Appendix 4-U

Project Description

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Project Description

October 2014

Submitted to:

Canadian Environmental Assessment Agency
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and

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GLOSSARY AND ABBREVIATIONS

AIA	Archaeological impact assessment
AIR	Application information requirements
AMA	Access Management Area
AOA	Archaeological overview assessment
ANFO	Ammonium nitrate/fuel oil
ARD	Acid rock drainage
ASTM	American Society for Testing and Materials
BC	British Columbia
BC CDC	British Columbia Conservation Data Centre
BCEAA	British Columbia Environmental Assessment Act
bcm	Bank cubic meters
BEC	Biogeoclimatic ecosystem classification
CCME	Canadian Council of Ministers of the Environment
CEA Agency	Canadian Environmental Assessment Agency
CEAA	Canadian Environmental Assessment Act
CCME	Canadian Council of Ministers of the Environment
CEO	Chief Executive Officer
COSEWIC	Committee on the Status of Wildlife in Canada
CHPP	Coal Handling and Coal Preparation Plant
CP	Canadian Pacific
CPP	Coal Preparation Plant
DFO	Fisheries and Oceans Canada
DMC	Dense (heavy) Media Cyclone
EA	Environmental Assessment
EAO	Environmental Assessment Office (British Columbia)
EVSTF	Elk Valley Selenium Task Force
EMP	Environmental Management Plan
FOB	Free on board
FSR	Forest service road

GHG	Greenhouse gases
ha	Hectares
IBC	International Building Code
km	Kilometre
Ktonnes	Kilotonnes
L	Litres
LSA	Local Study Area
m	Metres
masl	Metres above sea level
MBtu/hr	One thousand British Thermal Units per hour
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations (British Columbia)
MOE	Ministry of Environment (British Columbia)
MEM	Ministry of Energy and Mines (British Columbia)
MET	Metallurgical coal
Mg/L	Milligrams per litre
ML	Metal leaching
mm	Millimetres
M ROMt	Million run-of-mine tonnes
NO_2	Nitrogen dioxide
NOW	Notice of Work
° C	Degrees Celsius
OCP	Official Community Plan
PCI	Pulverized coal for injection
PD	Project Description
PEA	Preliminary Economic Assessment
PFS	Prefeasibility Study
PM	Particulate Matter
psi	Pounds per square inch
RDEK	Regional District of East Kootenay
RIC	Resource Information Standards Committee
ROM	Run-of-mine

ROMt	Run-of-mine tonnes
RSA	Regional Study Area
SARA	*Species at Risk Act*
Se	Selenium
SOI	Statement of Intent
SO_2	Sulphur dioxide
TEM	Terrestrial Ecosystem Mapping
tpd	Tonnes (metric) per day
tph	Tonnes per hour
tpy	Tonnes Per year
TSS	Total Suspended Solids
TU/TK	Traditional Use/Traditional Knowledge
UR	Urban Reserve

1.0 GENERAL INFORMATION AND CONTACTS

1.1 General Overview of the Project

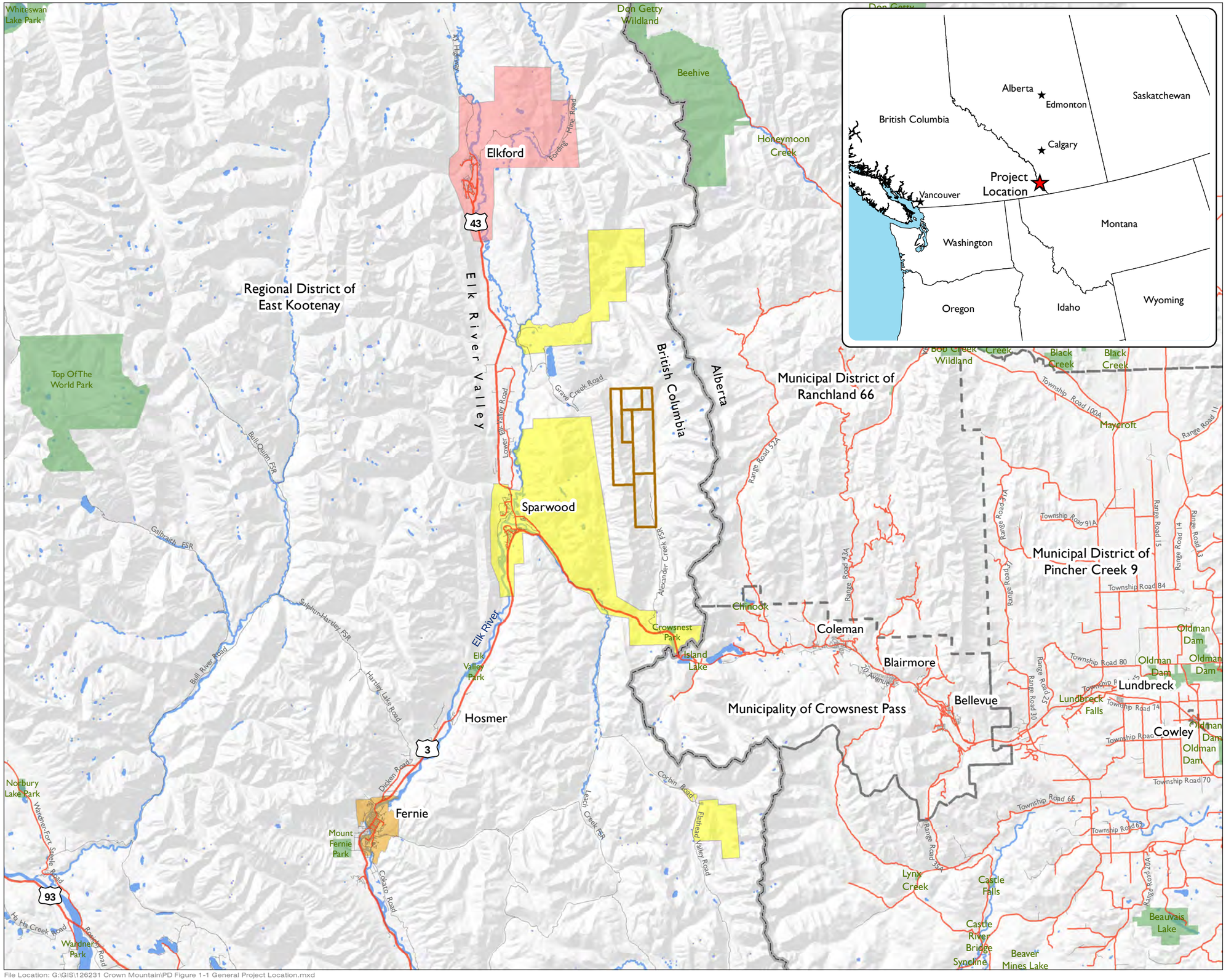
The Crown Mountain Coal Project (the Project) is a proposed open pit metallurgical coal mine in the Elk Valley coal field in the East Kootenay Region of south eastern British Columbia (**Figure 1-1**). The Project proponent is NWP Coal Canada Ltd. (NWP Coal), a wholly owned subsidiary of Jameson Resources Limited.

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 2012 resulted in the definition of a total open pit coal resource of 90 million tonnes for the Project. In 2013, an expanded exploration program resulted in a resource increase to 99 million tonnes. The Project occurs between several existing metallurgical coal mines in the Elk Valley and Crowsnest coal fields, the nearest being Teck Corporation's (Teck) Elkview (8 km southwest) and Line Creek (12 km north) mines. The Elk Valley and Crowsnest coal fields are home to five of Canada's 23 producing coal mines. The coal mines in the area produce over 21 million tonnes per annum of export quality metallurgical and thermal coal, over 70% of Canada's total coal exports annually, making the Elk Valley coal field the most productive in the nation.

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 1-1**). By road, the Project is situated approximately 30 km from Sparwood. The Project is accessed by several Forest Service Roads, including Grave Creek Road in the northwest and Alexander Creek Road from the south.

This document has been prepared following environmental assessment (EA) guidelines prepared by the British Columbia Environmental Assessment Office (BC EAO) and the Canadian Environmental Assessment Agency (CEA Agency). The guidelines are as follows:

- Guidelines for Preparing a Project Description for an Environmental Assessment in British Columbia, 2008 (BC EAO, 2008).
- Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act* 2012 (CEAA, 2012).



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 1-1
General 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: 10/22/2014

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

1.2 Proponent Contact Information

1.2.1 Name of the Designated Project

The Project is commonly referred to as the Crown Mountain Coking Coal Project.

1.2.2 Name of the Proponent

The name of the proponent is NWP Coal Canada Ltd.

1.2.3 Address of the Proponent

Suite 800, 1199 West Hastings Street
Vancouver, BC
V6E 3T5
Canada

Telephone: +1 (604) 629 8605
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1.2.4 Chief Executive Officer

Art Palm, Chief Executive Officer and Executive Director

Contact Information
Suite 800, 1199 West Hastings Street
Vancouver, BC
V6E 3T5
Canada

Telephone: +1 (435) 650 1122
Facsimile: +1 (603) 719 1718
Email: art.palm@jamesonresources.com.au

1.2.5 Principle Contact Person

Art Palm, Chief Executive Officer and Executive Director

Contact Information
As noted above

1.3 Parties Consulted During the Preparation of the Project Description

As part of the preparation process for the Project Description and other related preliminary Project activities, NWP Coal has had preliminary discussions and interaction with:

- Ktunaxa Nation (Ktunaxa);
- Shuswap Indian Band;
- BC EAO;
- BC Ministry of the Environment (MOE);
- BC Ministry of Forests, Lands and Natural Resource Operations (MFLNRO);
- BC Ministry of Energy and Mines (MEM); and the
- CEA Agency.

It is recognized that other groups such as the Métis Nation of BC may be consulted as the Project moves forward. **Sections 6.0** and **7.0** provide additional details regarding preliminary consultation and engagement activities that have taken place with Aboriginal groups and other parties, respectively, as well as plans for future engagement over the course of the Project.

1.4 Other Relevant Information

1.4.1 Regulatory Requirements of Other Jurisdictions

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]). A preliminary estimate of surface disturbance associated with the Project is up to 1,100 ha, which includes the pits, waste rock management areas, buildings, and transportation infrastructure (e.g., haul road and rail load-out).

It is anticipated that the proposed Project will be subject to an environmental assessment under 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.

1.4.2 Regional Environmental Studies

Although no regional environmental studies have been completed for the Elk Valley area, several relevant documents were reviewed and considered during the development of the Project Description, including, but not necessarily limited to:

- Valley-Wide Selenium Management Action Plan for Teck Coal Limited Operations in the Elk Valley, Summary Report (Teck Coal Limited, 2013a);
- Area Based Management Plan: The Elk Valley Water Quality Plan Terms of Reference (Teck Coal Limited, 2013b); and
- Elk Valley Selenium Task Force (EVSTF) Update and Overview – 2009 (Pumphrey & Gilron, 2009).

These documents provide information on the management and the natural environment of the Elk Valley and will be considered over the course of the Project's environmental assessment. Additional relevant documents will be consulted, as applicable. The CEA Agency has been contacted regarding relevant regional environmental studies and to date, no studies have been completed for the Elk Valley.

2.0 PROJECT INFORMATION

The information presented in **Section 2.0** is based on a number of sources, including, but not necessarily limited to: the Crown Mountain Technical Report (Norwest, 2013a), the Crown Mountain Preliminary Economic Assessment (Norwest, 2013b), the Crown Mountain Pre-Feasibility Study (Norwest, 2014), and recent corporate presentations and press releases.

2.1 Project Overview and Background

2.1.1 Project Purpose and Rationale

If approved, the proposed Project would create a new coal mine within the Elk Valley contributing significantly to local economies, particularly the communities of Sparwood, Elkford, Crowsnest Pass, and Fernie. The high quality metallurgical coal would be transported via railway to the Port of Vancouver and subsequently shipped overseas for use in steelmaking.

2.1.2 Site History

The history of exploration and development of this coal property extends back to coal development activities in southern Alberta and southeast British Columbia of the late nineteenth century. At that time, the Crows Nest Pass Coal Company was established in 1897 to develop the coal resources of the British Columbia side of the Crowsnest Pass. Several subsidiaries were created to operate ancillary activities. They included the Morrissey, Fernie and Michel Railway, and the Crows Nest Pass Electric Light and Power Company. Various mines were opened at Coal Creek, Natal, Michel and Morrissey. After the Second World War demand for coal dropped and the company diversified through a subsidiary, Crow's Nest Pass Oil and Gas Company. As the 1950s and 1960s progressed, the mines were closed and the company moved into the forest products area.

The first exploration, including percussion holes, trenching, and geological mapping was completed on the Crown Mountain Property in 1969 by Crows Nest Pass Oil and Gas. From 1979 to 1981, Crows Nest Resources, a wholly owned subsidiary of Shell Canada Resources, completed additional exploration activities on the property including reverse circulation drill holes, trenching, and bulk sampling. Detailed mapping by the British Columbia Geological Survey in 1985 included 87 coal outcrop locations, from which 10 samples were collected for reflectance determinations. There is limited historical coal quality data.

NWP Coal entered into an option agreement to acquire the Crown Mountain Project in April 2011. The MEM issued tenure May 2012 and the exploration approvals in June 2012. NWP Coal completed an extensive exploration program in 2012 which included 40 reverse circulation drill holes for 5,707 m (**Photo 1**), down-hole wireline geophysical logging, trenching, property wide geological mapping and coal quality test work.

A follow-up exploration drilling program was initiated at Crown Mountain in mid-2013 and was focused on the North and South Blocks of the Project area. The drilling program was designed to gather information required to quantify the coking characteristics of the coal and to allow a more accurate estimate of wash plant yield. **Photo 2** illustrates a typical coal core sample.

Photo 1: **Exploration drill site at the Crown Mountain Property.**

Photo 2: **Close-up of a coal core sample from the Crown Mountain Property.**

2.1.3 Resource Summary

Exploration activities completed to date have identified seven major coal seams on the property:

- 8 Upper Seam;
- 8 Middle Seam;
- 8 Lower Seam;
- 9 Seam;
- 10 Upper Seam;
- 10 Middle Seam; and
- 10 Lower Seam.

The average thickness for the major coal seams is estimated at over 35 m in the north with lower thicknesses in the south. In addition there are local "Rider Seams" of mineable thickness. Additional details regarding the Crown Mountain site geology can be found in **Section 5.1.2**.

2.1.3.1 Resource Estimate

Run of mine (ROM) coal reserves are estimated at 56 million tonnes, of which 50 million tonnes are proven and 6 million tonnes are probable (**Table 1**). It must be noted that these figures exclude the southern extension inferred resource area. It is expected that reserves will increase following the completion of additional exploration work in the southern extension area.

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.

Table 1: Summary of ROM Coal Reserves (Ktonnes) at the Crown Mountain Project.

Area	ASTM Group	Proven		Probable	
		Coking	PCI	Coking	PCI
North Pit	Bituminous	7,252	756	4,907	1,192
East Pit		3,563	461	0	0
South Pit		31,784	5,913	0	0
Sub-Total		42,599	7,131	4,907	1,192
Total Proven & Probable		49,730		6,099	
Total		55,829			

2.1.4 Estimated Capital Costs

The estimated capital costs of the proposed Project are $370 million based on the Project's Pre-feasibility Study.

2.1.5 Employment

The number of employees during Project operation is estimated to average 240 hourly full-time positions, which will peak at 266 positions. The average number of salary staff during operation is estimated to be 58. With an expected 16 year operating mine life, these positions equate to a total of approximately 4,768 person years of employment (based on an average of 240 positions).

The number of employees during construction is estimated to range from 50 to over 200 people, including both hourly and salaried personnel, depending on the season and the amount of work in progress. Final numbers will be determined as part of further socio-economic analyses.

2.2 Designated Activities

Based on CEAA 2012, the Crown Mountain Project is a Designated Project under Section 16 of the *Regulations Designating Physical Activities*. Specifically, Section 16 states that an EA may be required if a project involves:

> *"the construction, operation, decommissioning and abandonment of a new (d) coal mine with a coal production capacity of 3 000 t/day or more"*

Under the *Reviewable Projects Regulations* of the British Columbia *Environmental Assessment Act* 2002, the Project is considered a Reviewable Project. Part 3, Section 8 of the *Reviewable Projects Regulations* details the criteria for new coal mines in BC, which states:

> *"A new mine facility that, during operation, will have a production capacity of > 250,000 tonnes/year of clean coal or raw coal or a combination of both clean coal and raw coal."*

The anticipated production capacity of the Project is 3.7 million run-of-mine tonnes (M ROMt) per annum (approximately 10,150 tpd) with a predicted mine life of approximately 16 years (based on development of the North, East, and South Pits). As such, the Project will exceed the 3,000 tpd production capacity level noted in Section 16 (a) of the federal *Regulations Designating Physical Activities*. In addition, the Project will produce greater than 250,000 tpy of clean coal as noted in Part 3 of the provincial the *Reviewable Projects Regulations*.

2.3 Components and Activities

2.3.1 Major Physical Works and Features

The following section provides details regarding key mine components and activities. Components include:

- Surface extraction areas;
- Waste rock management areas;
- Plant area (including shops and offices);
- Clean coal transportation route (overland conveyor and haul road);
- Rail load-out facility and rail siding;
- Power supply;
- Natural gas supply;
- Explosives storage;
- Fuel storage;
- Sewage treatment; and
- Water supply.

Specific project features and activities are discussed in further detail in the following sections. **Figure 2-1** details the conceptual Project layout and infrastructure. Generally, the physical works and features described are planned to be under the care and control of NWP Coal during both construction and operation with the exception of existing infrastructure (e.g., existing access roads, rail lines, and gas and transmission lines). As the Project progresses, it is expected that details on the care of control of Project activities and those components that may involve a third party (e.g., rail, road, and transmission and gas services) will be confirmed and described in the Project EA.

2.3.1.1 Extraction Areas

Over the life of the Project, coal will be mined from three areas:

- North Pit;
- East Pit; and the
- South Pit.

Each of the pits will be developed sequentially based on the design criteria summarized in **Table 2**. **Figures 2-1** to **2-6** illustrate how the pits are expected to develop over the life of the Project.

Table 2: Preliminary Pit Slope Guidelines

	Bedding Plane Dip	Berm Width	Berm Frequency
Footwall	< 35°	0 m	Not required
	36° to 50°	8 m	70 m
	51° to 65°	8 m	30 m
	> 65°	10 m	30m
Highwall	Inter-ramp angle is 48° for a maximum wall height of 150 m. Walls higher than 150 m will require an additional 20 m catch bench between stacks.		

The surface mineable area of Crown Mountain is planned for development using the truck/shovel mining method. It is expected that the mining conditions will be very similar to those at the nearby mines which also use this extraction method.

Pit development will require drill and blast operations. Drill and blast operations will be carried out on a continuous basis as part of the normal mining operation. The selected drills will be required to drill to a depth of approximately 11.5 m in a single pass to allow for benches up to 10 m high, including subgrade, to be blasted. It is anticipated that the blasting agent would be composed of 70% Ammonium nitrate/fuel oil (ANFO), 20% Heavy ANFO, and 10% a waterproof product.

2.3.1.2 Waste Rock

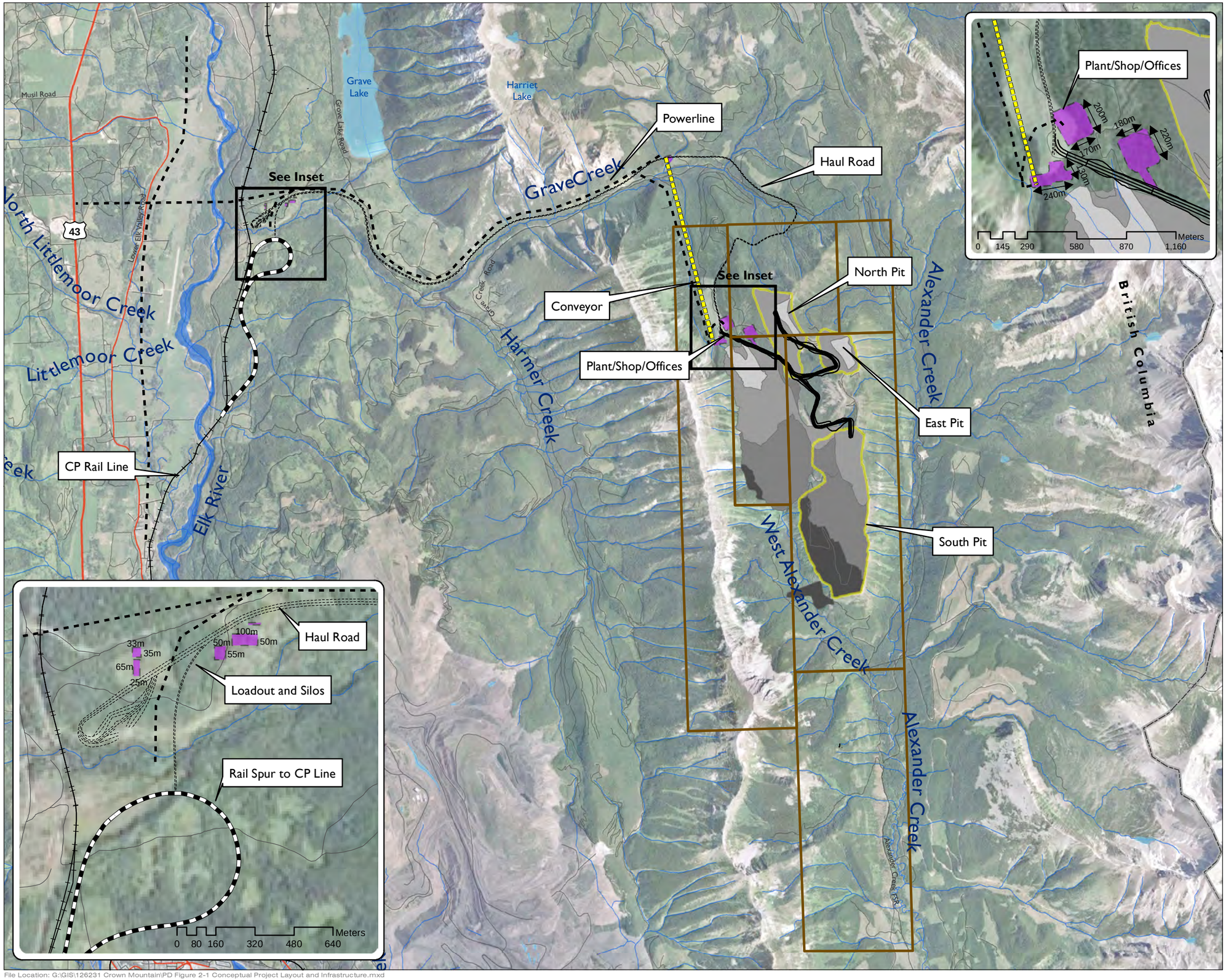
The Project is expected to have an average strip ratio of 4.84 bank cubic metres (bcm)/ROMt over the life of the Project. This strip ratio is presented as per established coal industry standards. This is considered quite low and is significantly below reported strip ratios for other operating mines in the area.

Waste rock from the Project will be managed using a combination of both external waste rock management areas and internal waste rock management areas, which backfill mined-out pit areas. The proposed external waste rock management area is situated within the West Alexander Creek valley (**Figure 2-1**). The northern extent is adjacent to the plant site, and the most southern extent is located approximately 1 km north of the confluence with the Alexander Creek. Design guidelines for the external waste rock management area are summarized below in **Table 3.**

Table 3: Waste Rock Management Area Design Guidelines.

Item	Design Guideline
Maximum Lift Height	• 30 m above areas with down-slope exposure to personnel • 50 m for non-critical areas with shallow foundation slopes • 150 m for non-critical areas with shallow foundation slopes in relatively narrow and confining valleys (i.e., where the dump progresses

Item	Design Guideline
	downstream along West Alexander Creek. Note: Dumps will require specific flow-slide assessment as part of permit preparation.)
Catch Berm Height	• 2 m high for lifts < 30 m • 3 m high for 30 m to 50 m lifts • 9 m high for 150 m lifts; specific risk mitigation activities will be required for work below high-dump lifts
Bench Width	• 28 m wide for 30 m lifts • 46 m wide for 50 m lifts • 138 m wide for 150 m lifts
Angle of Repose for Waste Rock	• 37°
Overall Slope	• 2.25H:1V
Maximum Dump Foundation Slope (Initial Lift)	• 15° (Note: Foundation slopes less than 10° for lift heights > 150 m) • Road-fill construction across steeper foundations will require specific foundation preparation which could include stripping to competent foundation material or keying-in the toe of the fill slope



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Crown Mountain Coking Coal Project

Figure 2-1
Conceptual Project Layout and Infrastructure

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Pit Crest
- Buildings
- Pre-production
- Five Year Extent of Mine
- Ten Year Extent of Mine
- 12 Year Extent of Mine
- Watercourses
- Lakes
- Rivers
- BC/Alberta Border
- Coal Tenure Licenses and Application

SCALE 1:21,502
0 0.5 1 2 km

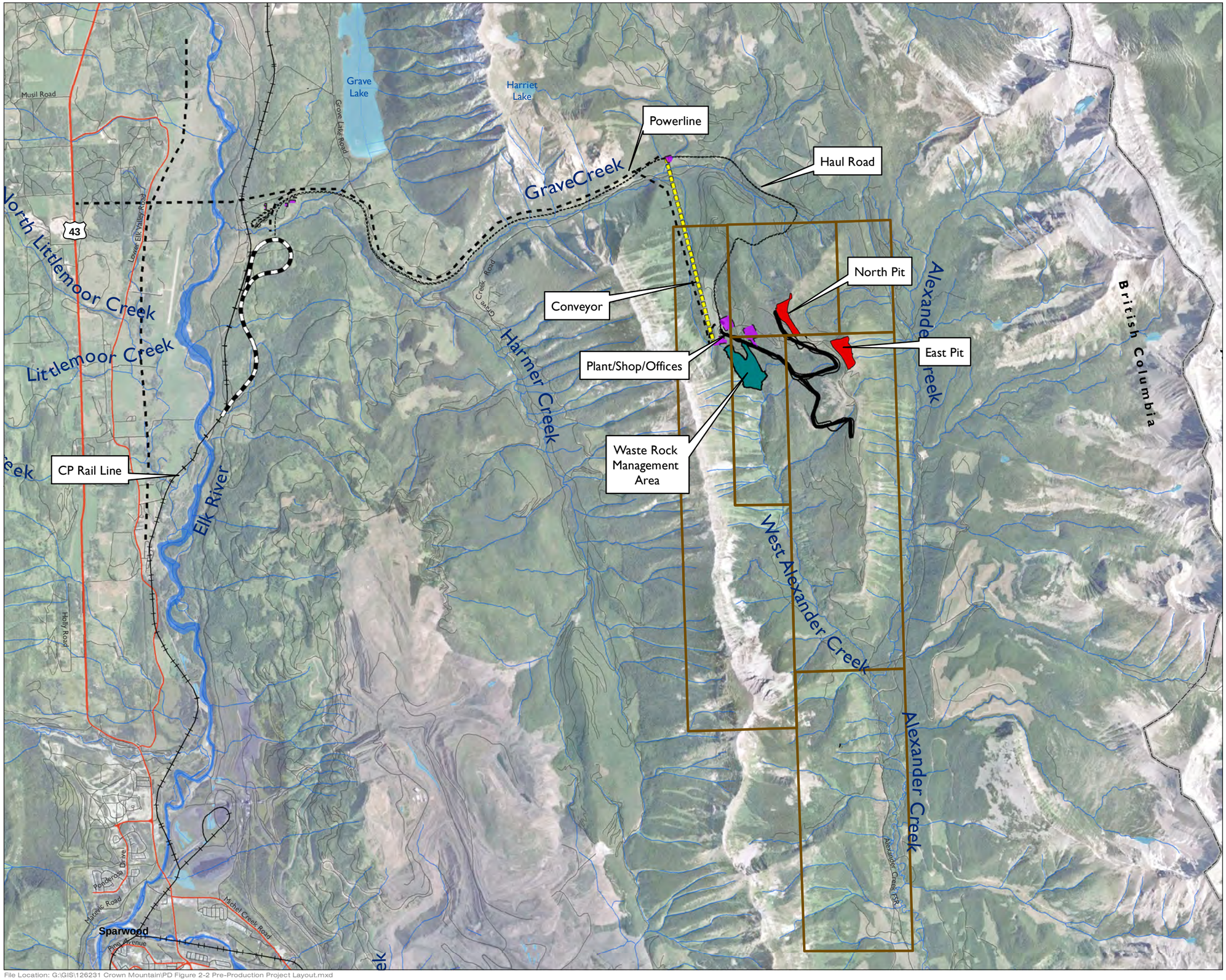
N
W E
S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-1 Conceptual Project Layout and Infrastructure.mxd



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Crown Mountain Coking Coal Project

Figure 2-2
Pre-Production Project Layout

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Watercourses
- Buildings
- Mine Pit
- Waste Rock Management Area
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:60,662

0 0.5 1 2 km

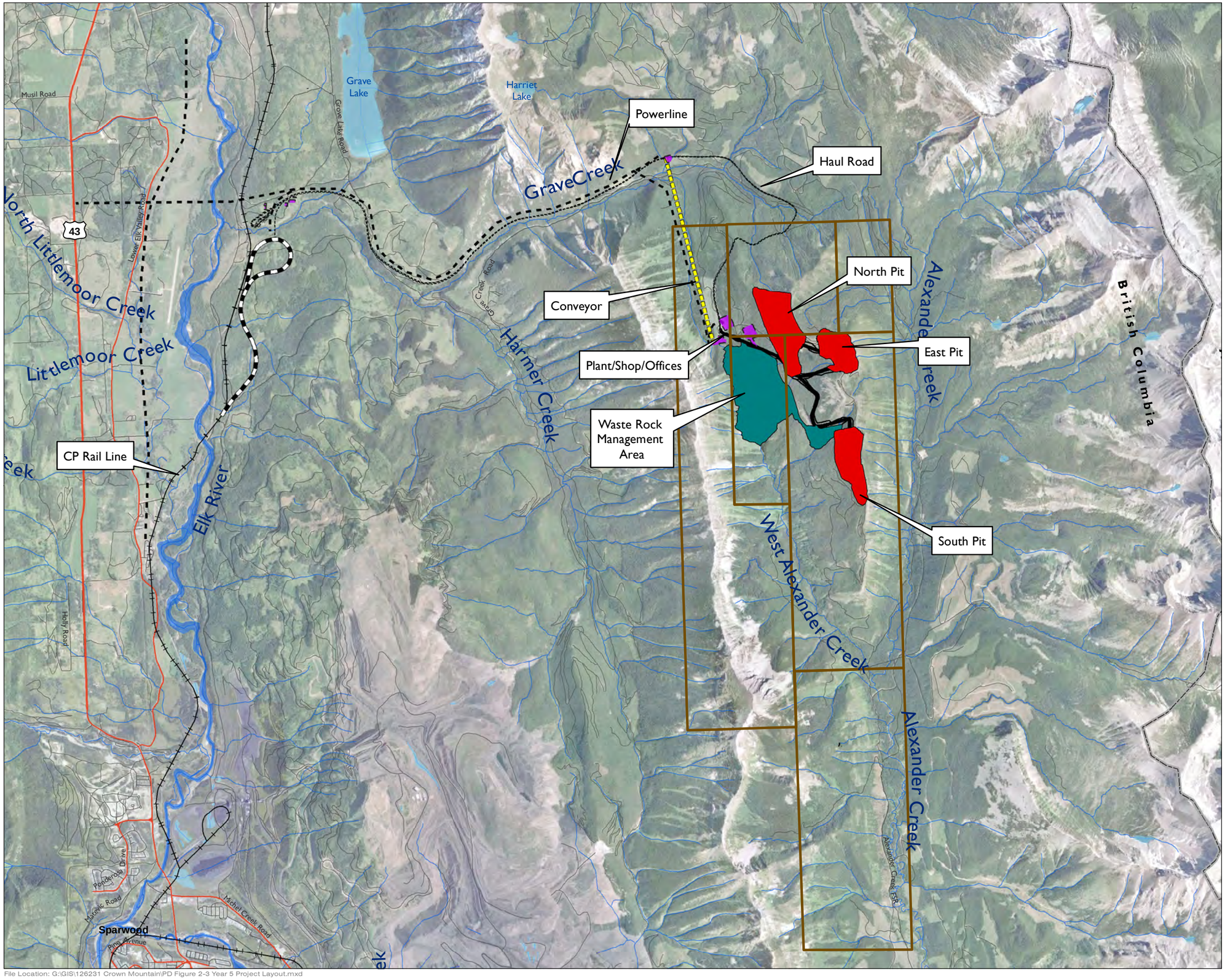
N
W E
S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-2 Pre-Production Project Layout.mxd



NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 2-3
Year 5 Project Layout

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor Option 1
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Watercourses
- Buildings
- Mine Pit
- Waste Rock Management Area
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:60,662

0 0.5 1 2 km

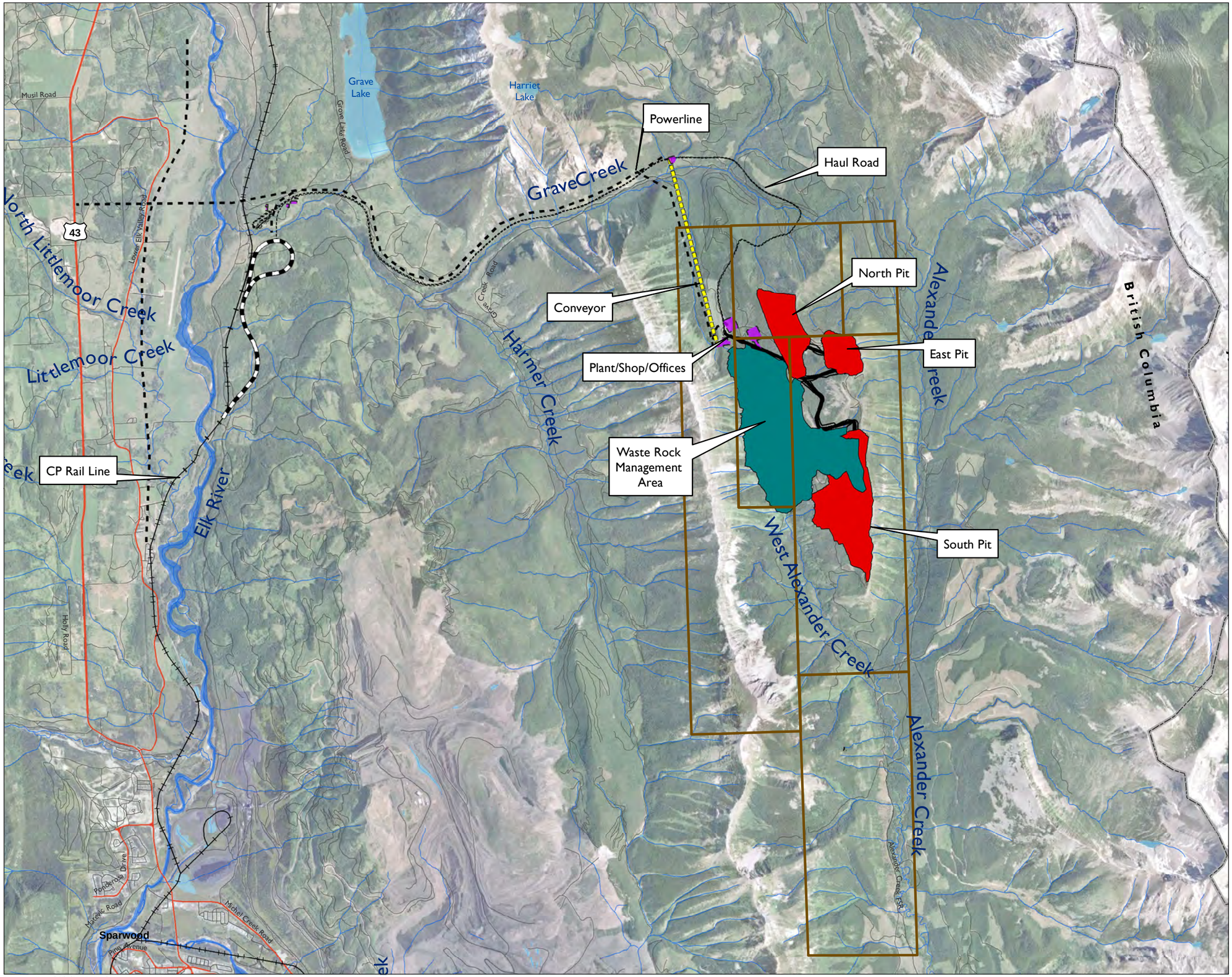
N
W E
S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-3 Year 5 Project Layout.mxd



