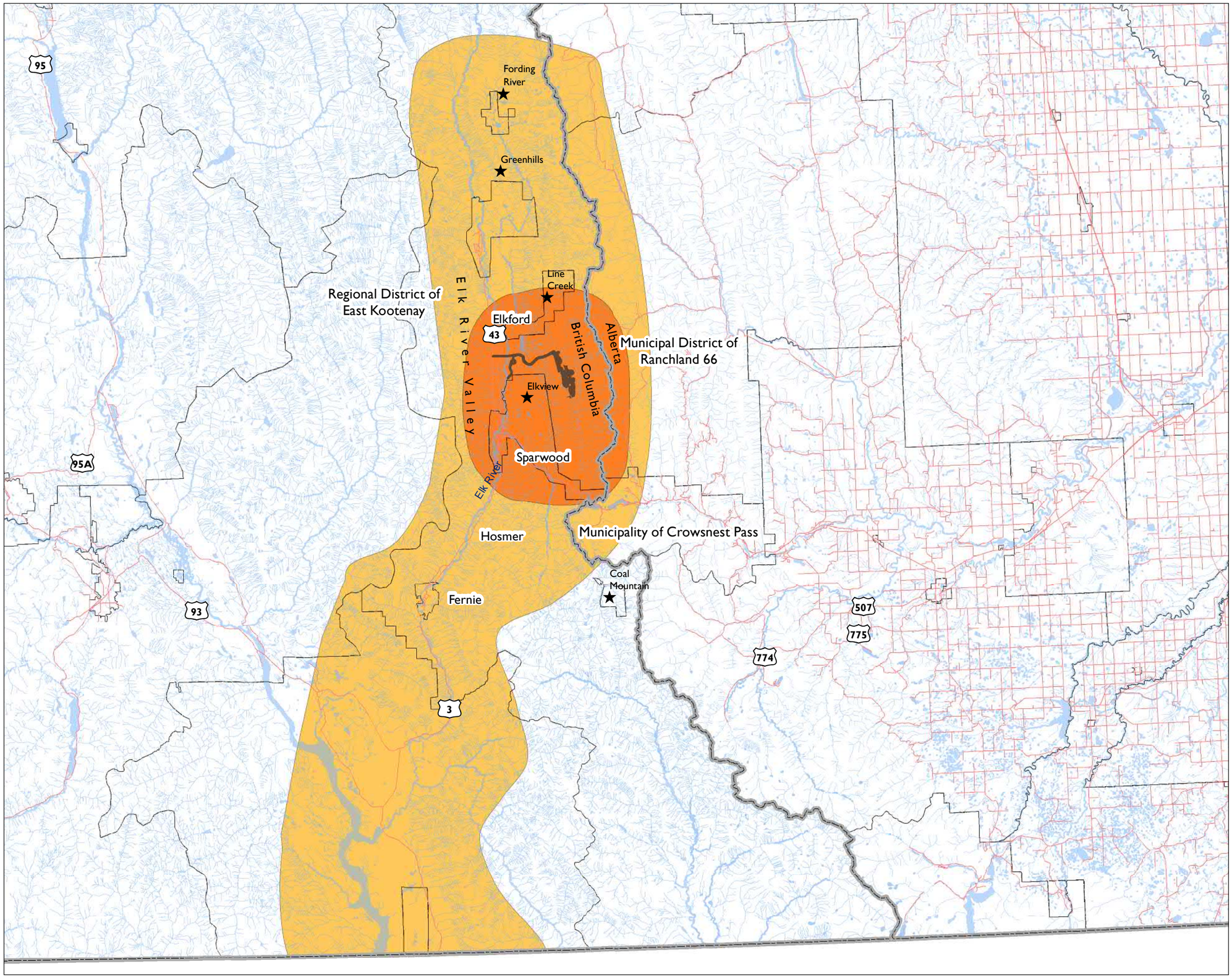
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/25/2015

File Location: G:\GIS\126231 Crown Mountain\VC Figure 3 - Project Footprint.mxd



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.

