PROJECT DESCRIPTION

Proposed Sukunka Coal Mine Project

VERSION 2

Prepared for:

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On Behalf of:

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Attention: Bryan Tiedt

Project No.:

123110482

Date:

January 10, 2013


Stantec

TABLE OF CONCORDANCE

Table of Concordance between CEA Agency Project Description Guidelines

Item	Clause	Requirement	PD Section
8.0 Executive Summary			
1	8.0	Summary of information provided in Sections 1 through 7 above in both French and English	Executive Summary
1.0 General Information			
2	1.1	The nature of the project	1.2.2
3	1.1	The proposed location of the project	1.2.3
4	1.2.1	The name of the project	1
5	1.2.2 1.2.3	The name and address of the proponent	1 1.1.1.1
6	1.2.4	The name and contact information for the proponent CEO or equivalent	1.1.1.2
7	1.2.5	The name and contact information for the principal contact person for the purposes of the project description	1.1.1.2
8	1.3	A list of the jurisdictions (federal authorities, provincial or municipal governments, etc.) consulted during the preparation of the project description	1.1.4 7.5.2
9	1.3	A list of the other parties (Aboriginal groups, the public, etc.) consulted during the preparation of the project description	1.1.4 7.2.2 7.4.2
10	1.4.1	Information on other jurisdictional environmental assessment regimes and/or regulatory requirements to which the project has been or could be subjected (i.e., provincial, territorial, land claim environmental assessment processes, etc.)	5.1
11	1.4.2	Information regarding whether the project area is located in a region that is/has been involved in a regional environmental study	1.2.1
2.0 Project Information			
12	2.1	General description of the project (context and objectives)	1.2.2
13	2.2	Activities that describe the project in whole or in part that concur with the provisions identified in the *Regulations Designating Physical Activities*	5.2

Item	Clause	Requirement	PD Section
14	2.3.1	A description of the physical works associated with the project including all structures and associated infrastructure. Include a description of their purpose, approximate dimensions and capacity where appropriate; and any related activities required to support the project	2.2
15	2.3.2	Production capacity and the size (e.g., length of road, acreage used) of the main components of the project, including a description of the processes, infrastructure and any permanent or temporary structures	1.2.4 2.2
16	2.3.3	The percent increase in size or capacity if project is an expansion of an existing project	N/A
17	2.3.4	A description of all activities associated with the project	2.3
18	2.4	The nature of any solid, liquid or gaseous wastes likely to be generated by the project, and of plans to manage these wastes	2.2.5 2.4
19	2.4.1	Sources and location of atmospheric contaminant emissions (greenhouse gases [GHGs], etc.)	2.4.1
20	2.4.2	Sources and location of liquid discharges	2.4.3
21	2.4.3	Types of by-products to be generated by the project and plans for proper disposal procedures as applicable	2.4
22	2.5	The construction, operation and decommissioning phases, and the timing and scheduling of each phase	2.3 3
23	2.5.1	Schedule–time of year, duration and staging (site preparation, construction, operation, decommissioning, abandonment)	3.1
24	2.5.2	Main activities associated with each phase of the project (e.g. site preparation – land clearing, excavations, grading, etc.)	2.3
3.0 Project Location			
25	3.1.1	The geographical location of the project–provide coordinates for the centre of a facility, or the start/end points of a linear facility	1.2.3
26	3.1.2	A site map indicating the location of the project at an appropriate scale	1.2.3 (Figure 1.2-1)

Item	Clause	Requirement	PD Section
27	3.1.3	Map(s) indicating the locations of the project components/activities in relation to existing features, including names where applicable (e.g., watercourses, transportation infrastructure, land use factors, Aboriginal settlement and/or claim lands, ESAs, etc.)	2.1 (Figure 2.1-1) 4.2.1.1 (Figure 4.2-1) 4.2.2.1 (Figure 4.2-4) 4.2.2.2 (Figure 4.2-5) 4.3 (Figures 4.3-1 and 4.3-2) 4.5 (Figure 4.5-1) 4.5.3.1 (Figure 4.5-2)
28	3.1.4	Photographs of work locations	1.2.3 (Photo 1.2-1)
29	3.1.5	Legal land description for property(ies) associated with the project (title, deed/document, authorization relating to a water lot)	1.2.1
30	3.1.6	Proximity of the project to: permanent, seasonal or temporary residences; Aboriginal lands associated with traditional territories, settlement and resources; and federal lands	4.3 4.5 5.2
31	3.2.1 3.2.2	Describe the ownership and zoning of land and water affected by the project, including zoning designations and current land ownership (including sub-surface rights)	1.2.1 4.5.3.1 4.5.9
32	3.2.3	Identify land use, water use, resource management or conservation plans in proximity to the project	4.5
33	3.2.4	Identify if the lands are or have been used as a marine terminal, or designated within a land use plan that has undergone public consultation	4.5.1
34	3.2.5	If applicable, provide land status and zoning under the Port Land Use Plan if lands are within waters/lands under the jurisdiction of a Canada Port Authority under the Canada Marine Act	N/A
35	3.2.6	Identify whether project activities will impact in any way (i.e., access, occupation, exploration, development, etc.) lands and resources currently used by Aboriginal peoples for traditional purposes	4.3 8.1
4.0 Federal Involvement – Financial Support, Lands and Legislative Requirements			
36	4.1	Information identifying any federal government department or agency that is, or may be, providing financial support to the project	5.2
37	4.2	Identify any federal lands associated with the project area, including information related to granting of interest in federal land (easement, ROW, transfer of ownership)	5.2

Item	Clause	Requirement	PD Section
38	4.3	Information relating to federal legislative or regulatory requirements, permits, licences and authorizations that the proponent believes are required for the project	5 6
5.0 Environmental Effects			
39	5.1	A summary of the physical and biological components in the area likely to be affected by the project, including known habitat areas:	4
40	5.1	Terrain	4.2.2.3
41	5.1	Water	4.2.1.1 4.2.1.2 4.2.1.3
42	5.1	Air	4.2.3
43	5.1	Vegetation	4.2.2.2
44	5.1	Fish	4.2.1.5
45	5.1	Wildlife	4.2.2.1
46	5.1	Migratory Birds	4.2.2.1 5.2.1.2
47	5.2	A summary of potential impacts of the project to:	
48	5.2	Fish and fish habitat (*Fisheries Act*)	Executive Summary 8.1
49	5.2	Aquatic species (*Species at Risk Act*)	Executive Summary 8.1
50	5.2	Migratory birds (*Migratory Birds Convention Act* 1994)	Executive Summary 5.2.1.2 8.1
51	5.3	Description of potential environmental impacts of the project to federal, provincial lands (outside the province the project is located in) or international lands	5.2
52	5.4	Description of the effects on Aboriginal peoples resulting from changes to the environment caused by the project:	
53	5.4	Health and socio-economic conditions	8.1

Item	Clause	Requirement	PD Section
54	5.4	Physical and cultural heritage	8.1
55	5.4	Current use of lands and resources for traditional purposes	8.1
56	5.4	Structure, site or thing of historical, archaeological, paleontological or architectural significance	8.1
6.0 Proponent Engagement and Consultation with Aboriginal Groups ***In order to determine the scope of Aboriginal interests related to the project, the proponent should provide background information on Aboriginal groups' potential or established Aboriginal or treaty rights, and identify the overlap area of the project describing any potential impacts to uses and lands associated with these rights.***			
57	6.1	List of Aboriginal groups potentially interested in or affected by the project, including detailed contact information	4.3 4.3.1
58	6.2	Description of engagement and consultation activities with Aboriginal groups undertaken to date with regards to the project (including names, date(s) that engagement/consultation activities occurred, and means of engagement/consultation– meetings, correspondence, communications)	1.1.4 7.2.2
59	6.3	Summary of comments and concerns expressed by Aboriginal groups, and responses provided to date with regards to the project	7.2.4
60	6.4	Summary of current land and resource use by Aboriginal groups/peoples for traditional purposes	4.3.2
61	6.5	Overview of a consultation plan identifying ongoing and proposed Aboriginal engagement and consultation activities, schedule and type of information that will be collected (or reasons why engagement and consultation is not required)	7.2.1 7.2.3
7.0 Consultation with the Public and Other Parties			
62	7.1	List of stakeholders potentially interested in or affected by the project, including detailed contact information and a description of engagement and consultation activities to date (names, date(s) that engagement/consultation activities occurred, and means of engagement/consultation – meetings, correspondence, communications)	7.4.1 7.4.2
63	7.2	Summary of comments and concerns expressed by stakeholders, and responses provided to date with regards to the project	7.4.4
64	7.3	Summary of ongoing and proposed stakeholder consultation activities	7.4.3
65	7.4	Summary of consultations with other authorities that have environmental assessment or regulatory decision-making jurisdiction with respect to the project	1.1.4 7.5

Table of Concordance between BC EAO Project Description Guidelines

Item	Requirement	PD Section
General Information		
1	The proponent's name and the representative managing the project	1 1.1.1
2	Contact information, including a mailing address, phone and fax numbers, and email addresses	1.1.1.1 1.1.1.2
3	Corporate information, including a website address, particulars of company incorporation, and partners' names (if applicable)	1.1.1.1 1.1.2 1.1.3
General Background Information		
4	The type and size of the project, with specific reference to the thresholds set out in the Reviewable Projects Regulation	1.2.2 1.2.4 5.1
5	Project purpose and rationale	1.2.5
6	Estimated capital cost	1.2.6
7	Number of construction jobs (in person years) and operating jobs (actual number)	1.2.6
8	Location (latitude and longitude)	1.2.3
Project Overview		
9	A brief description of the major on-site and off-site project components, including options if the final site selections are not yet available	2.1 2.2.11
10	A conceptual site plan and map(s) at sufficient scale to allow for clear location of all major components of the project (proponents may wish to include photographs if these would be helpful to understanding the nature and location of the proposed project)	2.1 (Figure 2.2-1)
11	The project's duration, including decommissioning if appropriate	3.1
12	The project's potential environmental, economic, social, heritage, and health effects (in general terms)	8