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Crown Mountain Coking Coal Project

Figure 2-4
Year 10 Project Layout

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Watercourses
- Buildings
- Mine Pit
- Waste Rock Management Area
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:60,662

0 0.5 1 2 km

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S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

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

PROJECT: 12-6231
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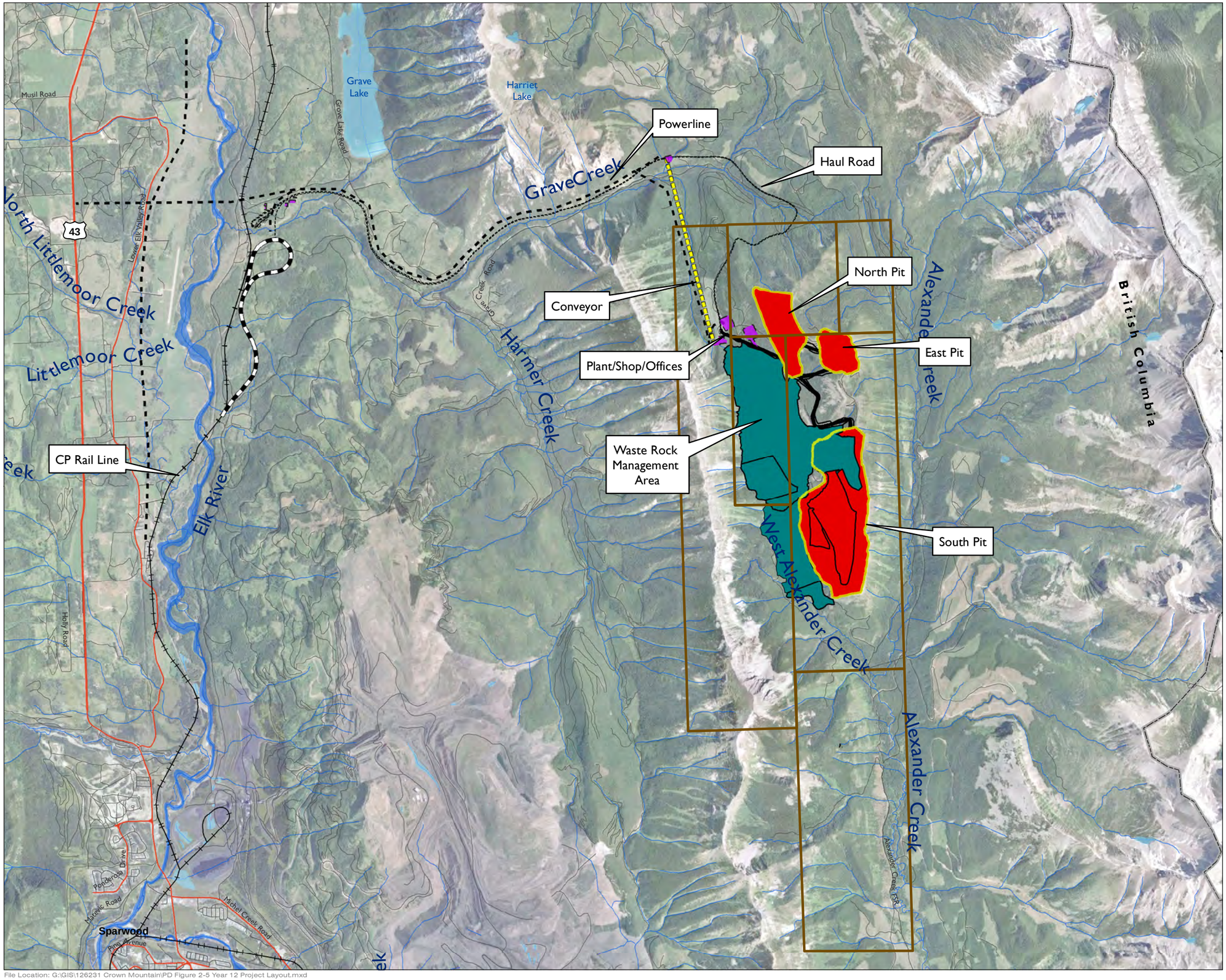
File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-4 Year 10 Project Layout.mxd



File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-5 Year 12 Project Layout.mxd

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Crown Mountain Coking Coal Project

Figure 2-5
Year 12 Project Layout

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Watercourses
- Buildings
- Mine Pit
- Waste Rock Management Area
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:60,662

0 0.5 1 2 km

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Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

Map Created By: ECH
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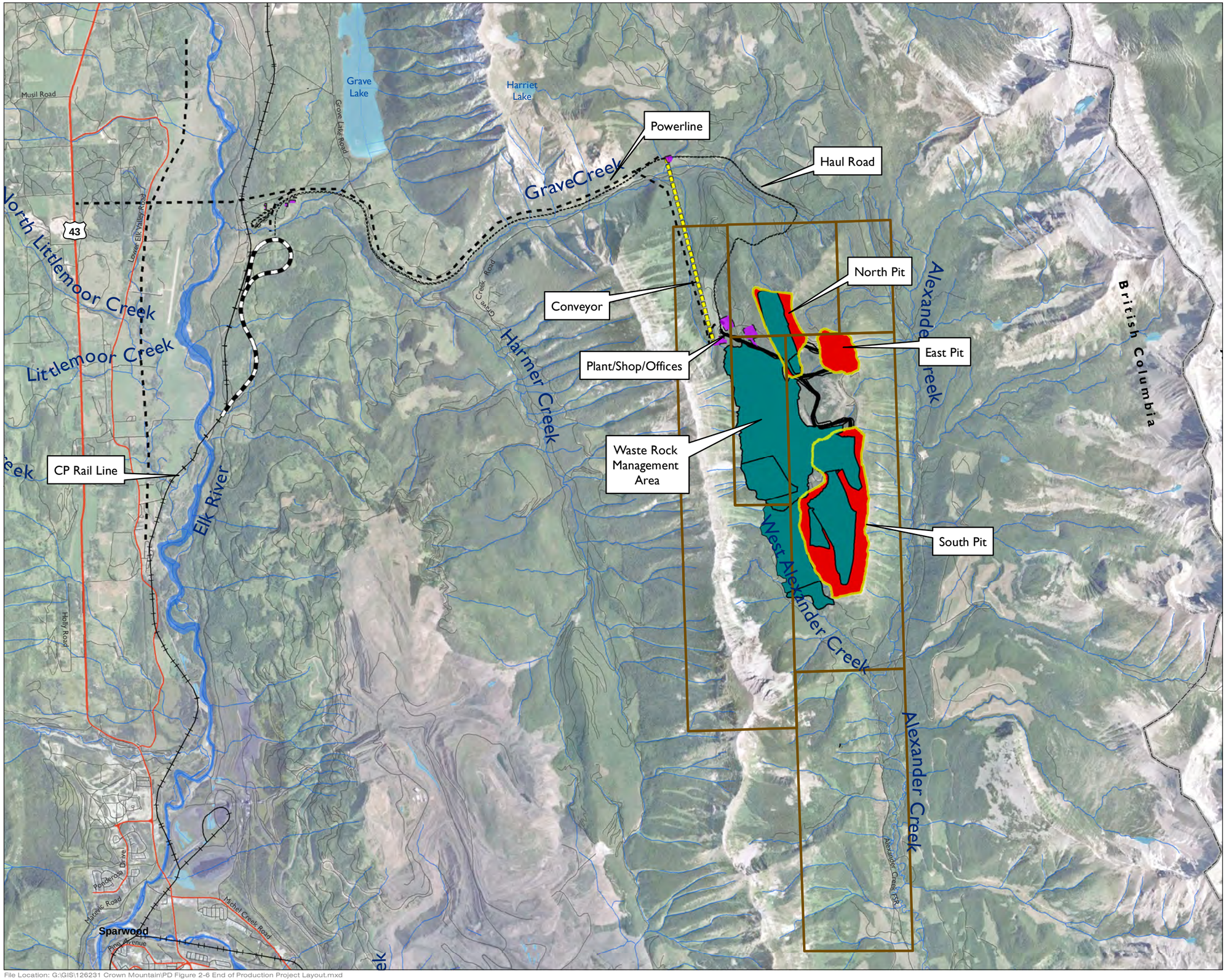

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 2-6
Year 16 End of Production Project Layout

- Highways
- Arterial Roads
- Local/Resource Roads
- BC Logging/Resource Roads
- Access Road
- Conveyor
- Haul Road
- Powerline
- Rail Spur
- Existing Rail Line
- Watercourses
- Buildings
- Mine Pit
- Waste Rock Management Area
- Pit Crest End of Mine Life
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:60,662

0 0.5 1 2 km

N W E S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited,

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 2-6 End of Production Project Layout.mxd

2.3.1.3 Plant Area

The plant area includes a raw coal stock pile, a processing plant, and site support facilities. The site support facilities are expected to include, but not necessarily be limited to an electrical sub-station, mine office, change house, warehouse, supply yard, and fresh and used water treatment and handling facilities. A conceptual layout of the plant area is illustrated in **Figure 2-7**. All buildings will be designed to meet relevant codes and guidelines such as the International Building Code (IBC), the British Columbia Building, Fire, and Plumbing Codes, Canadian Electrical Code, and Health, Safety and Reclamation Code for Mines in BC. The majority of the mine support facilities will be located in the main plant site area.

The mine support facilities are expected to be a combination of prefabricated and permanent structures. Where applicable, temporary or pre-owned type support facilities will be utilized to reduce initial capital requirements for the project.

Run-of-mine coal will require beneficiation to produce marketable products comparable to the other coal mine operations in the region. Two clean coal products will be produced at Crown Mountain, hard coking (COKING) coal and pulverized coal for injection (PCI) product.

Details regarding coal processing are provided in **Section 2.3.2.1**.

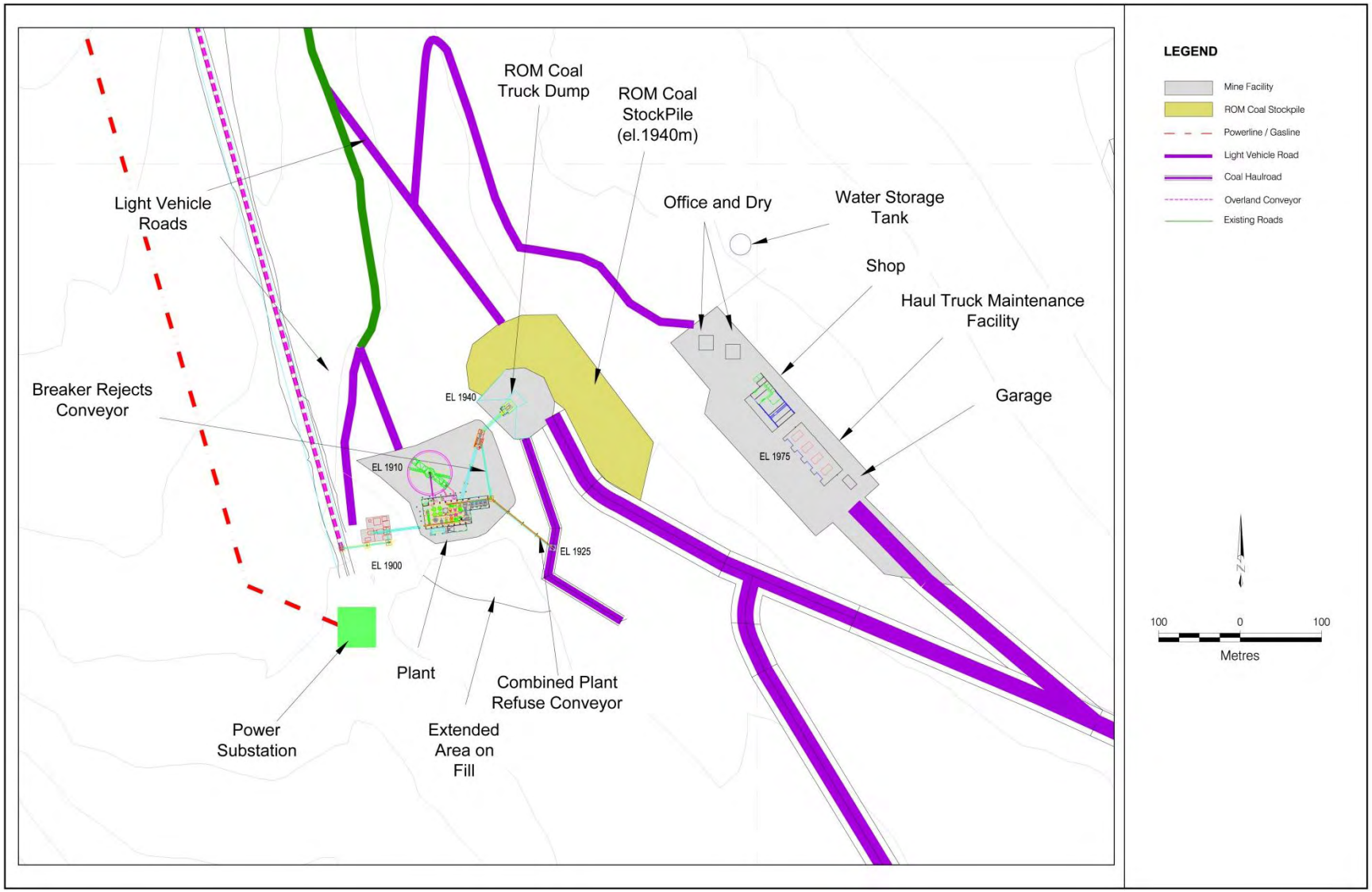

Figure 2-7: Conceptual Plant Layout

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2.3.1.4 Transportation of Clean Coal

The preferred option to transport coal from the plant site to the rail load-out area is a combination of overland conveyance and off-highway class haul trucks (**Figure 2-8**). The clean coal transport system is estimated at 12 km in total length. Following are details regarding each of the proposed transportation methods.

Overland Conveyor

A 3.2 km long overland conveyor will be used to transport the clean coal down to the transfer area and small stockpiling facility located in the upper reaches of Grave Creek (**Figure 2-9**). The overland conveyor would be fed by the transfer conveyor that has collected the dried clean coal from the thermal dryer and the clean coal from the dryer bypass conveyor. The overland conveyor would be approximately 760 mm wide and includes full covers and side skirts to protect the clean coal from wind effects.

Power to operate the conveyor will run through variable frequency drives. There is also the potential to develop regenerative power from this conveyor.

Coal Transfer Station

A coal transfer station will be constructed in the upper Grave Creek area at the termination of the overland conveyor (**Figure 2-10**). The transfer station includes a 250 tonne bin designed to receive coal and discharge into CAT 775 haul trucks with 103-tonne belly-dump trailers. The bin also has a bypass system to divert coal to ground storage if the bin is full or the material being conveyed needs to be diverted.

The diversion system or ground storage consists of a transfer conveyor and a radial stacker. The transfer conveyor allows the stockpile to be created in an area that the bin and loading operation will not be affected by the stockpile. The ground storage stockpile will be able to accommodate up to 60,000 tonnes, although the use of this stockpile is intended to be limited over the life of the Project.

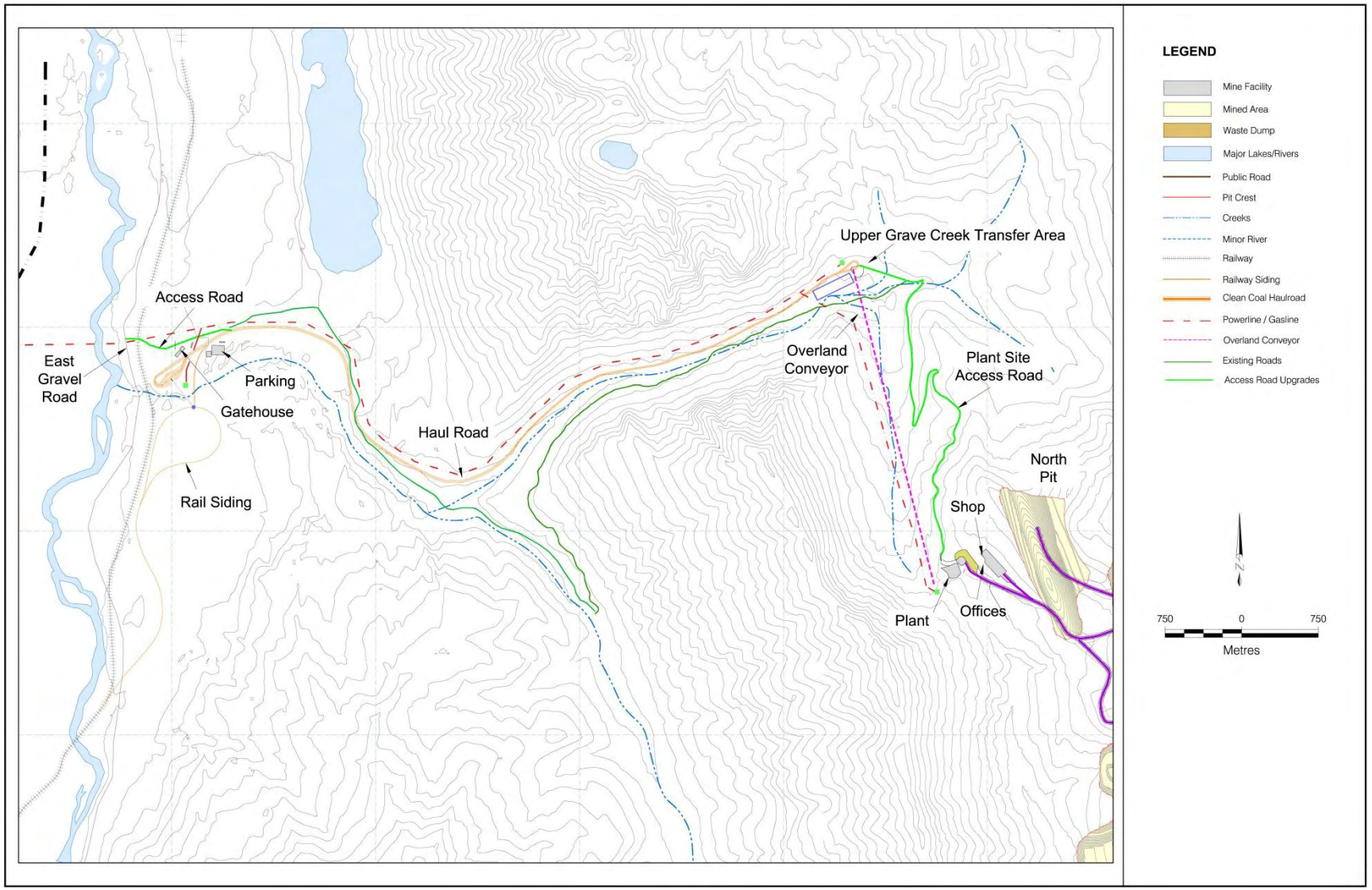

Figure 2-8: Conceptual Clean Coal Haul Route

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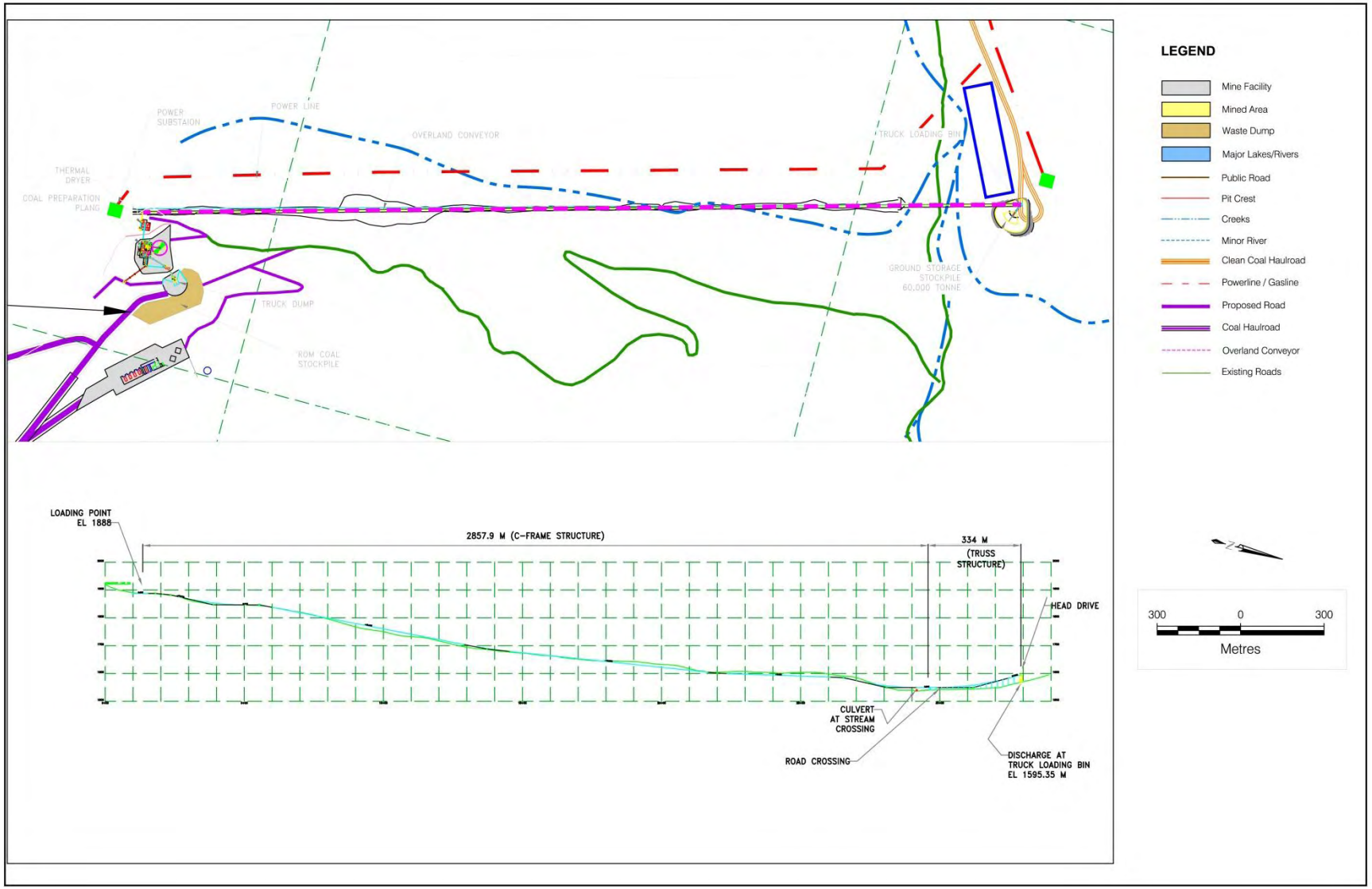

Figure 2-9: Conceptual Overland Conveyor Plan

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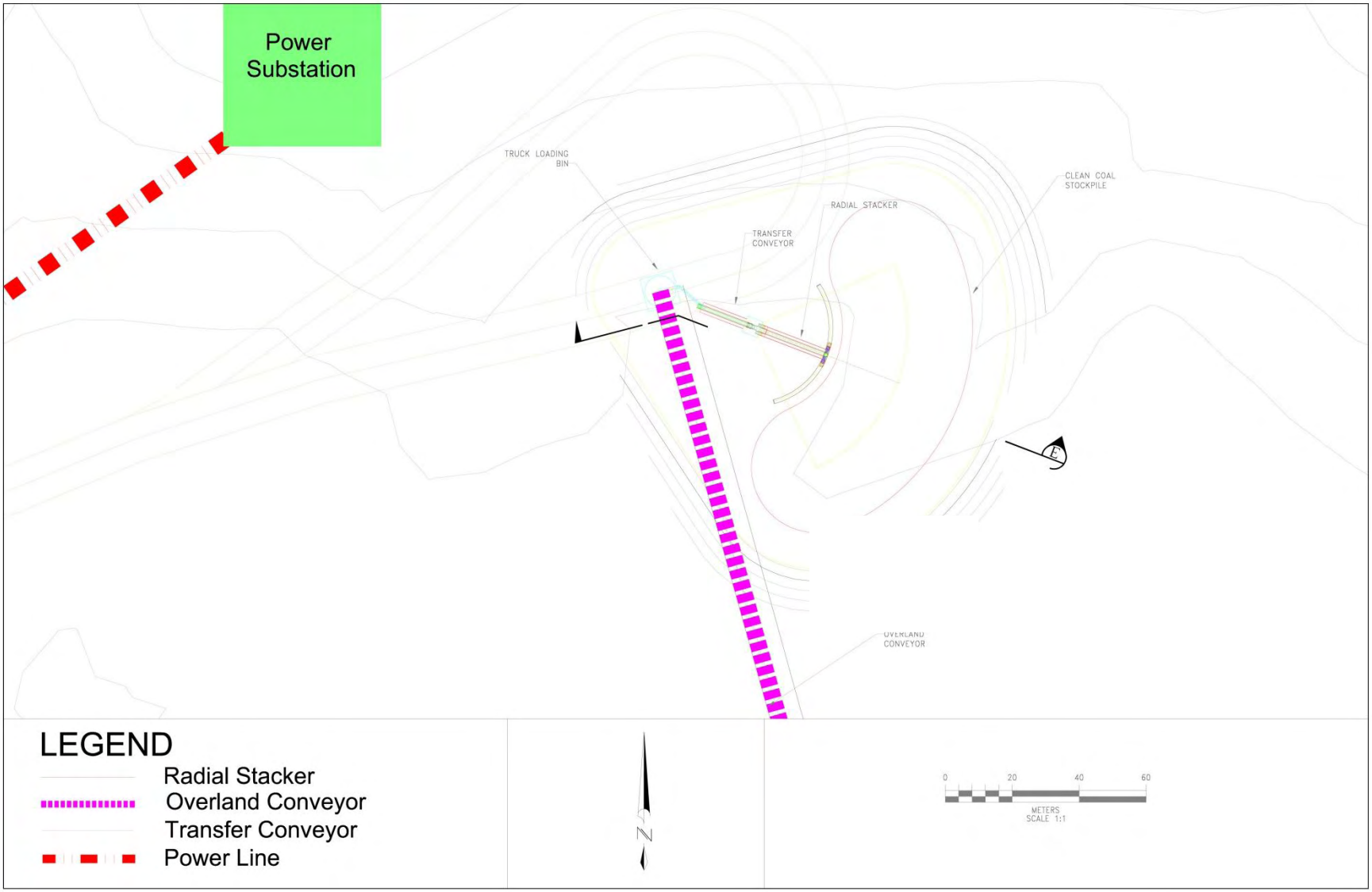

Figure 2-10: Conceptual Layout of the Clean Coal Transfer and Stockpiling Area

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Haul Road

The second leg of the clean coal transport system consists of a haul route from the transfer area to the coal load-out facility adjacent to the rail siding (**Figure 2-11**). There are existing forestry roads within the Grave Creek watershed that currently provide access to the Project area on a seasonal basis. A new haul road will be constructed independently of the existing Forest Service Road (FSR) to separate Project traffic from casual and recreational users in the area.

The haul road will be built to accommodate a midsize, off–highway haul truck. The design basis for the haul road is as follows:

- Minimum width for dual-lane haul road sections, 22 m;
- Minimum width for single-lane haul road sections, 14 m;
- Maximum grade, 8%;
- Ditches located on the uphill slope side of the haul road, 3 m wide;
- Berms located on the downhill slope side of the haul road, 2 m high; and
- Capping material over entire surface course of haul road, 6 in. deep.

The final road will also be designed to minimize cut and fill quantities. The haul road is anticipated to be approximately 8.8 km in total length. The haul road may cross a small creek which flows out of Grave Lake and into Grave Creek. Current designs are being evaluated for watercourse crossing, including a large diameter culvert or a segmented bridge.

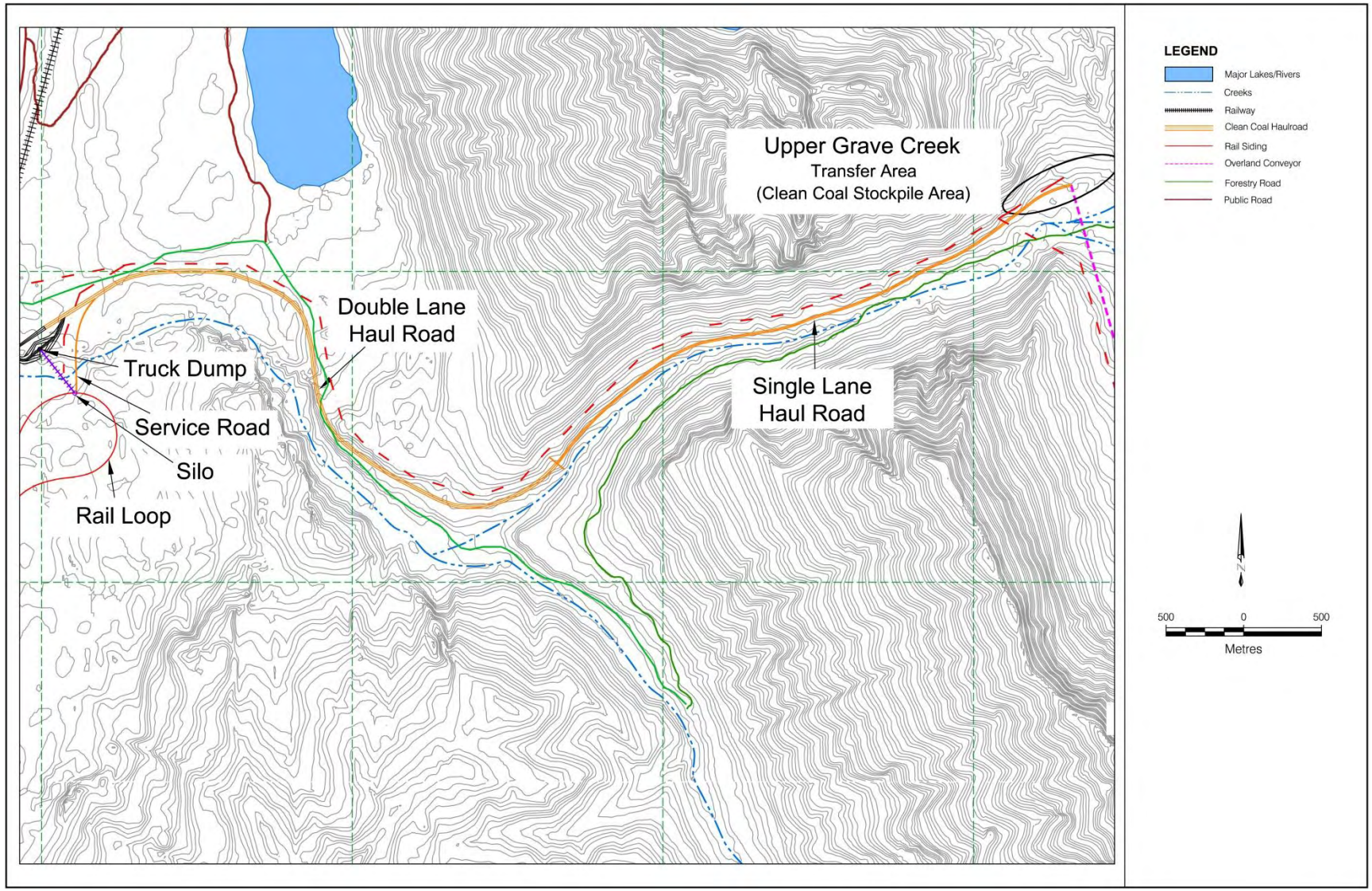

Figure 2-11: Conceptual Plan for the Clean Coal Haul Route

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2.3.1.5 Rail Load-out and Rail Siding

Load-out Facility

The coal load-out facility will be located alongside the new rail loop as illustrated in **Figure 2-12**. A conceptual plan view of the load-out facility is provided in **Figure 2-13**. At the end of the clean coal haul road, a drive-over 300 tonne hopper for belly dump haul trucks will be constructed. Access to the dump structure will be via gravel-fill access ramps. An apron feeder will meter the material out of the truck dump hopper at approximately 400 tph onto the silo feed conveyor. The diameter of the silo is 20 m, with the silo feed conveyor having a width of 914 mm. The silo feed conveyor is constructed framed as an open gallery which allows for greater spans between supports.

The conveyor empties into a 16,000 tonne silo constructed of reinforced concrete structure with a steel lined mass flow discharge. The silo includes a rapid discharge batch rail loading system that quickly weighs each load in a small hopper and fills each rail car as the train continues running along the rail spur at up to 6 km/h. This rapid batch loading system assures that each car is fully loaded and does not exceed the maximum load. The conceptual layout shows the silo located directly over the rail spur in a straight section of the alignment, although the final location will be determined based on site geotechnical studies and other factors.

The rail load-out area includes various other auxiliary facilities that will provide security and support for Project operations (**Figure 2-12**). The lower facilities will include: a guard house; light vehicle wash; drug and alcohol testing/ orientation building; and a small dry.

Rail Siding

The Project is located in close proximity to the existing CP rail line near Sparwood, BC. A new rail siding will be constructed adjacent to the rail that services three of Teck's coal mine operations located further to the north of the Crown Mountain Project. Coal will travel by rail (estimated 1,200 km) to a port terminal in Vancouver for shipment overseas.

The rail siding will accommodate up to 152 cars. A conceptual layout of the rail siding is illustrated in **Figure 2-14**. The final design will be according to CP guidelines for track clearances, construction, and grades.