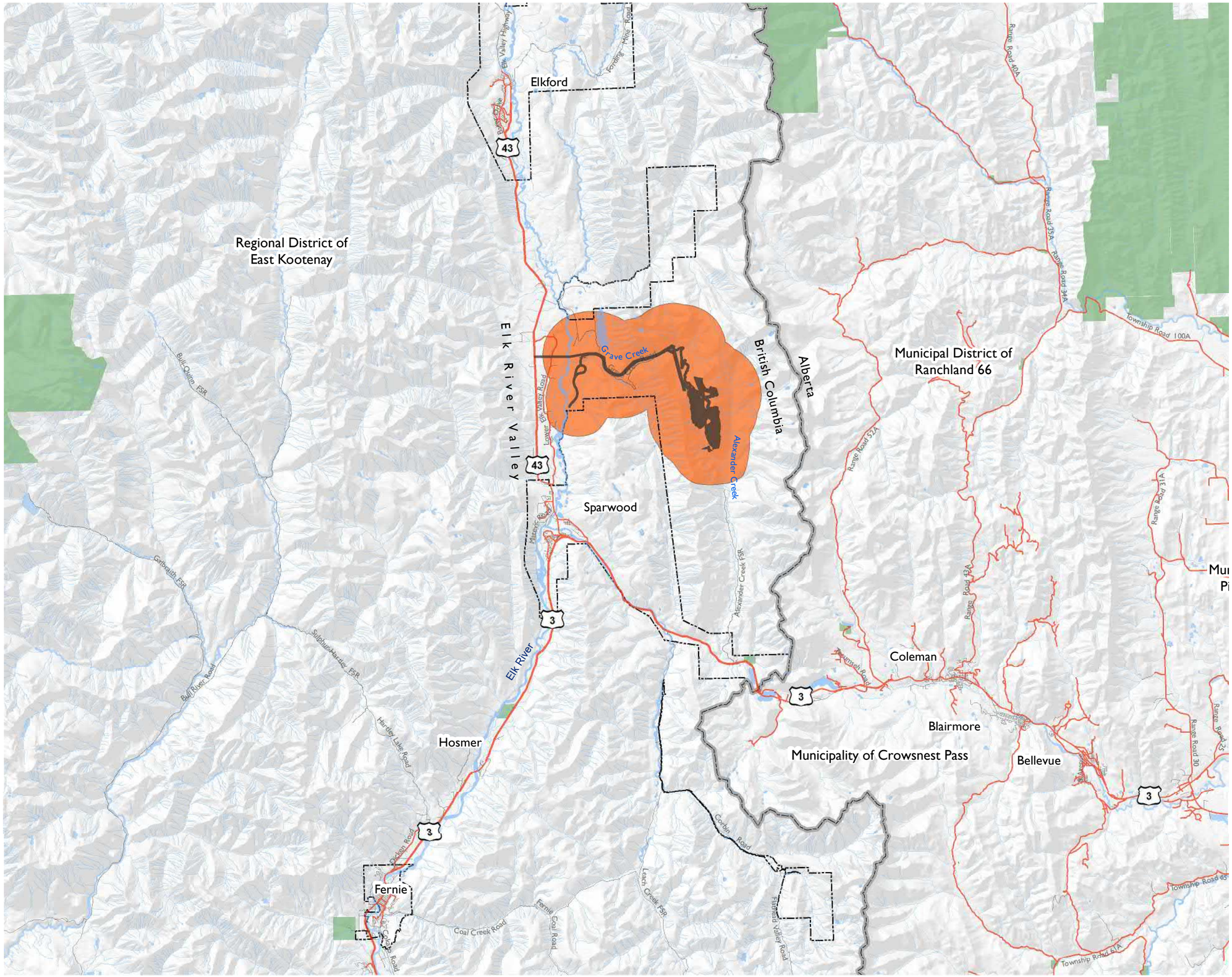
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/29/2015

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



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

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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.