Item	Requirement	PD Section
Land Use Setting		
13	A general description of existing land use in the vicinity of the project site	4.5
14	Whether the project and its components are situated on private or Crown land	1.2.1 4.3
15	Information about First Nations interests where asserted claims to rights or title are known	4.3
Consultation Activities		
16	A summary of consultation activities that have been carried out with First Nations, the public and local governments	1.1.4 7
Consultation Activities		
17	A tentative schedule for submitting an application for an environmental assessment certificate and developing the project (should a certificate be issued)	3.1 (Table 3.1-1)
Consultation Activities		
18	A list of required permits, if known	6 Appendix A

DISTRIBUTION LIST

Sukunka Project Description Distribution List

Authority	Recipient	Date
CEA Agency	Vivian Au General Project Description Inbox (CEAA Headquarters) project-projet@ceaa-acee.gc.ca	January 10, 2013
BC EAO	Scott Bailey	January 10, 2013
Xstrata Coal Canada	Bryan Tiedt	January 10, 2013
Stantec Consulting Ltd.	Mandy Sarfi	January 10, 2013
West Moberly First Nations	Chief Roland Willson	January 10, 2013
Saulteau First Nations	Chief Harley Davis	January 10, 2013
Halfway River First Nation	Chief Russell Lilly	January 10, 2013
Doig River First Nation	Chief Norman Davis	January 10, 2013
McLeod Lake Indian Band	Chief Derek Orr	January 10, 2013

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ACRONYMS AND ABBREVIATIONS

°C ..... degrees Celcius
µm ..... micrometres
ALR ..... Agricultural Land Reserve
ARD ..... acid rock drainage
BAFA ..... Boreal Altai Fescue Alpine
BC CDC ..... British Columbia Conservation Data Centre
BC EAO ..... British Columbia Environmental Assessment Office
BC ..... British Columbia
BCEAA ..... British Columbia *Environmental Assessment Act*
BCTS ..... BC Timber Sales
BP ..... before present
BRFN ..... Blueberry River First Nations
BWBS ..... Boreal White and Black Spruce
CAC ..... criteria air contaminants
CAGR ..... compound annual growth rate
CDA ..... Canadian Dam Association
CEA Agency ..... Canadian Environmental Assessment Agency
CEAA ..... Canadian *Environmental Assessment Act*
CHPP ..... coal handling and preparation plant
DC TSA ..... Dawson Creek Timber Supply Area
DRFN ..... Doig River First Nation
EA ..... environmental assessment
EIS ..... Environmental Impact Statement
ESSF ..... Engelmann Spruce Sub-alpine Fir
FCC ..... First Coal Corporation
FNFN ..... Fort Nelson First Nation
FSR ..... Forestry service road
GHG ..... greenhouse gas
ha ..... hectares
HADD ..... harmful alteration, disruption, or destruction
HRFN ..... Halfway River First Nation
ICOLD ..... International Commission on Large Dams
km ..... kilometers
km^2 ..... square kilometres
kV ..... kilovolts
LRMP ..... Land and Resource Management Plan
LSA ..... Local Study Area
m ..... metres
masl ..... meters above sea level
MBCM ..... million bank cubic meter

MIA ..... Mine Industrial Area
ML ..... metal leaching
ML/d ..... million litres (megalitres) per day
MLIB ..... McLeod Lake Indian Band
mm/y ..... millimetres per year
MOE ..... Ministry of Environment
Mt ..... million tonnes
Mt/y ..... million tonnes (megatonnes) per year
MW ..... megawatts
NRCan ..... Natural Resources Canada
NRRM ..... Northern Rockies Regional Municipality
PDR ..... petroleum development road
PM ..... particulate matter
PRFN ..... Prophet River First Nation
PRRD ..... Peace River Regional District
RCMP ..... Royal Canadian Mounted Police
RMZ ..... Resource Management Zone
ROM ..... Run-of-Mine
ROW ..... Right-of-Way
SARA ..... *Species at Risk Act*
SBS ..... Sub-boreal Spruce
SFN ..... Saulteau First Nations
Stantec ..... Stantec Consulting Ltd.
t/d ..... tonnes per day
t/h ..... tonners per hour
TEM ..... terrestrial ecosystem mapping
TK ..... Traditional Knowledge
TLU ..... Traditional Land Use
Treaty 8 ..... Treaty No. 8
TSP ..... total suspended particulate
WG ..... Working Group
WMFN ..... West Moberly First Nations
XCBC ..... Xstrata Coal British Columbia
XCC ..... Xstrata Coal Canada
XCCRL ..... Xstrata Coal Canada Resources Limited

1 INTRODUCTION

The proponent, Xstrata Coal Canada (XCC)—a controlling entity of Boreas Coal Limited (Boreas)—proposes to develop the Sukunka Coal Project (Sukunka Project) in northeastern British Columbia (BC). The Sukunka project tenure area consists of approximately 8,050 hectares (ha) of contiguous coal licences near Tumbler Ridge, British Columbia. The property is southeast of the Sukunka River, and northwest of the Bullmoose Creek, within the Peace River Regional District (PRRD). The Sukunka Project is about 55 kilometers (km) south of Chetwynd and about 40 km west of Tumbler Ridge.

This report presents a detailed description of the proposed Sukunka Project and provides a preliminary overview of potential effects of the Sukunka Project to:

- Regulatory agencies
- Treaty 8 First Nations
- Aboriginal groups at Kelly Lake
- Tenure holders
- Members of the public

This report follows the guidelines prepared by the British Columbia Environmental Assessment Office (BC EAO) and by the Canadian Environmental Assessment Agency (CEA Agency), specifically:

- 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)

It is anticipated that the Sukunka Project will be subject to both the federal CEAA 2012 and provincial BC *Environmental Assessment Act* (BCEAA). This Project Description will also be used to initiate these processes in the preparation for submitting an Application for Environmental Assessment Certificate (Application) to the BC EAO and an Environmental Impact Statement (EIS) to the Canadian Environmental Assessment Agency (CEA Agency). Both the Application and EIS requirements will be satisfied within a single document which will be referred to as the Application/EIS for the Sukunka Project.

1.1 Proponent Identification

1.1.1 Xstrata Coal Canada

1.1.1.1 Corporate Information

The Sukunka project tenure is owned by Boreas, an XCC controlled entity. Boreas was incorporated on March 2, 2012 under the laws of the Canada *Business Corporations Act*. It is principally engaged in the exploration, acquisition and development of coal properties near Chetwynd in northeast British Columbia and its registered office is 100 King Street West, Suite 6900, Toronto, ON M5X1E3.

Boreas is a jointly owned subsidiary of Xstrata Coal Canada Resources Limited (XCCRL) (25 percent) and First Coal Corporation (FCC) (75 percent). Both XCCRL and FCC are 75 percent owned by XCC and 25 percent owned by JX Nippon Oil & Energy (JX) (Australia) Pty Limited. For the purpose of this project description the proponent is XCC.

The mailing address for Boreas Coal Limited, XCC, XCCRL and FCC is:

1285 West Pender Street, Suite 900
Vancouver, BC V6E 4B1

Website Address: http://www.xstratacoal.com

Doug Smith, General Manager
Telephone: (604) 453-4440
Email: dhsmith@xstratacoal.ca

1.1.1.2 Project Contacts

All communications regarding the Sukunka Project should be sent to the following:

Primary Project Contact: Bryan Tiedt, Sustainable Development Manager
Telephone: (604) 453-4449
Email: btiedt@xstratacoal.ca

Alternative Project Contact: Ben Coleman, Technical Services Manager
Telephone: (604) 453-4442
Email: bcoleman@xstratacoal.ca

1.1.2 Project Partners

1.1.2.1 JX Nippon Oil & Energy

XCC and JX created the Xstrata Coal British Columbia Group (XCBC) whereby XCC and JX have a 75 and 25 percent interest respectively. XCBC incorporates contiguous metallurgical coal assets in the Peace River Coalfields in Western Canada. XCC is operating and managing the assets on behalf of the XCBC Group.

1.1.3 Consultants

XCC has retained Stantec Consulting Ltd. (Stantec) to conduct an environmental assessment (EA) for the Sukunka Project. Stantec is working collaboratively with other environmental consulting firms to complete this review:

- Knight Piésold Consulting (hydrology and hydrogeology environment studies)
- Lorax Environmental Services Ltd. (environmental geochemistry studies)
- Sean Sharpe and Associates Environmental Consulting (environmental wildlife studies)
- Engineering design and development is being lead in house and by other undetermined consultants

Table 1.1-1 Qualified Professionals

Individual	Company	Area of Responsibility	Professional Affiliation
Mandy Sarfi	Stantec Consulting Ltd.	Project Manager—Environmental Assessment	B.Sc., E.P.
Daniel Jarratt	Stantec Consulting Ltd.	Air Quality	EP, P.Eng. (APEGBC and NT/NU)
Paul Wierzba	Stantec Consulting Ltd.	Noise	Ph.D., P.Eng. (APEGGA)
Daniel Jarratt	Stantec Consulting Ltd.	Snow and Climate	EP, P.Eng. (APEGBC and NT/NU)
Dennis O'Leary	Stantec Consulting Ltd.	Soils and Terrain	P.Ag.
Terry Conville	Stantec Consulting Ltd.	Vegetation	B.Sc., RPF
Sara Duncan	Stantec Consulting Ltd.	Reclamation	P. Ag.
Sean Sharpe	Sean Sharpe Consulting	Wildlife	M.Sc., R.P.Bio.
Jamie Cathcart	Knight Piésold	Hydrology	Ph.D., P.Eng. (APEGBC)
Kyle Terry	Knight Piésold	Hydrology	B.Sc.
Cathy Safadi	Knight Piésold	Hydrogeology	P.Eng.
Jorgelina Muscatello	Stantec Consulting Ltd.	Water Quality	Ph.D.
Afshin Parsamanesh	Stantec Consulting Ltd.	Fish & Fish Habitat	R.P.Bio.
Jonathan Mackin	Lorax	Geochemistry	B.Sc.
Frank Bohlken	Stantec Consulting Ltd.	Socio-Economics	B.Sc., MRM, Member of Planning Institute of BC
Julie Swinscoe	Stantec Consulting Ltd.	First Nations and Aboriginal groups	B.A.
Ryan Spady	Stantec Consulting Ltd.	Archaeology	RPCA
Bryan Leece	Stantec Consulting Ltd.	Human Health	Ph.D.