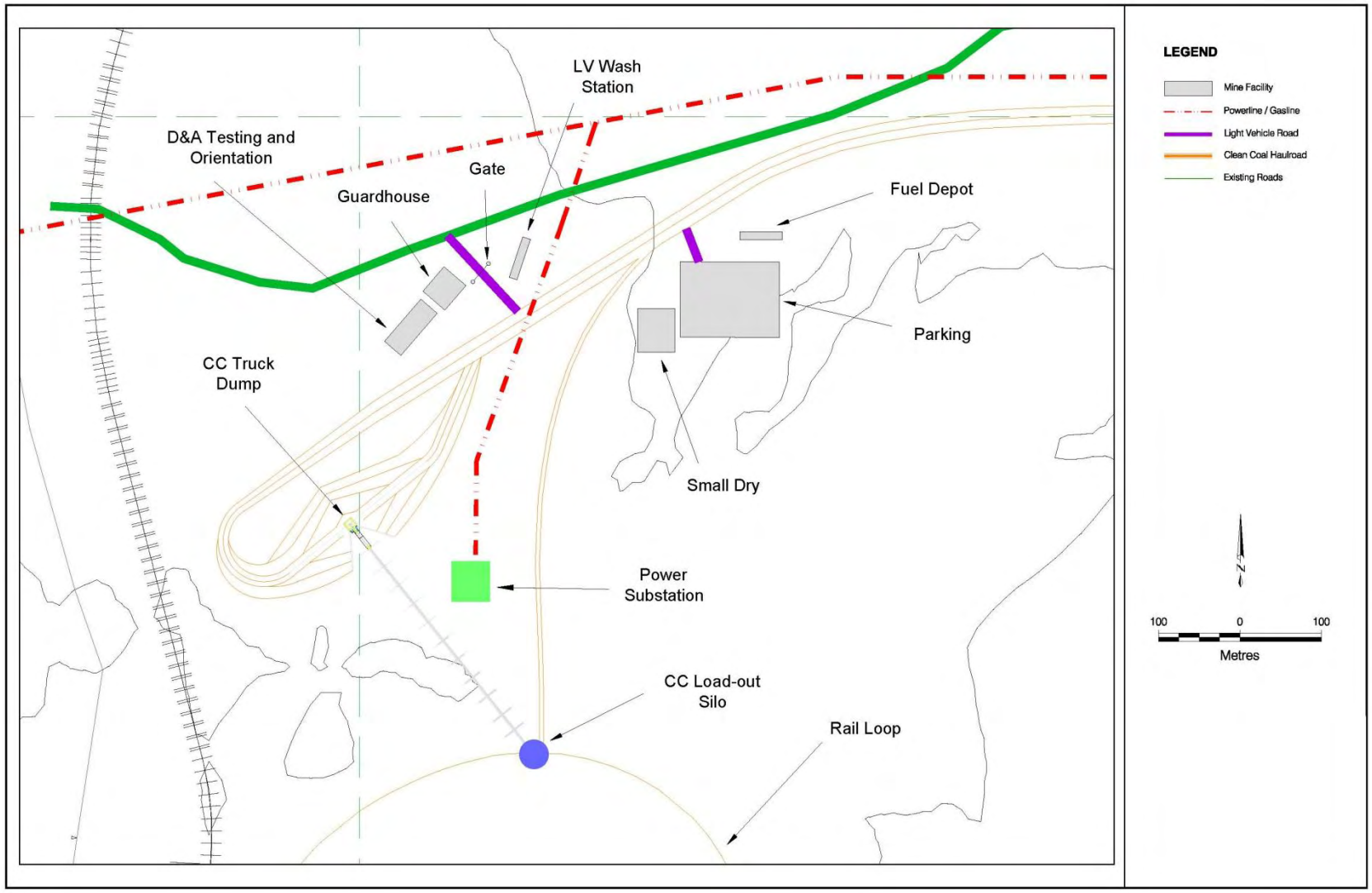

Figure 2-12: Conceptual Layout of Lower Site including Auxiliary Facilities

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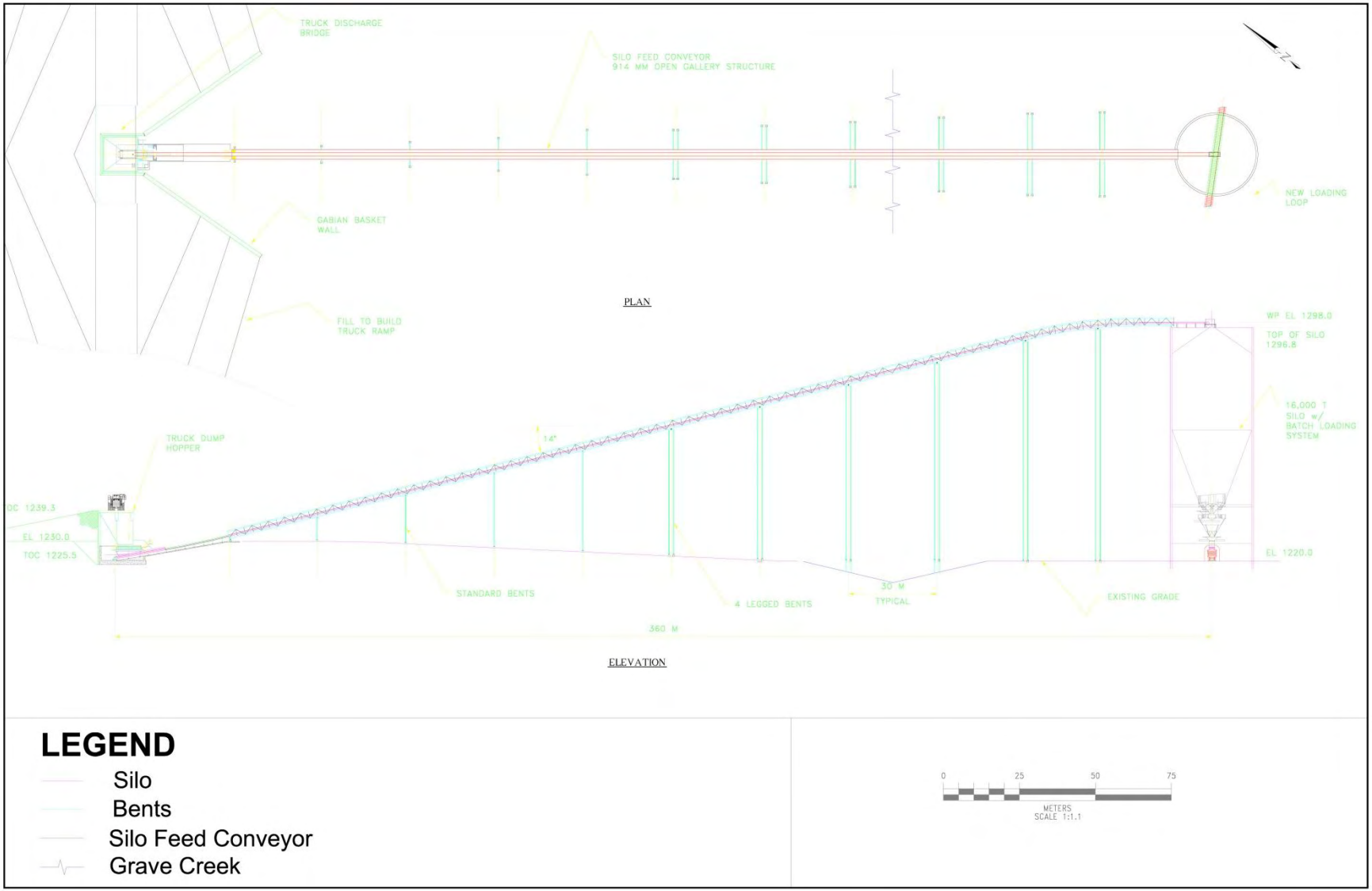

Figure 2-13: Conceptual Plan View of Rail Load-Out Facility

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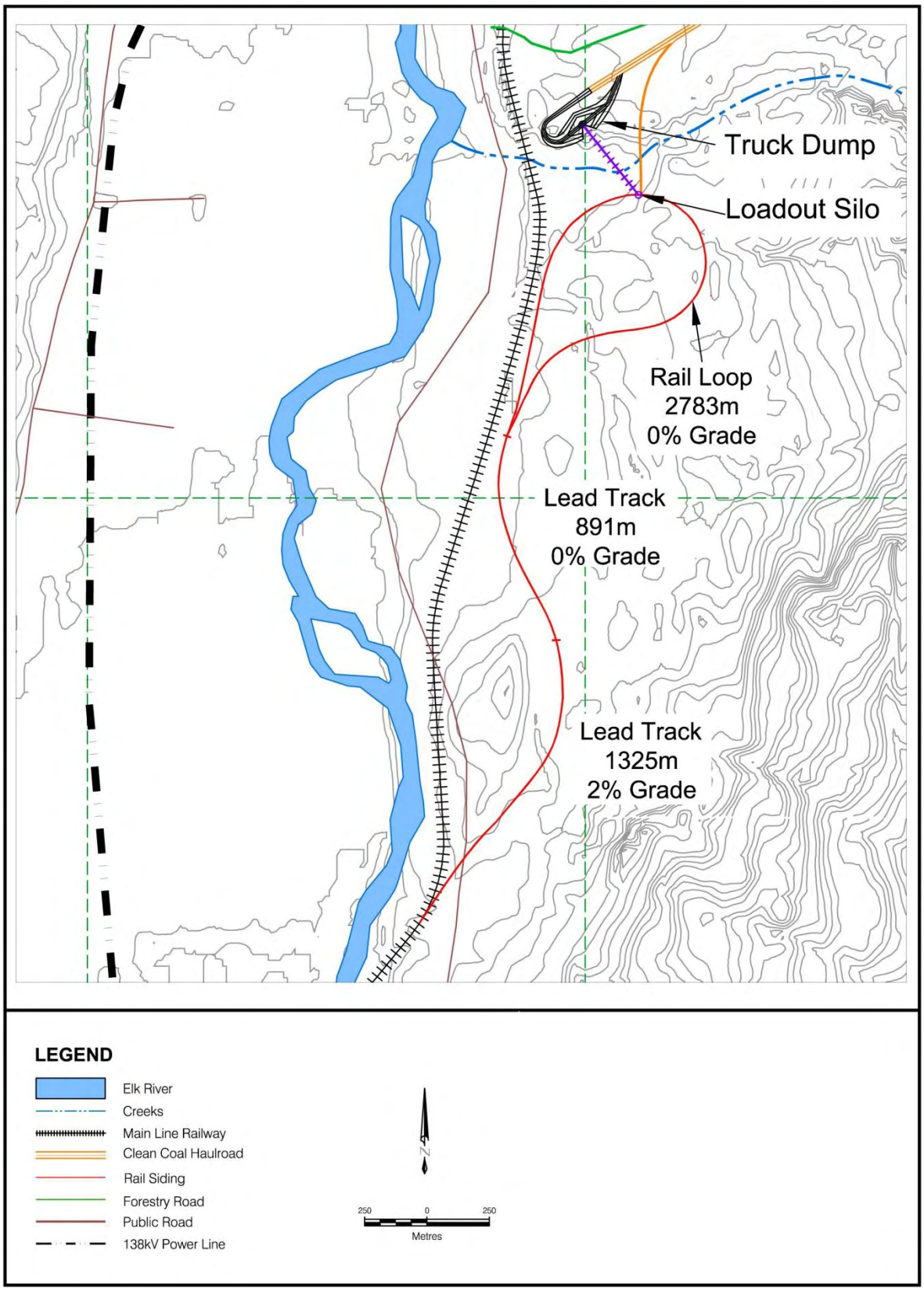

Figure 2-14: Conceptual Layout of Rail Siding

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2.3.1.6 Power Supply

A new 12.7 km power line extension will run from the mine site along the Grave Creek haul road and tie in to existing BC Hydro high voltage lines (**Figure 2-1**). Total connected load for the Project has been estimated at 9.3 MW. The new branch line will be built to 138-kV, 3-phase power line standards. Service drops will be provided at convenient locations along this linear infrastructure to service various components of the Project.

The newly built power line will provide power as far as the plant and office/shop buildings only. Lighting in the active mining areas will be provided by diesel run generators.

2.3.1.7 Natural Gas Supply

The Project will use natural gas for drying coal and heating (e.g., to heat buildings and water). The main gas requirement for the Project would be the thermal dryer which is located 14 km from the existing supply line. The existing natural gas transmission pipeline runs between the District of Sparwood and the District of Elkford and is owned and operated by FortisBC (also the local natural gas provider). The current pipeline is a 200 mm high pressure-odourised supply line that operates at close to 1,000 psi.

To add the Project to the supply line, a new valve station will need to be installed. The recommended location for the new station is along Highway 43 (Elk Valley Highway), north of the local airport runway. From the new valve station the new pipeline will run east crossing under Lower Elk Valley Road and over the Elk River. The line will continue on in an easterly direction crossing under the Elk Valley rail spur line to the Lower Facilities area. The pipeline will be a 100 mm lateral buried welded steel pipe, with an approximate length of 3.5 km, with the exception being the crossing of Elk River which will be a suspended pipeline stream crossing. The main 250 psi pipe line will continue another 10 km along the clean coal haul road and overland conveyor to the terminus at the main plant site location.

Natural gas usage for the entire Project is estimated to be 50 MBtu/hr at peak and 35 MBtu/hr on average.

2.3.1.8 Explosives Storage

As noted previously, it is anticipated that the blasting agent used for pit development would be composed of 70% ANFO, 20% Heavy ANFO, and 10% waterproof product.

For the Project, two distinct isolated areas will be used for storing all-related explosives products for the mining operation. The first area (site) will store the bulk explosives necessary for the main blasting operations on site and the second area will be designated to store the blasting accessories used for priming and igniting the bulk explosives.

The main bulk explosives site will secure the ammonium nitrate and emulsion inventories for blasting in the pits. In addition, the emulsion silo will require the installation of a small building for the pumping

system, as well as a glycol tank for maintaining the optimal temperature for the emulsion to be pumped. Concrete pads will be required for where the ammonium nitrate silo and emulsion silo will be placed. A containment or isolation berm will provide line-of-sight protection. The entire area will be isolated with a fence and locked gate.

The magazines site will be located at a secure distance from all workings and the bulk explosive storage areas, in accordance with the existing regulations. The magazine storage area includes separate magazines for blasting caps /detonator storage and primer/high explosives storage.

Appropriate locations for siting the magazines and silos have been identified along the mine access road leading up to the plant site area from Grave Creek. Small branch roads off of the main mine access road will lead to the storage sites and provide the clearances required for explosives storage.

2.3.1.9 Fuel Storage

Diesel fuel and gasoline will be stored on site at both the lower and upper mine site facilities. All diesel fuel will be stored in double walled, self-contained tanks, and the size of these tanks varies based on their location. For the lower facilities, a 35,000 litre tank will supply fuel for the clean coal haul trucks and occasionally for the auxiliary equipment offering support in the area.

At the upper facilities, four 65,000 litre tanks will supply the mine equipment for up to three days. In addition, a 35,000 litre gasoline tank will be required in order to provide fuel for all light vehicles on site. A concrete pad and containment area with sump will provide spillage protection for all fuels. A pair of fuel dispensing stations will be provided. A lined earthen berm will protect the fuel storage area from traffic, and concrete-filled bollards will provide an offset protection area. To mitigate the risk of fuel gelling in the winter, it is expected that the tanks will be insulated and heated per typical immersion heater designs. The facilities will meet all applicable environmental standards.

2.3.1.10 Sewage Treatment

The proposed sewage treatment for the mine support buildings is a mobile (portable) treatment system. The system will treat up to 100,000 litres per day with total suspended solids (TSS) concentration of 275 mg/l or less. The discharges will be drained into a leach (septic) field for further dispersion using French drains.

2.3.1.11 Water Supply

Fresh water will be withdrawn from Grave Creek to support plant water requirements; however, the withdrawal of water will be subject to minimum in-stream flow requirements to maintain aquatic health downstream. Preliminary assessments indicate that only a portion of the flow from Grave Creek could be diverted for mine use and that the diversion of water would not possible January through April. As a

result, it is estimated that 160,000 m^3 of storage is required to maintain adequate supply of water for the plant throughout the year.

An excavated water supply reservoir is proposed near the clean coal transfer area (**Figure 2-15**). The reservoir will have a maximum water depth of 6 m and a minimum freeboard of 1 m. Reservoir capacity will be supported by construction of perimeter berms. The water supply reservoir will have approximate dimensions of 250 m x 160 m (including berms). The reservoir will be installed with a 1 m thick clay liner to prevent seepage losses.

Water will be withdrawn from the reservoir using a vertical turbine pump housed on a floating platform. A second pump will be included for back-up. Water will be pumped from the reservoir to the plant site using 6" diameter steel pipe. The pipeline will be placed parallel to the conveyor from the clean coal transfer area to the plant site.

In addition to plant water requirements, water is required for various activities including dust suppression, fire suppression, and potable water usage at plant site. Water for dust suppression will be withdrawn from the water supply reservoir for the first three years of mine operation. Afterward, it will be withdrawn from the pit sumps when the pits will hold sufficient volume of water. Water for fire suppression will be stored in a large tank at the plant site. Potable water for the plant site will be withdrawn from wells drilled near the plant site.

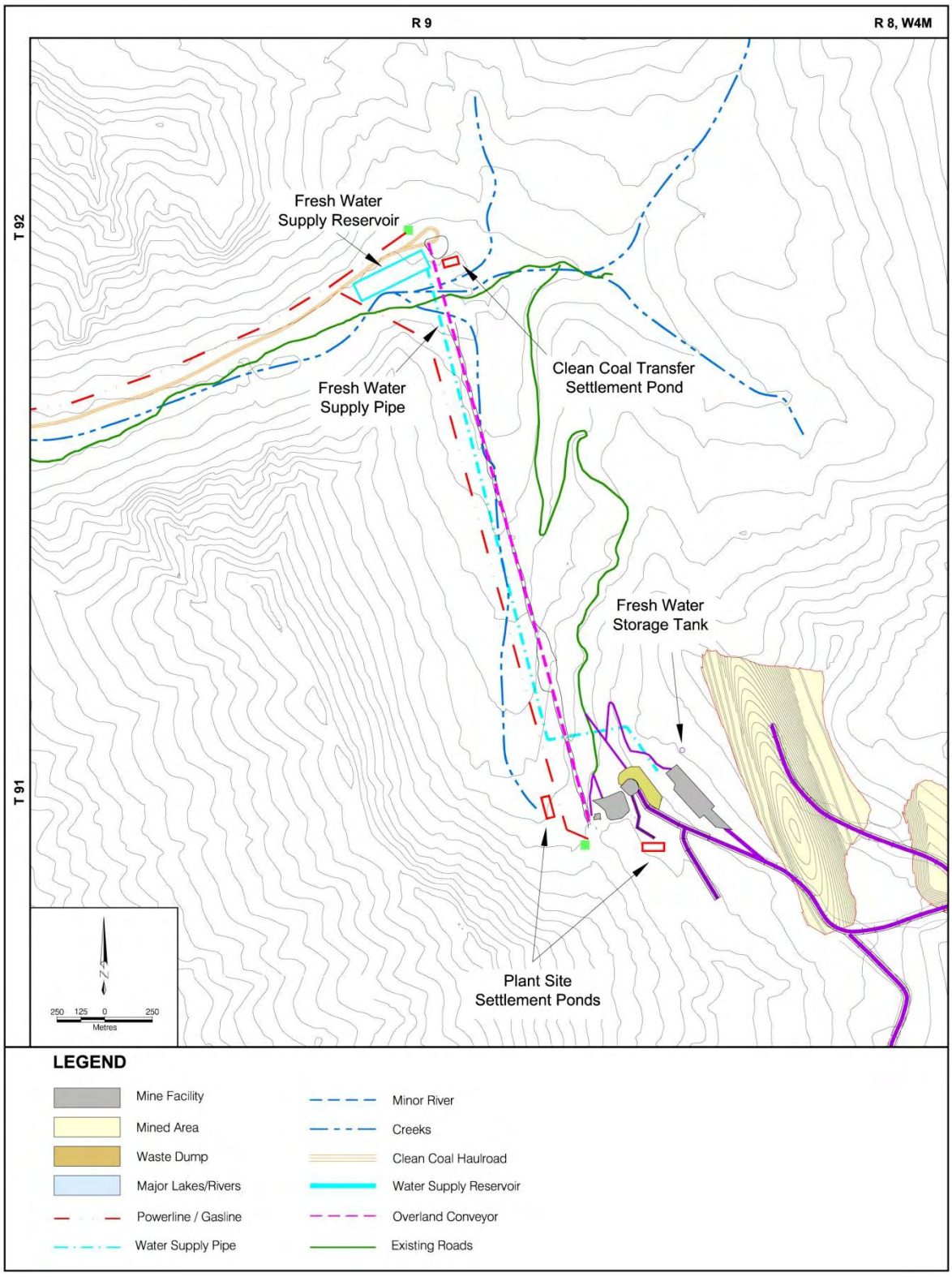

Figure 2-15: Conceptual Layout of Freshwater Supply System and Plant Site Settlement Ponds

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2.3.2 Production Processes and Anticipated Production Capacity

The anticipated production capacity of the Project is estimated at 3.7 M ROMt per annum with a predicted mine life of approximately 16 years. The daily production rate equates to approximately 10,150 tpd, which as noted previously, will exceed the 3,000 tpd production capacity level presented in Section 16 (a) of the federal *Regulations Designating Physical Activities*.

The majority of coal will be produced from the South Pit. A summary of the expected production from the site is provided below in **Table 4**.

Table 4: Crown Mountain Mine Production Schedule

Year	ROM Coal			Clean Coal			Waste	ROM Strip
	Total (Ktonnes)	COKING (Ktonnes)	PCI (Ktonnes)	Total (Ktonnes)	COKING (Ktonnes)	PCI (Ktonnes)	(Kbcm)	Ratio (bcm/tonne)
Pre-production	-	-	-	-	-	-	4,391	-
1	3,700	2,205	796	1829	1323	506	12022	4.01
2	3,700	3,166	534	2058	1759	299	15397	4.16
3	3,700	3356	344	2011	1834	177	15847	4.28
4	3,700	3283	416	1906	1691	215	17192	4.65
5	3,700	3099	601	1802	1479	232	19120	5.17
6	3,700	3531	170	1759	1670	89	19286	5.21
7	3,700	3374	326	1790	1606	185	19124	5.17
8	3,700	2882	818	1751	1284	467	19251	5.20
9	3,700	3018	682	1611	1281	330	20773	5.61
10	3,700	3662	38	1555	1543	12	20772	5.61
11	3,700	3002	698	1637	1340	297	19000	5.14
12	3,700	3002	698	1622	1325	297	17222	4.65
13	3,700	3002	698	1524	1228	297	16000	4.32
14	3,400	2758	642	1478	1205	273	15000	4.41
15	3,000	2434	566	1295	1055	240	14149	4.72
16	2,026	1735	294	751	649	102	5393	2.66
Total	**55,829**	**47507**	**8322**	**26379**	**22272**	**4107**	**269940**	**4.84**

Note: Up to 50,000 ROM tonnes of Year 1 coal may be used for plant commissioning in the pre-production period.

2.3.2.1 Coal Processing

A key part of the Project is the design and application of an appropriate coal handling and coal preparation plant (CHPP) to ensure the recovery of high-value, metallurgical-grade coal products. The following details the overall CHPP and associated activities.

Run-of Mine Raw Coal Handling

The ROM coal handling system will carry out the following three primary functions:

- Provide steady-state feed to the Coal Preparation Plant (CPP);
- Size the feedstock to control maximum particle size without undue generation of coal fines; and
- Pre-emptively reject as much oversize rock material as possible, reducing the load of unwanted material in the CPP's wetted process.

The conceptual ROM coal handling system is illustrated in **Figure 2-16**. ROM coal is fed into an elevated 300 tonne truck dump which is fitted with a large-aperture, protection grizzly with nominal 1,000 mm square openings. ROM coal discharges from the bottom of the hopper at a nominal rate of 600 tph via a feeder-breaker. The metered coal is conveyed onto a heavy-duty inclined vibrating screen that directs plus 38 mm oversize material into the rotary breaker. Material less than 38 mm bypasses the breaker to minimize particle size attrition. The rotary breaker removes large pieces and ensures the coal is of suitable size for the plant feed stream. Sized, broken coal is discharged onto the CPP feed conveyor. Since the tonnage is expected to be significant, large unbroken rock rejected out of the end of the rotary breaker will discharged onto a transfer conveyor. The rock will be conveyed to the CPP refuse conveyor and comingled with other CPP refuse material. Crown Mountain ROM coal will contain significant amounts of dilution material, and the rotary breaker is expected to reject, on average, 8.1% of the ROM.

The sized minus 38-mm raw coal is conveyed directly to the CPP.

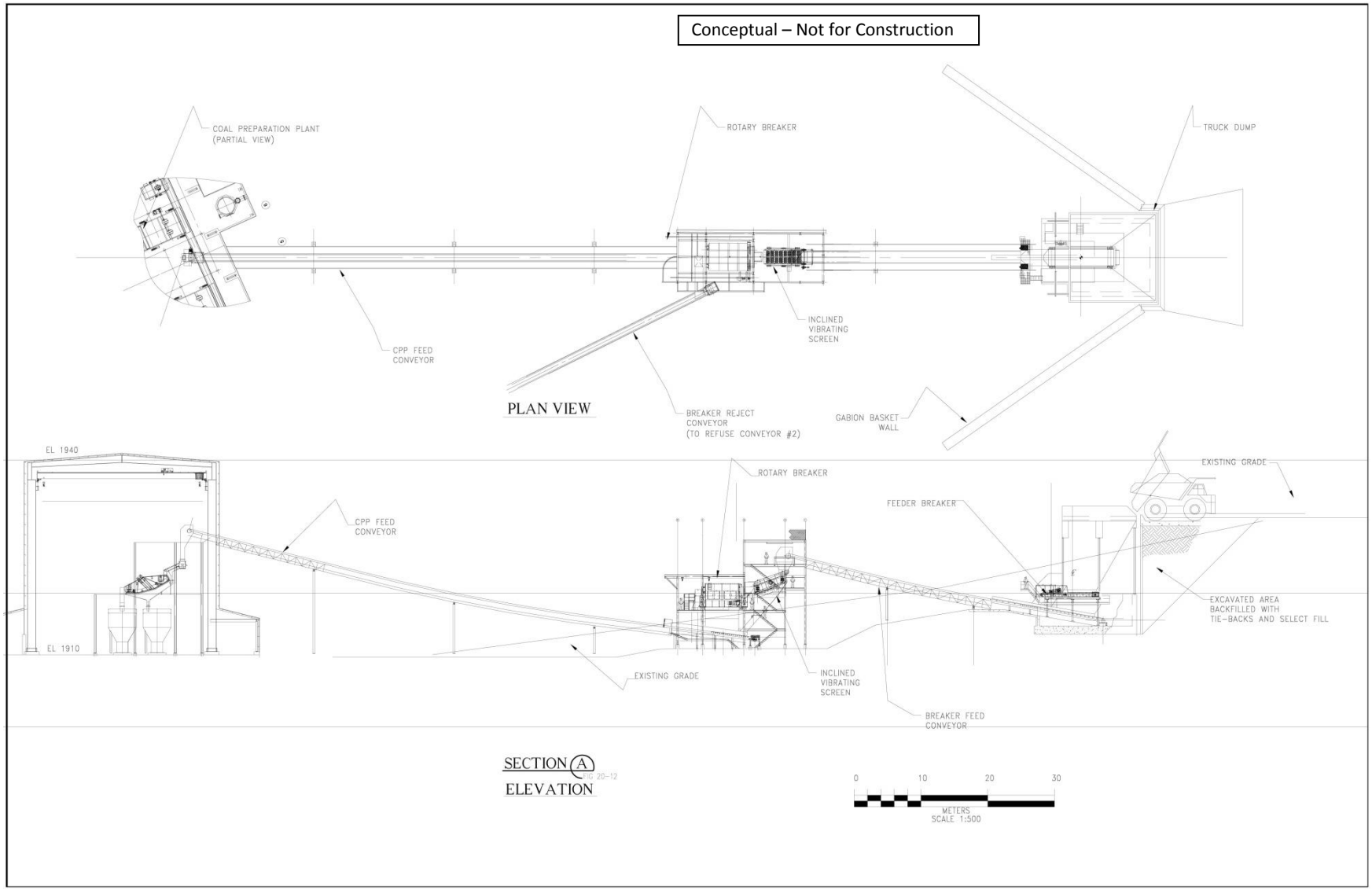

Figure 2-16: Conceptual Coal Handling – Truck Dump to Surge Bin

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Process Plant

The CPP is the wetted process that is tasked with achieving the maximum recovery of coal. The base case CPP design consists of a traditional, dense (heavy) media cyclone (DMC) circuit for processing the nominally 38 mm x 1.5 mm size coal, REFLUX™ classifiers for the 1.5 mm x 0.25 mm small coal and froth flotation for the fine and ultra-fine minus 0.25-mm coal.

The CPP is designed for a capacity of 550 tph.

Thermal Drying

Product moisture control is extremely important for coking coal production, with a maximum allowable total moisture content of 9.5% free on board (FOB) vessel for shipping from Canadian west coast shipping ports. Typically the moisture content in product from mines in western Canada ranges from 7% to 8% FOB rail.

For the Crown Mountain Project coal will be dried using a fluidized-bed dryer fired by natural gas.

Process Water Supply

A water balance flow diagram for the plant is provided in **Figure 2-17**. The Crown Mountain Project will process coal using a wet process that requires additional make-up water for operation (See **Section 2.3.1.11** for details regarding water supply).

Refuse Handling and Disposal

Coal processing results in some process refuse (rejects). The refuse consists of three sub-streams:

- Coarse DMC rejects;
- Fine classifier rejects; and
- The flotation tailings via the thickener and belt press.

Each of these sub-streams, as well as the rotary breaker rejects (see previous details under Run-of Mine Raw Coal Handling) are transferred by conveyor to a 500 tonne heated (to prevent freezing) bin. The blended refuse materials are then moved by truck to the waste rock management areas.

The blended material is expected to be primarily well-graded 300 mm minus material with approximately 8% fines. Given that the hydraulic conductivity of the material will be significantly lower than that of the waste rock, it is anticipated that the mixture can be placed in a layer (estimated 1 m) over waste rock to prevent/minimize water infiltration and to help minimize metal leaching of the waste rock.

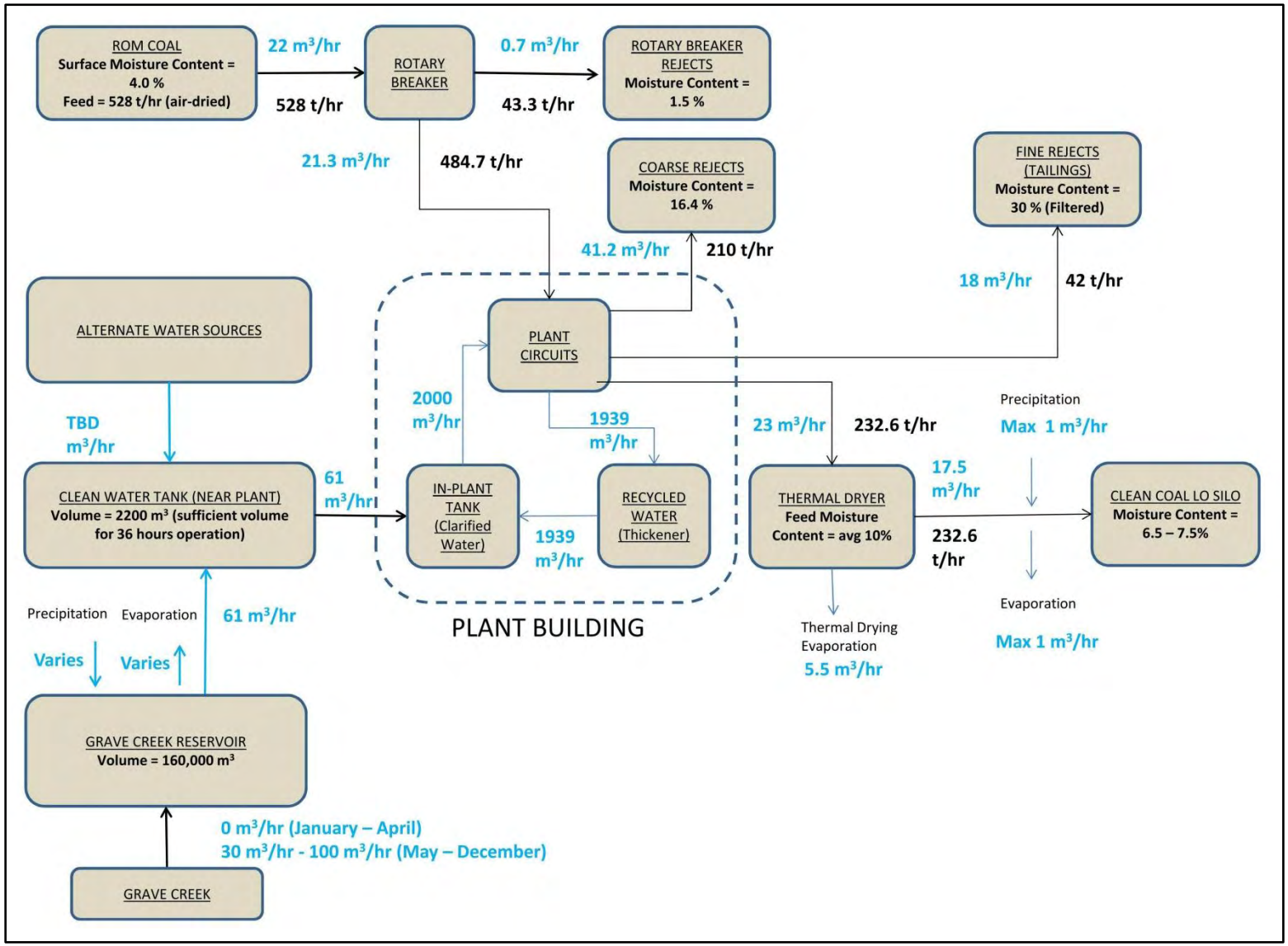

Figure 2-17: Preliminary Water Balance for the Crown Mountain Project

2.4 Emissions, Discharges, and Waste

2.4.1 Atmospheric Contaminant Emissions

It is expected that dust will be generated from four main sources:

- Active mining faces;
- Coal and waste haul roads;
- Stockpiles; and
- The coal processing plant.

As part of the overall Project Environmental Management Plan (EMP) a detailed air quality management plan will be developed. The plan will include details regarding the use of water and dust suppression agents to control dust. The plan will address both construction (e.g., dust from site grading activities) and operational (e.g., dust from trucks along the haul road; dust from the plant, etc.) air quality related concerns.

Dust suppressant sprays will be used, as required, throughout the CPP, with particular emphasis at components such as the ROM coal truck dump, coal crushers, conveyor transfer points, and raw and clean coal silos. All silos will be equipped with dust collection systems as well as methane detectors. Conveyors will be equipped with belt cleaners, dribble chutes, and tight fitting covers where needed. The production plant, conveyors, galleries, and other facilities will be equipped with complete wash-down systems to remove dust accumulations from all structures.

GHGs such as sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) will be generated by the burning of fuel for trucks and other machinery as well as from the thermal drying of coal. The Project EA will include a detailed assessment of potential GHG emissions.

2.4.2 Liquid Discharges

2.4.2.1 Water Management

Site water management will be an important Project component moving forward. Detailed baseline studies of hydrogeology, surface water hydrology, and climate will be completed to provide the basis for the development of an overall site water management plan.

<u>Pit Seepage and Groundwater Inflow</u>

Initial assessments of potential pit seepage and groundwater inflow indicate that there are a few years for each pit when there is no inflow from groundwater sources because the water table is below the base of pit elevation. Once the water table is above the base of pit elevation, surface recharge is expected to be low and it is assumed that contacted aquifers will drain all groundwater into the pit prior

to the start of the next mining stage. Therefore, it is expected that the water table will drop to the base of the pit during each stage.

Surface runoff and seepage into pits will be managed using a network of drainage ditches, berms, sumps, and pumps as required through the mine life. Water will be directed to a central sump location via ditches and berms within the pit. The sumps will be sized with sufficient volume to permit settling of suspended solids. They will also attenuate runoff and seepage inflow and limit pumping capacity required to remove water from the pit. For the first four years of mine operation, water from the sumps will drain out of the pit by gravity. Following this, a pump will be required to convey the water out of the pits. Through the mine life, water that is discharged from the North Pit and East Pit sumps will drain west and be intercepted by the haul road embankment. The water will then drain along the haul road and be directed by ditch to Grave Creek. The South Pit will drain by gravity until year 7 when a pump will be required. Water will be directed around the waste rock dump an into the West Alexander drainage basin. It will ultimately flow into the waste rock dump sedimentation pond.

Run-off Water Management Plan

The Project run-off water management system will include the use a combination of site grading and surface water diversions to divert clean runoff from undisturbed areas to Grave Creek or West Alexander Creek. Minor site grading and/or ditching will be constructed around mine infrastructure (i.e., plant site, haul roads, stockpile areas) to isolate clean runoff and allow it to drain by gravity to natural watercourses or to naturally infiltrate into the ground. Surface water diversions will be used to intercept runoff destined for the waste rock management areas and covey them downstream to West Alexander Creek.

The management of run-off water is particularly important in relation to proposed waste rock management areas. Surface water diversions are required to mitigate the risk of selenium (and other compounds) leaching from the rock and being conveyed into downstream aquatic systems. Surface water diversions will be constructed and expanded in stages to accommodate increasing waste rock footprint areas through the mine life. Conceptual designs currently include two surface water diversions – one located on the west side of the waste rock management area and another located along the east side. Surface water diversions will discharge directly to West Alexander Creek downstream of the waste rock management area.

The site water management plan will include several sedimentation ponds. S ome of these ponds, such as the waste rock management area sedimentation pond, will be decommissioned and reconstructed through the mine life to accommodate the advancing waste rock placement. It is expected that the pond will be constructed prior to pre-production and reconstructed immediately prior to years 1, 6, and 11. A summary of proposed sedimentation ponds based on the current conceptual design is provided in **Table 5**.