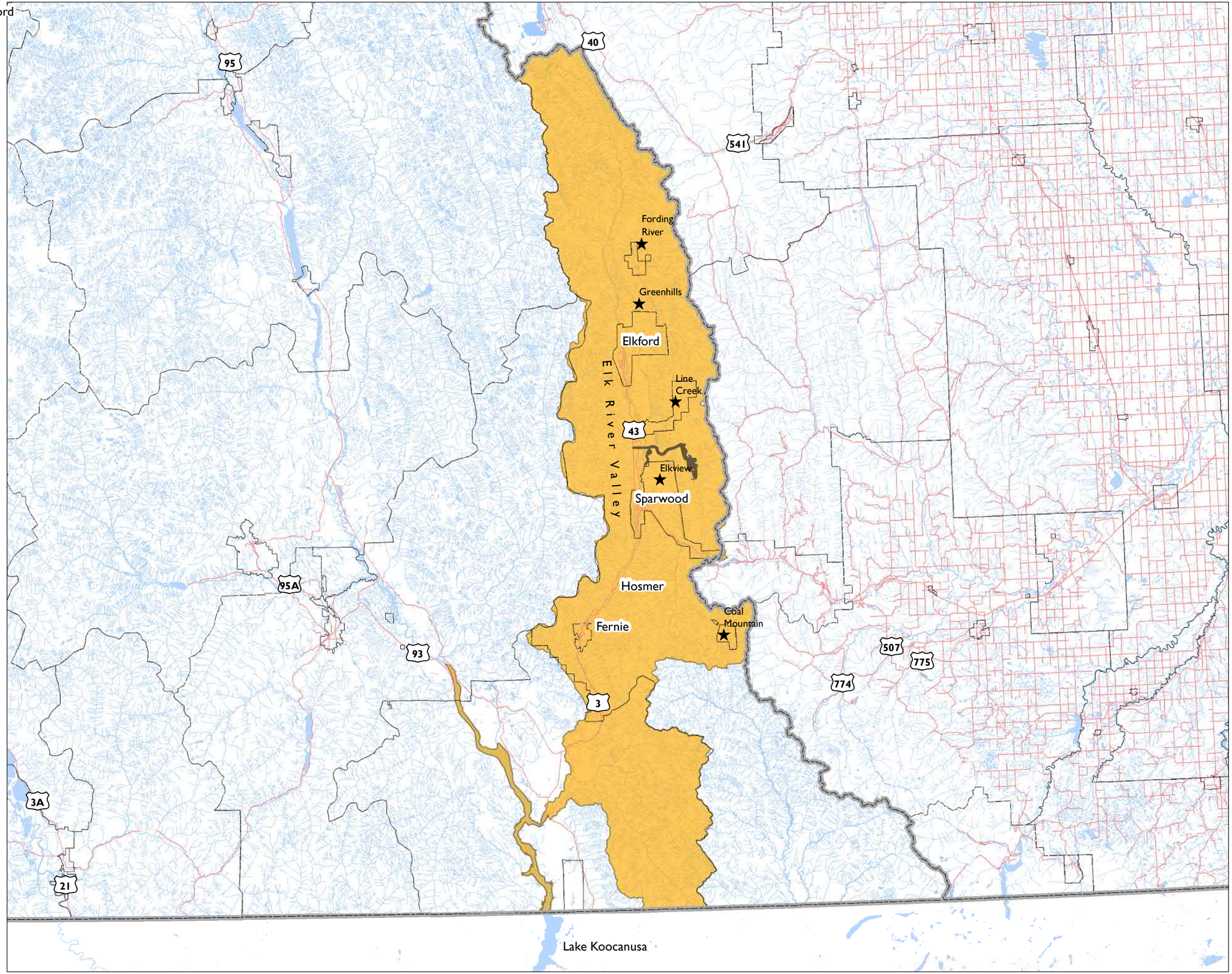
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/25/2015

Elkford



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.