1.1.4 Consultation

XCC is taking a phased approach to consultation and engagement, as detailed in Section 7. Consultation to date—Phases 1 and 2—has been considered in preparing this Project Description. Table 1.1-2 lists the parties consulted to date.

Table 1.1-2 Parties Consulted to Date

Audience Type	Audience	Type of Consultation
Regulator	BC EAO	Introductory meetings, email and telephone correspondence
Regulator	CEA Agency	Introductory meetings, email and telephone correspondence
First Nation	West Moberly First Nation	▪ Meetings with chief and council attended and conducted by XCC senior leadership ▪ Member participation in field work
First Nation	MacLeod Lake Indian Band	▪ Meetings with chief and council attended and conducted by XCC senior leadership ▪ Member participation in field work
First Nation	Saulteau First Nation	▪ Meetings with chief and council attended and conducted by XCC senior leadership ▪ Member participation in field work
First Nation	Halfway River First Nation	▪ Meetings with chief and council attended and conducted by XCC senior leadership ▪ Member participation in field work
Public	Land owners	Correspondence with land owners regarding property access
Public	Land users	Correspondence with land users (trappers, hunters, guide outfitters, recreational users) identified from the public record regarding their land use in the Sukunka project region

1.2 Project Overview

1.2.1 Project Background

Exploration and mining operations have been on-going within the Sukunka project tenure area since 1969, with exploration programs by Brameda Resources, a company that later became a subsidiary of Teck. In the next year, following the completion of an agreement with Coalition Mining, more exhaustive exploration efforts followed and this work continued with only a few short breaks into 1975. An agreement was then reached between Teck and BP Canada and further intense exploration continued for five years from 1977. Coalition Mining and Teck operated the Sukunka No. 1 and Sukunka Main (Window) Collieries in the 1970s, which were then taken over by BP Canada as trial underground mines. BP Canada closed and reclaimed the mines in 1984/85.

The southern half of the Sukunka project tenure area is referred to as the Bullmoose area. Teck also mapped and conducted drilling in this area. Coal tenures in the area were eventually acquired from Teck and BP Canada by Talisman Energy. XCC acquired the Sukunka leases from Talisman in March 2012 to develop a coal mining project (coal tenure numbers: 389288, 327241, 327208, 327258, 327206, 327456, 327455, 327257, 327256, 327464, 327454, 327453, 327421, 327407, 327402, 327390, 327383, 327380, 327309, 327288,327285, 327284, 327282, 327255, 327254, 327207, 327470, 327469, 327468, 327245, 327244, 327243, 327242, 327218, 327216, 327213, 327211). Total area of the Sukunka tenure is approximately 8,050 ha.

First Coal Corporation had recently proposed the Central South Mine Project located 60 km northeast of the Sukunka Project. Baselines studies were completed but the Sukunka Project was put on hold and withdrawn from the EA process in January 2012 as a result of an economic review which deemed the project not feasible as proposed. To the best of XCC's knowledge there have been no regional environmental studies completed in the Sukunka project area.

1.2.2 Project Description

XCC is proposing to develop and operate an integrated surface and underground mining operation and coal handling and processing plant (CHPP) to produce hard coking coal for export to overseas steel manufacturers. The overall plan for the Sukunka Project is to:

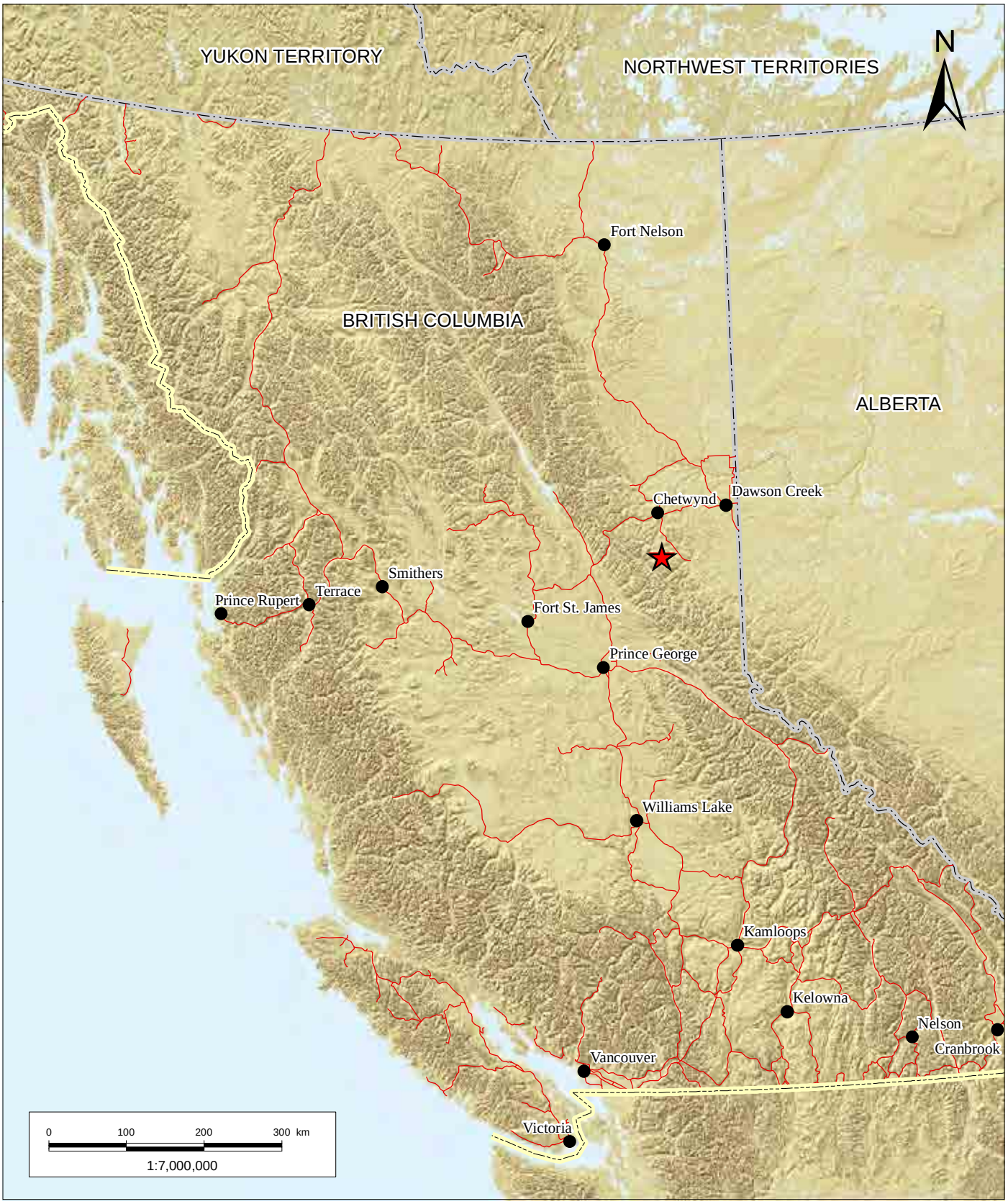
- Excavate raw coal and waste rock from three open pits within the property boundary using conventional open pit mining methods and equipment
- Excavate raw coal and waste rock from an underground longwall mining operation within the property boundary using conventional underground mining methods and equipment
- Haul the coal to a Coal Handling Preparation Plant (CHPP)
- Store the waste rock from the open pits in engineered waste rock stockpiles
- Co-dispose tailings with waste rock stockpiles (or in a separate storage facility)
- Transport washed coal by rail to a port facility in Prince Rupert, British Columbia (or an alternative Canadian port). Ridley Terminals Inc. currently operates a coal terminal in Prince Rupert.
- Decommission and reclaim the Sukunka project site on completion of the mining operation

1.2.3 Project Location

The property is located southeast of the Sukunka River, and northwest of the Bullmoose Creek, within the PRRD (Photo 1.2-1). The Sukunka Project is about 55 km south of Chetwynd, British Columbia and about 40 km west of Tumbler Ridge; with its approximate geographic centre at longitude 121.569° west and latitude 55.1964° north (see Figure 1.2-1 and Figure 1.2-2).

The mine site can currently be accessed by the Sukunka Forestry Service Road (FSR), 26 km south of Chetwynd on Highway 29 (Don Phillips Way). From there, the Sukunka Project is 33 km south along the Sukunka FSR.