Table 5: Sedimentation Ponds

Mine Area	Treatment Pond	Point of Discharge	Drainage Basin
East Pit	East Pit Sump	Drainage ditch to North Pit (adjacent to haul road)	Grave Creek
North Pit	North Pit Sump	Drainage ditch to Grave Creek (adjacent to haul road)	Grave Creek
Haul Road (East Pit to North Pit)			
Plant Site	Plant Site Sedimentation Pond	Drainage ditch to Grave Creek	Grave Creek
Clean Coal Transfer Area	Clean Coal Transfer Area Sedimentation Pond	Grave Creek upstream of reservoir	Grave Creek
Upper Haul Road	Haul Road Sedimentation Pond	Grave Creek upstream of Harmer Creek confluence	Grave Creek
Clean Coal Load-out Area, Lower Haul Road, Gatehouse and Security Area, and Parking Area	Clean Coal Load-out Area Sedimentation Pond	Harmer Creek	Harmer Creek
Rail Loop	Rail Loop Sedimentation Pond	Harmer Creek	Harmer Creek
Waste Rock Dump	Waste Rock Sedimentation Pond	West Alexander Creek	West Alexander Creek
South Pit	South Pit Dump	Drainage ditch to West Rock Sedimentation Pond	West Alexander Creek

2.4.2.2 Metal Leaching

Similar to other Projects in the area, there are concerns related to the potential mobilization of metals, such as selenium from waste rock, and the potential for introduction into aquatic systems. Selenium is a naturally occurring element present in the waste rock of coal mines within the Elk Valley. It is an essential nutrient for many organisms; however, it can be harmful at elevated concentrations.

Preliminary assessment work related to potential acid rock drainage (ARD) and metal leaching has been completed and indicates that waste rock associated within the Crown Mountain has a low potential for acid generation but does have elevated levels of selenium similar to those found elsewhere in the Elk Valley.

The management of selenium (and other metals of concern) will be integral to overall Project planning. Management approaches that will be evaluated moving forward are expected to include: minimizing / avoiding placement of waste in cross-valley fills; the use of low-selenium rock in rock drains; designing waste rock dumps to limit oxygen and water infiltration; reclaiming waste rock dumps earlier; the use of freshwater diversion ditches; and layering/capping waste rock management areas with processing plant

reject (which is predominately clay and finer size fractions that will allow for impeded water flow and will limit the oxygen content of the spoil).

Waste rock at Crown Mountain will be placed across the West Alexander Creek basin; however, placement will begin at the head of the West Alexander Creek basin and progress south. As a result, runoff and seepage flowing to the waste rock dump will be minimized. In addition, diversion ditches will be constructed as the waste rock dump progresses to intercept and decrease runoff and seepage from valley walls above the waste dump.

2.4.3 Waste Characterization and Disposal Plans

The Project will produce waste rock as the pits are developed. The overall approach for the management of waste rock is provided in **Section 2.3.1.2**.

No tailings containment facility is required for this Project.

2.5 Project Phases and Scheduling

2.5.1 Anticipated Scheduling

The plateau production rate for the project is estimated at 3.7 M ROMt per annum giving the Project a life of approximately 16 years (not including site decommissioning). A preliminary high-level development schedule for the Project is shown in **Table 6**. The Project development schedule includes first commercial production in 2018. It should be noted that the schedule includes some detailed engineering and limited site development activity taking place prior to final approval. In addition, it is noted that the timing for the completion of a Project EA and associated permitting can be influenced by a wide range of factors, including:

- Project financing;
- Type and range of input from local Aboriginal Groups and local stakeholders;
- Level of involvement and requests from regulators;
- Changes to mine/project design; and
- Implementation/timing of environmental baseline programs.

It is anticipated that Project construction will occur over 1.5 years, with site preparation beginning in the second quarter of 2016 and finishing in the fourth quarter of 2017. Decommissioning of the Project and associated site reclamation activities will take place progressively, beginning in Year 16 (i.e., 2034). It is estimated that full site reclamation will take two to three years to complete.

Table 6: Preliminary Project Development Schedule

ACTIVITY	Year -4				Year -3				Year -2				Year -1				Year 1			
	2014				2015				2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pre-Feasibility Study																				
Environmental Assessment - Baseline Studies																				
Submit Project Description																				
Regulatory Approval Process																				
Resource Definition																				
Geotechnical Data Collection																				
Feasibility Study																				
Detailed Engineering																				
Owner Approval (Sanction)																				
Access Road & Site Preparation																				
Pre-strip Pit Access Haul Road																				
Construct Plant & Facilities																				
Clean Coal Haulroad & Pre-Stripping																				
Plant Commissioning & Early Production																				
Clean Coal Production																				

2.5.2 Main Activities by Project Phase

2.5.2.1 Site Preparation and Construction

There are four major earthworks projects that must be completed during the pre-production period:

- **Mine Access Road** – The mine access road will serve as the clean coal haul road during production, from the proposed load-out area to the clean coal transfer area. The road from the clean coal transfer area to the plant site will be upgraded in order to bring major equipment on site.
- **Haul Road** – A new haul road will be constructed from the plant site to the top of North Pit to allow for access to the upper benches of the north and East Pits.
- **Pre-Stripping Activities** – Pre-stripping for the upper benches of the north and East Pits to establish a productive work area.
- **Site Grading** – Grading of the plant and shop/office complex areas.

These preliminary works will be completed by a contractor.

In addition to the major items noted above, other site activities that will need to be completed before mining begins include:

- Logging;
- Clearing and grubbing;
- Soil stripping and stockpiling; and
- Construction of water management structures.

Soil Salvage

An important component of site-preparation activities will be the salvage and stockpiling of top soil and sub-soils. Soil will be salvaged in areas that have a slope of 20° or less. Topsoil thickness is estimated to range from 10-15 cm and sub-soil thickness is estimated to range from 0 – 30 cm. Soil salvage will follow an approved plan to prevent mixing of top and sub soils.

2.5.2.2 Operations

As noted previously, each of the pits will be developed sequentially starting with the North Pit. The East Pit will be mined in conjunction with the North Pit due to shared access and to introduce increased coal strike length to facilitate equipment productivity. The East Pit is mined through to Year 4, at which point access to the East Pit is cut-off due to the advance of the North Pit.

Once the East Pit has been temporarily abandoned, operations will be moved to the South Pit. Mining into the East Pit resumes in year 7 once the North Pit is complete and backfilling of the North Pit can begin. The East Pit will be completed in year 8. Mining of the South Pit will be completed in year 16. The South Pit will be mined in five phases which will allow for earlier backfilling.

2.5.2.3 Closure and Site Reclamation

The final reclamation and closure plan will be developed for the Project to address the reclamation of all disturbed areas. The reclamation plan will consist of a number of phases. The initial phase, during pre-production and preparation of the pit and waste rock storage areas, will involve clearing and stockpiling of top soil and sub-soils.

Additional details regarding the anticipated site closure plan are as follows:

- **Pits** – The plan will include the re-sloping and reclaiming the disturbed footprint of the North, East, and South Pits. The pit walls and benches will be left in their post-mining configuration. The exposed, gently sloping pit floors will be covered with soil and re-vegetated. Water management channels within the post-closure pit will be developed, where required, to minimize erosion. No end-pit lakes are currently planned in the post-closure landscape.
- **Plant and Infrastructure** – As part of the closure plan, buildings, power lines, steel structures, tanks, and other infrastructure will be dismantled or demolished. Concrete foundations will be broken up or buried under a suitable depth of cover. Roads and shop/laydown areas will be ripped by dozers and re-graded prior to soil placement in assist with the management of surface water runoff. All areas will be covered in soil and re-vegetated.
- **Waste Rock Management Areas** – After active mining, the waste rock storage areas will be re-sloped to a maximum 2H:1V slope as required by BC mine reclamation requirements.

The re-contoured areas will be covered with stockpiled soils (low-permeability soils to prevent/minimize infiltration) and re-vegetated as per an approved planting plan which is expected to include seeding with a native vegetation mixture and planting tree seedlings.

- **Drainage** – Drainage channels will be developed alongside haul roads at specified intervals to manage surface runoff and to mitigate erosion. Drainage channels will also be developed along the outer slopes of the waste rock storage areas. Final platforms will be graded to slope gently (1% to 2%) outwards to direct flow away from the storage area surface and toward the drainage channels.
- **Sedimentation Ponds and Ditches** – Following mine closure, existing water management structures, including the sedimentation ponds and collection ditches, will remain in place until all reclamation earthwork activities have been completed (e.g., re-sloping/re-vegetation of waste rock storage areas). Once the reclamation activities have been completed, the collection ditches will be backfilled to original topography and capped with soil. Any pond excavations which are no longer in use will be re-sloped and breached to prevent the accumulation of runoff water. Surface water will flow along the natural local drainage systems.

It is expected that the final reclamation process will be completed over a number of years. The final site reclamation plan will take into consideration potential selenium-related issues. In addition, progressive reclamation activities will also be initiated, where possible. For example, re-sloping and reclamation activities will be carried out during operations as areas become available.

3.0 PROJECT LOCATION

3.1 Description of the Project Location

The Project covers approximately 2,588 ha of land across five coal license tenures and one license application in The Regional District of East Kootenay in south eastern British Columbia (**Figure 1-1**). The centre of the Project is positioned approximately 12 km northeast of the District of Sparwood and approximately 5 km west of the provincial boundary between BC and Alberta. The Project property is accessible by FSRs, specifically Grave Creek Road in the north and Alexander Creek Road in the south.

The Project property is situated in an area of steep topography of the Front Ranges Rocky Mountains of BC. Given the variation in topography across the Project license tenures, a range of biogeoclimatic zones occur, resulting in ranges of vegetation typical of varying elevations. Temperatures in the area of the Project range from an average minimum of -11.6°C in winter to an average maximum of 23.6°C in the summer.

3.1.1 Project Coordinates

The approximate centre of the Project property (i.e., the license tenures) is located at Latitude 49° 48' 7.1994" and Longitude -114° 43' 44.3994" (663416.8823E 5519088.2865N, UTM Zone 11N).

3.1.2 Site Plan

The proposed Project includes open pit mine areas, processing plant, mine support buildings (e.g., office building, warehouses, shop), and other site infrastructure as detailed **Section 2.3.1**. The conceptual layout is based on the current preferred site configuration which was chosen to minimize the footprint of the Project as much as possible while maximizing access to the coal resource.

3.1.3 Project Location Relative to Existing Features

3.1.3.1 Watercourses and Fishing Areas

Key watercourses in the area include the Elk River, Michel Creek, Alexander Creek, West Alexander Creek, Harmer Creek, Michel Creek, and Grave Creek (see **Figure 3-1**). Waterbodies in the immediate vicinity include Grave Lake, Harriet Lake, Mite Lake, and Barren Lake. West Alexander Creek flows in a southerly direction joining with Alexander Creek immediately south of the Project. Alexander Creek continues to flow south before turning west at Highway 3 and subsequently joining 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 where it joins Harmer Creek flowing from the south. Harmer Creek eventually discharges to the Elk River.

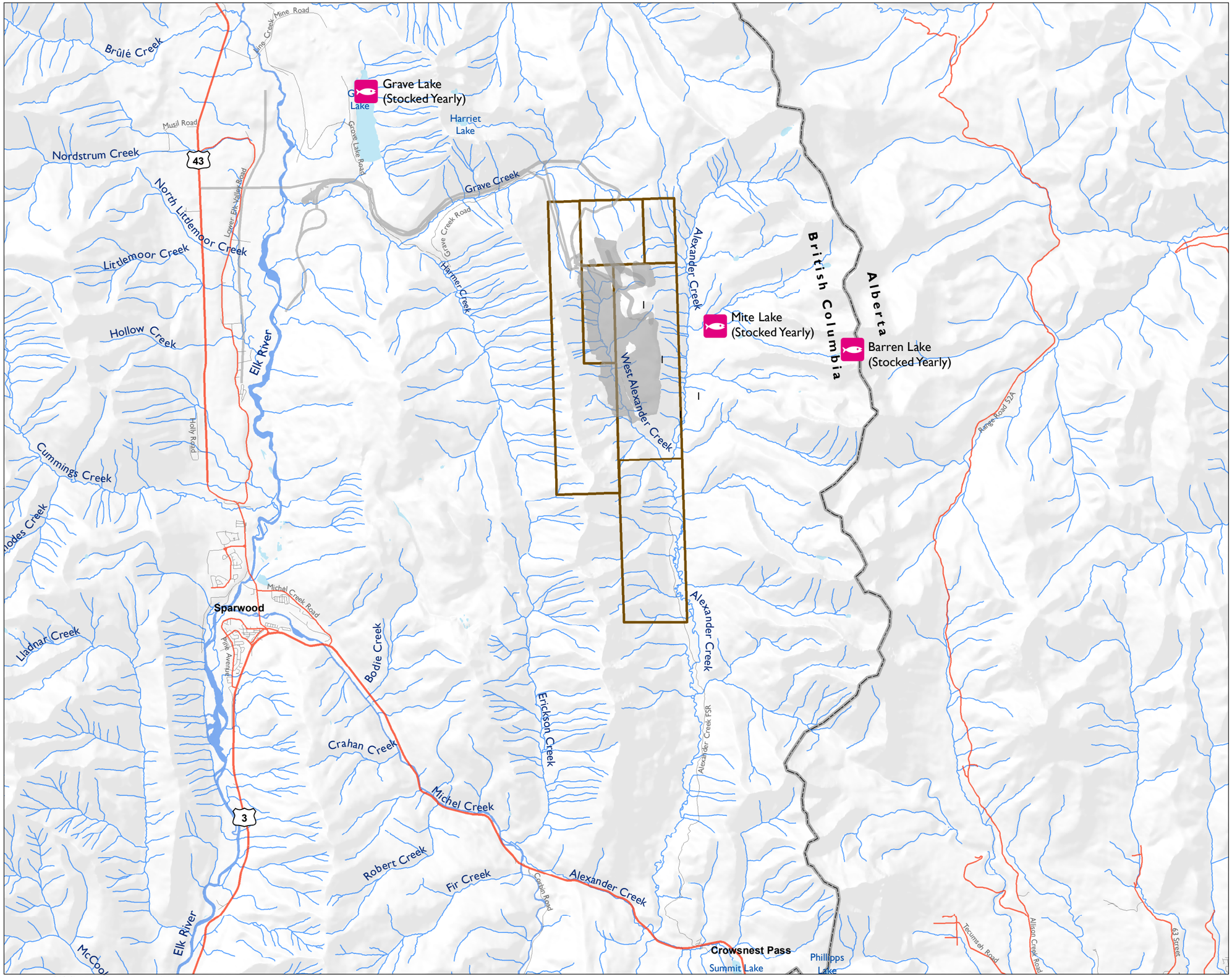

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Figure 3-1
Watercourses and Waterbodies

- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Project Infrastructure Extent
- Rivers
- Lakes
- Coal Tenure Licenses and Application
- BC/Alberta Border
- Fish Stocked Lakes

SCALE 1:105,000

0 1 2 4 km

N W E S

Map Drawing Information: Province of British Columbia, Jameson Resources, Dillon Consulting Limited, BC Fresh Water Atlas, Freshwater Fisheries Society of BC.

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 11/4/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 3-1 Watercourses and Waterbodies.mxd

The Elk River Valley is intensively used as a recreational fishery, particularly the section of river between Sparwood and Elkford. Lakes located within the vicinity of the Project are used for recreational fishing and some are stocked according to the Freshwater Fisheries Society of BC (2014). Grave Lake was stocked in 2013 with rainbow trout and both Mite and Barren Lake were stocked with Westslope cutthroat trout in 2010 and 2012 (Freshwater Fisheries Society of BC, 2014). Watercourses within the vicinity of the Project are known to be inhabited by several species of fish (see **Section 5.1.7** for more information). Given the high fishing pressure in the area, the Elk River and its tributaries are designated as Classified Waters, including Alexander Creek which occurs in the Project property. The Classified Waters designation indicates that a special angling license is required to fish the waters (Province of British Columbia, 2013a).

The Elk River Valley has historically been used by local Aboriginal Groups. Traditionally, the Ktunaxa Nation followed a nomadic existence throughout the mountains and valleys of the upper Columbia River drainage which included fishing during the late spring through early fall (Choquette, 2008). As the Project moves forward a Traditional Use / Traditional Knowledge (TU/TK) study will be completed in consultation with local Aboriginal Groups. The TU/TK study will help to identify fish species of interest for traditional use.

3.1.3.2 Linear and Other Transportation Components

An existing network of roads, railway, and bridges exists within and surrounding the Project (**Figure 3-2**). Two highways exist in the vicinity of the Project, the Crowsnest Highway (Highway 3) and the Elk Valley Highway (Highway 43). The main highway allowing access to the Project is the Elk Valley Highway (Highway 43), which connects Elkford and Sparwood and runs north past Teck's Line Creek mine. The Crowsnest Highway runs west from the Alberta border to Sparwood and allows limited access to the southern portion of the Project by way of Alexander Creek Road. The majority of the Project is accessible via a network of Forest Service Roads (FSR). Main FSRs include that will be used for the Project include Valley Road, Harmer Road, Grave Creek Road, Branch C Road, and Alexander Creek Road. Alexander Creek Road is not the planned primary access for the Project but allows access to the southernmost area of the Project, including the proposed sediment ponds. The approximate extents of several transmission lines and pipelines as well as the location of the Natal Substation at Sparwood are shown in **Figure 3-2** (CanVec Energy, 2014).

A Canadian Pacific (CP) rail line runs north-south along the Elk River, approximately 15 km west of the Project, and connects the Elk Valley coalfield to coal terminals near Vancouver, BC. The main line of the CP line occurs adjacent to Highway 3 from Alberta to Sparwood and then trends south to Fernie before continuing to the ports on the west coast. A spur from this line extends to the north following the Elk Valley to service the Teck's Line Creek, Fording River, and Greenhills mines.

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Figure 3-2
Linear Infrastructure and Transportation Components

- Sparwood/Elk Valley Airport
- Bridge
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- BC Logging/Resource Roads
- Railway (Canadian Pacific)
- Transmission Lines*
- Pipelines*
- Natal Substation
- Utility/Transportation Tenures - Crown Land
- Coal Tenure Licenses and Application
- Project Infrastructure Extent
- Rivers
- Lakes
- BC/Alberta Border

*Data for pipelines and transmission lines are historical and represent an approximation of existing linear infrastructure.

SCALE 1:150,000
0 1 2 4 km

N
W E
S

Map Drawing Information: Province of British Columbia, Jameson Resources, Dillon Consulting Limited, GeoGratis, CanVec.

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 3-2 Linear Infrastructure and Transportation Components.mxd

3.1.3.3 Existing or Past Land Use

The Project occurs within the Regional District of East Kootenay (RDEK) and within the boundaries of the Kootenay Boundary Land Use Plan, the Elk Valley Official Community Plan (OCP; to be completed October, 2014), and the Alexander Creek Access Management Area (AMA) (**Figure 3-3**). The RDEK covers approximately 28,000 km^2 of land in south eastern BC and existing land uses include but are not exclusive to residential, commercial and industrial, and institutional (recreational trails, parks, etc.).

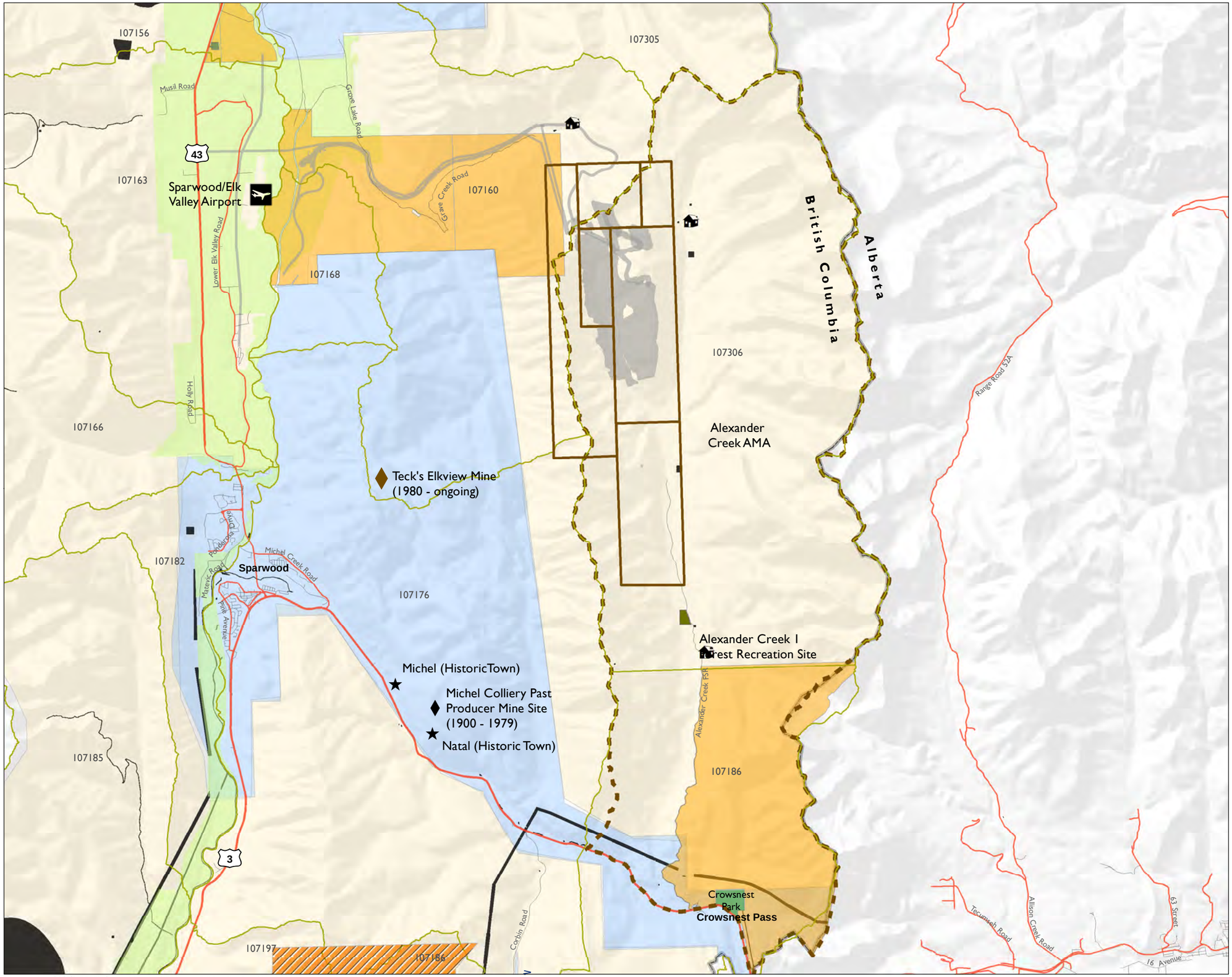
The Alexander Creek AMA defines road closures and access routes for motor vehicular traffic. The Project is located in an area designated as Rural Resource under the draft Elk Valley Official Community Plan (Regional District of East Kootenay, 2014a).

Located to the west and south of the main Project area (i.e., the pits, waste rock management area, and plant site) are lands privately held by Teck (**Figure 3-3**). The current Project design requires the transportation of clean coal from the plant area via conveyor and haul road through Teck's privately held lands in the Grave Creek watershed.

Within the vicinity of the Project, current land uses include residential, recreational (e.g., hunting, ATV trails, fishing, hiking, etc.), exploration, resource, industrial, rangeland, agriculture, and forestry. Mining in the East Kootenays has been on-going for well over a decade with coal being the dominate resource extracted in the area. Active coal mines in the vicinity of the Project include Elkview, Line Creek, Fording River, Greenhills, and Coal Mountain. Historic mines in the area noted by provincial data include Balmer, J-Area (Sparwood Operations), Natal Ridge, Michel Creek, Sparwood Ridge, and Hosmer Wheeler (Province of British Columbia, 2013b). Three trapping cabins are located near the Project (see **Figure 3-3** for cabin locations). Trapping areas are generally also used for berry and medicinal plant gathering, hunting and fishing. Twelve registered traplines in the vicinity of the Project and include:

TR0423T004	TR0423T011
TR0423T005	TR0423T012
TR0423T006	TR0423T018
TR0423T007	TR0423T021
TR0423T008	TR0423T022
TR0423T009	TR0423T023

Archaeological sites and heritage resources are known to occur within the vicinity of the Project. To determine the locations of potential archaeological resources in the Project footprint, a program will be developed in consultation with local Aboriginal Groups and is expected to include an initial Archaeological Overview Assessment (AOA) followed by a site-specific Archaeological Impact Assessment (AIA). As part of the 2012 and 2013 exploration programs, AOAs and AIAs were completed for areas potentially impacted by the programs. In 2012, the Ktunaxa Nation participated in the 2012 assessments.



File Location: G:\GIS\126231 Crown Mountain\PD Figure 3-3 Existing Land Use.mxd

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Figure 3-3
Existing Land Use

- Sparwood/Elk Valley Airport
- Historic Town
- Active Mine
- Historic Uses
- Highways
- Arterial Roads
- Local/Resource Roads
- Trapline Cabins
- Trapline Areas
- Alexander Creek AMA
- Agricultural Land Reserve Lands
- BC Provincial Parks
- Crown Land Tenures
- Elk Valley Official Community Plan Area
- Forest Recreation Sites
- Sparwood Official Community Plan Area
- Teck Coal Limited Lands
- Parcel 73 of the Dominion Coal Blocks
- Coal Tenure Licenses and Application
- Project Infrastructure Extent
- BC/Alberta Border

SCALE 1:105,000

0 1 2 4 km

N W E S

Map Drawing Information: Province of British Columbia, Jameson Resources, Dillon Consulting Limited, Regional District of East Kootenay

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

3.1.3.4 Aboriginal Groups

The Project is located within the Ktunaxa Nation and the Ktunaxa Kinbasket Statement of Intent Boundary (**Figure 3-4**), indicating the extent of asserted traditional territory used by the Nation in BC. The Ktunaxa Nation currently consists of four member Bands in BC and two Bands in the United States, covering approximately 70,000 km^2 of Ktunaxa historical traditional territory (Ktunaxa Nation, 2014). Ktunaxa member groups located in BC are:

- The ʔakisq̓nuk First Nation (formally the Columbia Lake Band - Windermere);
- The ʔaq̓am – St. Mary's First Nation (Cranbrook);
- The yaqan nukiy – Lower Kootenay Band (Creston); and
- The Tobacco Plains Indian Band (Grasmere).

The Ktunaxa Kinbasket Treaty Council, also referred to as the Ktunaxa Nation Council, includes four of the member bands (noted above), with the Shuswap Indian Band acting as a member band of the Shuswap Nation Tribal Council (Aboriginal Affairs and Northern Development Canada, 2014).

Several Aboriginal communities are located within a 100 km radius of the Project in both BC and Alberta (**Figure 3-4**). The communities in BC within 100 km of the Project include Bummer's Flat 1, Kootenay 1, St. Mary's 1A, Isidore's Ranch 4, Cassimayooks 5, and Tabacco Plains 2. In Alberta, communities within 100 km include include the Peigan Timber Limit 147B, Piikani Reserve, Blood 148, and Eden Valley 216. The closest Aboriginal communities to the Project are Bummer's Flat 1 in BC, approximately 68 km to the southwest, and Peigan Timber Limit 147B in Alberta, approximately 52 km to the east.

The Ktunaxa people have lived adjacent to the Kootenay and Columbia Rivers and the Arrow Lakes of BC for more than 10,000 years. Choquette (2008) noted that historically the Ktunaxa bands followed a nomadic existence that resulted in extensive travels throughout the mountains and valleys of the upper Columbia River drainage. Scheduling of the Ktunaxa's seasonal travels was determined by the location and timing of abundance and condition of a broad range of animal and plant resources. Traditionally, the Ktunaxa have hunted a variety of big game species, particularly deer and elk. From the late spring through early fall, game, fish, waterfowl and plant foods such as roots and berries were collected and consumed. Foods not eaten directly were dried for winter storage, with berries being a very important dried winter food. The Ktunaxa employed a wide range of materials in their traditional technology. Several stones and minerals were used for tools and the Ktunaxa also mined iron oxide for paint and soft argillite for making pipes.

NWP Coal does not currently anticipate the Project will have potential effects to the Métis Nation of British Columbia and there are no Metis settlements within proximity to the proposed Project.

The Project does not require access to or occupation of First Nations Reserve lands.

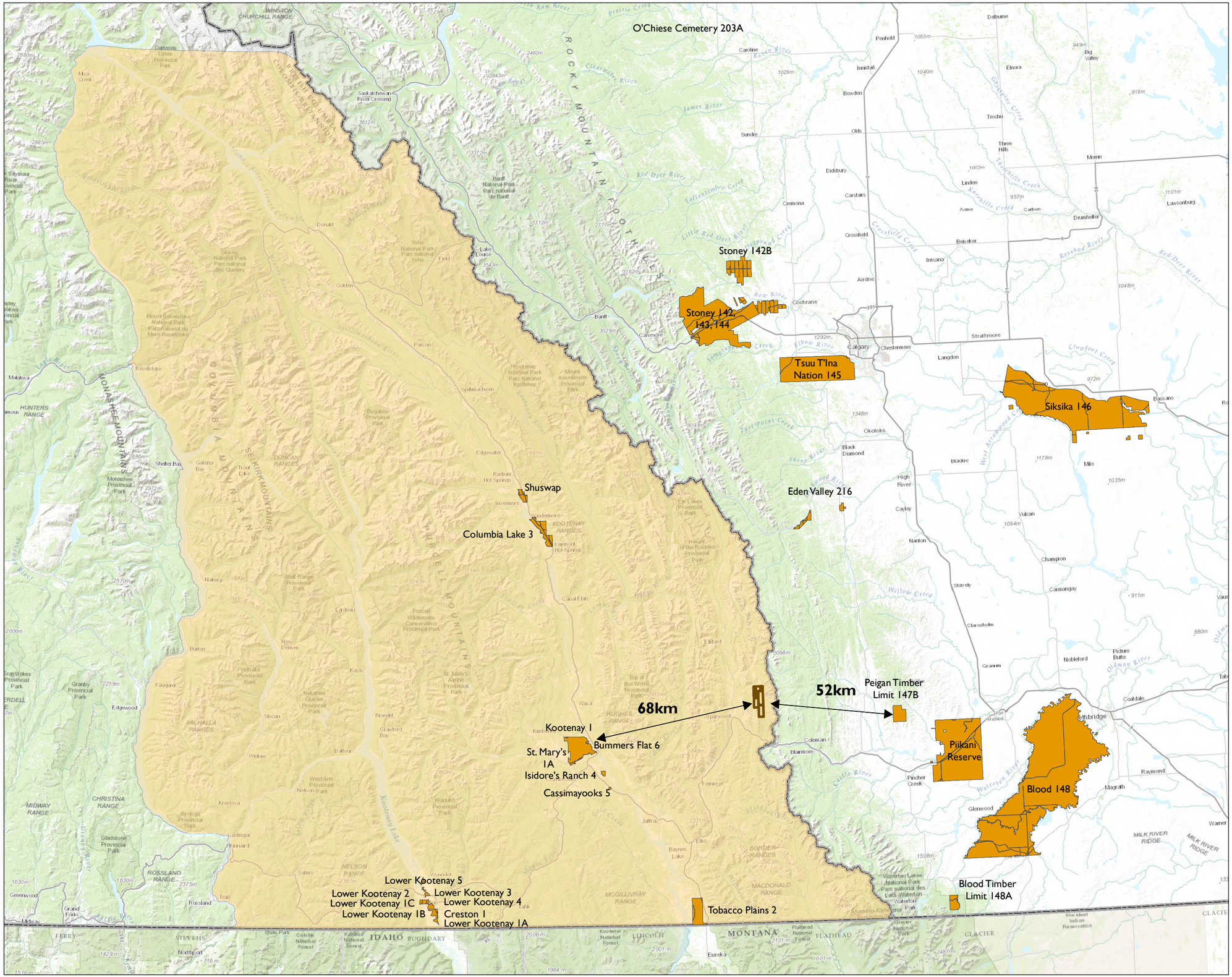

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Figure 3-4
Aboriginal Groups

- Ktunaxa Kinbasket Treaty Council SOI Area
- First Nation Reserve Land
- Coal Tenure Licenses and Application
- BC/Alberta/United States Border

SCALE 1:1,460,195

0 15 30 60 km

N W E S

Map Drawing Information: Province of British Columbia, Jameson Resources, Dillon Consulting Limited, ESRI Base Layers, GeoBase.

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

PROJECT: 12-6231

STATUS: FINAL

DATE: 11/4/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 3-4 Aboriginal Groups.mxd

3.1.3.5 Federal and Provincial Crown Land

As noted in **Section 3.1.3.4**, the nearest federal Crown Land to the Project includes the Bummer's Flat 1 Reserve (approximately 68 km southeast), Peigan Timber Limit 147B (approximately 52 km east in Alberta), and Parcels 73 and 82 of the Dominion Coal Blocks (approximately 20 and 40 km southwest, respectively). Federal land is not required to facilitate the Project.

The proposed extraction and processing areas of the Project are located on Provincial Crown Land, as well as much of the supporting infrastructure. **Section 3.2.2** details the land ownership and legal descriptions associated with the parcels of land on which the Project will be located. Provincial parks (Crowsnest Provincial Park and Elk Valley Park), a forest recreation site, and range tenures, also occur in the vicinity of the Project and are considered provincial Crown Land (**Figure 3-3**). Parts of the proposed conveyor and haul road, as well as the proposed rail load-out facility are located land privately held by Teck.

3.1.3.6 Local Communities and Residences

Local communities include the District of Sparwood, the community of Hosmer, the City of Fernie, the Municipality of Crowsnest Pass, and the District of Elkford (**Figure 3-5**). With the exception of Crowsnest Pass, the local communities occur within the Regional District of East Kootenay. The RDEK functions as a partnership of the municipalities and electoral areas (unincorporated areas) within its boundaries. The Project occurs within the Electoral Area A of the RDEK within the Elk Valley Subregion.

The closest community to the Project is Sparwood, which is located on located on Highway 3. The centre of Sparwood occurs approximately 12 km from the centre of the Project. Sparwood covers approximately 20,000 ha of land and has a population of approximately 4,000 (District of Sparwood, n.d). Hosmer is a small community located approximately 30 km southwest of the Project along Highway 3. Further south, Fernie also occurs on Highway 3 and is approximately 1,500 ha in size and approximately 37 km from the Project. In the north, the nearest community to the Project is Elkford which is located approximately 26 km north along Highway 43. The nearest community in Alberta is Coleman, approximately 24 km southeast of the Project and located along Highway 3.

There are no permanent residences in close proximity to the Project property. At this time, the presence of temporary or seasonal residences in close proximity to the Project is unknown.