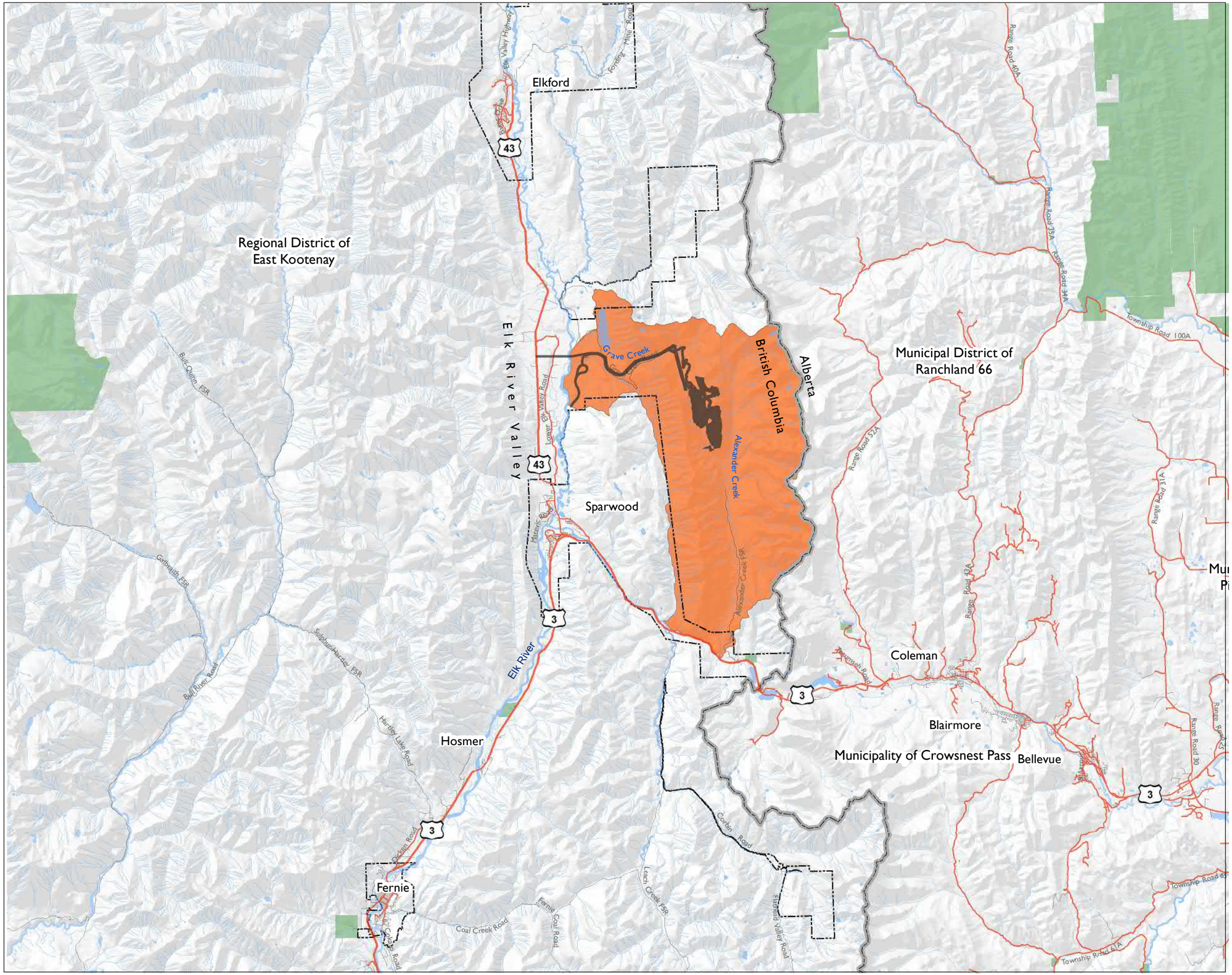
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

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.