Photo 1.2-1 Sukunka Project Area



Legend

- Sukunka Project Tenure Area
- City or Town
- Road
- International Border
- Provincial or Territorial Border

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

PROJECT LOCATION

Sources:

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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DATE: 21-DEC-12	PROJECTION: UTM 10
FIGURE ID: 123110482	DATUM: NAD 83
DRAWN BY: R. CAMPBELL	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **1.2-1**

550000 575000 600000 625000 650000 675000

6250000 6225000 6200000 6175000 6150000 6125000 6100000 6075000 6050000

N

Fort St John
Taylor
Hudson's Hope
Chetwynd
Dawson Creek
Pouce Coupe
Tumbler Ridge

29
97
52

Butler Ridge Park
Taylor Landing Park
Beatton River Park
Kiskatinaw Park
Moberly Lake Park
Klin-Se-Za Park
East Pine Park
Pine River Breaks Park
Gwillim Lake Park
Pine Lemoray Park
Sukunka Falls Park
Pine Lemoray Park Addition
Hole In The Wall Park
Bearhole Lake Park
Monkman Park
Wapiti Lake Park
Arctic Pacific Lakes Park

British Columbia
Alberta

0 10 20 30 40 km
1:700,000

Legend

- Airport/ Aéroport
- City / Town / Village
- Road
- Railway
- Provincial Border
- Watercourse
- Waterbody
- Provincial Park
- Sukunka Project Tenure Area
- Existing Transmission Line
- Proposed Transmission Line

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

PROJECT REGION

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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DATE: 08-JAN-13	PROJECTION: UTM 10	DRAWN BY: R. CAMPBELL
FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **1.2-2**

1.2.4 Project Capacity

The Sukunka Project will initially produce 1.5 to 2.5 Million tonnes (megatonnes) per year (Mt/y) of washed coal, increasing to approximately 6 Mt/y when underground mining starts. Mine life is expected to exceed 20 years.

1.2.5 Project Purpose

XCC proposes to develop a combined open pit and underground project producing premium hard coking (or metallurgical) coal. Approximately 4 Mt/y of washed coal are expected from the open pits, and 2.7 Mt/y from the underground longwall operation. Coking coal is heated in the absence of oxygen to produce coke, a solid mass of nearly pure carbon. Coke is combined in a blast furnace with iron ore to manufacture steel.

The latest outlook for the coking coal market highlights the ongoing need for the development of brown-field and green-field projects in order to meet the projected demand growth.

Global seaborne coking coal demand is projected to increase from 227 Mt in 2011 to 378 Mt in 2020 at a compound annual growth rate (CAGR) of 5.8 percent. This compares to a historical growth rate of 6 percent over the last five years from 2006 to 2011. Demand growth is driven by increased steel production in Asian and South American countries without a sufficient supply of coking coal of suitable quality to operate modern blast furnaces. India, China and Brazil are the countries where the greatest demand growth is expected to occur.

As at October 2011, capital expenditure for the development of new capacity totalling approximately 61 Mt had been committed representing around 41 percent of the new capacity required to satisfy increased demand and replace declining production from existing operations.

As of October 2011 a further 117 Mt of brown-field and green-field capacity was uncommitted but considered likely to proceed, leaving a potential supply shortfall of 32 Mt in 2020.

The Sukunka Project, being located in western Canada, is well placed to secure marketing opportunities to the growing Asian market which continues to seek diversification from Australian supply. Coal will be transported along the CN Railway to a port facility in Prince Rupert, British Columbia (or an alternate Canadian West Coast port) for export to overseas markets. An alternative port for coal export that could serve the Sukunka Project is described in Section 2.2.11.4.

1.2.6 Benefits of the Proposed Sukunka Project

The proposed Sukunka Project will provide economic benefits over the life of the mine to individuals, local communities, First Nations, Aboriginal groups, British Columbia and Canada by way of employment, materials, contracts and taxes. The construction of the mine's infrastructure prior to operation is expected to create about 250 jobs. Maximum annual coal production from the operation is expected to be around 6 Mt of washed coal while up to 40 million bank cubic meters (MBCM) of waste rock will be excavated annually from the open pits using industry standard equipment. Bank cubic metres refers to the volume, before drilling or blasting, of material excavated during mining operations, in cubic metres.

These production rates will result in an operations workforce of about 700 employees, based on preliminary studies. Further indirect jobs are expected to arise as result of the Sukunka Project. Based on estimates from XCC's pre-feasibility study, capital costs of the proposed Sukunka Project are expected to be approximately $1.8 billion.

2 PROJECT OVERVIEW

The Sukunka Project will consist of two open pits, an underground mining operation and CHPP with associated infrastructure, access and haul routes, power transmission lines, and a coal load-out facility. Alternative haul routes, CHPP locations, load-out facilities and transmission line corridors are under consideration and detailed in Section 2.2.11.

2.1 Project Layout

As currently conceived, the proposed Sukunka Project includes the following components and activities:

- Mine Site
  - Three open pits
  - Underground longwall panels
  - Tailings disposal either co-disposed in waste rock stockpiles or in a dedicated storage facility
  - Mine haul roads within the mine property
  - Waste rock stockpiles, borrow pits, overburden and topsoil storage
  - Erosion and sediment control and water management structures
  - Explosives storage and mixing facilities
- Processing Facilities
  - CHPP
  - Coal storage
  - Process water management
- Maintenance and Administration Infrastructure
  - Construction camp and operations accommodations
  - Maintenance shop, warehouse and offices
  - Administration offices, mine offices and dry facilities
  - Infrastructure facilities and services, including a fuel tank farm, laboratories, potable water supply, sewage treatment and waste disposal facilities, and communication, safety and fire protection systems
  - Reagent handling and storage facilities

    - Electrical substation and power transmission lines and/or gas pipelines and generating facilities
- Transportation System
    - Coal load-out facility
    - Coal conveyors
    - Rail line
    - Haul route to load-out facility
    - Access road
- Relocation and Diversions
    - Talisman well and pipeline relocations
    - Creek diversions

2.2 Mine Footprint and Infrastructure

The conceptual mine layout indicates that the CHPP will be located adjacent to the Sukunka FSR, between Skeeter and Chamberlain creeks (see Figure 2.2-1). Infrastructure and services will also be located in this area and comprise the Mine Industrial Area (MIA). The primary access to the northern Sukunka project area is via the Sukunka FSR, which is planned to be upgraded during the construction phase to enable two-way traffic. Access to the southern Sukunka project area is via the two-lane Bullmoose Road.

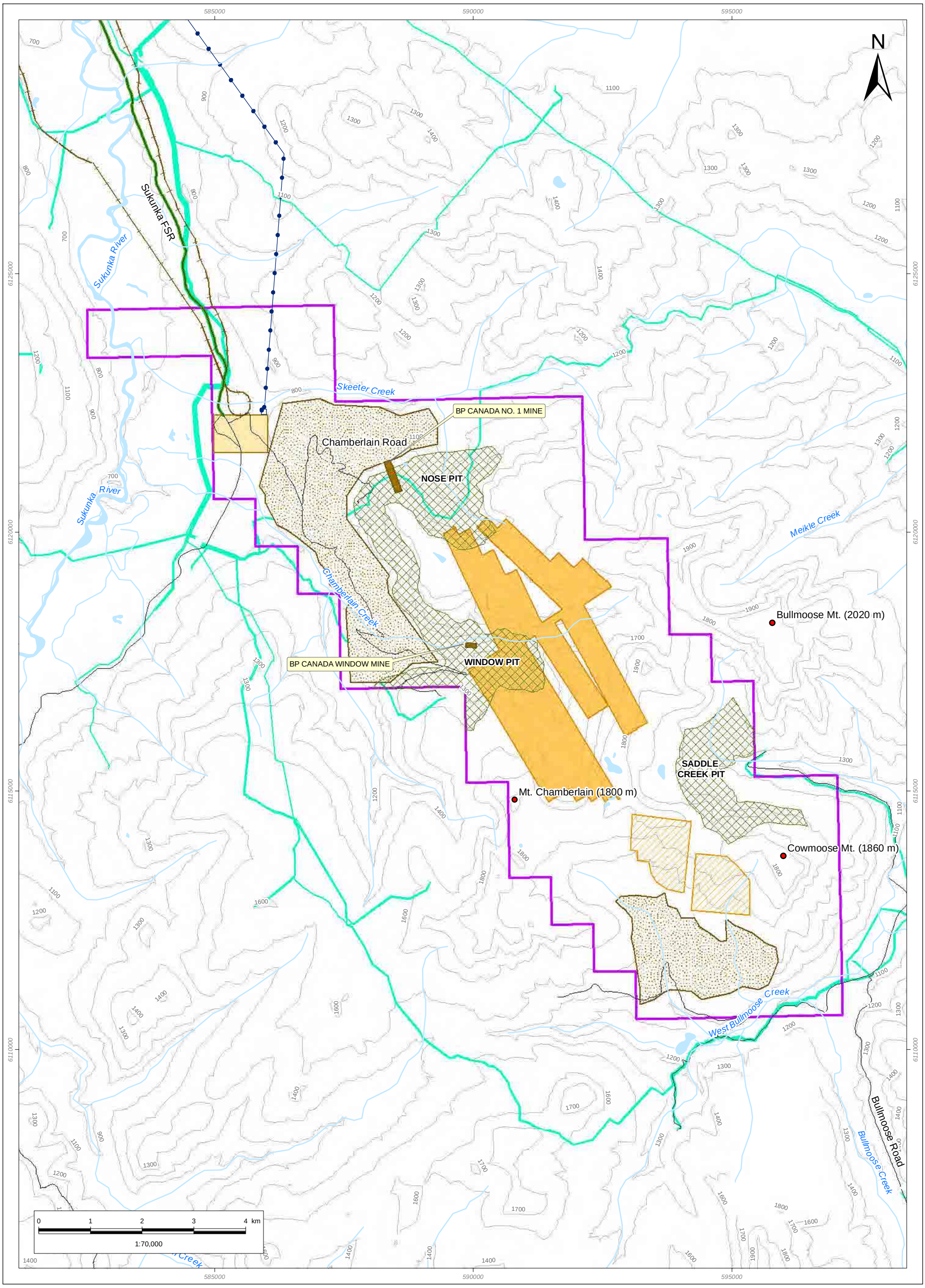
The layout of the Sukunka Project is driven largely by topography and access to the site due to the mountainous landform. Out of pit waste rock stockpiles will be situated in the valley between Skeeter and Chamberlain creeks and north of West Bullmoose Creek until in-pit backfilling is available.