3.1.3.7 Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) will be evaluated as part of the Project EA. ESAs are expected to include wetlands and protected areas. In 2013, Teck purchased land in the Alexander Creek and Grave Creek watersheds for conservation (see **Figure 3-3** for location of conservation). The conservation areas were purchased to allow for habitat connectivity for wildlife and overwintering habitat. Information regarding wetlands with the vicinity of the Project is provided in **Section 5.1.8.1.**

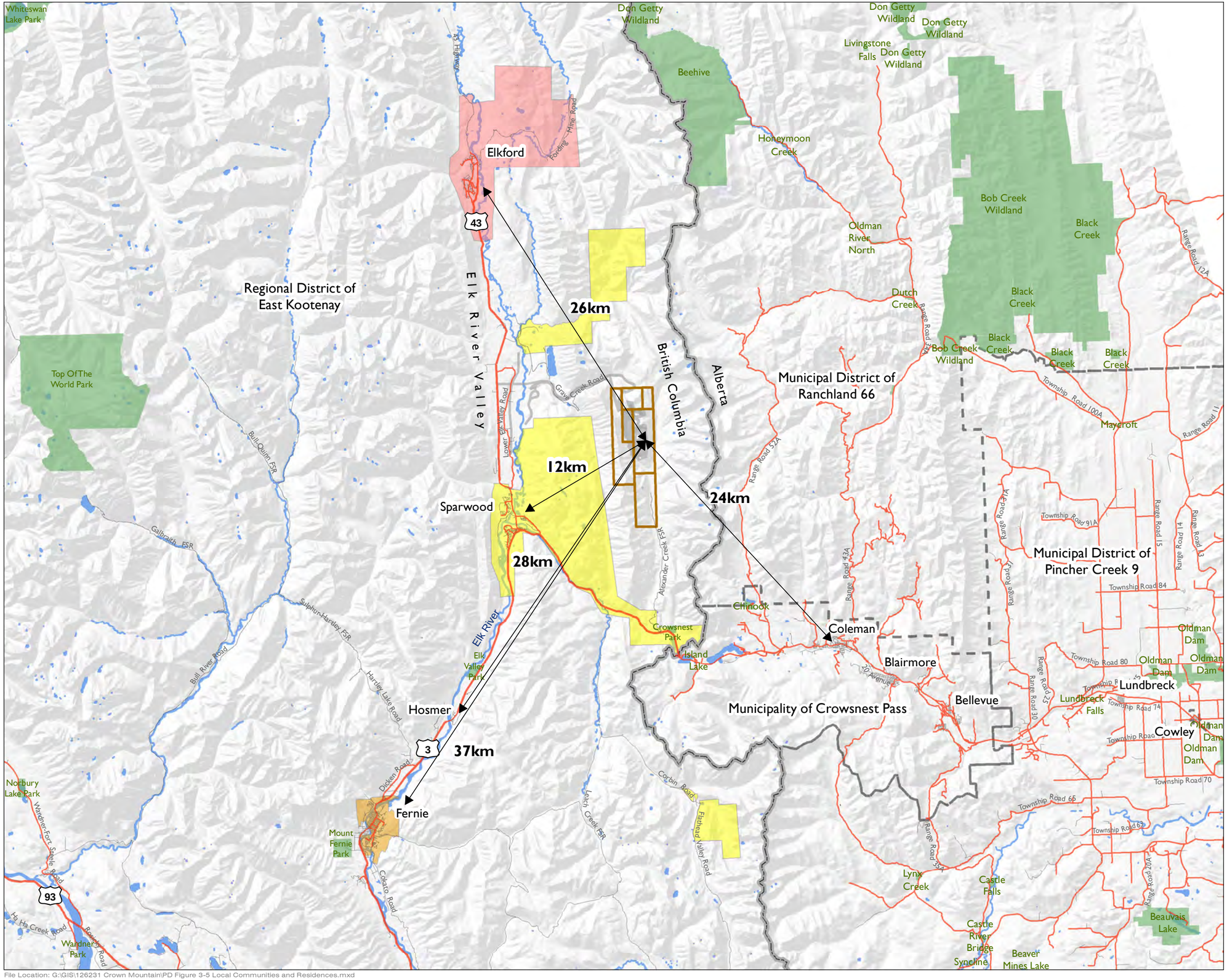

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Figure 3-5
Local Communities and Residences

- Highways
- Arterial Roads
- Local/Resource Roads
- Regional District/Regional Municipality
- District of Elkford
- City of Fernie
- District of Sparwood
- Project Infrastructure Extent
- 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, Jameson Resources, 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: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 3-5 Local Communities and Residences.mxd

3.1.3.8 Provincial and International Boundaries

The provincial border between British Columbia and Alberta occurs approximately 5 km east of the Project. The federal border between BC and Montana is located approximately 90 km south of the Project.

3.1.4 Photographs of Work Locations

Representative photographs of the work locations and Project property are provided below.

Photo 3: Existing Grave Creek FSR, approximately 1.5 km south of Grave Lake. Photo is looking towards the southeast. Proposed new haul road will be independent from the Grave Creek FSR.

Photo 4: **Grave Creek FSR, approximately 1.5 km from the confluence of Grave and Harmer Creeks.**

Photo 5: **Branch C Road, a spur road off of Grave Creek FSR. Photo taken facing southeast towards the Alexander Creek drainage area.**

Photo 6: Deactivated access road near West Alexander Creek.

Photo 7: Climate station installed as part of the Project. See Figure 5-10 for the location of the station.

3.1.5 Proximity of the Project to Residences, Traditional Territory, and Federal Lands

The Project is located in an area only accessible by FSRs. There are no permanent residences in close proximity to the Project property. As mentioned in **Section 3.1.3.3**, several trapping cabins occur within the Alexander Creek drainage (see **Figures 3-3** and **3-5**).

No land claims have been identified in the area; however, the Project is located in the asserted traditional territory of the Ktunaxa Nation. Federal lands in the vicinity of the Project include Parcels 73 and 82 of the Dominion Coal Blocks (approximately 20 and 40 km southwest of the Project, respectively) and Reserve Lands. The nearest Reserve Lands to the Project are located approximately 68 km southwest in BC and approximately 52 km east in Alberta (Bummer's Flat 1 Reserve and Peigan Timber Limit 147B, respectively).

3.2 Land and Water Use

3.2.1 Zoning Designations

The Project occurs within the RDEK, which includes the District of Sparwood, the City of Fernie, and the District of Elkford. The Elk Valley is considered a sub-region of the RDEK and as such, portions of the Elk Valley Zoning Bylaw No. 829 may be relevant to the Project. Specific sections of the Elk Valley Zoning Bylaw No. 829 (1990) that may apply include:

Section 7.17

(1) Permitted Uses in LIGHT INDUSTRIAL ZONE: MG-1

(d) Service industries incidental to mineral and hydrocarbon extraction

Section 7.18

(1) Permitted Uses in HEAVY INDUSTRIAL ZONE: MG-2

(f) Mineral and chemical production and mineral and chemical product industries (35, 36, 37)

(h) Mineral and hydrocarbon extraction (06, 07, 08)

(Regional District of East Kootenay, 1990)

Sections of the City of Fernie Zoning Bylaw No. 1406 (1998) that pertain to the Project include:

Section 2.4.2 Definitions

> *87. LAND means: the surface of water, but does not include improvements, mines or minerals belonging to the Crown, or mines or minerals for which title in fee simple has been registered in the land title office, for the proposes of assessment and taxation, "land" has the same meaning in the Assessment Act.*
>
> *130. RESOURCE EXTRACTION USE means: the extraction of primary minerals and other resources and includes the preliminary grading, working and crushing of such materials, but excludes all other processing or manufacturing.*

Section 4.2.12.2 Permitted Uses in M1 – LIGHT INDUSTRIAL ZONE

> *15. Service industries incidental to mineral and hydrocarbon extraction*
>
> (City of Fernie, 1998)

Sections of the District of Elkford Zoning Bylaw No. 737 (2013) that pertain to the Project are as follows:

Section 1.1 Definitions

> *(a) In this Bylaw, unless context requires:*
>
> *Resource Extraction Use means the extraction of primary mineral and other resources, and includes the preliminary grading, washing or crushing of such materials for shipment, but includes all other processing or manufacturing.*

Section 4.14 Industrial Zone I-1

> *(a) Principal Uses*
>
> *(xiii) Resource extraction and non-Retail distribution, including gravel and sand pits*

Section 4.18 Urban Reserve Zone UR-1

> *(a) Principal Uses*
>
> *(ii) Resource Extraction Uses.*
>
> (District of Elkford, 2013)

Sections of the District of Sparwood Zoning Bylaw No. 264 (1982) that pertain to the Project are as follows:

Section 5.3 M-3 Extraction Industrial

> *Purpose: The purpose of this zone is to provide for mineral extraction and processing of minerals extracted*
>
> *1. Permitted Uses*
>
> *A. Mineral Extraction*
>
> *B. Processing of Minerals Extracted*
>
> *C. Railway lines and utility lines required for the processing or extraction*
>
> *D. Waste Dumps associated with the primary use*

(District of Sparwood, 1982)

3.2.2 Land Ownership and Legal Descriptions

For the Project, NWP Coal Canada Ltd. is the registered owner of five coal license tenures in the RDEK and one tenure application (**Table 7**). All tenure licenses and the application are in good standing with the Province of British Columbia. The centre of the Project's property is approximately 12 km northeast of the District of Sparwood, British Columbia at 114°43.6'W and 49°48.4'N.

Table 7: Coal tenures for the Crown Mountain Project

Tenure Number	Owner	Issue Date	Area (ha)
418150	147488 NWP Coal Canada Ltd. (90%)	May 2, 2012	334.0
418151	147488 NWP Coal Canada Ltd. (90%)	May 2, 2012	1001.0
418152	147488 NWP Coal Canada Ltd. (90%)	May 2, 2012	167.0
418153	147488 NWP Coal Canada Ltd. (90%)	May 2, 2012	251.0
418154	147488 NWP Coal Canada Ltd. (90%)	May 2, 2012	835.0
418430	Application Stage (100%)		975.0

The legal descriptions for surveyed Crown Land parcels that potentially overlap with the Project footprint are provided in **Table 8**. The information provided in **Table 8** is based on land parcels surveyed

as part of the BC Crown Land Management Program and available through the BC Land and Title Survey Online Cadastre Application (Latitude Geographics Group Ltd., 2014).

Table 8: Legal Descriptions of Land Parcels within Project Footprint

Plan Number	Legal Description
9TR27 KOOTENAY	DISTRICT LOT 8290, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 13843, KOOTENAY DISTRICT
9TR27 KOOTENAY	DISTRICT LOT 8521, KOOTENAY DISTRICT
9TR27 KOOTENAY	DISTRICT LOT 8518, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 7933, KOOTENAY DISTRICT
9TR27 KOOTENAY	SPECIAL TIMBER LICENCE 611P, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 7932, KOOTENAY DISTRICT
9TR27 KOOTENAY	SPECIAL TIMBER LICENCE 615P, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 7936, KOOTENAY DISTRICT
9TR27 KOOTENAY	SPECIAL TIMBER LICENCE 610P, KOOTENAY DISTRICT.
9TR27 KOOTENAY	S1/2, DISTRICT LOT 8520, KOOTENAY DISTRICT
43TR1 KOOTENAY	SPECIAL TIMBER LICENCE 616P, KOOTENAY DISTRICT.
9TR27 KOOTENAY	SPECIAL TIMBER LICENCE 609P, KOOTENAY DISTRICT.
	W1/2, DISTRICT LOT 6780, KOOTENAY DISTRICT
	W1/2, DISTRICT LOT 6781, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 6780, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 6781, KOOTENAY DISTRICT.
9TR27 KOOTENAY	DISTRICT LOT 8522, KOOTENAY DISTRICT.
9TR27 KOOTENAY	N1/2, DISTRICT LOT 8519, KOOTENAY DISTRICT
9TR27 KOOTENAY	DISTRICT LOT 8519, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 6444, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 13844, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 6442, KOOTENAY DISTRICT
	N1/2, DISTRICT LOT 8520, KOOTENAY DISTRICT
	E1/2, DISTRICT LOT 8521, KOOTENAY DISTRICT
9TR27 KOOTENAY	DISTRICT LOT 8520, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 6779, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 7934, KOOTENAY DISTRICT
23TR17 KOOTENAY	DISTRICT LOT 4588, KOOTENAY DISTRICT
9TR27 KOOTENAY	SPECIAL TIMBER LICENCE 612P, KOOTENAY DISTRICT.
43TR1 KOOTENAY	DISTRICT LOT 6443, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 13857, KOOTENAY DISTRICT

Plan Number	Legal Description
43TR1 KOOTENAY	DISTRICT LOT 6441, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 7935, KOOTENAY DISTRICT
9TR27 KOOTENAY	DISTRICT LOT 8289, KOOTENAY DISTRICT
	E1/2, DISTRICT LOT 8522, KOOTENAY DISTRICT
43TR1 KOOTENAY	DISTRICT LOT 6440, KOOTENAY DISTRICT

3.2.3 Local Land Use Plans

There are several local land use plans that are being drafted or are in place within or near the Project.

In 2013, land use planning for the Elk Valley was identified as a priority by the RDEK Board of Directors (Regional District of East Kootenay, 2014b). As part of the land use planning process, the RDEK is currently in process of creating the Elk Valley Official Community Plan (OCP) which will serve as a long range strategic planning document that identifies preferred future land use for the area (RDEK, 2014b). The draft Elk Valley OCP is currently open to public comment and an OCP Visioning Workshop was held on June 10, 2014 in Hosmer, BC (RDEK, 2014b). Relevant goals set out in Section 3 of the draft Elk Valley OCP that pertain to the Project include (paraphrased):

> *Maintenance of rural character and identification of development nodes, and balance of commercial development with economic diversification;*
>
> *Direction of light industrial activities within the Elk Valley to appropriate locations within the plan area;*
>
> *Maintenance of ecological resiliency and protection of ecosystem services, including preservation of riparian areas, dry grassland and sensitive habitat. Maintenance and enhancement of species-at-risk and functional ecosystem components. Limited fragmentation and contraction of wildlife habitat;*
>
> *Proactive risk management for public safety; and*
>
> *Reduction of greenhouse gas emissions to in order to mitigate climate change impacts* (RDEK, 2014b).

The draft Elk Valley OCP currently provides draft mapping of land use designations across the RDEK. Based on the draft mapping, the Project occurs in an area designated as Rural Resource under the Residential and Rural Land Uses category. The draft Elk Valley OCP (2014) includes a description of the Rural Land Uses permitted as follows:

Section 20.3 Rural Land Uses

(1) RR, Rural Resource supports agricultural, rural residential and rural resource land uses with parcel size 8.0 ha and larger. The RR designation also recognizes the use of these lands for public utility use, resource extraction, green space and recreation (Regional District of East Kootenay, 2014a).

The City of Fernie, approximately 41 km south of the Project, has a current OCP, the City of Fernie Official Community Plan Bylaw No. 2231, which was subject to public review. This OCP focuses on land use and future growth opportunities for the municipality. Sections of the City of Fernie Official Community Plan Bylaw No. 2231 (2014) that pertain to the Project include:

Introduction statement:

50% of Fernie's population base is tied to the coal mining industry.

Policies Section 1-A.4:

Fernie has goals to provide higher numbers of accommodation options for permanent and temporary coal mining workers

Section 3:

"With significant reserves in most of the operating coalmines (between 17 and 75 years worth of coal) and some new mining projects at some stage in the approval process, mining will likely maintain its position as a major component of the sub-regional economy"

Section 6:

Addresses the natural environment, and identifies seven key areas to focus protection and stewardship on: Environmentally Sensitive Areas, Wildlife Corridors, Aquatic Habitats and Water Quality, Air Quality, Urban Forest, Viewscapes and Sand and Gravel Extraction (City of Fernie, 2014).

The District of Elkford is located approximately 28 km north of the Project and has a current OCP, the District of Elkford Official Community Plan Bylaw No. 710, which was subject to public review. The OCP (2010) focuses on land use and development policies with a goal date of 2035. The OCP focuses on long term sustainability and includes plans to combat climate change and reduce greenhouse gas emissions. The plan also acknowledges a current economic reliance on coal mining and aims to increase tourism (District of Elkford, 2010).

The Fernie Alpine Resort is located directly south of the City of Fernie and has a current OCP titled the Regional District of East Kootenay – Fernie Alpine Resort Official Community Plan Bylaw No. 2363 (2012). Island Lake is located 8 km west of the City of Fernie and has a current OCP titled the Regional District of East Kootenay – Island Lake Official Community Plan Bylaw No. 2170 (2009). Both OCPs were subject to public review and First Nations consultation. The plans focus on tourism resources but do acknowledge coal mining as an important resource activity in the Elk Valley as a whole. Information regarding Ktunaxa Nation history and archaeological resources is also included (RDEK, 2012; RDEK, 2009).

The District of Sparwood, approximately 12 km from the Project, is currently in process of creating an OCP which will serve as a long range strategic planning document that identifies preferred future land use. The draft OCP is open to public comment and an OCP Open Houses were held on March 13, 2014 and March 18, 2014. Sections of the OCP that pertain to the Project include but are not limited to:

Section 3 Economic Development

Goal 3 – Support a diverse economy that provides a wide range of jobs and services.

Mining is the primary economic driver in Sparwood (…) The coal mines in the Elk Valley are the largest producing metallurgical coal mines in Canada (District of Sparwood, n.d.)

Specific land use and growth strategy plans available for areas within and around the Project include:

- The East Kootenay Land-Use Plan (BC Commission of Resources and Environment, 1995);
- Kootenay Boundary Land Use Plan Implementation Strategy (Kootenay Inter-Agency Management Committee, 1997); and
- Regional Growth Strategy (RDEK, 2004).

Conservation, management and wildlife inventory documents for the area include:

- Elk River Creel Survey 2002 Quality Waters Strategy (River Guardian Program) (Heidt, 2003)
- Survey on 7 East Kootenay Streams – 2004 Quality Waters Strategy (River Guardian Program) (Heidt, 2005)
- Fish Population and Riverine Habitat Inventory of the Elk River, Sparwood, British Columbia (Johnston, 2007)
- District of Elkford: Climate Change Adaptation Strategy (Gorecki et al., 2009); and
- City of Fernie GHG Emission Reduction Plan (Walsh, 2009).

Water quality plans were implemented throughout the Elk Valley in association with the Columbia Basin Trust. The "Water Smart Action Plans" for each municipality were created as an internal operations document and were spearheaded by local government. The structure of the local government dictated the level of public involvement in the plans. Each plan includes a section on public stewardship and education regarding water consumption. Specific water quality plans for the area include

- District of Sparwood Water Smart Action Plan (2010) and
- City of Fernie Water Smart Action Plan (2010).

3.2.4 Aboriginal Land and Resource Requirements

The Project is not located on or adjacent to a First Nation Reserve. The Project is located within the asserted traditional territory of the Ktunaxa Nation. The Ktunaxa Nation in BC includes the ʔakisq̓nuk First Nation (Windermere); the ʔaq̓am – St. Mary's First Nation (Cranbrook); the yaqan nukiy – Lower Kootenay Band (Creston); and the Tobacco Plains Indian Band (Grasmere). The Project is also located within the asserted traditional territory of the Shuswap Indian Band.

In BC, the nearest Reserve Lands to the Project are approximately 70 km to the west and include the communities of Bummer's Flat 1, Kootenay 1, St. Mary's 1A, Isidore's Ranch 4, and Cassimayooks 5 (**Figure 3-4**).

As part of the EA, a detailed TU/TK study will be completed. Any available information relating to traditional land use will be considered in the EA of the proposed undertaking, as appropriate.

4.0 GOVERNMENTAL FINANCIAL SUPPORT, LANDS, AND LEGISLATIVE REQUIREMENTS

4.1 Financial Support

There is no federal or provincial funding identified for this Project.

4.2 Federal and Provincial Lands

There are no federal or provincial lands required for the Project to proceed.

4.3 Legislative Requirements

4.3.1 Federal Requirements

The following federal Acts or Regulations may apply to the design, construction, and operation of the Project:

- *Canadian Environmental Assessment Act;*
- CEAA Regulations Designating Physical Projects;
- *Fisheries Act*, Fisheries Act Regulations
    - Section 35(2) (b) Authorization for the serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery;
- *Migratory Birds Convention Act;*
- *Species at Risk Act;*
- *Radiocommunications Act;*
- *Explosives Act;* and the
- *Transportation of Dangerous Goods Act*.

4.3.2 Provincial Requirements

Provincially, several Acts or Regulations may apply to the design, construction, and operation of the Project:

- *Environmental Assessment Act*
- *Environmental Management Act,* Hazardous Waste Regulation
    - Waste Discharge Authorization
    - Open Burning Permit
    - Other permits may be required for the temporary storage of hazardous waste, building of new gas equipment, authorization to discharge sewage into a holding take and construct a subsurface disposal system;

- *Water Act*, Water Regulation
    - Water License for the use, storage, or diversion water or alteration to a stream channel
    - Approval (complex works) or Notification (anticipated minimal impacts) application for the authority to make changes in and about a stream;
- *Wildlife Act*
    - Wildlife Permit;
- *Heritage Conservation Act*
    - Heritage Inspection Permit;
- *Mines Act*
    - Permit Approving Work System and Reclamation Program;
- *Coal Act*
    - Coal Lease applications;
- *Land Act*
- *Forest Act*
    - Road Use Permit
    - Occupant License to Cut
    - Special Use Permit;
- *Fire Services Act*
    - Fuel Storage Approval; and the
- *Transportation Act*
    - Highway Access Permit.

5.0 ENVIRONMENTAL SETTING AND POTENTIAL EFFECTS

5.1 Physical and Biological Setting

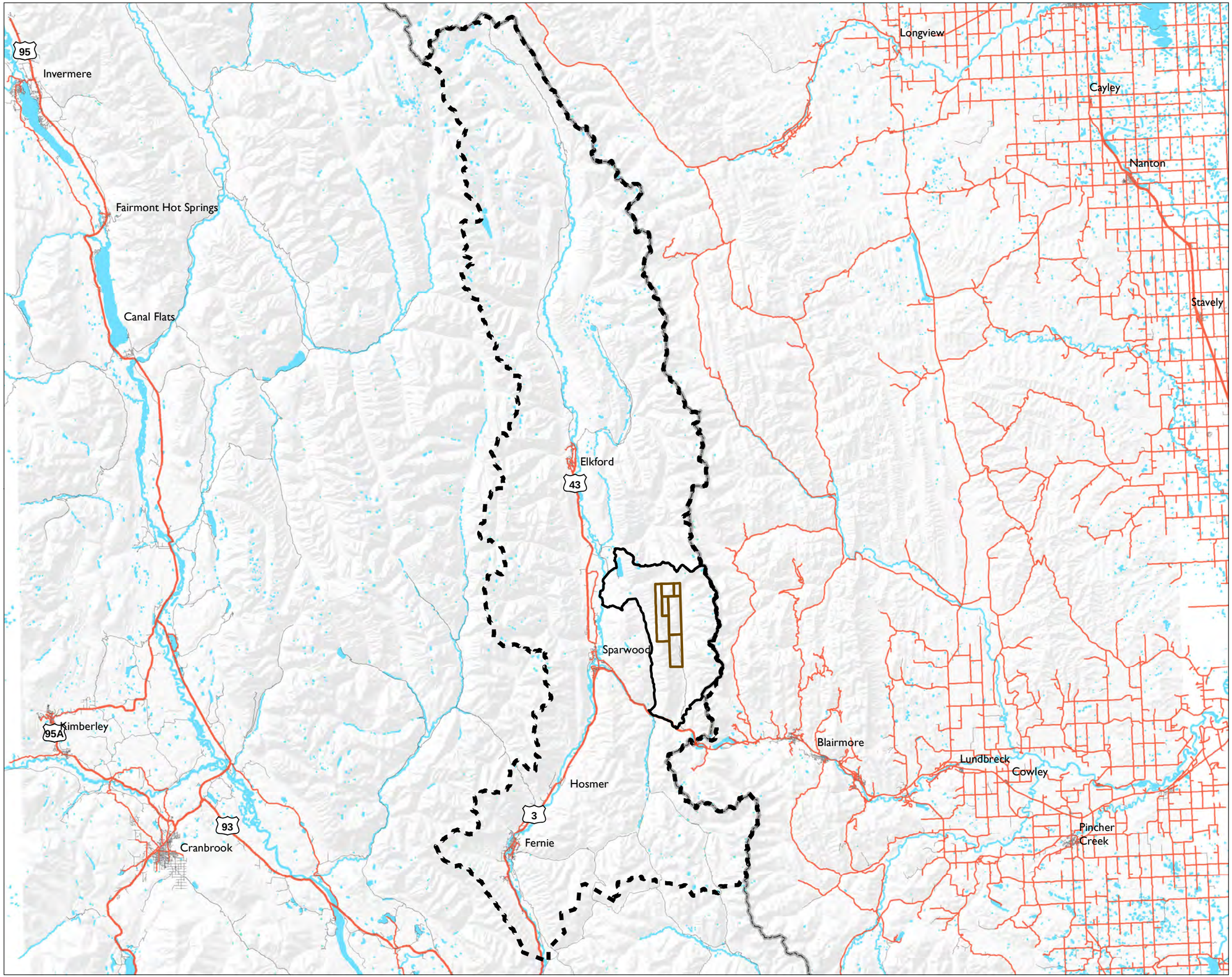
5.1.1 General Environmental Setting

The Project is located in a relatively high elevation mountainous area of the Rocky Mountains approximately 12 km north east of Sparwood and about 150 km line-of-sight south southwest from the City of Calgary, Alberta. The area is classified as lying in the Front Ranges Physiographic Region of the Rocky Mountains (Ryder, 2981). The relief on the Project property (i.e., the coal license tenures) generally ranges from 1,850 m to 2,200 m above sea level. The area is characterized by rugged ridges with moderate to steep-sloping sides at higher elevations and gentle slopes at lower elevations. The west side of the Project is characterized by steep sided ridges and subdued mountains, while those on the east are rugged with many cirques and U-shaped valleys. The setting is truly mountainous, underlain mostly by structurally deformed sandstone, siltstone, mudstone, and coal. The Project property is predominately forested with predominant species being lodgepole pine, Engelmann spruce, alpine fir, and limber and jack pine.

Alexander Creek and West Alexander Creek drain the majority of the Project property, with Grave Creek draining a small portion of the northern portion of the property. Alexander Creek typically ranges from 1,400 m to 1,500 m. Gaff Peak, located to the west of the property, has an elevation of approximately 2,500 m. Alexander Creek, the main watercourse draining the Project property, runs north-south to the east of the proposed mining areas of the Project coal licenses.

Environmental baseline studies were initiated for the Project in 2012 to support the EA process. As part of the baseline studies, a Local Study Area (LSA) and Regional Study Area (RSA) were chosen and used to guide the extents of baseline surveys around and within the Project property (**Figure 5-1**). The LSA is approximately 24,000 ha in size and the RSA is 337,000 ha. The LSA represents the geographic area that has the potential to experience direct effects associated with the Project. This area typically includes the Project footprint, haul routes, and specific areas or components that may interact with Project components (e.g., watercourses and waterbodies) and includes the area of a potential southern extension. The RSA is the broader area around the Project which has the potential to experience direct, indirect, or cumulative effects associated with the Project.

Baseline studies initiated for the Project include, but are not limited to, fish and fish habitat surveys (e.g., winter fisheries assessment and spring spawning surveys), terrestrial surveys (e.g., breeding bird surveys, winter furbearer and ungulate surveys), geochemistry, groundwater, hydrology, and surface water quality. Information from the studies has been included in the Project Description, as applicable. Baseline programs will be discussed with Technical Working Groups as the Project progresses.



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Crown Mountain Coking Coal Project

Figure 5-1
Regional and Local Study Areas

- Highways
- Arterial Roads
- Local/Resource Roads
- Local Study Area
- Regional Study Area
- Coal Tenure Licenses and Application
- Lakes
- Rivers
- BC/Alberta Border

SCALE 1:533,897

0 5 10 20 km

N
W E
S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, Regional District of East Kootenay

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/22/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-1 Regional and Local Study Area.mxd

5.1.2 Geologic Setting

5.1.2.1 Regional Geology

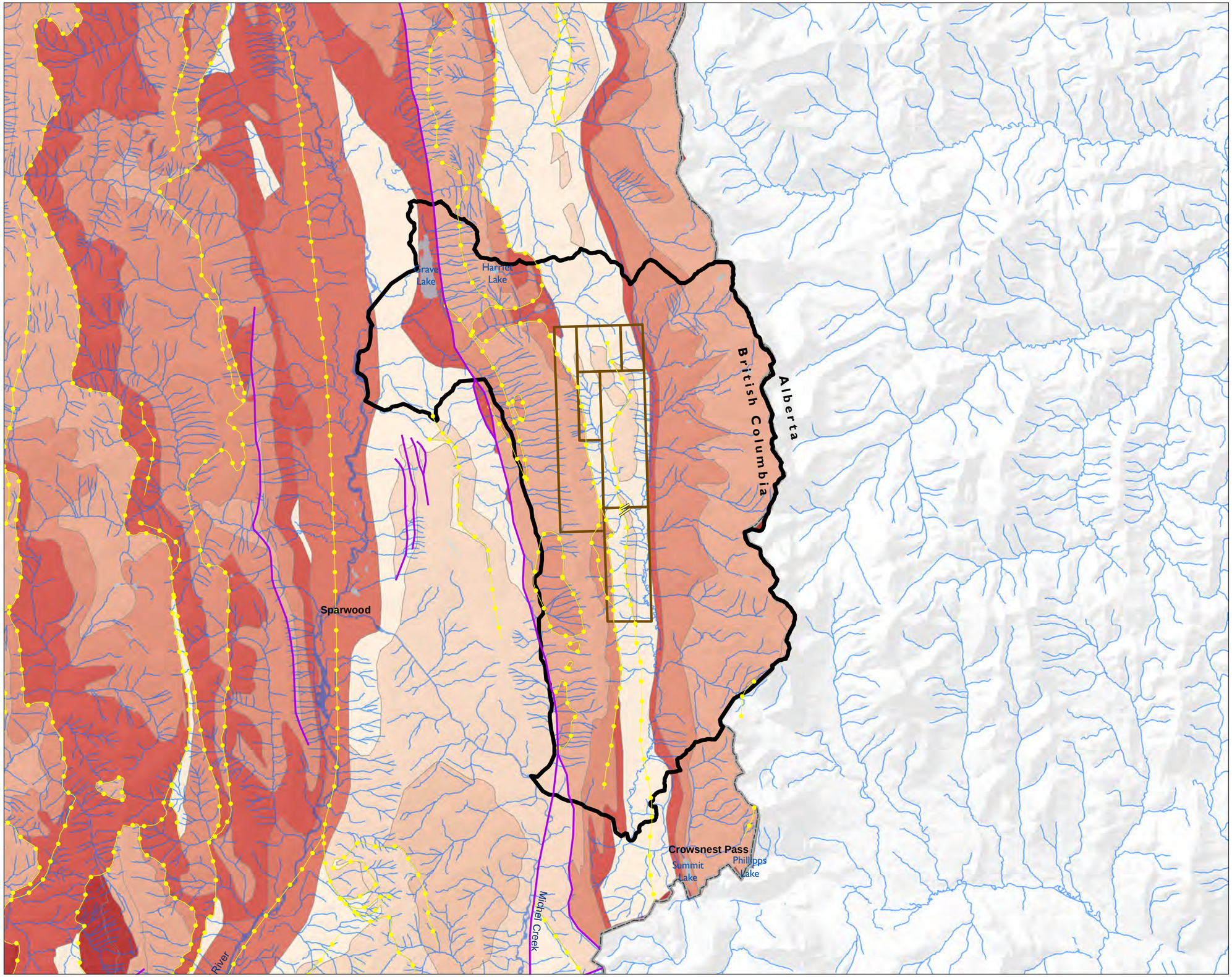
The Project is located in the Front Ranges of the Rocky Mountains of BC, in an area of the Elk Valley coal field with non-marine sediments of the Jurassic-Cretaceous Kootenay Group. This area is characterized by numerous thrust faults, open to tight folds, and some normal faults. The high mountains of the area are composed of parallel ridge systems of resistant Paleozoic carbonates, separated by thrust faults of large displacement. Regionally the Crown Mountain project lies within the Lewis Thrust sheet, between the Lewis Thrust and overlying Bourgeau Thrust. **Figure 5-2** shows the regional geology of the area and **Figure 5-3** summarizes the regional stratigraphy of the area.

The Jurassic-Cretaceous Group includes the Elk Formation, the Mist Mountain Formation, and the Morrissey Formation. The Kootenay Group is underlain by marine sediments, mostly shales of the Jurassic Fernie Formation. These shales grade upward into the Morrissey Formation, a package of fine to coarse grained cliff forming sandstones. The Morrissey Formation is divided into the lower Weary Ridge member consisting of up to 55 m of fine grained sandstone and the Moose Mountain Member which consists of up to 36m of medium to coarse grained sandstone. Overlying the Morrissey Formation, the Mist Mountain Formation contains mudstone, shale, siltstone, sandstone, and coal. This formation is overlain by the Elk Formation. Of the formation within the Jurassic-Cretaceous Kootenay Group, the Mist Mountain Formation is the main coal-bearing unit (see **Figure 5-4** for the local coal seam stratigraphy). All the mines in the Elk Valley and Crowsnest coalfields extract coal from the Mist Mountain Formation (Ryan, 2011).

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 5-2
Regional Geology



Fault Line By Type
- Fault
- Normal Fault
- Thrust

Formation Age
- Jurassic
- Jurassic and Cretaceous
- Lower Cretaceous to Tertiary
- Mississipian
- Pennsylvanian and Permian
- Quarternary
- Triassic
- Other/Unknown
- Local Study Area
- Coal Tenure Licenses and Application
- Rivers
- Lakes
- BC/Alberta Border

SCALE 1:150,000
0 1 2 4 km

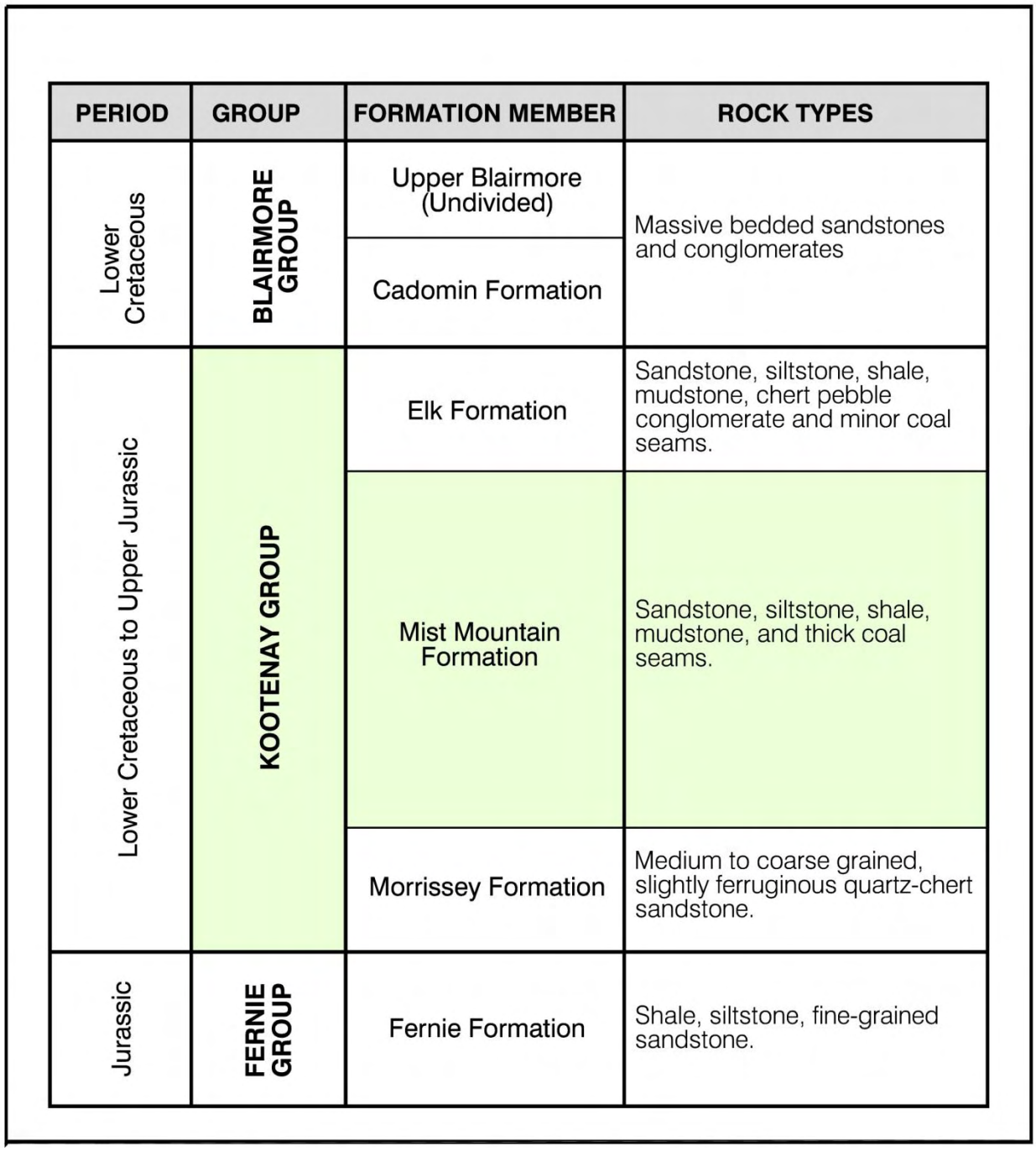
N
W E
S

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, Regional District of East Kootenay

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/27/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-2 Regional Geology.mxd



PERIOD	GROUP	FORMATION MEMBER	ROCK TYPES
Lower Cretaceous	BLAIRMORE GROUP	Upper Blairmore (Undivided)	Massive bedded sandstones and conglomerates
		Cadomin Formation	
Lower Cretaceous to Upper Jurassic	KOOTENAY GROUP	Elk Formation	Sandstone, siltstone, shale, mudstone, chert pebble conglomerate and minor coal seams.
		Mist Mountain Formation	Sandstone, siltstone, shale, mudstone, and thick coal seams.
		Morrissey Formation	Medium to coarse grained, slightly ferruginous quartz-chert sandstone.
Jurassic	FERNIE GROUP	Fernie Formation	Shale, siltstone, fine-grained sandstone.