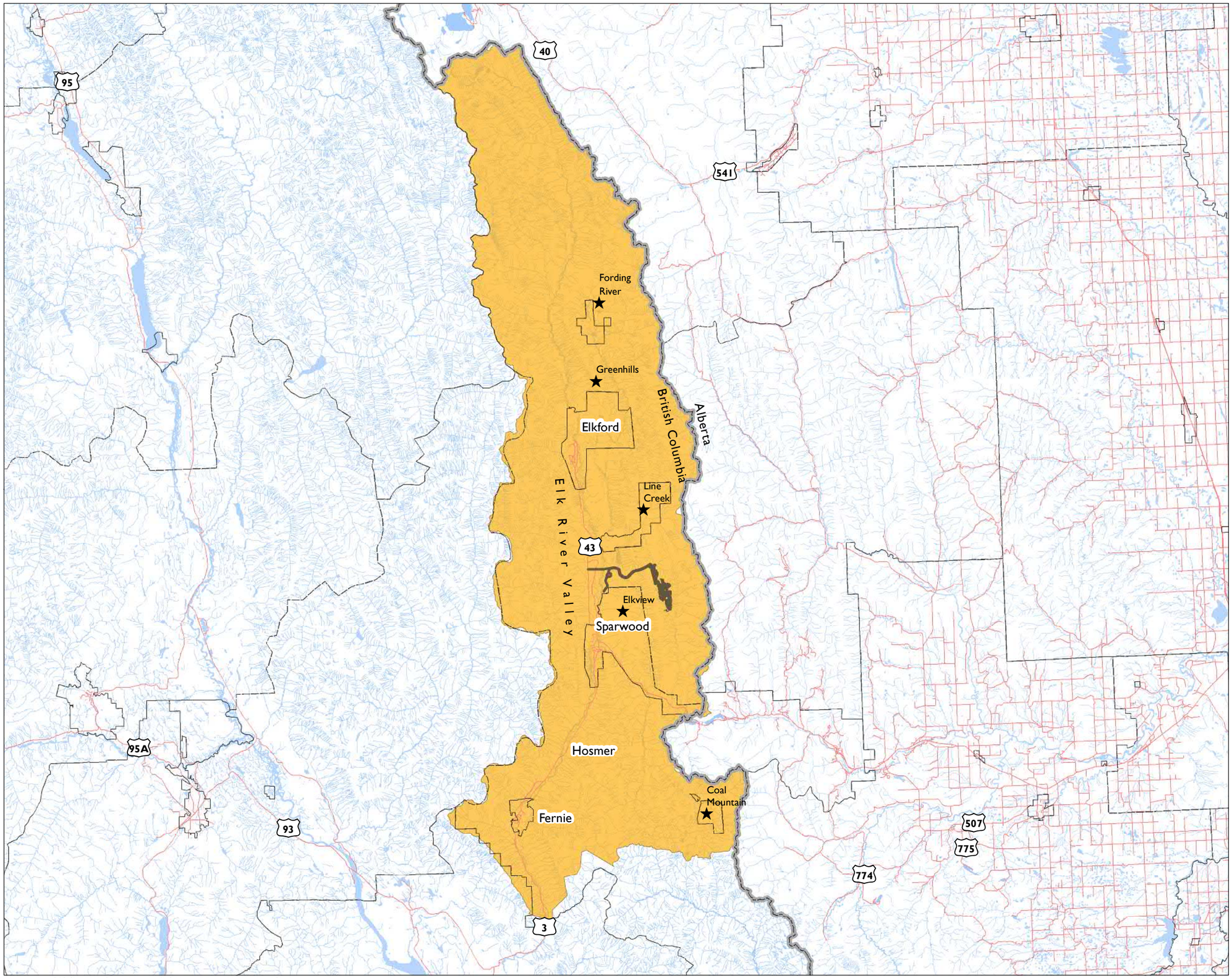
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/25/2015

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



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

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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.

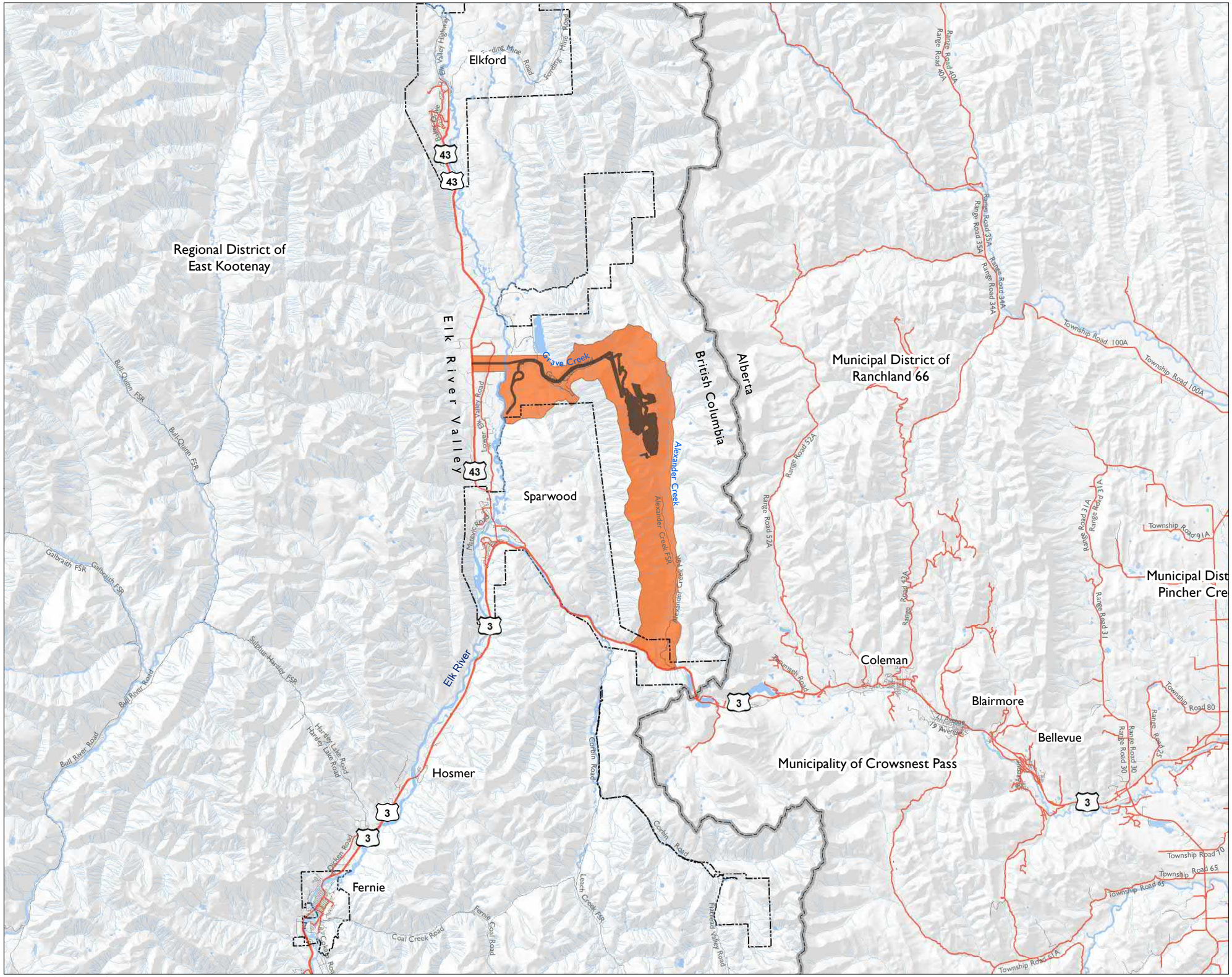
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231