Currently, the mine design has a total footprint of approximately 2,400 ha composed of open pits, coal storage and waste rock stockpiles and the MIA. The mine plan will be updated based on the ongoing assessment of potential environmental effects and on the results of exploration drilling which started in Q3 2012, and the pre-feasibility study are complete in Q2 2013. XCC is proposing several alternatives for the run-of-mine (ROM) and washed coal haul routes including variations of road and rail options.

2.2.1 Coal Pits

The Sukunka deposit has outcrops around the mid elevations of mountainous country which favours a contour mining operation. XCC undertook a concept design process to confirm that this style of operation will be feasible at Sukunka.

The process identified two discreet open pit mining areas: the Nose/Window pit area and the Saddle Creek pit area (see Figure 2.2-1). The Nose area is approximately 6 km east of the Sukunka River/Chamberlain Creek confluence, with the Window area approximately 4 km south of Nose area. The Saddle Creek pit area is approximately 5 km southeast of the Window area. This scenario is akin to “contour mining”.



Legend

- Mountain
- Existing Roads
- Contour Line (100 meter interval)
- Pipeline
- Proposed Transmission Line
- Creeks
- Rivers and Lakes
- Conceptual Open Pit
- Closed Underground Mine
- Conceptual Underground Mine
- Potential Underground Mine
- CHPP and Mine Infrastructure Area
- Conceptual Waste Dumps
- Sukunka Project Tenure Area

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

PROJECT LAYOUT

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **2.2-1**

2.2.2 Underground Longwall Panels

Access to the underground longwall coal panels will be from the Window area of the main (Nose/Window) open pit. Panels will extend northwest toward the Nose area and southeast towards the Saddle Creek pit.

2.2.3 Coal Handling and Processing Plant

The CHPP will consist of the feed, refuse and product material handling components and modular processing units. The ROM coal from the open cut will be truck dumped onto one or more stockpiles (depending on the type or quality of coal being mined), fed into a breaker or crusher and conveyed to the raw coal stockpiles. Underground ROM coal will be fed via conveyor from the mine entrance to the raw coal stockpiles. From the raw coal stockpile coal will be fed to the CHPP via a surge bin.

Product coal will be stacked while coarse rejects will be fed to a bin for truck haulage into the waste rock stockpiles. Fine rejects will either be pumped to a tailings emplacement or thickened to enable co-disposal with coarse rejects into the waste rock stockpiles. Dust suppression will be installed at each stage of the materials-handling cycle based on dust modelling and environmental and operational requirements.

Initial coal quality testing has indicated that the CHPP is likely to consist of a two-stage sized dense medium cyclone, spirals/teeter bed mid-circuit and fines flotation which will yield a primary coking coal product and a secondary PCI/thermal product. In order to advance the CHPP design, core samples and washability tests will be collected during the 2012 exploration program. The proposed CHPP will have a 24,000 tonnes per day (t/d) (1,200 tonners per hour [t/h] throughput) ROM coal capacity to produce approximately 6 Mt/y of washed coal.

The Sukunka CHPP will initially be required to wash 2 to 3 Mt/y ROM coal, increasing up to around 7.5 Mt/y when underground mining commences. This will initially produce 1.5 to 2.5 Mt/y of washed coal, increasing up to 6 Mt/y. Thus, initial design will need to take into account the expansion capability of the CHPP. This will mean consideration of CHPP space, stockpile expansion room and rail load-out capacity. The design will also take into account capacity which may be required to process coal from neighbouring mines, such as XCC's potentially proposed Suska Project. This capacity will also be evaluated as an alternative in the environmental assessment of both projects.

2.2.4 Explosives Plant

A bulk explosives mix plant (or reload facility) will be constructed on site to supply bulk explosives to the mining operation. The facility will likely contain an ammonium nitrate emulsion silo, nitrate prill silos, garage/wash bay and office. There will also be a site designated for storage of powder and fuse magazines. The bulk explosives mix plant will be located to meet the requirements of the explosives permit and the quantity-distance criteria under Natural Resources Canada (NRCan) explosives regulations.

2.2.5 Soils and Waste Management

Topsoil and till will be removed and placed in storage stockpiles for use during reclamation. Erosion and sedimentation control structures such as diversion ditches, berms and sediment basins will be put in place prior to disturbance of the landscape. The stockpiles will be vegetated with appropriate fertiliser and seed to minimize weed infestation, maintain soil organic matter levels and maximize the vegetative cover. A soil survey will be completed to inform the soil management plan and identify suitable soils for use in reclamation. Any shortfalls in topsoil material required for reclamation may be met with suitable unconsolidated overburden materials, which will be identified using data collected during the geotechnical site investigations.

2.2.5.1 Waste Rock Stockpiles

An assessment of the spoil (removed overburden) in the Sukunka project area will be conducted during the summer environmental baseline studies. Contour dumping is currently anticipated.

The total waste rock volume to be excavated over the 20+ year life of the mine is estimated to be about 725 MBCM. Annual waste excavation will increase over the initial years of mining up to about 40 MBCM and will be stored in four to six stockpiles around the pits. A geotechnical study will determine the final design parameters. Surface water around the stockpiles will be controlled using ditches, berms or related water management infrastructure. Geotechnical studies will determine strata control measures to be implemented to ensure stable waste emplacements. These may range from surface preparation and selective material placement in the stockpiles to pore pressure relief drainage or other appropriate measures. A preliminary layout is shown on Figure 2.2-1. The exact location of the waste rock stockpiles will be revised as the mine plans are developed through the pre-feasibility and environmental assessment studies.

2.2.5.2 Tailing Storage Facility

Co-disposal of coarse and fine rejects will be advantageous at Sukunka due to the terrain. Washability testing will be used to assess whether this strategy is suitable for the Sukunka coal types. If required, a tailings storage facility will be constructed to contain fine rejects from the CHPP. The quality and quantity of the potential groundwater seepage from a proposed tailings storage facility will be investigated to estimate potential effects during development, operation and closure.

2.2.6 Water Management

A comprehensive water balance model will be developed from baseline studies including hydrological data, water quality data, terrain mapping and hydrogeology to manage processed and potable water.

Out-of-pit waste dumps will be situated along valley side hills adjacent to the mining area until in-pit backhauling is available. The catchment of the mining area will be minimized to reduce environmental impacts and to ensure that a sustainable water balance is established.

2.2.6.1 Water Supply

There is no pipeline water supply available in the Sukunka project area. The water supply at the site will be established as a self-contained system. Groundwater bores for water supply will require modeling and measurement to demonstrate minimal impacts to downstream catchments.

Water supply is likely to be sourced from harnessing surface run-off on site. The average rainfall is approximately 800 millimetres per year (mm/yr), some of which falls as snow. If required, approval for additional surface water will be sought under current legislation to extract up to 10 percent of the stream flows during high flow periods of the spring melt from Chamberlain Creek, which flows in a northwesterly direction; Skeeter Creek, which flows west; or directly from the Sukunka River, 2 km west of the MIA. Potential withdrawal levels will be determined from a groundwater study. Storage capacities will need to be calculated during pre-feasibility using baseline study data.

2.2.6.2 Water Storage

Runoff water from surrounding mountain/valley areas will be captured and stored in dams created in natural gully formations or constructed adjacent to the MIA. Storage capacity will need to be calculated during pre-feasibility using baseline study data.

2.2.6.3 Sediment Pond Facility Locations

Water which has been in contact with the active mining area will be collected and stored to allow sediments to settle out and allow for the release of clean water back into the environment. Analysis of ground water quality and overburden will be evaluated as part of the pre-feasibility program to determine the treatment required for mine contact water. Sediment storage and control will be required for the waste rock stockpiles, CHPP facilities, coal reject piles and rail load-out site runoff.

Construction of the embankment structures for the sedimentation ponds will be carried out using suitable overburden material from the upper benches of the pits. Additional site investigation and more detailed engineering evaluations are required to support the design and to meet regulatory requirements.

2.2.6.4 Creek Diversion

The conceptual pit layout requires the potential diversion of a Skeeter Creek tributary around the Nose pit, the diversion of a Chamberlain Creek tributary around the Window pit and the diversion of a Bullmoose Creek tributary around the east side of the Saddle Creek pit. Following exploration drilling in 2012, a detailed assessment of the creek diversions will occur. The potential impacts of these diversions will be assessed and will inform the mine design process.

2.2.7 Access and Haul Routes

The Sukunka Project requires the transportation of ROM coal to the CHPP and washed coal to a rail load-out facility from where it is planned to be transported by train to a port in Prince Rupert. Coal haulage options by road, conveyor and rail have been identified during preliminary studies and a

preferred system will be determined during pre-feasibility studies. An alternative port for coal export that could serve the Sukunka Project is described in Section 2.2.11.4.

2.2.7.1 Access Road for Current Access

The northern end of the property is located 50 km south of Chetwynd and can be accessed via Highway 29 (Don Phillips Way) south for 26 km and the Sukunka FSR, south for 33 km. From there, Chamberlain Road provides further access into the proposed mine site. The Sukunka FSR is currently a well maintained, all-weather, good quality gravel road allowing for bi-directional traffic flow using pull out points for incoming vehicles to stop, allowing heavy vehicles heading towards the highway to pass safely. The road is suited to four-wheel-drive vehicles, forestry trucks and other industrial traffic.