Figure 5-3: Regional Stratigraphy

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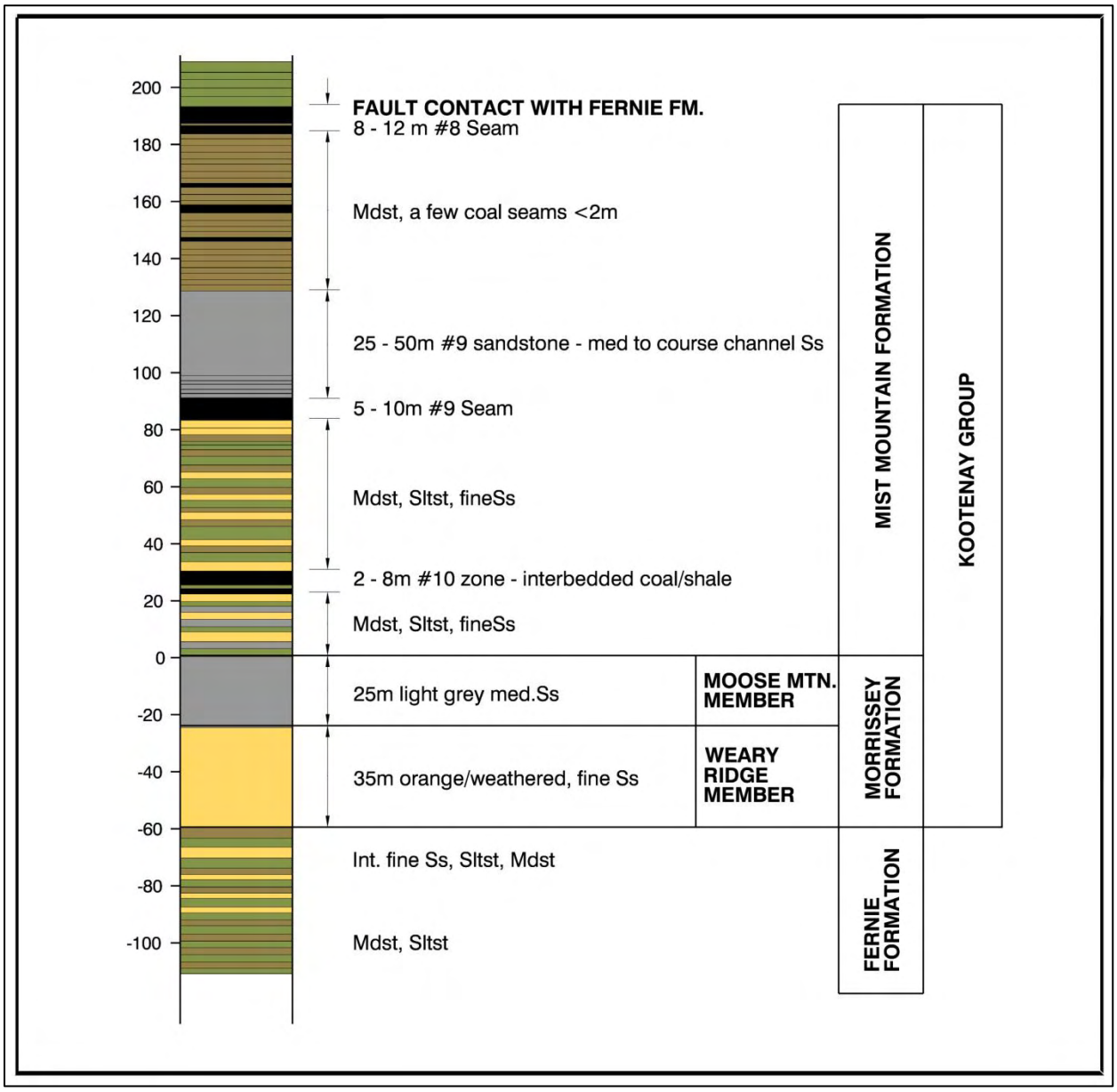

Figure 5-4: Local Coal Seam Stratigraphy

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5.1.2.3 Site Geology and Soils

The geology within the Project property is often outlined by the Moose Mountain and Weary Ridge Members of the Morrissey Formation which are prominent cliff-forming markers along the south eastern margins of the Project. Another channel sandstone unit is correlative with the Number 9 sandstone within the Mist Mountain Formation in the Line Creek Mine area.

The Project consists of three principal coal seams which comprise a total of seven major seams. The seams are interpreted to be the equivalents of Seam 8, Seam 9, and Seam 10, which are mined at the Line Creek metallurgical coal mine, approximately 12 km to the north of the Project. Host lithology is composed of sandstone, siltstone, shale, and mudstone of the Mist Mountain Formation. Mineralogical characterization at the nearby Line Creek Mine found siderite, dolomite, and calcite to be the most common carbonates, and pyrite as the most common sulphide. **Figures 5-5 to 5-9** detail cross sections of the Project property North and South Blocks and **Figure 5-4** details the local coal seam stratigraphy.

Geology in The North Block has been classified in accordance with Geological Survey of Canada Paper 88-21 criteria as "Complex", based on its angular and tightly appressed synclinal folding. A broadly north south trending regional thrust fault separates the North Block from the South Block and the contiguous Southern Extension. Geology to the south east of the thrust fault has been classified as “Moderate”.

The soils in the Project area are expected to be influenced by topographic relief, parent materials, local climate, and vegetation. Site-specific soils will be evaluated as part of project Terrestrial Ecosystem Mapping (TEM) which will be required as part of the Project environmental baseline studies.

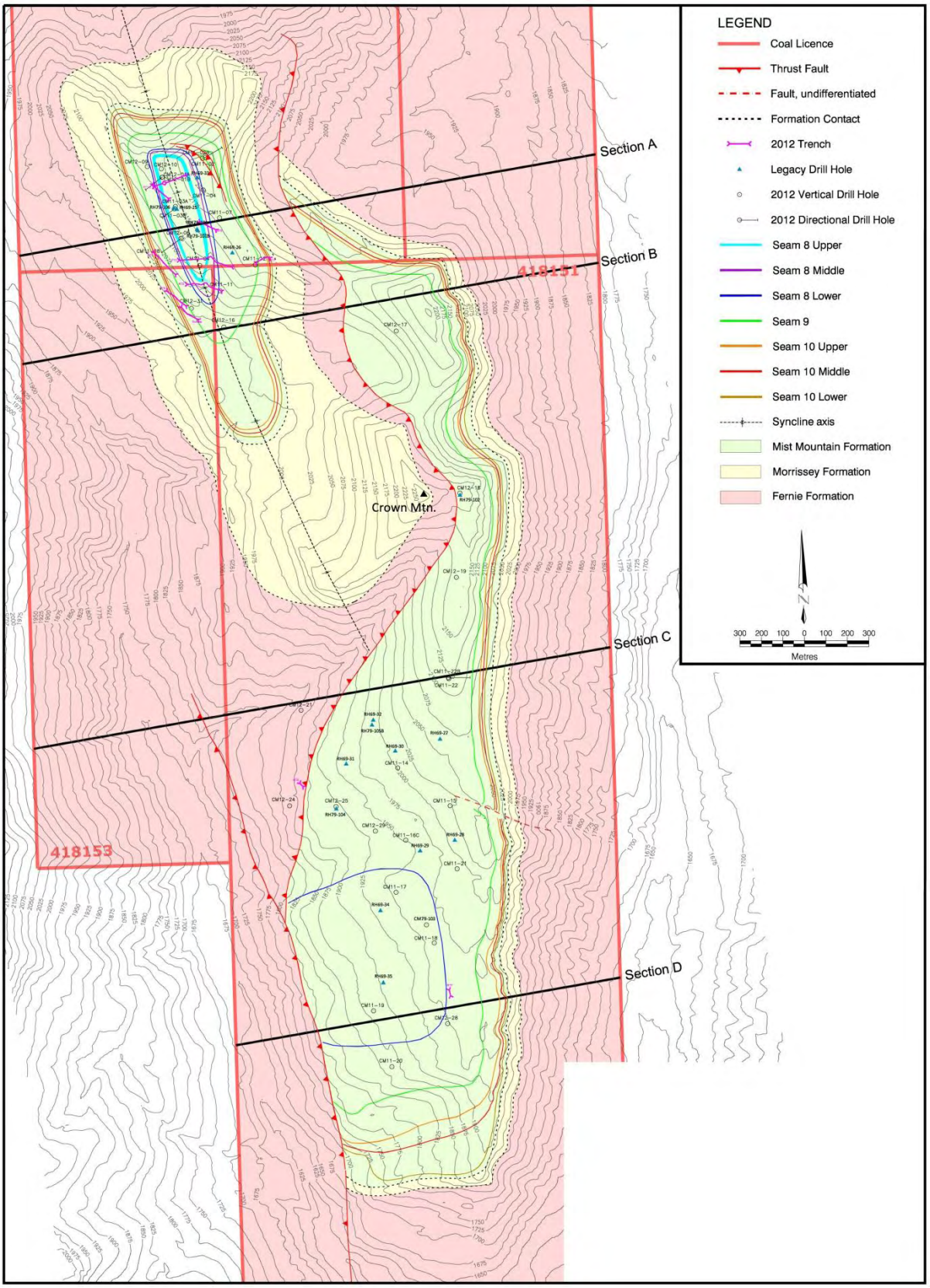

Figure 5-5: Location of Geology Cross Sections

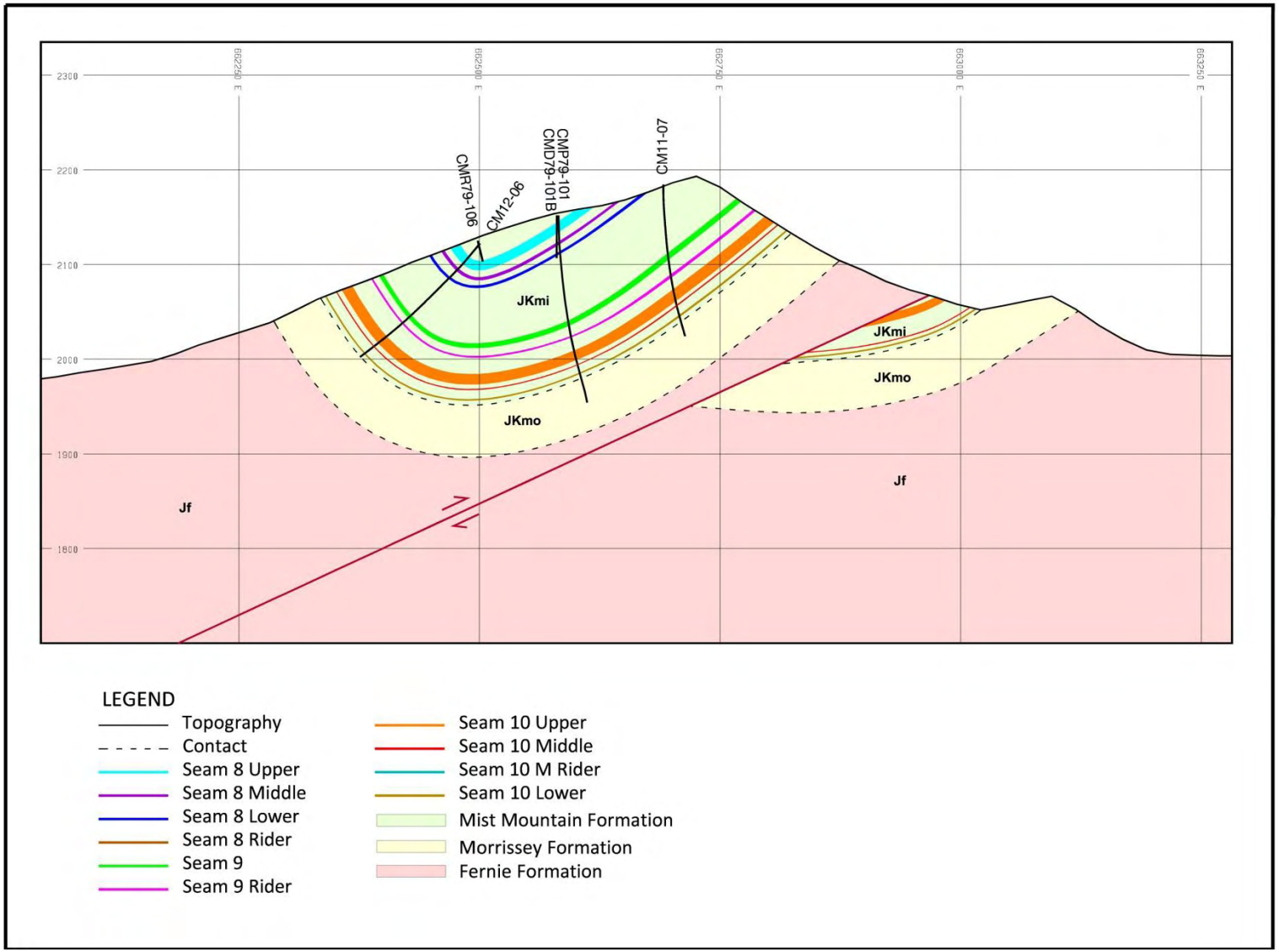

Figure 5-6: Cross Section of Project Geology (A – A')

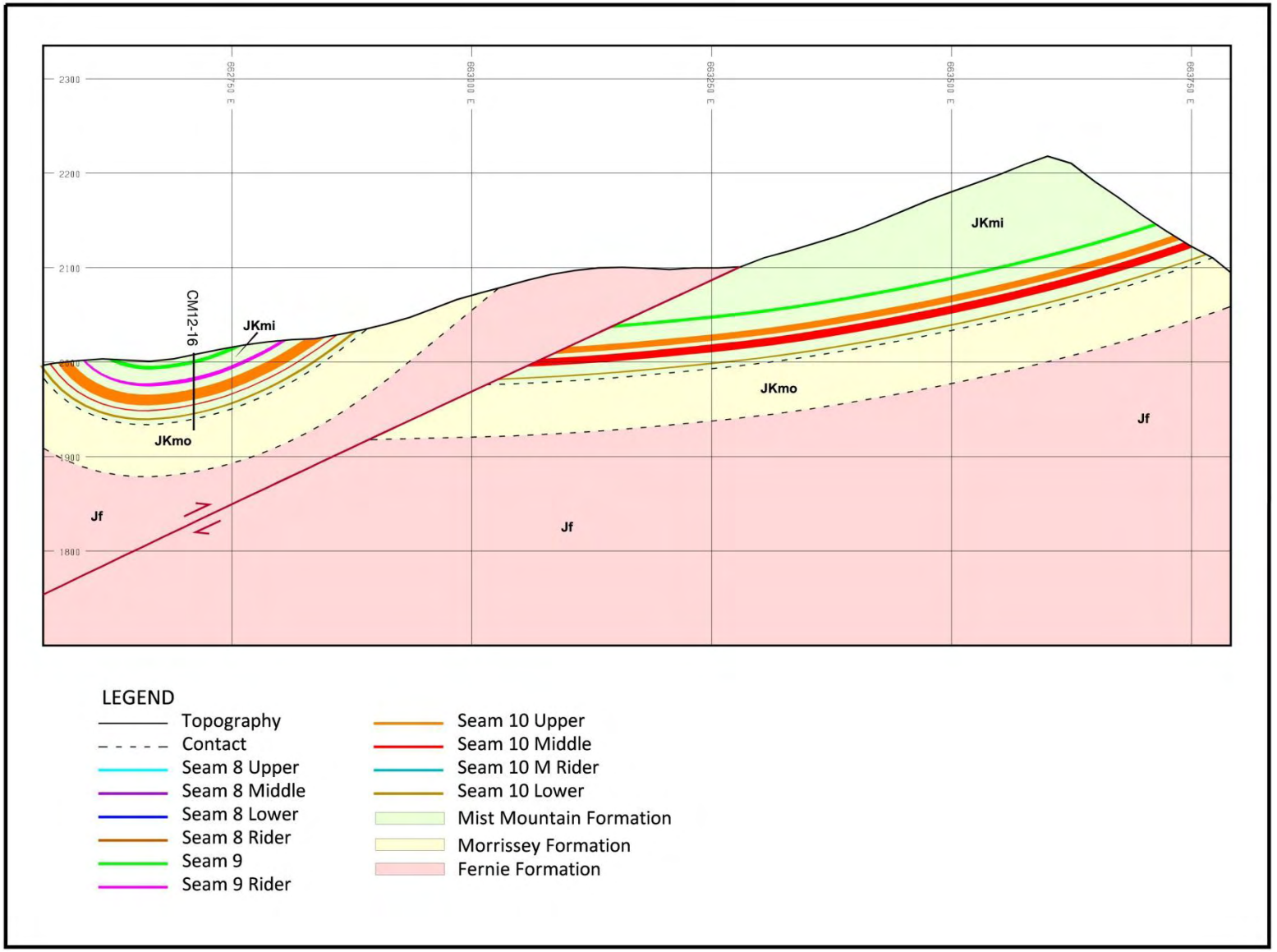

Figure 5-7: Cross Section of Project Geology (B – B')

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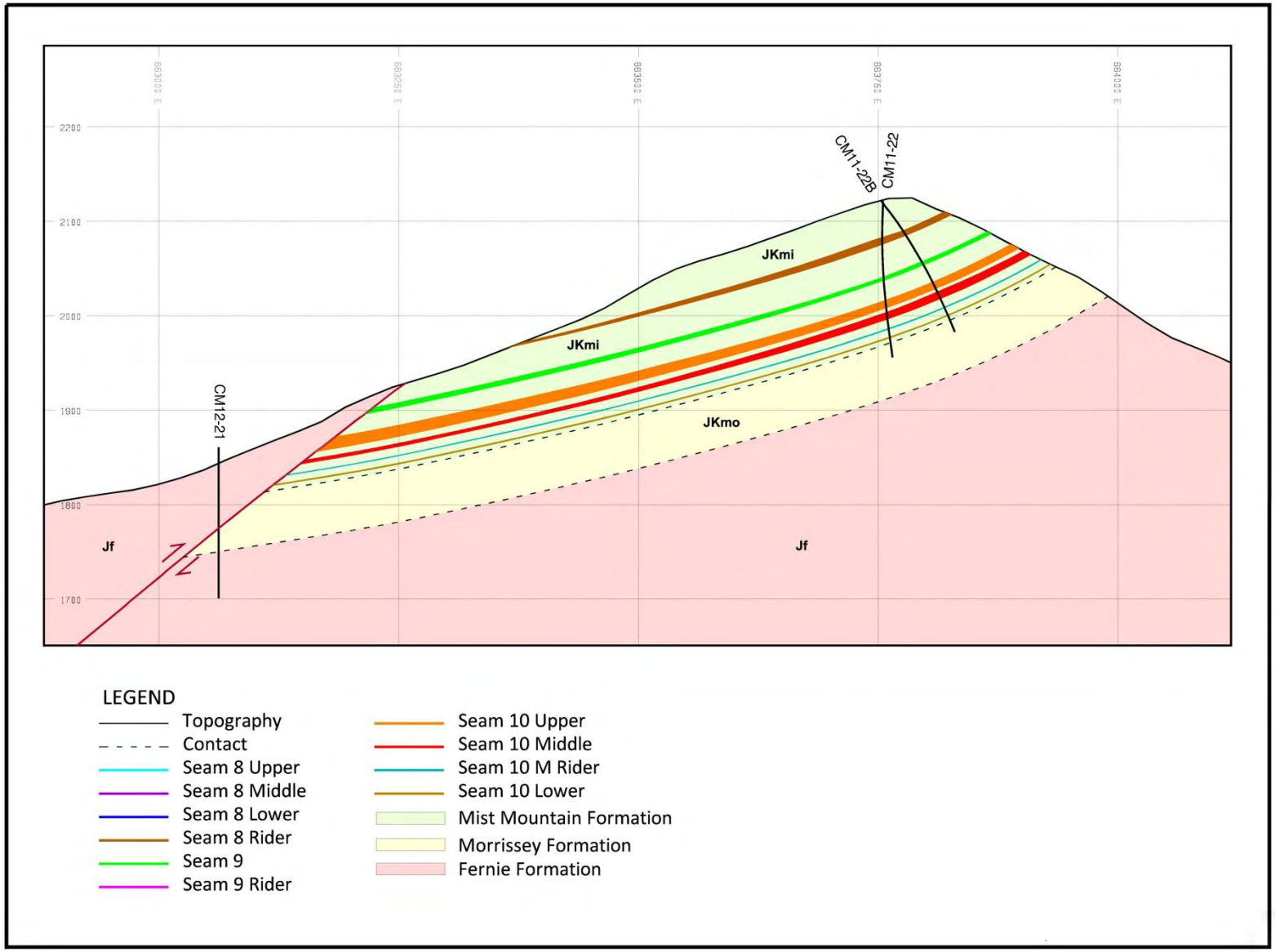

Figure 5-8: Cross Section of Project Geology (C – C')

NWP Coal Canada Ltd

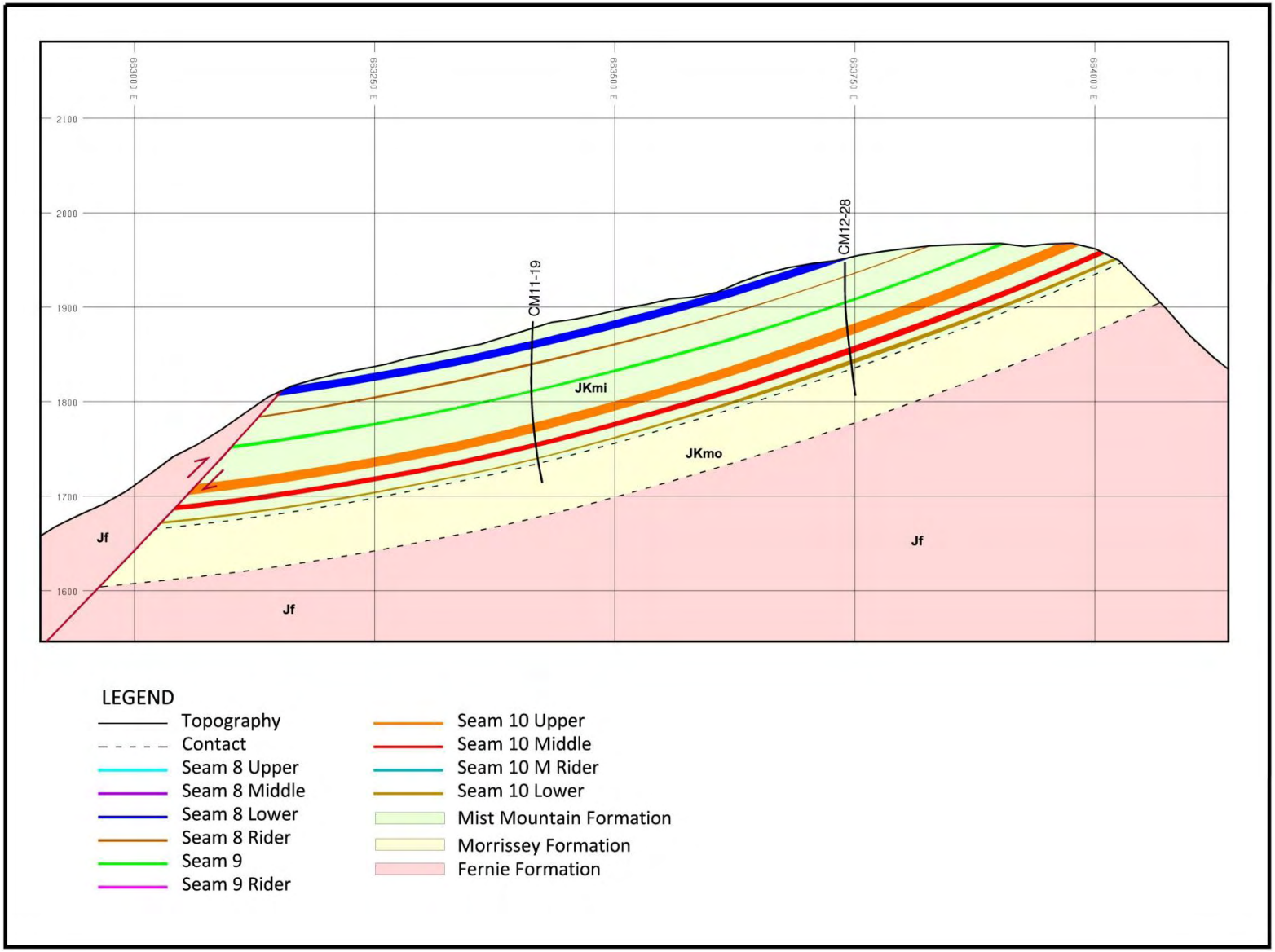

Figure 5-9: Cross Section of Project Geology (D – D')

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5.1.3 Climate and Atmospheric Environment

The climate of the Crown Mountain area is typical of central British Columbia with below freezing temperatures (0° C to -40°C) from November to April and periods of hot weather in the summer from 20° to 40°C (Shearer, 2007). Precipitation averages 80 cm a year, with a substantial portion in the form of snow (Shearer, 2007).

The closest long-term Environment Canada meteorological station to the Project is in Sparwood (Station ID: 1157630), approximately 12 km away from the centre of the Project property. Climate normals for the Sparwood Station from 1971 to 2000 are presented in **Tables 9**. **Figure 5-10** shows the location of the Sparwood Station relative to the Project.

Table 9: Climate Normal for Sparwood (Station ID: 1157630), 1971 to 2000 (Environment Canada, 2014a)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Daily Average Temperature (°C)	-6.8	-4.4	0.2	4.9	9.2	12.6	15.4	15.1	10.4	5	-2	-7.7	4.3
Daily Maximum Temperature (°C)	-2.5	0.5	5.5	11	16	19.5	23.2	23.6	18	10.8	1.7	-3.7	10.3
Daily Minimum Temperature (°C)	-11.1	-9.3	-5.1	-1.3	2.4	5.7	7.6	6.6	2.7	-1	-5.7	-11.6	-1.7
Rainfall (mm)	14	14.4	14.5	26.1	56.8	61.2	51.5	34.1	41.3	38.8	39	14.1	405.7
Snowfall (cm)	50.6	34	28.4	15.6	5.2	1.6	0	0.1	1.4	11.1	43.3	57.2	248.4
Precipitation (mm)	53.2	40.9	38.4	38.4	61.9	62.8	51.5	34.2	42.7	48.2	71.7	59.6	603.3

To support the EA process and collection of site-specific climatic data, a climate station was installed for the Project in 2013. Since 2013, the station has been collecting information on barometric pressure, air temperature, relative humidity, solar radiation, average wind speed, wind direction, precipitation rate, and accumulated precipitation. Collection of climatic data has followed, and will continue to follow, guidelines set out in the BC Ministry of Environment (2012) Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations.

Air and noise baseline measurements do not exist for the Project property. As part of environmental baseline studies, air and noise monitoring will be conducted to establish baseline conditions at the Project property and to understand potential effects of the Project on the acoustic and atmospheric environment.

NWP Coal Canada Ltd

Crown Mountain Coking Coal Project

Figure 5-10
Current and Historical Climate Stations

- Sparwood Climate Station
- Crown Mountain Climate Station
- Watercourses
- Local Study Area
- Coal Tenure Licenses and Application
- Rivers
- Lakes
- BC/Alberta Border

SCALE 1:105,000

0 1 2 4 km

N W E S

Map Drawing Information: Province of British Columbia, Jameson Resources, Dillon Consulting Limited, Regional District of East Kootenay

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

PROJECT: 12-6231
STATUS: FINAL
DATE: 10/27/2014

File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-10 Climate Stations.mxd

5.1.4 Hydrology

The Project is located in the Elk River watershed. The Elk River drains into the Kootenay River which is a tributary to the Columbia River. Watercourses in the vicinity of the proposed Project include Grave Creek, Harmer Creek, Alexander Creek, West Alexander Creek, Michel Creek, Erickson Creek, and the Elk River (see **Figure 3-1**). Main watercourses within the LSA include Alexander Creek, West Alexander Creek and Grave Creek, all of which drain to the Elk River. These watercourses are fed by small tributaries which drain mountain ridges within the LSA. Alexander Creek is classified as a two to five-ordered basin with a drainage area of approximately 15,500 ha. The majority of Alexander Creek is classified as a third and fourth order stream and is classified as a second order in higher elevation areas in the north and firth order in the south near the confluence with Michel Creek. West Alexander Creek is an order two and three watercourse and has a drainage area of approximately 1,500 ha. Grave Creek is classified as a first order stream in higher elevation areas and as a fifth order stream near the confluence with the Elk River. The drainage area of Grave Creek is approximately 4,200 ha.

As part of environmental baseline studies, four hydrometric monitoring stations were established in 2012 to collect hydrological baseline information (**Figure 5-11**). These stations were established at Alexander Creek, West Alexander Creek, and Grave Creek given their proximity to and occurrence within the Project property and potential Project footprint. **Table 10** details preliminary flow measurements of the three watercourses monitored since 2012. In addition to flow measurements, data loggers were installed at the hydrometric stations to monitor real-time changes in water flow. Monitoring at the stations installed as part of baseline surveys continues. The nearest active Environment Canada hydrometric stations to the Project area are located at the Elk River near Natal (Station ID: 08NK002) and at the mouth of the Fording River (Station ID: 08NK016). Two discontinued hydrometric stations are located at the Michel Creek below Natal and at the mouth of Grave Creek.

Seasonally-high peak discharges in watercourses within and surrounding the Project typically occur in the spring months of May and June during snow melt in the local mountains. Low-flow periods typically occur in warm summer months of August and early September.

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Figure 5-11
Watercourses and Hydrometric Monitoring Stations

- Flow Direction
- Baseline Hydrometric Monitoring Stations
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Watersheds
- Wetlands
- Rivers
- Lakes
- Local Study Area
- Coal Tenure Licenses and Application
- BC/Alberta Border

SCALE 1:125,000

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Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited. Government of Canada, Environment Canada.

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

PROJECT: 12-6231
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File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-11 Watercourses and Hydrometric Monitoring Stations.mxd

Table 10: Preliminary Flow Measurements 2012 to 2014

Station ID	Date	Watercourse	Discharge Rate (m^3/sec)
July 2012			
A1	July 23, 2012	Lower Alexander Creek	5.625
A3	July 24, 2012	Alexander Creek	0.484
WA1	July 24, 2012	West Alexander Creek	0.46
G2	July 25, 2012	Lower Grave Creek	0.725
July 2013			
A1	July 11, 2013	Lower Alexander Creek	4.803
A3	July 9, 2013	Alexander Creek	0.454
WA1	July 10, 2013	West Alexander Creek	0.381
G2	July 10, 2013	Lower Grave Creek	0.697
November 2013			
A1	November 15, 2013	Lower Alexander Creek	1.079
A3	November 15, 2013	Alexander Creek	0.045
WA1	November 15, 2013	West Alexander Creek	0.053
G2	November 15, 2013	Lower Grave Creek	0.139
May 2014			
A1	May 1, 2014	Lower Alexander Creek	1.546
A3	May 22, 2014	Alexander Creek	3.615
WA1	May 21, 2014	West Alexander Creek	2.259
G2	May 1, 2014	Lower Grave Creek	0.208

5.1.5 Hydrogeology

In 2013, five groundwater monitoring wells were installed for the Project as part of a baseline groundwater investigation program. This program was initiated as an extension of the resource drilling and coring program (see **Figure 5-12** for groundwater monitoring well locations). The groundwater investigation program is intended to provide baseline information for the proposed mine development area and for partial fulfillment of the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations (BC MOE, 2012). Water collected from the monitoring wells is analyzed for the following parameters: pH; electrical conductivity; temperature; routine potability parameters (including major ions); dissolved selected heavy metals; total selected heavy metals; selected hydrocarbon compounds; and cyanide. In addition to field and laboratory parameters, aquifer characterization tests have been completed at three of the five groundwater wells.

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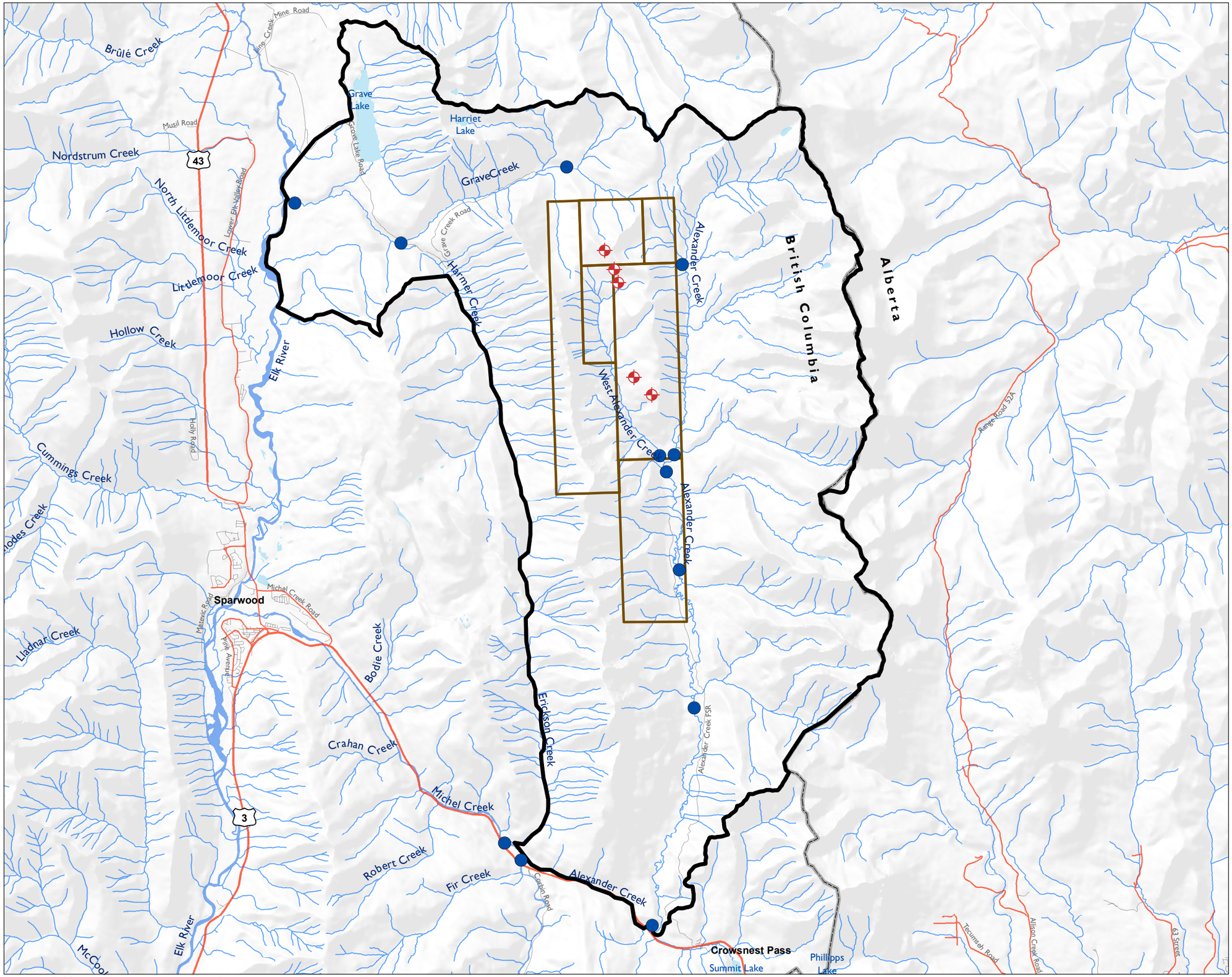
Figure 5-12
Groundwater and Surface Water Quality Sampling Locations



- Baseline Groundwater Monitoring Wells
- Baseline Surface Water Quality Stations
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Local Study Area
- Coal Tenure Licenses and Application
- Rivers
- Lakes
- BC/Alberta Border

SCALE 1:105,000

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Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, Regional District of East Kootenay

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Map Projection: NAD 1983 UTM Zone 11N

PROJECT: 12-6231
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File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-12 Groundwater Monitoring Wells and Water Quality Sampling Locations.mxd

Aside from the wells installed and monitored as part of the baseline groundwater investigation program, there are no known monitoring wells or historical studies on hydrogeology within the Project area.