STATUS: FINAL

DATE: 5/25/2015

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



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 10
Archaeological 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

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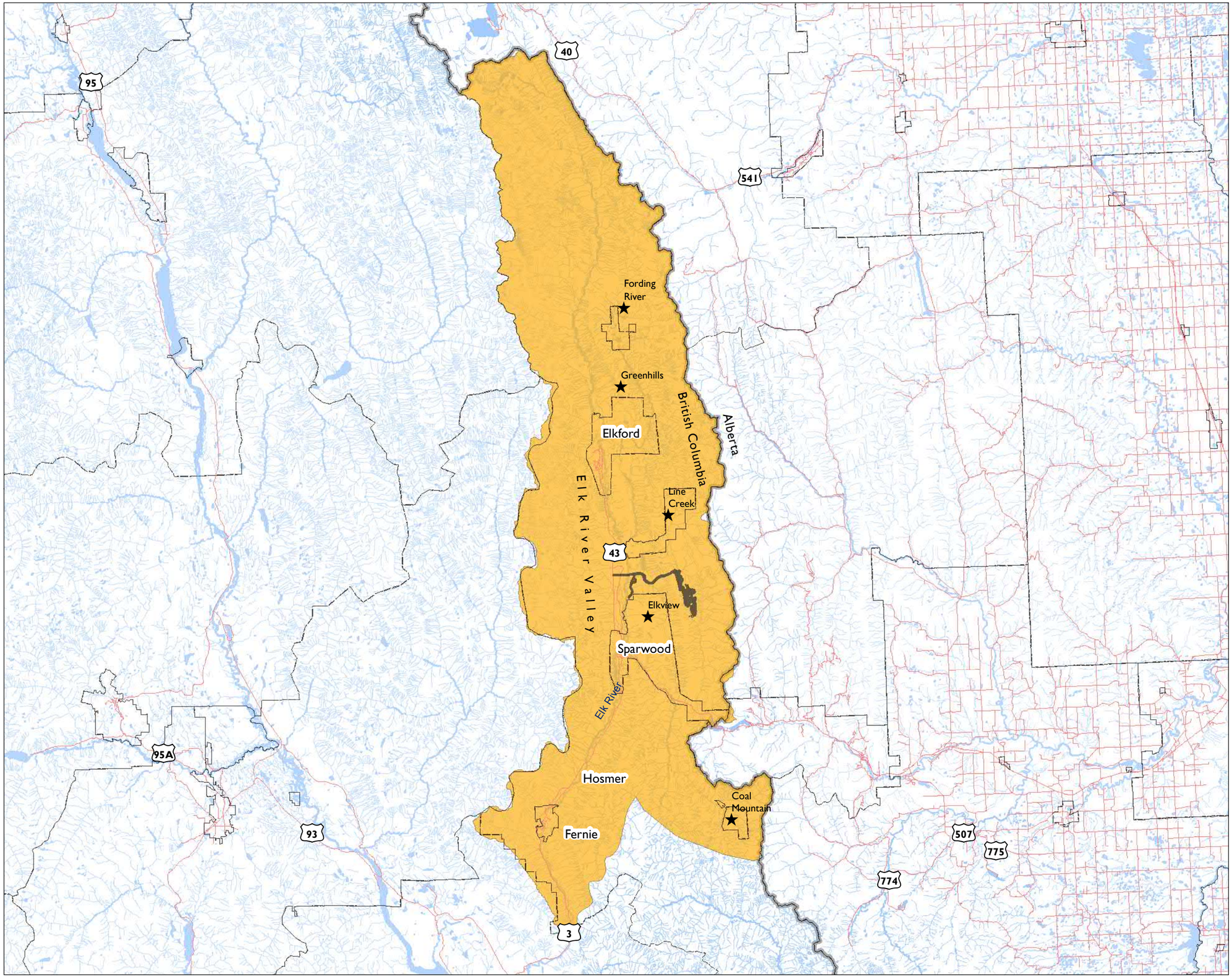
Figure 11
Archaeological Regional Study Area