The road is controlled by a road users group which consists of companies from various industries as well as the BC Ministry of Forests, Lands and Natural Resource Operations. The road user's committee is responsible for and committed to the safe operation of the Sukunka FSR to km 39.

A system of radio signalling of vehicles positions based on kilometre markers is utilized on the Sukunka FSR, as agreed on by the road users group. However, recreational users often use the road without a radio which will present a significant hazard as the volume of traffic increases with the mine development. Sections of the road are controlled by several parties over its length. Under current legislation these "owners" are responsible for the maintenance and safe operation of the road. Upgrading of the road to allow two-way traffic flows and eliminate the need for radio control will be considered during the project development, environmental assessment and pre-feasibility studies.

The southern area of the property is located 60 km south of Chetwynd and can be accessed via Highway 29 southeast for 72 km, Bullmoose Road southwest for 15 km and northwest along petroleum development road (PDR) #334 for 5 km. Upgrades to old petroleum development roads may be required to provide safe access between the northern and southern areas of the property.

2.2.7.2 Mine Site Haul Routes

A mine site haulage road will be developed along the flanks of the pits, and to the east of Chamberlain Creek, to provide access for mining and support equipment between the pit operations and the CHPP. Other haul routes will be constructed within the active mining area as required during operation.

2.2.7.3 Sukunka Valley Rail Route and Load-Out

A potential rail loop and washed coal load-out will be located adjacent to the CHPP (see Figure 2.2-1). The rail loop will be sized to handle a car unit train that is potentially up to 220 units and may be approximately 4,274 metres (m) in length. The rail line will run north from the CHPP site along the Sukunka River Valley to connect with the existing CN rail line near the town of Chetwynd. The total length of new track required would be approximately 45 km. At peak production, about seven trains per week will be required to transport the washed coal off site.

2.2.8 Power and Transmission

2.2.8.1 Power

Electric power is not available at the proposed MIA site. The nearest potential connection points to existing power lines are to the south east of the Sukunka Project along the Bullmoose Mine Road, or to the north in the Sukunka River valley. It is not known whether this infrastructure will support the mine power requirements, although a preliminary study is currently underway to evaluate the most viable concept.

Electric power is supplied by BC Hydro hydroelectric which has multiple generating facilities along the Peace River, north of Chetwynd, which combined, produce more than 3,000 megawatts (MW) of electric power for use throughout the region. Current supply capacity in the area is stretched and there is a significant group of major industrial projects that require additional capacity in the same timeframe as the Sukunka Project. Alternative power sources that would serve the Sukunka Project are described in Section 2.2.11.3.

2.2.8.2 Transmission

Two area reinforcement projects are planned by BC Hydro. The projects are the Dawson-Chetwynd area transmission project, scheduled for April 2014, and the GMS Dawson area transmission project, tentatively scheduled for October 2015. These projects will involve connecting the Peace River 138 kilovolts (kV) system to the 230 kV system at Sundance Substation in order to reinforce the Peace River area.

An option for power from BC Hydro is being investigated that would involve upgrading the existing 230 kV Sukunka substation and connecting to a new XCC owned 230–69 kV substation with an approximately 15 km, 230 kV transmission line. From here an approximately 17 km, 69 kV transmission line would be constructed to a 69–4.16/13.8 kV substation at site (see Figure 2.2-1). Both the 230 and 69 kV transmission lines would require new rights-of-way (ROWs). Alternative transmission line routes that could serve the Sukunka Project are described in Section 2.2.11.3.

2.2.9 Administration and Maintenance Infrastructure

The MIA will contain the administrative and service facilities necessary for operating the mine. This will include a maintenance shop, warehouse, administrative and mine offices, dry facilities, truck wash bay, fuel storage, laboratories, waste and water treatment plants and parking for mine vehicles and employees. The proposed site was selected for its moderate topography and proximity to the mining operations and CHPP.

2.2.9.1 Accommodations

Construction Camp

The distance from Chetwynd to the Sukunka project site and the restrictive weather in the winter months has led to the inclusion of a full camp facility positioned near the MIA for approximately 200 permanent personnel.

Accommodations during Operations

XCC will work with the local community and municipal governments to ensure that sustainable solutions to Sukunka project accommodation requirements are developed. No housing costs have been forecast for the Sukunka Project as developer-funded accommodation will be sought. XCC has been contacted by several developers interested in the Chetwynd housing market and who, in addition to conventional dwellings, are proposing innovative concepts for resource based accommodation. These include:

- Apartments designed to be converted from single person, studio units used during a project's construction phase to family style, two and three bedroom units during the operations phase
- Modular portable motel complexes designed to be set up as short term housing solutions for a three- to five-year period
- Smaller, modular cottage style homes and duplexes in planned neighbourhoods

An adequate amount of contractor accommodation at the camp facility will be maintained for shutdown periods or other peak short term activity.

2.2.9.2 Fuel Tank Farm

Regional bulk fuel supply is available via tanker. Onsite storage and dispensing facilities will be part of the MIA, and will be situated on a large gravelled area for easy access. The tanks will be double walled tanks underlain by an impermeable barrier to prevent fuel spills. Concrete barriers or alternative structures will protect the storage tanks from potential vehicle impacts.

2.2.9.3 Laboratories

For quality control, a coal testing laboratory will be included in the MIA to receive and analyze coal samples.

2.2.9.4 Potable Water Supply

Potable water for cooking and drinking will be supplied by truck from Chetwynd to the camp site or from on-site water treatment facilities.

2.2.9.5 Sewage Treatment

Sewage will be treated in a common treatment facility that will be used for the camp, CHPP and mine operations sewage streams. The treatment facilities will be part of the MIA. Preliminary design of the system will be developed in the pre-feasibility study.

2.2.9.6 Waste Disposal Facilities

There are no industrial waste facilities located in the vicinity of the site. Industrial wastes will need to be removed by licensed contractors. Waste collection facilities will be part of the MIA.

2.2.9.7 Communication, Safety and Fire Protection Systems

A communications system will be installed on site to provide radio access between operators and staff. As part of the water supply system a dedicated line and storage facility will be setup to maintain the fire protection system.

2.2.10 Closure and Reclamation

A conceptual Reclamation Plan will be developed using XCC's Rehabilitation Management Control Framework and Rehabilitation Management Protocol and presented in the environmental assessment application and in the future application for the Mine and *Environmental Management Act* Permit according to the *Guide to Processing a Mine Project Application under the British Columbia Mines Act* (MEMPR 2009). Reclamation will proceed based on identified end land use objectives, and will include restoring land for wildlife use and an ecosystem based approach to re-establish the vegetation. Salvage of suitable soil will be completed according to a Soil Salvage and Handling Plan, and soil will be replaced on all Sukunka project features to return the land to equivalent capability.

Reclamation activities will include interim reclamation for erosion control and invasive weed management, progressive reclamation of features during operations, including planning for the case of premature closure of the mine, and final decommissioning and reclamation of the site. Reclamation will take an adaptive approach by including research and monitoring throughout the operational to post-closure period and will follow land management and conservation plans in place at the time.

2.2.10.1 Exploration Reclamation Planning

The proposed exploration reclamation plan is:

- Trail disturbance will be completed on accesses to discourage ungulate, predator and motorized traffic
- Tree planting will be completed prior to the addition of any shrubs so that they are not outcompeted
- Shrub planting will be completed once the trees are sufficiently established

There has been general positive support from the First Nations that have been consulted on this approach to the reclamation planning.

2.2.10.2 Tailing Storage Facility Reclamation

Reject and tailings placement areas will be left in a geotechnically stable configuration and capped with a suitable growing medium. Following this reclamation will be conducted as per the Reclamation Plan.

2.2.10.3 Pit and Waste Rock Stockpile Reclamation

It is expected that the environmental risk around the waste rock stockpiles will not be significant or can be managed using selective placement of problematic waste materials deep into the stockpile. Regionally, there are existing issues around selenium and acid rock drainage (ARD). These issues will be fully considered and assessed in the environmental assessment and accounted for when developing an appropriate waste rock management plan.

Progressive reclamation of the pits and waste rock stockpiles is planned. Contour dumping will be used for the stockpiles, with designs based on geotechnical analysis to ensure the integrity of the final landform. The open pit waste rock stockpiles will be created along the slopes of the valley between Skeeter and Chamberlain creeks. For final reclamation, waste rock stockpiles will be re-contoured to blend with adjacent topography and allow animal movement. Stockpile surfaces will then be capped with soil salvaged during construction and stockpiled on site, and re-vegetated. Restoration of drainage around and through the stockpiles will depend on water quality objectives and waste rock chemistry, but is anticipated that the reclamation plan will include the restoration of pre-disturbance drainage to the extent feasible on the post-mine topography.

2.2.10.4 Final Pit Lake Design

Given the location of the proposed open pit operations, it is not probable that a final lake will be created by mining. However, if there is a final pit void, because there is a positive water balance in the region (precipitation greater than evaporation), a final pit lake will eventuate post closure. In that case there will be modeling of the dynamics of the pit lake to understand and manage any turnover of thermal stratification of the lake to ensure that releases of oxygen-poor water do not occur and that appropriate mitigations are incorporated into the final design. Should there be a potential for a final pit lake it will be considered as part of the effects assessment.

2.2.11 Potential Project Alternatives

Exploration activities associated with the Sukunka Project are still ongoing and therefore the mine and haul routes design and engineering aspects of project development are not complete. XCC is considering various options for coal haulage which include truck, rail and conveyor. In order to accommodate the uncertainty, the environmental assessment will fully consider and evaluate the environmental effects of all potential alternatives. The environmental assessment will be used to support the Sukunka project design and development to reduce or avoid potential environmental impacts.