5.1.1 Surface Water Quality

Historically, surface water quality sampling in the Elk River watershed has been largely focused on assessing and monitoring impacts to water quality as a result of coal mining and forestry operations in the area (e.g., BC Ministry of Environment, 1978, McDonald & Stosher, 1998). According to the BC Water Resources Atlas (Province of British Columbia, 2013c), there are several water quality sampling locations in the Elk River, Michel Creek, Alexander Creek, and north of Grave Lake (see **Figure 5-12** for locations). As part of ongoing mining in the area, water quality is regularly monitored, for example as part of the Elkview mine operated by Teck. Water quality data is available for the Line Creek EA completed by Teck which provides multi-seasonal (March 2009 and March 2011) information on parameters such as pH, dissolved oxygen, major ions, alkalinity, total suspended solids, nutrients, metals, and trace elements.

In the Elk Valley, parameters of concern for water quality include selenium, as coal mining has been shown to enhance the natural release of selenium, resulting in elevated concentrations of this parameter downstream of coal mines in the area (Chapman, 2003). A recent study in the Elk Valley found nitrate, total nitrogen, and sulfate concentrations were elevated at sites downstream of existing coal mining operations in the Elk River Basin and that selenium concentrations were also elevated and were found to be above background levels and the British Columbia Guideline for aquatic life (Hauer and Sexton, 2013; Nagpal, 2001).

As part of Project environmental baseline studies, a water quality sampling program was initiated in May 2012 to collect monthly water samples at watercourses within the LSA. The surface water quality baseline program initiated as part of the Project provides background information for which to assess potential effects of the Project on aquatic life. The water quality program currently includes sampling at nine locations within the LSA. In addition to the monthly samples, freshet (high flow) and low flow sampling are also conducted to assess changes in water quality associated with seasonal variability.

Analytical parameters sampled as part of the Project water quality baseline program include: total and dissolved metals; nutrients; anions; inorganics; polycyclic aromatics; and general water chemistry. Sample results are compared against BC Water Quality Guidelines (BC Ministry of Environment, 2006) and the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life (CCME, 1999).

5.1.2 Geochemistry

The Elk Valley Coalfield hosts several active coal mines, including Fording River, Greenhills, Line Creek, Elkview, and Coal Mountain which are operated by Teck. Water quality monitoring of waste rock drainage at these mines since the late 1990s has shown alkaline conditions, dominated by sulphate, calcium, magnesium, and bicarbonate (Day, Kennedy & Pumphrey, 2012). Since the late 1980s,

monitoring of the Elk River has shown increasing selenium concentrations. Calcite precipitates from the alkaline mine drainages have been problematic in terms of cementation of stream beds and changes in channel morphology (MacGregor, Day & Lopez, 2012).

Mines operating in the area, including proposed expansions of existing mines, conduct geochemical investigations to determine metal leaching and acid rock drainage (ML/ARD) potential. As part of environmental baseline studies for the Project, a geochemical program has been initiated to evaluate ML/ARD potential. The baseline geochemical program includes rock testing and sampling, mineralogical characterization and kinetic testing, and characterization of waste samples to assess the potential for ML/ARD associated within mining in the Project property and allow for an assessment of potential effects of ML/ARD.

5.1.3 Fish and Fish Habitat

The Project is situated in the Elk River watershed. Key watercourses and waterbodies in the area include the Elk River, Michel Creek, Alexander Creek, Harmer Creek, West Alexander Creek, Grave Creek, and Grave Lake (see **Figures 3-1 and 5-13**). The Elk River watershed is home several species of fish (see **Figure 5-13** for the location of fish observations). **Table 11** details the species of fish observed within watercourses within and surrounding the Project based on provincial data (Province of British Columbia, 2013d). According to Teck Resources (2011), upper reaches and watercourses flowing into the Elk River generally have lower numbers of resident fish species.

Of the species observed in the area, two are considered sensitive - westslope cutthroat trout and bull trout. Westslope cutthroat trout is one of 14 sub-species of interior cutthroat trout and is currently a blue-listed species in BC; bull trout is also a blue-listed species provincially. In 2010, westslope cutthroat trout were 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, 2006). Bull trout are also recognized as a species of Special Concern by the Committee on the Status of Wildlife in Canada (COSEWIC, 2012). In British Columbia, westslope cutthroat trout and bull trout (interior lineage) are species of Special Concern (BC Conservation Data Centre, 2013). Brook trout and rainbow trout are not native to the area.

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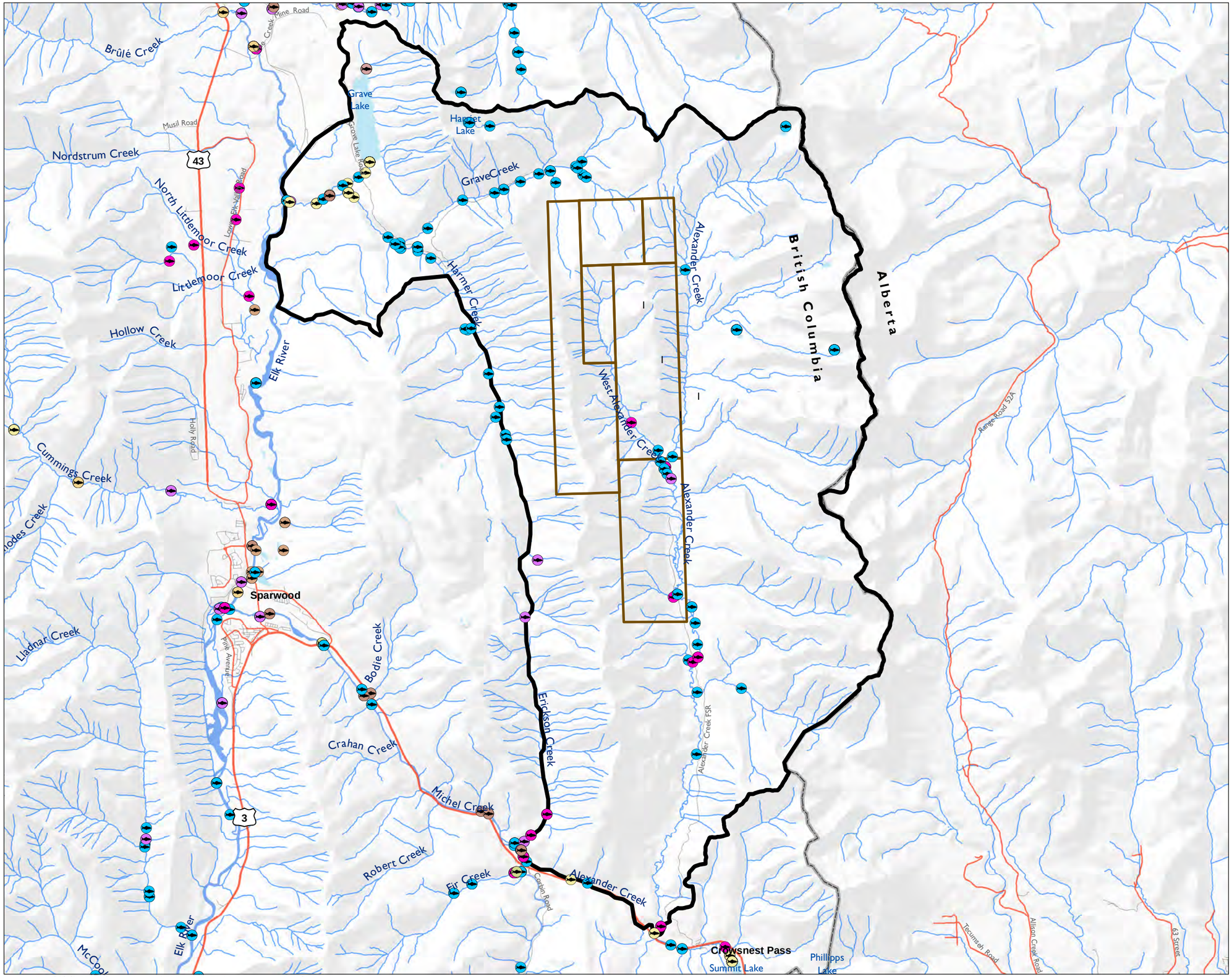
Figure 5-13
Watercourses and Fish Observations



- Brook Trout
- Bull Trout
- Cutthroat Trout
- Rainbow Trout
- Westslope (Yellowstone) Cutthroat Trout
- Dolly Varden
- Kokanee
- Longnose Sucker
- Mountain Whitefish
- Redside Shiner
- Steelhead
- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Rivers
- Lakes
- Local Study Area
- Coal Tenure Licenses and Application
- BC/Alberta Border

SCALE 1:105,000

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Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, BC Fresh Water Atlas.

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Map Checked By: LKD
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File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-13 Watercourses and Fish Observations.mxd

Table 11: Fish Observations in Watercourses within and Surrounding the Project

Common Name	Scientific Name	Alexander Creek[1]	West Alexander Creek[1]	Elk River[1]	Grave Creek[1]	Grave Lake[1]	Harmer Creek[1]	Michel Creek[1]
Brook trout	*Salvelinus fontinalis*	X	X	X	X	X	-	X
Bull trout	*Salvelinus confluentus*	X	-	X	X	-	-	X
Cutthroat trout	*Oncorhynchus clarki clarki*	-	-	X	-	-	-	X
Dolly varden	*Salvelinus malma*	-	-	X	X	-	-	X
Kokanee	*Oncorhynchus nerka*	-	-	-	X	X	-	-
Longnose sucker	*Catostomus catostomus*	-	-	X	X	X	-	-
Mountain whitefish	*Prosopium williamsoni*	-	-	X	X	X	-	X
Rainbow trout	*Oncorhynchus mykiss*	X	-	-	X	X	-	X
Steelhead	*Oncorhynchus mykiss*	-	-	-	-	X	-	-
Sucker (General)	*Catostomus spp.*	-	-	-	-	X	-	X
Westslope cutthroat trout	*Oncorhynchus clarkii lewisi*	X	X	X	X	-	X	X

[1] Fish occurrence data based on provincial data sets for known fish observations and distributions (Province of British Columbia, 2013d).

Drainages that have the potential to be affected by the Project are West Alexander Creek, Alexander Creek, and Grave Creek. West Alexander Creek flows in a southerly direction, along the western base of Crown Mountain, and flows into Alexander Creek which drains into Michel Creek south of the Project. Alexander Creek flows south along the eastern base of Crown Mountain, connects with West Alexander Creek and then flows south towards Michel Creek. Grave Creek flows west towards the Elk River. These watercourses are characterized by gravel and cobble substrates (see **Photos 8** to **10**).

Baseline aquatic studies have been initiated for the Project and have included winter fisheries assessments, spring and fall spawner surveys, and fish inventory assessments. Additional studies will be initiated to evaluate additional aspects of fish habitat, including benthic invertebrate and periphyton

communities. These studies will help to evaluate the potential impact of the Project on aquatic resources. Baseline studies of the aquatic environment will follow appropriate Resource Inventory Committee (RIC) guidelines such as Reconnaissance Inventory Standards (RIC, 1999) and the Standard Method for Hydrometric Surveys (RIC, 2009).

Photo 8: Alexander Creek upstream of the confluence with West Alexander Creek at the A4 water quality sampling station.

Photo 9: West Alexander Creek upstream of the confluence with Alexander Creek at the WA1 water quality sampling station.

Photo 10: Grave Creek upstream of the confluence with Harmer Creek at the G2 water quality sampling station.

5.1.4 Ecosystems and Vegetation

As mentioned, the area of the Project is classified as lying in the Front Ranges Physiographic Region of the Rocky Mountains (Ryder, 1981). The Project is within the Elk Valley Ecosection and the Southern Interior Mountains Ecoprovince. The LSA for the Project overlaps four Biogeoclimatic Ecosystem Classification (BEC) units, including: the Engelmann Spruce – Subalpine Fir zone; the Interior Mountain-heather Alpine zone; the Montane Spruce zone; and the Interior Douglas-fir zone (**Figure 5-14** and **Table 12**).

The Engelmann Spruce – Subalpine Fir zone (ESSF) covers the majority of the LSA with the Englemann Spruce – Subalpine Fir elk dry cool zone (ESSFdk1) being the most common subzone, covering approximately 99.8 km^2 (**Table 12**). The ESSFdk1 is found in the upper slopes of the Rocky Mountains surrounding the Elk Valley. Within the Project LSA, this zone occurs above the Montane Spruce elk dry cool zone up to approximately 1,900 m elevation. The ESSFdk1 is cool and moist in the summer and very cold in the winter months. Heavy winter snowpacks give way to moist soils, with good moisture retention over most of the growing season up until the late summer. Climax forests in this subzone are dominated by subalpine fir and Englemann Spruce (*Picea englemanii*). Significant cover of false azalea (*Menziesia ferruginea*) is often observed in the understories of the ESSFdk1, with lesser cover of native berry shrubs (*Vaccinium* spp., *Ribes* spp., and *Lonicera* spp.). Herbaceous cover is typically dominated by

Table 12: BEC Zones within the Project LSA

BEC Zone	Area (km^2)	Percent of LSA
Engelmann Spruce – Subalpine Fir elk dry cool (ESSFdk1)	99.8	42.1
Montane Spruce elk dry cool (MSdk1)	58.3	24.6
Engelmann Spruce – Subalpine Fir dry cool woodland (ESSFdkw)	50.2	21.2
Engelmann Spruce – Subalpine Fir dry cool parkland (ESSFdkp)	23.2	9.8
Interior Douglas-fir undifferentiated (IDFun)	3.5	1.5
Interior Mountain-heather Alpine (IMA)	2.1	0.9
Total	**237.1**	**100**

western meadowrue (*Thalictrum occidentale*), arnicas (*Arnica* spp.), and one-leaved foamflower (*Tiarella trifoliate* var. *unifoliata*).

The Montane Spruce elk dry cool zone (MSdk1) is the second most common zone and covers approximately 58.3 km^2 of the LSA, occupying valley bottoms through midslopes in the Elk Valley region of the Rocky Mountains. In the LSA, the MSdk1 occupies mid to lower portions of Grave, Harmer, Alexander, and Erickson Creeks from 1,300 m to a maximum of 1,700. Climax forests of the MSdk1 are led by hybrid white spruce (*Picea englemanii* x *glauca*) and subalpine fir (*Abies lasiocarpa*) with understories featuring a mix of deciduous shrubs and herbaceous vegetation, including false azalea (*Menziesia ferruginea*), grouseberry (*Vaccinium scoparium*) and twinflower (*Linnea borealis*).

The ESSFdkw zone covers approximately 50.2 km^2 of the LSA. The woodlands of the dry, cool ESSF occur at higher elevations where canopies typically become more open and forests are less productive than there lower elevation counterparts. In the study area, the ESSFdkw occurs above the ESSFdk1 to approximately 2,100 m elevation. Stand structure is still relatively homogeneous when compared with the ESSFdkp above, but features lower tree cover and higher cover of understory shrubs and herbs. Leading vegetation species are similar to those observed in the lower elevation ESSFdk1. Occurring in the divide between the woodlands of the ESSF and alpine subzones, the ESSF dry cool parkland (ESSFdkp) occurs at high elevations at and below treeline in the Purcell and southern Rocky Mountains. In the LSA, the ESSFdkp occurs between the ESSFdkw and the Interior Mountain-heather Alpine zone, from approximately 2,100 m to 2,400 m.

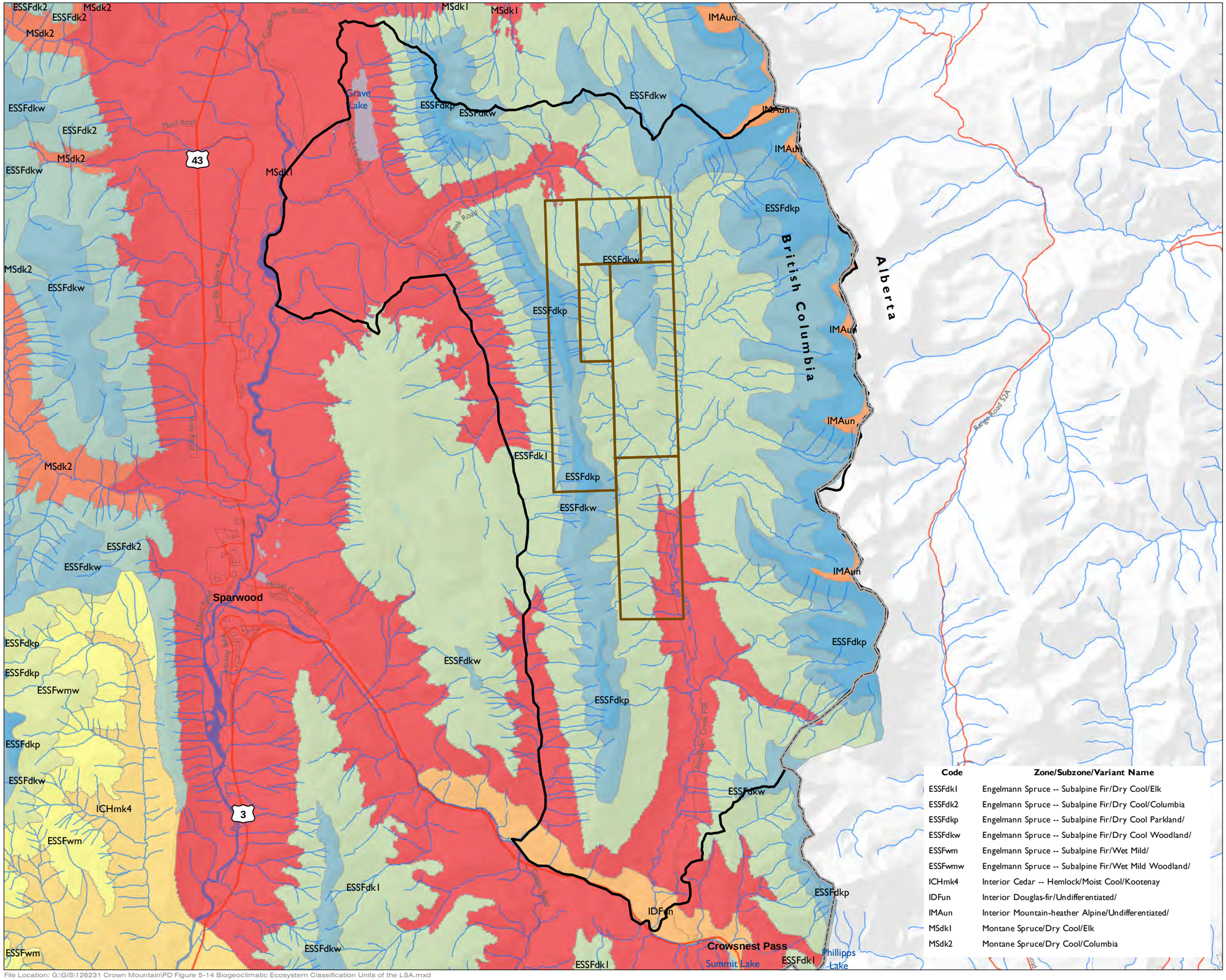

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Figure 5-14
Biogeoclimatic Ecosystem Classification Units of the LSA

- Highways
- Arterial Roads
- Local/Resource Roads

Zone/Subzone/Variant

- ESSFdk1
- ESSFdk2
- ESSFdkp
- ESSFdkw
- ESSFwm
- ESSFwmw
- ICHmk4
- IDFun
- IMAun
- MSdk1
- MSdk2
- Local Study Area
- Coal Tenure Licenses and Application
- Rivers
- Lakes
- BC/Alberta Border

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Code	Zone/Subzone/Variant Name
ESSFdk1	Engelmann Spruce -- Subalpine Fir/Dry Cool/Elk
ESSFdk2	Engelmann Spruce -- Subalpine Fir/Dry Cool/Columbia
ESSFdkp	Engelmann Spruce -- Subalpine Fir/Dry Cool Parkland/
ESSFdkw	Engelmann Spruce -- Subalpine Fir/Dry Cool Woodland/
ESSFwm	Engelmann Spruce -- Subalpine Fir/Wet Mild/
ESSFwmw	Engelmann Spruce -- Subalpine Fir/Wet Mild Woodland/
ICHmk4	Interior Cedar -- Hemlock/Moist Cool/Kootenay
IDFun	Interior Douglas-fir/Undifferentiated/
IMAun	Interior Mountain-heather Alpine/Undifferentiated/
MSdk1	Montane Spruce/Dry Cool/Elk
MSdk2	Montane Spruce/Dry Cool/Columbia

Map Drawing Information: Province of British Columbia, NWP Coal Canada Ltd., Dillon Consulting Limited, Regional District of East Kootenay

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

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File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-14 Biogeoclimatic Ecosystem Classification Units of the LSA.mxd

The Interior Douglas-fir undifferentiated (IDFun) and the Interior Mountain–heather Alpine (IMA) zones cover small areas of the LSA at 3.5 and 2.1 km^2, respectively. The IDF occurs in the southern most region of the LSA on warm aspect slopes around 1,500 m elevation. The IMA zone occurs above the ESSFdkp zone in high elevations up to 2,500 m elevation.

Terrestrial baseline studies have been initiated for the Project to characterize vegetation and help to assess potential impacts of the Project on ecosystems and vegetation. Baseline studies underway include rare plant surveys and terrestrial ecosystem mapping (TEM) within the Project footprint and LSA. Where appropriate, studies will follow RISC standards for rare plant surveys and TEM.

5.1.4.1 Wetlands

Approximately 19 wetlands occur within the LSA, covering approximately 65 ha based on review of available provincial data (Province of British Columbia, 2013e). The number of wetlands and their respective classification will be confirmed during TEM data collection. Within the LSA, wetlands generally occur within valley bottoms along watercourses (see **Figure 5-15** and **Photo 11**). As with other baseline surveys, RISC standards will be followed when conducting wetland surveys.

Photo 11: Off-channel wetland of Alexander Creek, east of the Alexander Creek FSR. Photo is taken looking towards the northeast.

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Figure 5-15
Wetlands within the LSA

- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Wetlands
- Rivers
- Lakes
- Local Study Area
- Coal Tenure Licenses and Application
- BC/Alberta Border

SCALE 1:125,000

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File Location: G:\GIS\126231 Crown Mountain\PD Figure 5-15 Wetlands within the LSA.mxd

5.1.4.2 Rare Plant Species and Ecosystems

The BC Conservation Data Centre (BC CDC) lists 50 red- and 91 blue-listed plant species that have the potential to occur within the vicinity of the Project based on the BEC zones present (BC Conservation Data Centre, 2014; see **Appendix A** for a list of the species). The ESSFdk1 had the greatest potential number of rare species with 46 potentially occurring within the subzone followed by the IMA at 43 species and MSdk1 at 40 species. Several rare species were identified as potentially occurring in more than one subzone; whitebark pine (*Pinus albicaulis*) and purple oniongrass (*Melica spectabilis*) each potentially occur in five of the six subzones present. Six species potentially occur in four of the six subzones present including: elk sedge (*Carex geyeri*), little fescue (*Festuca minutiflora*), high alpine butterweed (*Packera conterminal*), dwarf poppy (*Papaver pygmaeum*), limber pine (*Pinus flexilis*), and large-headed groundsel (*Senecio megacephalus*).

Of the species listed in the BC CDC search, four species listed under the federal *Species at Risk Act* were identified including two species listed as Endangered (Southern maiden hair fern [*Adiantum capillus-veneris*] and whitebark pine), one Threatened species (alkaline wing-nerved moss [*Pterygoneurum kozlovii*]) and one species of Special Concern (giant helleborine [*Epipactis gigantean*]) (Environment Canada, 2014b). Of the four federally listed species, only whitebark pine is confirmed to live in the area, whereas the others are known to southeastern BC but not specifically to the Alexander Creek region.

Previous work in the area has indicated that whitebark and limber pine inhabit the Project property and LSA. Whitebark pine (*Pinus albicaulis*) 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). Human caused impacts are not indicted in the conservation concerns surrounding whitebark pine, however, cumulatively and at a regional scale, human impacts may become important. Surveys of the Elk and Flathead Valleys identified 40% of all whitebark pine was already dead, and 67% of remaining live trees were infected by blister rust (Smith et al., 2008). In this context it is probable that when local human impacts are considered that they pose a significant threat to an already reduced and threatened local population.

The sole ecosystem at risk potentially in the LSA is the Bluebunch wheatgrass-junegrass (*Pseudoroegneria spicata – Koeleria macrantha*) association possibly occurring within the IDFun subzone. This ecosystem is blue-listed and has a provincial conservation status of S3.

5.1.5 Wildlife

The Elk Valley has long been known and appreciated for the abundance and diversity of mammals which it supports. The area is home to a variety of mammals, birds, invertebrates, and amphibians. The dominant wildlife habitat in the LSA consists of riparian habitat along Alexander and Grave Creeks and their tributaries, mature and immature conifer forest (including regenerating cutblocks), non-forested or

sparsely forested areas on steep slopes dominated by grasses, forbs and shrubs created primarily by avalanches, and alpine grasslands.

5.1.5.1 Large and Small Mammals

A number of carnivores occur in the area, including: Canada lynx (Lynx lynx); wolverine (*Gulo gulo*; provincially blue-listed); grizzly bear (*Ursus arctos*; provincially blue-listed); and black bear (*Ursus americanus*). These species are important from a conservation perspective given that they are subject to regulated hunting, and in the cases of Canada lynx and wolverine, regulated trapping. American badger (*Taxidea taxus*; provincially red-listed and Endangered under SARA) is also expected to inhabit the LSA as their presence has been reported in lower Alexander Creek. Many ungulate species are also found in the area, including: Rocky Mountain elk (*Cervus elephus*); moose (*Alces alces*); mountain goat; Rocky Mountain bighorn sheep (*Ovis Canadensis*; provincially blue-listed); mule deer (*Odocoileus hemionus*); and white-tailed deer (*Odocoileus virginiana*; **Figure 5-16**). Ungulate Winter Range (UWR) occurs across valley bottoms in the area and within the LSA, specifically along lower elevations of the Elk River, Alexander Creek, and Grave Creek (**Figure 5-16**). Three species of bats that are of special conservation concern have the potential to occur in the Project LSA and include the little brown bat (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and the eastern red bat (*Lasiurus borealis*).

Winter wildlife surveys conducted for the Project in 2013 confirmed the presence of American marten, weasel species, wolverine, Canada lynx, coyote, wolf, river otter, cougar, red squirrel, snowshoe hare, grouse species, elk, and moose within the LSA. A late winter ungulate aerial survey conducted in 2014 for the Project also confirmed the presence of bighorn sheep, mountain goats, and moose within the LSA. Additional wildlife surveys will be completed as part of environmental baseline studies to characterize wildlife habitat and species within the LSA.

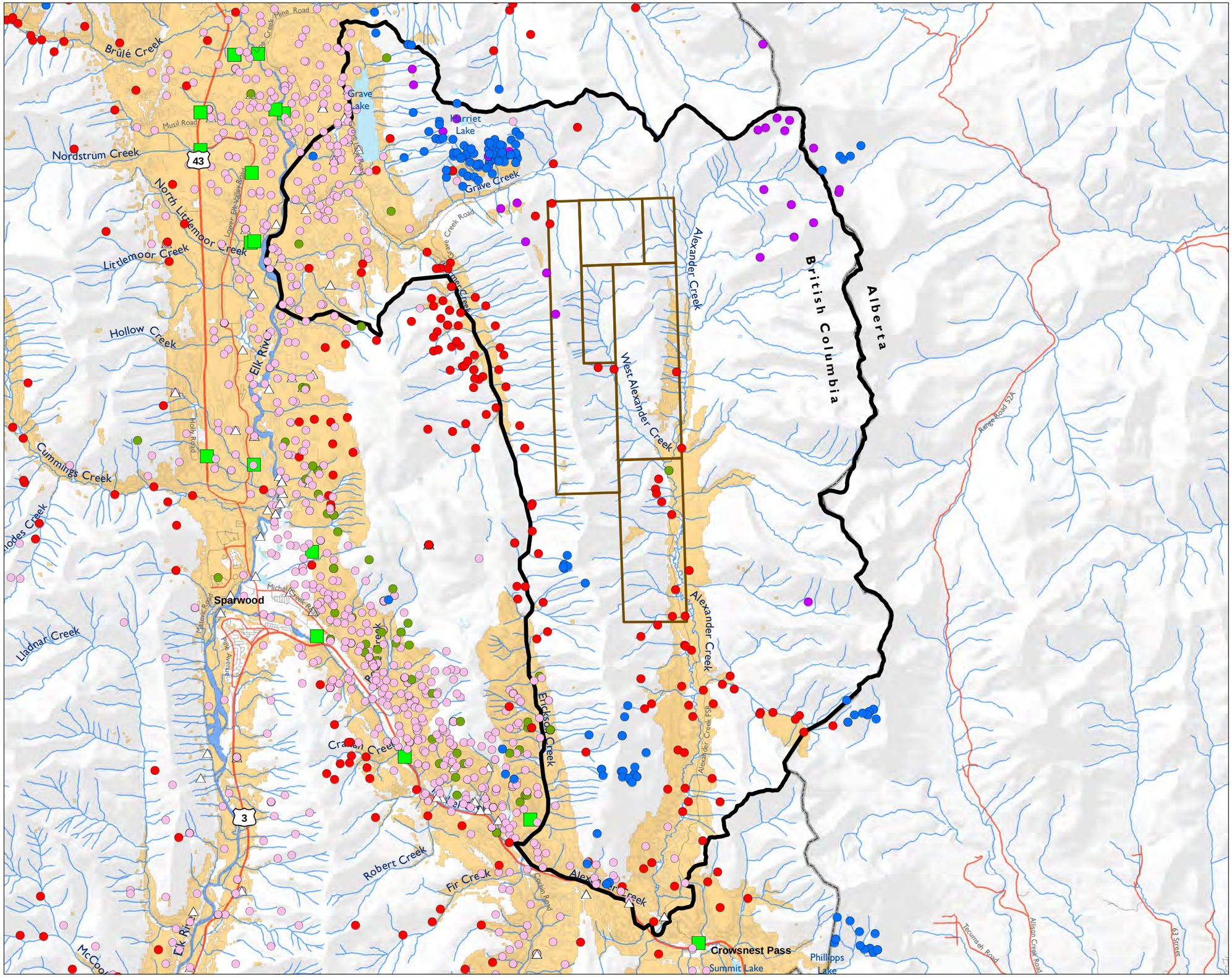

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Figure 5-16
Wildlife Observations and Ugulate Winter Range

Wildlife Observations
- American Badger
- Bighorn Sheep
- Elk
- Moose
- Mountain Goat
- Mule Deer
- White-tailed Deer

- Highways
- Arterial Roads
- Local/Resource Roads
- Watercourses
- Ungulate Winter Ranage
- Local Study Area
- Coal Tenure Licenses and Application
- Rivers
- Lakes
- BC/Alberta Border

SCALE 1:105,000

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Photo 12: Moose observed within the Project LSA, June 2014.

5.1.5.2 Birds

The mountainous ecosystems of the Elk Valley provide high elevation grasslands and ridgetops on which a variety of migrating birds may rest and stage. Flocks of migratory bird species can provide an important, although short-lived, prey source for raptorial birds. A number of bird species undoubtedly migrate to the habitats presented by the LSA to breed and nest. It is speculated that Northern goshawk (*Accipiter gentilis*), an indicator of mature forests, occurs in the LSA. There is also the potential for the Olive-sided Flycatcher (provincially blue-listed), Barn Swallow (provincially blue-listed), and the American Dipper to be present within the LSA. In addition, a number of gallinaceous bird species, including ruffed and spruce grouse, are expected to occur within the LSA and white-tailed ptarmigan may occur in the alpine. Waterfowl are not expected to be found in the LSA.

Breeding bird surveys were initiated in the spring of 2014 to assess breeding birds and raptors within the LSA. Additional surveys will be conducted of the Project LSA in 2015 to confirm the presence of nesting, fledging, and breeding birds and will follow appropriate RIC standards.

5.1.5.3 Amphibians

Two amphibians potentially occur within the LSA, the western toad (*Bufo boreas*) and the Rocky Mountain tailed frog (*Ascaphus montanus*). The western toad (provincially blue-listed, Schedule 1 of the *Species at Risk Act*, and Special Concern under COSEWIC) is widely-occurring in the area and has been

recorded in wet ecosystem types elsewhere in the Elk Valley. The Rocky Mountain tailed frog (provincially red-listed, Schedule 1 of the *Species at Risk Act*, and Endangered under COSEWIC) 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.

Initial wetland surveys were conducted in the spring of 2014 to assess potential habitat for amphibian species. Additional surveys will be completed in 2015 to assess the presence of amphibians and reptiles within the LSA. Amphibian surveys will follow established RIC standards such as the Inventory Methods for Pond-breeding Amphibians and Painted Turtle (RIC, 1998).

5.1.5.4 Invertebrates

Gillette's Checkerspot (*Euphydryas gillettii*) is a provincially red-listed butterfly that has been located elsewhere in the extreme southeastern Rocky Mountains (at Procter and McGillivary Lakes) and whose habitat is localized to moist meadows, usually near streams, in mountain valleys. Baseline surveys will be conducted of the Project property and LSA to determine presence of the butterfly and suitable habitat.

5.1.5.5 Rare Wildlife Species

As mentioned above, several species have the potential to inhabit the Project LSA and in some cases are known to occur within the LSA based on recent studies. These species, as well as their provincial and/or federal rankings, are outlined in **Table 13**. In addition, those species listed under the *Migratory Birds Convention Act* that have the potential to occur in the LSA are noted.

The presence of sensitive species will be assessed as part of environmental baseline studies to be completed for the Project.

Table 13: Sensitive Wildlife Species Rankings

Scientific Name	Common Name	BC List	SARA[1]	COSEWIC[2]	Migratory[3]
Anaxyrus boreas	Western toad	Blue	1-SC (Jan 2005)	SC (Nov 2012)	
Gulo gulo luscus	Wolverine, *luscus* subspecies	Blue		SC (May 2003)	
Myotis lucifugus	Little brown bat	Yellow	Candidate for status	E (2012)	
Myotis septentrionalis	Northern myotis	Blue	Candidate for status	E (2012)	
Lasiurus borealis	Eastern red bat	Red			
Neotamias minimus oreocetes	Least chipmunk, *oreocetes* subspecies	Blue			
Ovis Canadensis	Rocky mountain bighorn sheep	Blue			
Ursus arctos	Grizzly bear	Blue		SC (May 2002)	
Taxidea taxus jeffersonii	American badger	Red	1-E (Jun 2003)	E (Nov 2012)	
Contopus cooperi	Olive-sided flycatcher	Blue	1-T (Feb 2010)	T (Nov 2007)	Y
Hirundo rustica	Barn swallow	Blue		T (May 2011)	Y
Ascaphus montanus	Rocky mountain tailed frog	Red	1-E (Jun 2003)	E (May 2000)	
Euphydryas gillettii	Gillett's checkerspot	Red			

[1] Species at Risk Act ranking, 1 – Schedule 1 (E – Endangered, SC – Special Concern, T – Threatened)
[2] Committee on the Status of Endangered Wildlife in Canada, E – Endangered, SC – Special Concern, T - Threatened
[3] As per the *Migratory Birds Convention Act*

5.2 Potential Effects

Environmental and socio-economic data will continue to be collected for the Project to determine potential impacts, effects, and issues. Potential effects of the Project will be discussed with EA Working Groups, Aboriginal groups (e.g., the Ktunaxa Nation), regulatory agencies, and other stakeholders as the Project progresses. As part of the EA, a detailed impact and effects analyses will be undertaken to evaluate effects of the Project and determine appropriate mitigation measures to prevent or reduce the potential of anticipated impacts.