- 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.

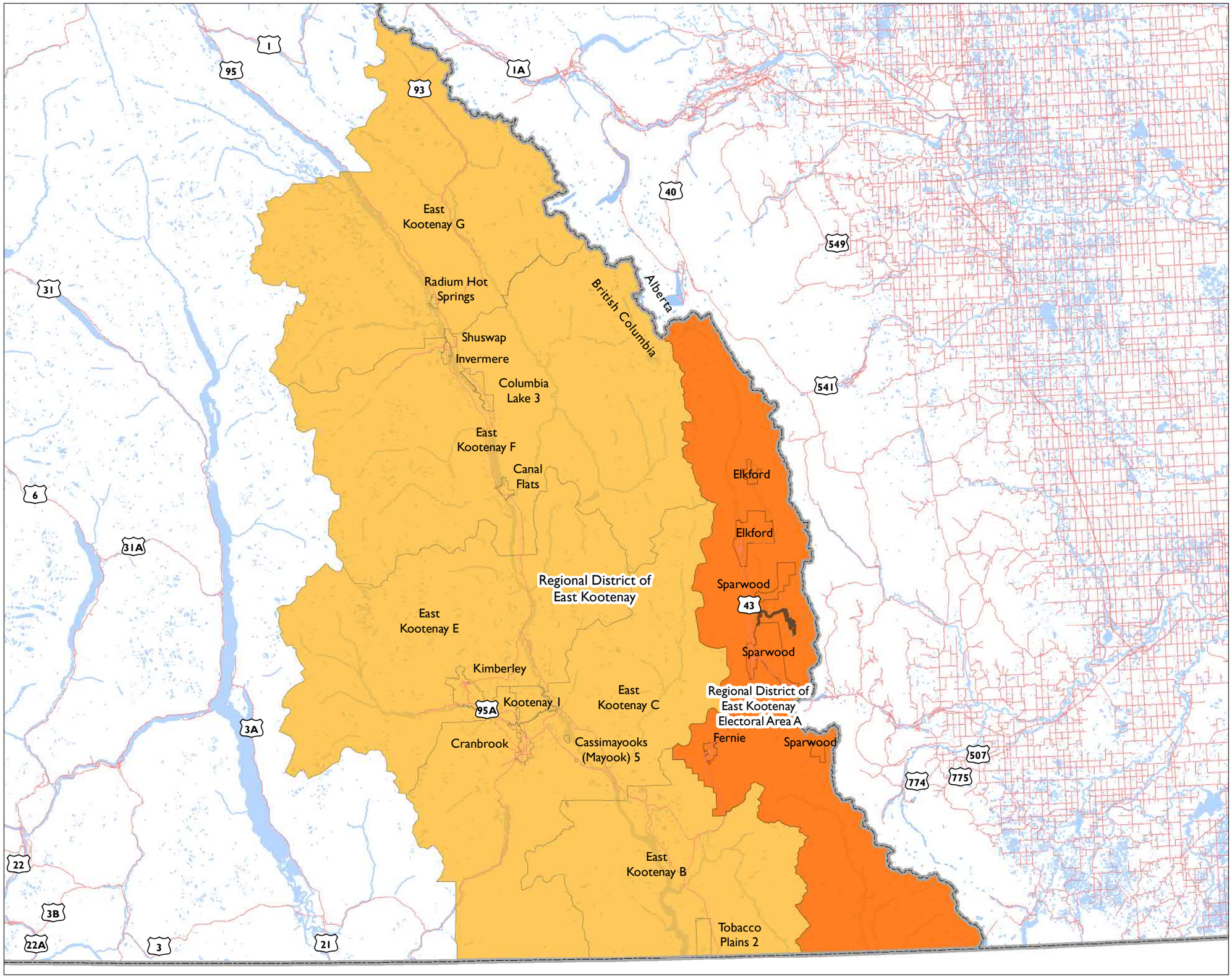
Map Created By: ECH
Map Checked By: LKD
Map Projection: NAD 1983 UTM Zone 11N