2.2.11.1 Central Coal Handling and Processing Facility

Potential exists for a central CHPP and coal load-out facility to be shared between the Sukunka and Suska projects. A proposed location for this alternative CHPP is approximately 15 km north of the Sukunka MIA and about 28 km east of Suska, as shown on Figure 2.2-2. A decision on the development of a central processing facility for the two projects will be made during the Feasibility Study.

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6130000

Hasler FSR
Brazion Creek
Blind Creek
Boulder Creek
Sukunka River
Sukunka Falls Park
Burnt River
North Burnt River
Rocky Creek
Sukunka FSR

N

0 1 2 3 4 5 km
1:80,000

Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Contour Line (100 meter interval)
- Potential Central Processing Facility
- Sukunka Project Tenure Area
- Suska Project Tenure Area
- Provincial Park
- Rail Sukunka Valley
- Central CHPP Road Option
- Central CHPP Conveyor Option

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

CENTRAL PROCESSING FACILITY

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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DATE: 04-JAN-13	PROJECTION: UTM 10	DRAWN BY: R. CAMPBELL
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PREPARED BY: Stantec

PREPARED FOR: Xstrata Coal

FIGURE NO: **2.2-2**

2.2.11.2 Haul Route and Load-Out Options

There are several coal haulage and load-out options available to the Sukunka Project. These options include:

- Construction of a rail line to a CHPP located at the Sukunka mine
- Transport of coal to a CHPP or rail load-out approximately 15 km north in the Sukunka valley via rail, conveyor or road truck
- Transport of coal to a rail load-out at Chetwynd by road or rail

In the case of a central CHPP option for both the Sukunka and Suska projects, raw coal would be transported to the central CHPP by rail, conveyor or road truck. Studies will be undertaken to understand the impact on cost, environment and community of these options to enable final selection.

2.2.11.3 Power and Transmission

Alternative power sources for the Sukunka Project include a line joining the Sukunka Project to an existing BC Hydro line which runs southeast of the property along the Bullmoose road to the main 230 kV line between Chetwynd and Tumbler Ridge. This would involve extending an approximately 20 km connecting line, which currently powers gas infrastructure in the Sukunka valley.

Another potential alternative power source for the Sukunka Project is for XCC to connect to the 138 kV Chetwynd Substation. This would involve an approximately 40 km, 138 kV transmission line from the Chetwynd Substation to a new substation at the central CHPP, with an approximately 17 km, 69 kV transmission line continuing on to the Sukunka MIA. The total length of the 138 kV transmission line is not anticipated to be greater than 57 km with some that may be constructed on new ROWs. On site gas powered generation is also an option.

The choice will be based on cost, impact to environment and community and BC Hydro capacity along the various lines.

2.2.11.4 Coal Shipping

Coal haulage options by road, conveyor and rail have been identified during preliminary studies. It was determined that the coal will transported by existing rail to a port facility. Although the current preferred option is to ship the washed coal to market from Prince Rupert, the alternative of shipping from the Port of Vancouver, in Vancouver, British Columbia will also be considered and assessed.

2.3 Planned Project Activities

2.3.1 Construction Phase

Upon receipt of all regulatory approvals and permits, preparations for the construction phase of the Sukunka Project will include the following main steps:

- Mine Site
  - Selection of appropriate contractors to lead individual construction activities
  - Safety and environmental procedures implemented
  - Ground transportation of people, equipment and supplies
  - Site clearing, grading, grubbing and stream diversion
  - Relocation of three gas wells and associated pipelines
  - Construction of sediment control and water management facilities
  - Set up of mine infrastructure (camp, power, water supply, office, equipment repair)
  - Set up of explosives facility
  - Aboriginal worker hiring and training programs
  - Development of haul road network and preparation of open pits
  - Construction of CHPP
- Coal Transportation System
  - Construction of rail loop and load-out related facilities
  - Construction of coal transport facilities from the mine site to the rail load-out facilities

2.3.2 Operation Phase

During operation of the Sukunka Project, the following key activities will occur:

- Training of construction workers, First Nations and Aboriginal workers (on initial hiring and ongoing)
- Ground transportation of people, equipment and supplies
- Mining, handling and processing of coal
- Deposition of mine rock in rock stockpiles and in-pit placement
- Deposition of coal rejects in mine rock stockpiles
- Operation of sediment control and water management facilities
- Ongoing reclamation of disturbed areas
- Environmental monitoring, supervision and surveillance
- Establishment of the coal transportation system
- Loading of coal into rail cars (including implementation of dust control measures)
- Transport of coal by rail from the mine site to Prince Rupert or an alternative port location

2.3.2.1 Mining

Open Pit Mining

The Sukunka deposit outcrops around many parts of the tenure which makes it suitable for contour mining. Excavation will be carried out using conventional open pit mining equipment. Mining will be conducted in two discrete areas, the Nose and Window pit area in the northern part of the property and the Saddle Creek area in the south east. The amount of waste rock to be removed over the life of the open pit operation will be approximately 725 MBCM with the maximum annual extraction rate being around 40 MBCM. Extraction rates for the open pit are based on a 12.4:1 ROM strip ratio. This strip ratio is based on current knowledge, and will be updated with the results of on-going exploration. ROM coal production will initially be in the range of 2 to 3 Mt/y, increasing to approximately 7.5 Mt/y when underground mining commences.

A bulk explosive storage and mixing plant will supply bulk explosives for the open pit mining operation. The plant will be as described in Section 2.2.4. A fleet of mixing trucks will supply various explosives products from the plant to the pit during explosive loading operations.

Underground Mining

The proposed underground mining will be accessed from around the Chamberlain Creek area from the highwall of the open cut. A series of longwall coal panels will be developed extending northeast to the Nose area and southwest towards the Saddle Creek open pit.

2.3.2.2 Coal Handling and Processing

The Sukunka CHPP will be required to process up to approximately 7.5 Mt/y ROM coal to produce around 6 Mt/y of washed coal. In addition the CHPP may be required to process coal sourced from Suska and other regional mines as needed. Segregation of coal types will be required in order to maximize product value and frequent changes to the type of coal being mined can be expected. The number of excavators and steeply dipping seams will also lead to inconsistent deliveries and multiple coal types being mined both sequentially and simultaneously at times. Therefore a system of ROM storage and selective reclamation will be required. At this stage a ROM pad with loader re-handle is being considered and this will work in concert with raw and product coal stacking and reclaiming systems.

The CHPP site will have the space to expand as additional deposits are defined and developed. This will include CHPP space, stockpile expansion room, coal transport capacity, and rail load-out capacity.

2.3.2.3 Coal Handling and Processing Plant

The proposed CHPP design for Sukunka is a conventional coal plant with full washing including fine coal flotation. Alternative processes will be evaluated during the pre-feasibility stage with the emphasis being on minimizing fine coal generation and ensuring that hard coking product is able to be separated from other coal types.

2.3.2.4 Coal Drying

Thermal drying will be required as indicated by previous CHPP design studies for the deposit. Pre-feasibility test work will include analysis of the coal to assess whether other coal drying techniques will be effective or whether alternative coal and waste separation methods can be used to reduce the reliance on product coal drying.

2.3.2.5 Washed Coal Storage Facilities

The individual washed coal products will be stockpiled separately using a series of stacker conveyors and then reclaimed for loading into rail cars at the load-out. It is expected that the washed coking coal and PCI stockpiles would have a maximum capacity of about 100,000 t each. As an alternative to washed coal stockpiles large capacity silos may be also considered.

The coarse rejects will be stockpiled separately and then backhauled by mining trucks for disposal.

2.3.3 Decommissioning Phase

The life of the Sukunka Project is expected to be a minimum of 20 years. Plans for the decommissioning and closure of the mine will be presented in the Application/EIS. At the end of the Sukunka Project, the decommissioning plan will be implemented. All decommissioning activities will be conducted in accordance with the applicable regulations at that time, including land management and conservations plans.

2.4 Waste Management Plan

2.4.1 Atmospheric Discharge

Mining will release fugitive dust and combustion emissions to the atmosphere. The air contaminant of greatest concern associated with coal mining is usually particulate matter (PM), which is defined in terms of size fractions. Particulate of all size classes is referred to as total suspended particulate (TSP), particulate less than 10 micrometres (µm) is PM_{10}, and particulate less than 2.5 µm is $PM_{2.5}$. Dustfall has the potential to negatively impact water bodies by increasing the sediment load and also causes accumulation of dust that can be a nuisance.

Coal mining is also a source of greenhouse gas emissions. The primary greenhouse gas (GHG) source will be fuel combustion by mobile equipment (e.g. haul trucks, locomotives, heavy equipment like drills and loaders and light duty vehicles). Other sources of GHGs may potentially include electricity consumption at the mine and load out and a thermal coal dryer. A full alternatives analysis for the coal transportation routes, power sources and coal dryer will be included in the prefeasibility study.

In order to manage potential impacts to air quality and minimize any effects to the environment and people XCC will potentially use:

- Water sprays on coal stockpiles
- Latex binder on rail cars

- Dust control on access and haul roads
- Air pollution control equipment (e.g., baghouses) on crusher and coal processing facilities

2.4.2 Water Treatment

Based on the current mine plan, mine contact water generated by the operation will be used or recycled through the coal washing process.