Although baseline data is currently being collected for the Project and analyses of potential effects have not been completed, **Sections 5.2.1** to **5.2.4** discuss some potential effects that may arise as a result of the Project and associated activities.

5.2.1 Physical and Biophysical Environment

A preliminary list of potential effects on the physical and biophysical environment includes:

- **Geology and Terrain** – Loss of local terrain features in areas of site preparation, construction, and operation (e.g., open pits, access roads, and waste rock piles). Some aspects of the Project, in particular the open pit mining, will change the existing terrain and may impact terrain integrity.
- **Air Quality** – The Project may result in the generation of emissions and dust, specifically though operation of equipment, the use of gravel access roads, and open pit mining (e.g., blasting). 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 generate greenhouse gas emissions (GHGs).
- **Noise** – 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 wildlife.
- **Hydrology and Hydrogeology** – Local hydrology and groundwater may be directly and indirectly impacted due to potential mine dewatering activities and the location of proposed mining areas, waste rock management areas, and other mine infrastructure (e.g., haul roads, rail load-out). Watercourses could experience stream flow reductions or changes in peak flow events due to the Project footprint and activities. Potentially impacted watercourses may include West Alexander Creek, Alexander Creek, and Grave Creek as well as the small tributaries feeding these watercourses.
- **Surface Water Quality** – Water quality may be influenced due to the proposed mine development activities, resulting in impacts to aquatic life such as fish and benthic communities. For example, surface water resources and aquatic life may be impacted by the release of sediment laden water to watercourses and exposure of watercourses to increased levels of metals (such as selenium).
- **Fish and Fish Habitat** – The Project may result in direct and/or indirect effects on fish and fish habitat, as well as sensitive fish species (e.g., Westslope cutthroat trout, a species listed as Special Concern under the SARA). Watercourses, such as West Alexander Creek, may experience impacts as a result of the placement of waste rock. It is proposed that freshwater be withdrawn from Grave Creek to support processing plant water requirements, which could result in changes to in-stream flows impacting aquatic health downstream. Other watercourses may be impacted through the construction of watercourse crossings and Project infrastructure (e.g., construction and/or locations of conveyors and site buildings). Impacts to watercourses may result in a reduction of fish

habitat quality and quantity, reducing the productive capacity of watercourses for fish. Specific changes to fish and fish habitat may include loss of habitat, changes in water quality and flows, and exposure to potentially deleterious substances.

- **Sensitive Vegetation** – There is a potential for rare plant species (e.g., whitebark pine) to exist within the Project footprint, and as such, sensitive plant species may be directly impacted. Impacts to sensitive vegetation may occur through changes in the structure and function of plant communities as a result of vegetation removal, changes in localized drainage patterns, dust accumulation, and the introduction of invasive plant species. Management plans will be developed as part of the Project to reduce the potential for impacts to sensitive plant species.
- **Wildlife Habitat and Sensitive Wildlife –** Wildlife habitat within the Project property and LSA may be directly impacted as a result of the Project infrastructure and activities, and have impacts on local wildlife and sensitive wildlife species. Changes in wildlife habitat may include a reduction in available habitat due to Project infrastructure and activities, sensory disturbances to wildlife during construction and operation, wildlife mortalities during site preparation (e.g., vegetation removal) and access road traffic, wildlife health impacts associated with habitat changes, and changes in wildlife use of the area and predation associated with alteration in habitat structure and availability.
- **Migratory Birds** – The Project has the potential to impact migratory birds. Potential impacts may include mortality as a result of construction activities and vehicle collisions, modification of behaviour (e.g., movement) as a result of habitat loss and sensory disturbance, and increased predation due to habitat alteration.

5.2.2 Federal Lands and Transboundary Effects

The Project is not expected to result in changes to federal lands and provinces outside of BC. The nearest federal Crown Land to the Project includes the Bummer's Flat 1 Reserve (approximately 68 km southeast), Peigan Timber Limit 147B (approximately 52 km east in Alberta), and Parcels 73 and 82 of the Dominion Coal Blocks (approximately 20 and 40 km southwest, respectively).

As described in **Section 3.1.3.1**, several watercourses flow from the Project LSA to the Elk River. Within the Project property, West Alexander Creek and Alexander Creek flow directly through the Project property to Michel Creek in the south which connects with the Elk River at Sparwood, BC. To the north of the Project property, Grave Creek flows west towards the Elk River. The Elk River discharges to Lake Koocanusa in the southeast of BC, a lake which spans both BC and the State of Montana. Given that there is a potential for impacts to surface water quality within and surrounding the Project, impacted watercourses that flow in to the Elk River and Lake Koocanusa may experience a decline in water quality. Potential transboundary effects will be investigated as part of the detailed impact and effects assessments to be completed for the Project.

5.2.3 Social Environment

The Project may result in impacts to the social environment, which could include impacts to human health conditions, local socio-economics, commercial and recreational fishing and fishing areas, and the visual environment. A preliminary list of potential effects related to the social environment includes:

- **Human Health Conditions** – Over the operation of the Project, there is a potential for changes in regional and ambient air quality due to the use of machinery and the generation of dust. The Project will result in GHG emissions due to the operation of the mine and associated machinery and transportation. Human health also has the potential to be impacted through 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.
- **Socio-economics** – The Project may result in localized increases in labour demands, increased vehicle traffic along local roads and highways, land use changes, increased demand in accommodation and services in nearby communities to support Project staff (e.g., mine workers). It is expected that the Project will result in an economic benefit for local communities as well as benefit the area through employment and business opportunities.
- **Commercial and Recreational Fishing and Fishing Areas** – Changes to watercourses in and around the Project footprint may result in downstream impacts to watercourses used as commercial and recreational fishing areas. For example, potential changes to water quantity in Alexander Creek that may impact downstream Michel Creek, a watercourse which flows into the Elk River.
- **Visual** – The Project is located in an area that is used for recreational purposes and thus may result in localized changes to the visual landscape.

5.2.4 Aboriginal Groups

Aboriginal Groups may be impacted as a result of the construction and operation of the Project, resulting in indirect or direct impacts on Traditional Knowledge and Use, heritage and archaeological resources, local socio-economics and community conditions, and health conditions. A preliminary list of potential effects related to the Aboriginal Groups includes:

- **Traditional Knowledge and Use** – The Project occurs within the asserted traditional territory of the Ktunaxa Nation and as such, the Project may impact the natural environment and result in changes to the current use of lands and resources for traditional purposes. This may include traditional lands used for hunting, fishing, and collection of plants used for food and medicine (e.g., berry collection). Project-related impacts that may affect the current use of lands and resources for traditional purposes include changes in wildlife behaviour and wildlife habitat, impacts to the quantity and quality of fish habitat, water quality impacts in local watercourses used for fishing and downstream changes, and removal of vegetation

used for traditional use (see **Section 5.2.1** for additional information on impacts to the biophysical environment). Impacts to fish and fish habitat, as described in **Section 5.2.1** and **5.2.3**, may result in changes to fishing areas used by Aboriginal Groups.

- **Heritage and Archaeological Resources** – Heritage and/or archaeological resources may be uncovered or disturbed during the Project as a result of ground disturbance during construction. An Archaeological Overview Assessment (AOA) and an Archaeological Impact Assessment (AIA) will be completed for the Project to determine potential heritage resources within the Project footprint and the LSA. These studies will be conducted in consultation with the Ktunaxa Nation.
- **Socio-economics and Communities** – The Project is expected to increase the local demand for labour, resulting in a potential economic benefit for local communities. Impacts to local communities may result in changes and/or maintenance of community health and the well-being of individuals. As part of the Project, opportunities for capacity building will be discussed with local Aboriginal Groups and will be continued as the Project progresses (e.g., Ktunaxa involvement in AOA and AIAs completed for the Project).
- **Human Health Conditions** – As mentioned in **Section 5.2.3**, the Project has the potential to change regional and ambient air quality. Aboriginal Groups may be impacted by potential air quality changes, as well as through the consumption of plants and fish which are contaminated through dust accumulation and impacted water quality, respectively.

6.0 ENGAGEMENT AND 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. Engagement is an important component of a Project as it involves those who may be potentially affected by, or have an interest in, the Project. As part of this Project, NWP Coal's primary objective of public, Aboriginal, and stakeholder engagement is to effectively communicate information about the proposed Project. Key components of the Project's consultation and engagement strategy will include:

- Communication of information in a timely, consistent manner to the local community members, Aboriginal groups, regulators, and stakeholders throughout the lifecycle of the Project;
- Early identification and understanding of Project issues and concerns, as well as responsive engagement regarding stakeholder interests;
- Early, frequent, open, and honest communication to build strong relationships with interested parties, particularly those who will potentially be most affected by the Project; and
- Fostering strong, collaborative and long-term partnerships with Aboriginal Groups, regulators, community groups, and other stakeholders.

As the Project progresses, NWP Coal will adapt engagement and consultation strategies to allow for effective communication and relationship building. The following Section describes preliminary engagement and consultation completed for the Project as well as strategies to be used to communicate and engage with stakeholders as the Project continues. NWP Coal will develop a detailed consultation program to be implemented as part of the EA process.

6.1 Aboriginal Consultation and Engagement

6.1.1 Potentially Interested Aboriginal Groups

The Project occurs within the Ktunaxa Kinbasket Statement of Intent (SOI) Boundary (**Figure 3-4**). Member Bands of the Ktunaxa Nation Council and the Shuswap Nation Tribal Council may have an interest in the Project. The four member bands of the Ktunaxa Nation are:

- the ʔakisq̓nuk First Nation (formally the Columbia Lake Band - Windermere);
- the ʔaq̓am – St. Mary's First Nation (Cranbrook);
- the yaqan nukiy – Lower Kootenay Band (Creston); and
- the Tobacco Plains Indian Band (Grasmere).

The Project would also be located within asserted traditional territory of the Shuswap Indian Band of the Shuswap Nation Tribal Council.

Based on the existing information available, NWP does not expect that the Project would have potential effects to the Métis Nation of BC. There are no Métis settlements within proximity to the Project. The Métis Nation of BC has not been consulted during initial environmental baseline activities or the preparation of the Project Description

Following submission of the Project Description and formal initiation of the EA process, potentially interested Aboriginal Groups will be confirmed through further consultation and the establishment of Technical Working Groups.

6.1.2 Engagement and Consultation Activities Completed to Date

Preliminary engagement and consultation with Aboriginal Groups has included in-person meetings, telephone calls, letter, and email correspondence. **Table 14** summarizes key engagement and consultation activities completed to date with local Aboriginal Groups. To date, NWP Coal has had introductory meetings with the Ktunaxa Nation and correspondence regarding Notice of Work releases for exploration. In addition to those items detailed in **Table 14**, NWP Coal has also corresponded with the Shuswap Nation through phone meetings and email.

NWP Coal is committed to building and continuing relationships with interested Aboriginal Groups to ensure effective and open communication of Project activities.

Table 14: Engagement and Consultation Activities Completed to Date

Date	Consultation Method	To/With	Summary
2011	Meetings (various)	Ktunaxa Nation	In 2011, various meetings were held before NWP was granted tenure. NWP invited the Ktunaxa to participate in a Project site visit with NWP and regulatory agencies and representatives.
May 4, 2012	Meeting	Ktunaxa Nation	Introductory meeting to discuss Project and potential activities for 2012.
May, 2012	Email	Ktunaxa Nation	Provided information on recent correspondence with the Canadian Columbia River Inter-Tribal Fishery Commission.
May and June 2012	Email (various)	Ktunaxa Nation	Correspondence regarding surface water quality sampling and potential for Ktunaxa to participate.
2012	Meeting	Ktunaxa Nation	Meeting to discuss completion of the 2012 exploration program.
January 18, 2013	Meeting	Ktunaxa Nation	Meeting to review proposed Project activities.
February 21, 2013	Email	Ktunaxa Nation	Email discussions regarding Ktunaxa Nation concerns and comments on proposed Project activities.

Date	Consultation Method	To/With	Summary
May 29, 2013	Letter	Ktunaxa Nation, NWP Coal, and Ministry of Energy and Mines	Notice of Work (NOW) for Crown Mountain exploration activities. Comments from the Ktunaxa on the NOW provided to the Ministry of Energy and Mines.
June 25, 2013	Meeting	Ktunaxa Nation	Meeting to review proposed Project activities.
August, 2013	Meeting	Ktunaxa Nation	Meeting to discuss completion of the 2013 exploration program.
April 7, 2014	Email	Ktunaxa Nation	Discussion regarding a meeting to review proposed Project activities.
May 23, 2014	Email	Ktunaxa Nation	Discussion regarding a meeting to review proposed Project activities.
September 9, 2014	Email	Ktunaxa Nation	Request for meeting to review Project plan.

Key contacts with the Ktunaxa include

Ray Warden, Director, Lands and Resources
Ktunaxa Nation Council
7648 Mission Road
Cranbrook, BC, V1C 7E5
Phone: 250-417-4022
Fax: 250-489-2438
E-mail: rwarden@ktunaxa.org

Kerri Garner, Manager, Lands Stewardship
Ktunaxa Nation Council
7648 Mission Road
Cranbrook, BC, V1C 7E5
Phone: 250-420-2741
Fax: 250-489-2438
E-mail: KGarner@ktunaxa.org

Nicole Kapell, Environment and Archaeological Stewardship Coordinator
Ktunaxa Nation Council
7648 Mission Road
Cranbrook, BC, V1C 7E5
Phone: 250-489-2464 ext 3123
Fax: 250-489-2438
E-mail: NJKapell@ktunaxa.org

The main contact with the Shuswap Indian Band is:

Dean Martin, CEO, Kinbasket Development Corporation
PO Box 2847
Invermere, BC, V0A 1K0
Phone: 250-341-3678
E-mail: dean@kinbasket.net

6.1.3 Key Comments and Concerns to Date

The Ktunaxa Nation Council provided comment on an amended Mines Act Permit submitted by NWP Coal to the Ministry of Energy and Mines in May of 2013. Key comments and concerns regarding aquatic and terrestrial environments included:

- Potential impacts of water intake systems on fish species in Alexander Creek.
- Presence of bull trout and Westslope cutthroat trout, as well as introduced eastern brook trout, in Alexander Creek. Michel Creek is also known to be occupied by the bull and Westlope cutthroat trout as well as mountain whitefish, suckers, and introduced brook trout and rainbow trout.
- Potential impacts to the Alexander Creek watershed and the importance of this habitat as a corridor to mammals and as a linkage to the Michel Creek corridor.
- Need for further studies and analysis of potential Project impacts on the wildlife values of the Alexander Creek watershed and mitigation measures to be implemented.
- Impacts to wildlife and vegetation have the potential to impact the rights of the Ktunaxa to hunt and gather in the Alexander Creek watershed.

The Ktunaxa have also expressed concerns regarding development in the Elk Valley prior to the completion of a study on cumulative effects of mining in the area. Since 2012, the surface water quality sampling program underway for the Project is completed by Nupqu Development Corporation (Nupqu), a contracting company owned by the Ktunaxa Nation. Nupqu has also assisted with hydrology and climate related baseline components.

6.1.4 Aboriginal Consultation Strategy

The engagement strategies used for the Project will meet provincial and federal requirements for consultation and will work to address issues and concerns of interested Aboriginal Groups. Effective communication and engagement is important in developing relationships with interested groups. Effective engagement should take into account:

- Diversity of Project participants and group dynamics;
- Historical relationships Aboriginal Groups and government agencies;

- Sensitivity to setting, location of meetings, and scheduling constraints; and
- Encouraging discussion, good communication, and an open dialogue.

As part of the EA, a detailed consultation program will be developed. The Aboriginal Consultation Strategy to be implemented for the Project is expected to include the following components:

- **Stakeholder Identification** – Interested Aboriginal Groups and Groups that may be affected by the Project will continue to be identified. This is an on-going component of the Project's engagement and consultation strategy.

- **In-person Meetings** – Preliminary informational meetings were held to discuss proposed activities scheduled for 2012 and 2013. Meetings included discussions of proposed exploration activities, Project teams, baseline environmental programs, and on-going communication strategies. A meeting will be scheduled for 2014 to discuss on-going and scheduled activities. Project update meetings will be held at regular intervals with Chiefs and Councils to review Project plans and scheduled activities.

- **Participation in Technical Working Groups** – NWP Coal will participate in Working Group meetings organized by the BC EAO and CEA Agency as the Project progresses and the draft Application Information Requirements and EA documents are prepared.

- **Notifications** – Aboriginal Groups will be notified by NWP Coal of public comment periods and Technical Working Group meetings in writing.

- **Conduct Assessments** – NWP Coal will conduct an Archaeological Overview Assessment and an Archaeological Impact Assessment for the Project in consultation with the Ktunaxa. Findings of the assessments will be provided to and discussed with the Ktunaxa.

- **Facilitate Traditional Knowledge and Land Use Studies** – NWP Coal will work with Aboriginal Groups to facilitate and complete TU/TK studies

- **Document Review and Comment** – Project documents/submissions will be distributed for comment by the Ktunaxa and other Aboriginal Groups, as appropriate (e.g., Notice of Work announcements, draft and final versions of the Application Information Requirements and other EA documents).

- **Comment Tracking** – Comments and concerns identified by the Aboriginal Groups with an interest in the Project and responses to those concerns and how they will be incorporated into the Project will be documented in a Stakeholder Consultation Report.

- **Notices and Newsletters** – Project notification will include both newspaper notices and newsletters. Notices will be developed to provide information to the public about upcoming events and the process underway. Newsletters will augment public notices to provide

additional information on the Project. There are four notification points that warrant additional newsletter-type information within our proposed consultation plan:

- The first newsletter would be developed early in the Project and will be used as a tool for Project consultation. This will be used to explain the Project, need, and other pertinent information.

- Following this, the first notice and newsletter (same as above but revised according to potential Project changes) will be sent out at the commencement of the EA process, providing additional information on the Project origin, potential alternatives and inviting people to the first open house.

- The second notice and newsletter will invite participation to open houses and include details on the preliminary preferred route, as well as potential construction impacts and mitigation proposed.

- The third notice and newsletter would advertise completion of the EA and invite feedback on the Project.

- **Open Houses** – Community open houses will be held to notify community members of the Project and proposed activities as well as to collect community member's opinions and comments on the Project and potential impacts. It is also anticipated that a Project newsletter and/or other communication materials will be created and distributed to interested Aboriginal Groups to provide Project updates and create awareness of the Project.

- **Capacity Building** – Identify and discuss opportunities for capacity building and employment with interested Aboriginal Groups.

In order to properly inform NWP Coal with respect to Aboriginal engagement and stakeholder consultations, the following documents will be reviewed and applied to Project consultation strategies:

- Aboriginal Affairs and Northern Development Canada: Aboriginal Consultation and Accommodation - Updated Guidelines for the Federal Officials to Fulfill the Legal Duty to Consult (March 2011);
- Canadian Association of Petroleum Producers: Industry Best Practice Guide: Developing Effective Working Relationships with Aboriginal Communities (January 2006);
- Association for Mineral Exploration British Columbia: Aboriginal Engagement Guidebook, a Practical and Principled Approach for Mineral Explorers (January 2014);
- BC EAO: Guide to Involving Proponents when Consulting First Nations in the Environmental Assessment Process (December 2013); and

- Natural Resources Canada: Exploration and Mining Guide for Aboriginal Communities (2013).

6.2 Public and Stakeholder Consultation and Engagement

6.2.1 Potentially Interested Public and Stakeholder Groups

A range of non-Aboriginal stakeholder groups may have an interest in the Project, including local communities, regulatory agencies, community groups, public interest groups, and recreational organizations. **Table 15** lists public and stakeholder groups that may have an interest in the proposed Project. As the Project progresses and Technical Working Groups are formed, it is expected that the list of potentially interested stakeholders will change.

Table 15: Potentially Interested Stakeholder Groups

Stakeholder Group
Local and Regional Governments and Regulatory Agencies
BC Environmental Assessment Office
Canadian Environmental Assessment Agency
BC Ministry of Environment, Environmental Protection, Kootenay Boundary
BC Ministry of Highways, Southern Interior Region
BC Forest, Lands and Natural Resource Operations
Regional District of East Kootenay
Sparwood & District Chamber of Commerce
Fernie Chamber of Commerce
District of Sparwood
Recreational
Fernie Fly Fishing
Kootenay Fly Fishing
Elk River Guiding Company
Canyon Raft Company
Mountain High Adventures
Fernie Wilderness Adventures
Fernie Rod and Gun Club
Trappers
Quad Squad Association
Elkford ATV Club
Elkford Snowmobile Club
Sparwood Fish and Wildlife
Podraskis (Special Use Permit holder in Alexander Creek)

Stakeholder Group
Industry
Teck Coal Limited
CanAus Coal Ltd.
Canadian Forest Products
Jemi Holdings Ltd.
CPR Rail
Summit Natural Rock Inc.
Elk Valley Integrated Forestry Task Force
Community and Public Interests Groups
Sparwood and District Fish and Wildlife Association
Elk River Alliance
Crowsnest Forest Stewardship Society
Crowsnest Conservation Society
Canadian Parks and Wilderness Society
Sierra Club BC
Wildsight
The Nature Trust of BC

6.2.2 Engagement and Consultation Activities Completed to Date

Preliminary engagement and consultation with non-Aboriginal stakeholders has included telephone meetings and discussions, in-person meetings, and email correspondence regarding the proposed Project. **Table 16** summarizes engagement and consultation activities completed to date with public and stakeholder groups.

Table 16: Engagement and Consultation Activities

Stakeholder Group	Consultation Method(s)	Date	Summary
BC Environmental Assessment Office	Telephone and in-person meeting	February 2014 April 2014 September 2014	Introductory Project meetings. Discussions regarding proposed Project plans, timelines, and the EA processes.
Canadian Environmental Assessment Agency	Telephone and in-person meeting	April 2014 September 2014	Introductory Project meetings. Discussions regarding proposed Project plans, timelines, and the EA processes.
BC Ministry of Environment, Environmental Protection, Kootenay Boundary	Telephone and email (various)	May 2012 June 2012 March 2013	Email and telephone discussions on proposed water sampling and hydrometric monitoring stations, as well as the location for a climate station.

Stakeholder Group	Consultation Method(s)	Date	Summary
BC Forest, Lands and Natural Resource Operations	Email, telephone, in-person meeting	June 2014 July 2014	Meeting to discuss baseline wildlife studies and available information (e.g., habitat models).

6.2.3 Key Comments and Concerns to Date

To date, consultation with the public and stakeholders has focused on preliminary discussions regarding the proposed Project (e.g., location of the climate station and baseline wildlife studies). As the Project progresses, it is anticipated that interested public and stakeholders will provided comments on the following key areas:

- Water quality and concerns regarding selenium levels in local watercourses;
- Wildlife habitat and connectivity of wildlife corridors;
- Fish and fish habitat and the presence of sensitive fish species within the Project property (e.g., Westslope cutthroat trout); and
- Access to areas used for recreation (e.g., snowmobiling, hunting, ATV use, etc.).

6.2.4 Public and Stakeholder Consultation Strategy

As part of the Project and the EA process, NWP Coal will undertake a comprehensive consultation program. To date, consultation with public and other stakeholders has included in-person and telephone meetings as described in **Section 6.2.2**. The public and stakeholder consultation strategy over the course of the pre-application and application phase/EA process will include the following components:

- **Participation in Technical Working Groups** – NWP Coal will participate in Working Group meetings organized by the BC EAO and CEA Agency as the Project progresses and the draft Application Information Requirements and EA documents are prepared.
- **Mailing List –** NWP Coal will develop a comprehensive contact list of stakeholders with an interest in the Project, including municipal, provincial and federal agency representatives, Aboriginal representatives, private landowners, registered trap line owners, industry, and public interest groups. This contact list will be used at various points in the EA process in order to disseminate information about the Project and to gather feedback.
- **Elected Officials –** Contact will be made with elected officials during the EA process. NWP Coal will arrange for a meeting with local Councilors to ensure they are aware of the Project and provide them the opportunity to ask questions such that they have the information needed to respond to their constituents. Municipal Councilors will be on the Project contact list and will also be invited.
- **Notices and Newsletters –** Project notification will include both newspaper notices and newsletters as described in **Section 6.1.4**.

- **Open Houses** – Open houses will be held at key stages during the EA process in order to present Project information to the general public. Project staff will be available to answer questions (e.g., series of panels to facilitate discussion) and questionnaires will be available for the public to complete, along with other supporting information.

6.3 Consultation with Other Jurisdictions

At this time, there has been no interaction with jurisdictions outside of the Province of BC and Canada. As the Project progresses, NWP Coal will work with regulators to determine the need for additional consultation activities.

7.0 REFERENCES

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Appendix A
Plant Species at Risk Potentially Occurring in the Local Study Area

Scientific Name	English Name	COSEWIC	SARA	BC List	IDFun	MSdk1	ESSFdk1	ESSFdkw	ESSFdkp	IMAun	Regionally Present
Adiantum capillus-veneris	southern maiden-hair fern	Endangered	Endangered	Red							x
Agoseris lackschewitzii	pink agoseris			Blue			x			x	
Androsace chamaejasme ssp. *lehmanniana*	sweet-flowered fairy-candelabra			Blue			x			x	
Anemone canadensis	Canada anemone			Blue		x					
Arenaria longipedunculata	low sandwort			Red			x				
Arnica chamissonis ssp. *incana*	meadow arnica			Blue							x
Astragalus bourgovii	Bourgeau's milk-vetch			Blue			x			x	
Astragalus crassicarpus	ground plum			Red		x					
Astragalus drummondii	Drummond's milk-vetch			Red		x					
Astragalus vexilliflexus var. *vexilliflexus*	bent-flowered milk-vetch			Blue			x		x	x	
Atrichum tenellum				Blue							x
Atriplex argentea ssp. *argentea*	silvery orache			Red							x
Besseya wyomingensis	Wyoming kitten-tails			Blue			x			x	
Boechera drepanoloba	pointing suncress			Red		x				x	
Botrychium ascendens	upswept moonwort			Red			x			x	
Botrychium crenulatum	dainty moonwort			Blue			x				
Botrychium simplex var. *compositum*	least moonwort			Blue		x					
Botrychium spathulatum	spoon-shaped moonwort			Red		x					
Bouteloua gracilis	blue grama			Red							x
Brickellia grandiflora	large-flowered brickellia			Red		x					
Bryum uliginosum				Blue							x
Calamagrostis montanensis	plains reedgrass			Blue	x						
Carex crawei	Crawe's sedge			Blue							x
Carex enanderi	Enander's sedge			Blue							x
Carex geyeri	elk sedge			Blue		x	x		x	x	
Carex incurviformis var. *incurviformis*	curved-spiked sedge			Blue						x	
Carex lenticularis	lakeshore sedge			Blue							x
Carex paysonis	Payson's sedge			Blue			x		x	x	
Carex rostrata	swollen beaked sedge			Blue			x			x	
Carex rupestris ssp. *drummondiana*	curly sedge			Blue						x	
Carex scoparia	pointed broom sedge			Blue			x				
Carex sychnocephala	many-headed sedge			Blue		x					

Scientific Name	English Name	COSEWIC	SARA	BC List	IDFun	MSdk1	ESSFd k1	ESSFd kw	ESSFd kp	IMAun	Regionally Present
Castilleja cusickii	Cusick's paintbrush			Red	x	x					
Castilleja gracillima	slender paintbrush			Blue		x	x				
Cirsium scariosum var. *scariosum*	elk thistle			Red		x					
Claytonia megarhiza var. *megarhiza*	alpine springbeauty			Blue						x	
Cryptantha ambigua	obscure cryptantha			Blue		x					
Delphinium bicolor ssp. *bicolor*	Montana larkspur			Blue		x	x		x		
Delphinium sutherlandii	Sutherland's larkspur			Blue						x	
Didymodon subandreaeoides				Blue							x
Draba densifolia	Nuttall's draba			Blue			x		x	x	
Draba lactea	milky draba			Blue						x	
Draba porsildii	Porsild's draba			Blue						x	
Draba ruaxes	coast mountain draba			Blue						x	
Eleocharis elliptica	elliptic spike-rush			Blue			x			x	
Eleocharis rostellata	beaked spike-rush			Blue							x
Encalypta spathulata				Blue							x
Epilobium glaberrimum ssp. *fastigiatum*	smooth willowherb			Blue	x					x	
Epilobium saximontanum	Rocky Mountain willowherb			Red		x	x		x		
Epipactis gigantea	giant helleborine	Special Concern		Blue							x
Erigeron ochroleucus	buff daisy			Red						x	
Erigeron trifidus	three-lobed daisy			Red						x	
Eriogonum androsaceum	androsace buckwheat			Red			x			x	
Eutrema salsugineum	saltwater cress			Red	x						
Festuca minutiflora	little fescue			Blue			x	x	x	x	
Gaura coccinea	scarlet gaura			Red	x	x					
Gayophytum humile	dwarf groundsmoke			Blue		x					
Gayophytum racemosum	racemed groundsmoke			Red							x
Gayophytum ramosissimum	hairstem groundsmoke			Red							x
Gentiana affinis	prairie gentian			Blue							x
Gentiana calycosa	mountain bog gentian			Blue			x		x	x	
Glyceria pulchella	slender mannagrass			Blue	x						
Glycyrrhiza lepidota	wild licorice			Blue							x
Hedeoma hispida	mock-pennyroyal			Red							x
Helianthus nuttallii ssp. *rydbergii*	Nuttall's sunflower			Red	x						

Scientific Name	English Name	COSEWIC	SARA	BC List	IDFun	MSdk1	ESSFdk1	ESSFdkw	ESSFdkp	IMAun	Regionally Present
Heterocodon rariflorum	heterocodon			Blue							x
Hygrohypnum alpinum				Blue							x
Hypericum scouleri ssp. *nortoniae*	western St. John's-wort			Blue			x				
Impatiens ecalcarata	spurless touch-me-not			Blue							x
Isoetes howellii	Howell's quillwort			Red			x				
Juncus arcticus ssp. *alaskanus*	arctic rush			Blue			x				
Juncus confusus	Colorado rush			Red							x
Lathyrus lanszwertii var. *sandbergii*	pinewood peavine			Red							x
Leptosiphon septentrionalis	northern linanthus			Blue		x	x				
Lewisia triphylla	three-leaved lewisia			Blue						x	
Lomatium sandbergii	Sandberg's desert-parsley			Blue		x	x		x		
Lomatium triternatum ssp. *platycarpum*	nine-leaved desert-parsley			Red	x	x					
Lupinus arbustus ssp. *neolaxiflorus*	spurred lupine			Red							x
Lupinus arbustus ssp. *pseudoparviflorus*	Montana lupine			Red							x
Lupinus bingenensis var. *subsaccatus*	Suksdorf's lupine			Red			x				
Megalodonta beckii	water marigold			Blue	x						
Melica spectabilis	purple oniongrass			Blue		x	x	x	x	x	
Mimulus breviflorus	short-flowered monkey-flower			Blue							x
Minuartia austromontana	Rocky Mountain sandwort			Blue						x	
Minuartia elegans	northern sandwort			Blue						x	
Minuartia nuttallii ssp. *nuttallii*	Nuttall's sandwort			Blue						x	
Mnium arizonicum				Blue							x
Muhlenbergia andina	foxtail muhly			Red							x
Myriophyllum ussuriense	Ussurian water-milfoil			Blue							x
Orobanche corymbosa ssp. *mutabilis*	flat-topped broomrape			Blue							x
Orobanche ludoviciana var. *ludoviciana*	prairie broomrape			Red							x
Orthotrichum pallens				Blue							x
Packera contermina	high alpine butterweed			Blue		x	x		x	x	
Papaver pygmaeum	dwarf poppy			Red			x	x	x	x	
Pellaea gastonyi	Gastony's cliff-brake			Blue		x					
Penstemon nitidus var. *nitidus*	shining penstemon			Red		x					

Scientific Name	English Name	COSEWIC	SARA	BC List	IDFun	MSdk1	ESSFd k1	ESSFd kw	ESSFd kp	IMAun	Regionally Present
Phacelia lyallii	Lyall's phacelia			Blue			x			x	
Physaria didymocarpa ssp. *didymocarpa*	common twinpod			Blue	x		x			x	
Physcomitrella patens				Red							x
Physcomitrium pyriforme				Blue							x
Pinus albicaulis	whitebark pine	Endangered	Endangered	Blue		x	x	x	x	x	
Pinus flexilis	limber pine			Blue		x	x	x	x		
Plagiobothrys hispidulus	harsh popcornflower			Blue		x					
Plantago canescens	arctic plantain			Red		x					
Plantago eriopoda	alkali plantain			Blue	x	x	x				
Poa laxa ssp. *banffiana*	Banff bluegrass			Red						x	
Pohlia longicollis				Red							x
Polemonium elegans	elegant Jacob's-ladder			Blue			x		x	x	
Polygonum austiniae	Austin's knotweed			Blue		x					
Polygonum engelmannii	Engelmann's knotweed			Blue		x					
Potamogeton strictifolius	stiff-leaved pondweed			Blue	x						
Potentilla diversifolia var. *perdissecta*	diverse-leaved cinquefoil			Blue			x		x	x	
Potentilla nivea var. *pentaphylla*	five-leaved cinquefoil			Blue			x		x		
Potentilla ovina var. *ovina*	sheep cinquefoil			Blue			x		x	x	
Prenanthes sagittata	arrow-leaved rattlesnake-root			Red		x					
Pterygoneurum kozlovii	alkaline wing-nerved moss	Threatened	Threatened	Red							x
Racomitrium pygmaeum				Blue							x
Salix boothii	Booth's willow			Blue	x	x					
Schistidium atrichum				Red			x		x		
Schistidium robustum				Blue							x
Schizachyrium scoparium	little bluestem			Red							x
Scirpus pallidus	pale bulrush			Red							x
Senecio hydrophiloides	sweet-marsh butterweed			Red		x	x				
Senecio megacephalus	large-headed groundsel			Blue		x	x		x	x	
Silene drummondii var. *drummondii*	Drummond's campion			Blue		x					
Sphaeralcea coccinea	scarlet globe-mallow			Red	x	x					
Sphenopholis intermedia	slender wedgegrass			Blue							x
Sphenopholis obtusata	prairie wedgegrass			Red							x
Sporobolus compositus var. *compositus*	rough dropseed			Blue							x

Scientific Name	English Name	COSEWIC	SARA	BC List	IDFun	MSdk1	ESSFdk1	ESSFdkw	ESSFdkp	IMAun	Regionally Present
Stellaria obtusa	blunt-sepaled starwort			Blue			x				
Stuckenia vaginata	sheathing pondweed			Blue	x	x					
Symphyotrichum ascendens	long-leaved aster			Red							x
Thalictrum dasycarpum	purple meadowrue			Blue			x				
Thermopsis rhombifolia	prairie golden bean			Red		x	x				
Tortula obtusifolia				Blue							x
Townsendia hookeri	Hooker's townsendia			Red	x						
Townsendia parryi	Parry's townsendia			Red			x		x	x	
Trichophorum pumilum	dwarf clubrush			Blue						x	
Trisetum wolfii	Wolf's trisetum			Blue		x	x				
Veronica catenata	pink water speedwell			Red							x
Warnstorfia pseudostraminea				Blue						x	
				Total	**16**	**40**	**46**	**5**	**21**	**43**	**46**