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



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 12
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
0 2.5 5 10 km

N
W E
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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

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 13
Land Use and Tenure Local Study Area

- Land Use and Tenure 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: 6/1/2015

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

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 14
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

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: 5/29/2015

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

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Appendix A

Project Interaction Matrix

Project Interactions Matrix and Candidate Valued Components

Activity	Candidate Valued Components											
	Air Quality	Acoustic Environment	Aquatic Health (includes fish and fish habitat, water quality, etc.)	Landscapes and Ecosystems	Vegetation	Wildlife and Wildlife Habitat	Archaeological Resources	Traditional Use and Traditional Knowledge	Economics	Socio-economics and Community Health	Land Use and Tenure	Visual Aesthetics
Site Preparation and Construction												
Vegetation clearing and removal of overburden/soils	X	X	X	X	X	X	X	X	X	X	X	X
Construction of natural gas supply	X	X	X	X	X	X	X	X	X	X	X	X
Construction of transmission line/power supply	X	X	X	X	X	X	X	X	X	X	X	X
Construction of plant area, ancillary structures, and site infrastructure (including shops, offices, and conveyors, fuel and explosives storage)	X	X	X	X	X	X	X	X	X	X	X	X
Construction of haul roads and access roads	X	X	X	X	X	X	X	X	X	X	X	X
Construction of rail load-out facility, and rail siding	X	X		X	X	X	X	X	X	X	X	X
Construction of water supply	X	X	X	X	X	X	X	X	X	X	X	X
Materials and equipment storage			X	X	X	X	X	X	X		X	X

Activity	Candidate Valued Components											
	Air Quality	Acoustic Environment	Aquatic Health (includes fish and fish habitat, water quality, etc.)	Landscape and Ecosystems	Vegetation	Wildlife and Wildlife Habitat	Archaeological Resources	Traditional Use and Traditional Knowledge	Economy	Socio-economics and Community Health	Land Use and Tenure	Visual Aesthetics
Operations												
Pit development (drilling and blasting of pit areas)	X	X	X	X	X	X	X	X	X	X	X	X
Resource extraction and processing	X	X	X					X	X	X		
Waste rock management area (placement and development)	X	X	X	X	X	X	X	X	X	X	X	X
Onsite loading and hauling to rail load-out	X	X	X		X	X		X	X		X	X
Fuel and explosives storage and handling			X			X				X		
Sewage and wastewater treatment	X		X									
Operation and use of facilities and site infrastructure (including transmission line, water supply, transportation of workers/staff/materials/equipment)	X	X	X			X		X	X	X		X
Use of the rail line and load-out	X	X	X				X	X	X	X	X	X
Decommissioning, Closure, and Reclamation												
Removal of facilities and infrastructure	X	X	X		X	X	X		X		X	X
Disposal of materials	X	X	X		X				X	X	X	X
Transport of materials and equipment	X	X			X				X	X		
Site remediation	X	X	X		X	X			X			X
Reclamation of disturbed areas	X	X	X	X	X	X		X	X		X	X