In addition, it is estimated that water treatment capacity of over 2 million litres (megalitres) per day (ML/d) may be required at steady state open cut and plant operations. A combination of clean water diversions, sedimentation ponds, and perhaps active treatment will be used. Limiting the disturbance area will be a key design requirement for the open cut. Clean water will be diverted around disturbance areas and mine pits. Any mine contact water will be collected in water management facilities for treatment or re-use prior to discharge in the environment. Current details of the water management involving sedimentation ponds are discussed in Section 2.2.6. In preparation for the Application/EIS, waste rock (overburden) and coarse rejects chemistry will be characterized, baseline surface and groundwater quality will be evaluated and predictions of water quality in the receiving environment will be made to determine whether specific contact water treatment technologies are required, and what the treatment objectives will be. Information from the aquatic biota studies will be used to determine whether generic British Columbia water quality guidelines or site specific objectives will be used as performance objectives.

Finally, the site is located in an active seismic region and therefore impacts to downdip infrastructure will be assessed in terms of catastrophic failure of constructed water management structures. Water storage facilities will be designed in line with the Canadian Dam Association (CDA) and International Commission on Large Dams (ICOLD) guidelines as required.

2.4.3 Liquid Discharge

A key design consideration is for discharge of contact water offsite following winter. The snow thaws and generally runs off the slopes over a one- to two-month period between late March and late May (freshet); this is a period of peak stream flows in the catchment area. Therefore dam overflow design and the location and design of the open cut stockpiles will maximize the amount of clean water runoff bypassing the operations during freshet. Contact water (runoff from waste rock stockpiles and other disturbed areas and pit dewatering) will be treated before being discharged to area streams by settling in sedimentation ponds (locations and sizing to be determined during pre-feasibility studies).

Design compliance with the appropriate regulations will be a priority going into the next phase of study.

2.4.4 Solid Waste Management

General and recyclable waste materials will be taken off-site for disposal either at a licensed land fill or appropriate recycling centre. Fine tailings will be co-disposed with coarse reject in the waste rock stockpiles or transported to dedicated storage facilities on site.

2.4.5 Hazardous Waste Management

It is not anticipated that any hazardous waste will be produced by the Sukunka Project. If any is produced it will be disposed of off-site at a licensed waste management facility.

2.4.6 Mine Waste Management

Soil, waste rock and tailings are wastes that will be produced by the Sukunka Project. Management of these wastes is discussed in Section 2.2.5 of this project description.

3 PROJECT PLANNING AND SCHEDULING

3.1 Project Schedule

Table 3.1-1 Project Schedule

Phase		Start Date	Completion Date
Environmental Baseline Studies		Q1. 2012	Q2. 2013
Exploration		Q4. 2012	Q4. 2013
Environmental Assessment Process	PD Submission and Review	Q1. 2013	Q1. 2013
	EAC/EIS Submission and Review	Q3. 2014	Q1. 2015
	EA Approval		Q1. 2015
Permitting and EMPs		Q4. 2013	Q2. 2015
Construction		Q3. 2015	Q4. 2016
Operation		Q4. 2016	Q4. 2038
Reclamation		Q1. 2018	Q4. 2043
Decommissioning / Closure		Q1. 2038	Q4. 2043

Environmental baseline studies of the components described in Section 4 will include desktop, field and laboratory test work summarized in technical data reports. The study areas will include the Sukunka tenure boundary which will contain the mining operations and infrastructure, haulage option corridors and additional “far field” monitoring sites in the region. An approval for a Notice of Work was received in November 2012. Exploration drilling to delineate the resources and test coal samples commenced in December 2012, and will be carried out in phases. It is anticipated that the submission of the Application/EIS to the BC EAO and the CEA Agency will occur in Q3 2014. Mine permitting is intended to occur concurrently with the environmental assessment process as much as possible.

Construction of the MIA, CHPP, power supply, transport network, and the rail load-out is scheduled to commence in Q3 2015 upon receipt of the necessary mining permits. A camp will be setup on site

to house the crews during construction and operations. Operations, commencing with excavating and stockpiling topsoil and overburden material for further reclamation, will start in in Q4 2016. Concurrent reclamation activities of pits, waste rock stockpiles and ditches will occur throughout the life of mine, as is currently modelled. Decommissioning of facilities and closure activities will follow completion of the mine.

4 PROJECT SETTING

4.1 Geologic Setting

4.1.1 Regional Geology

The northern Inner Foothills Belt, referred to as the Peace River coal District, extends 300 km between the Kakwa and Sikanni Chief rivers in northeast British Columbia. Major Lower Cretaceous coal deposits occur in the Gething Formation of the Bullhead Group and in the Gates Formation of the Fort St. John Group (Figure 4.1-1). The main development of coal beds in the Gething Formation is between Wolverine and Halfway rivers. North of Sukunka River, these beds were intermittently exploited on a relatively small scale between 1908 and the 1960s, and they now constitute the primary coal exploration target in the northern half of the district.

The Gething Formation is an interstratified mainly non-marine, fluvial-deltaic sequence of sandstone, siltstone, mudstone, conglomerate and coal, deposited over the fluvial-alluvial fan strata of the Cadomin Formation. In the Carbon Creek Coalfield, the Gething Formation attains a thickness of at least 1,036 m, and more than 100 coal beds, ranging in thickness from a few centimetres to 43 m have been reported within it. Duff and Gilchrist (1986) reported the existence of “several extensive 2 m seams” within the Gething Formation between the Alberta border and Sukunka River, and at least 20 coal beds that exceed 1 m in thickness northward from Sukunka River.

In the southern half of the Peace River Coal District the coal beds within the Gates Formation constitute the primary exploration target. Recent mine developments and coal exploration activities have focused on these coals. The Gates Formation is an 80 to 280 m thick interstratified sequence of mainly non-marine sandstone, conglomerate, coal, shale and mudstone. It is separated from the underlying Gething Formation by interstratified fine grained marine deposits assigned to the Moosebar Formation. Within the formation, eleven coal beds that have a maximum thickness of about 10 m and an aggregate thickness of up to 46 m have been reported. Four or five laterally extensive seams, ranging in thickness from 5 to 10 m, are common between Kakwa and Sukunka rivers. The Peace River Arch apparently controlled the northern extent of alluvial-deltaic environments where the major coal beds originated.

Although several coal beds occur below the Cadomin Formation in the Minnes Group, and above the Gates Formation in the Boulder Creek Formation, they are generally thin and appear to have limited areal extent. Significant coal beds in the Gething Formation extend northward to Sikanni Chief River; however, commercially important coal beds may be limited to the area south of Halfway River.

600000

6125000

N

Boulder Creek

Mt. Suprenant (1420 m)

Highway 29

Rocky Creek

Sukunka FSR

Skeeter Creek

Chamberlain Creek

Sukunka River

Bullmoose Mt. (2020 m)

Bullmoose Road

Mt. Chamberlain (1800 m)

Cowmoose Mt. (1860 m)

Windfall Creek

West Bullmoose Creek

Mt. Spieker (1960 m)

Bullmoose Creek

0 1 2 3 4 5 km

1:100,000

600000

6125000

Legend

- Mountain
- Road
- Watercourse
- Provincial Parks
- Sukunka Project Tenure Area

Geological Formation

- Cadomin Formation
- Gates Formation
- Gething Formation
- Moosebar Formation

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

REGIONAL GEOLOGY

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.1-1**

Structural deformation of the Cretaceous sequence in the district is characterized by en echelon, northwest-plunging anticlines and synclines, and by southwest-dipping low and medium angle thrust faults, which have repeatedly brought coal measures to the surface. Locally, the tectonic activity has resulted in a thickening of coal beds. At a mesoscopic scale, fault and fold structures can be complex and mining operations can be significantly complicated.

Although the rank of coals that occur in the Gething and Gates Formations ranges from high volatile A to low volatile bituminous, most of the resource is classified as medium volatile bituminous. In some areas mean maximum vitrinite reflectance values exceed 1.5 percent, indicating a rank of semi-anthracite. The coals commonly have sulphur contents of less than 1 percent wt and excellent coking properties. Locally the upper seam in the Gething Formation can have sulphur contents up to about 1.5 percent. Coals within both formations have similar characteristics, and those in the Gates Formation are similar to those of the Luscar Group in the southern Inner Foothills.

Coal ranks, as in the southern Inner Foothills, were mainly established prior to major deformation, and thrusting has not had a significant impact on rank. Weathering of coals that occurs near surface has rendered a relatively small portion of the resource unsuitable for carbonization; these oxidized coals are generally considered to be thermal coals.

4.1.2 Site Geology

With consideration to the amount of exploration of this deposit, which has provided a very detailed understanding of the nature of its structural geology, and the fact that the Bullmoose deposit is specifically referred to in Geological Survey of Canada Paper 88-21 *A Standardized Coal Resource/Reserve Reporting System for Canada* (Ministry of Energy, Mines and Resources Canada 1989), the Sukunka-Bullmoose deposit is classified as “Moderate” Geology Type.

The Sukunka Project lies within the elongate, disturbed Foothills sedimentary belt of northeastern British Columbia. The coal licenses are underlain by the transgressive/regressive Lower Cretaceous Bullhead and Fort St. John Groups that consist of fluviodeltaic and marine terrigenous clastic sediments that have a maximum composite thickness, excluding those of the Minnes Group, of 1,100 m. The oldest lithologies exposed within the property belong to the Minnes Group. That unit is overlain by the Cadomin, Gething, Moosebar, Gates, Hulcross and Boulder Creek Formations.

4.2 Environmental Setting

The Sukunka property is located in the Rocky Mountain Inner Foothills region and is characterized by relatively low, rounded, northwest-southeast trending ridges and valleys, ranging from approximately 1,000 to 2,000 m in elevation relief. The property is predominantly forested with stands of lodgepole pine and occasional spruce, with stands of balsam poplar occurring in the lower and wetter areas of the property.

4.2.1 Aquatic Environment

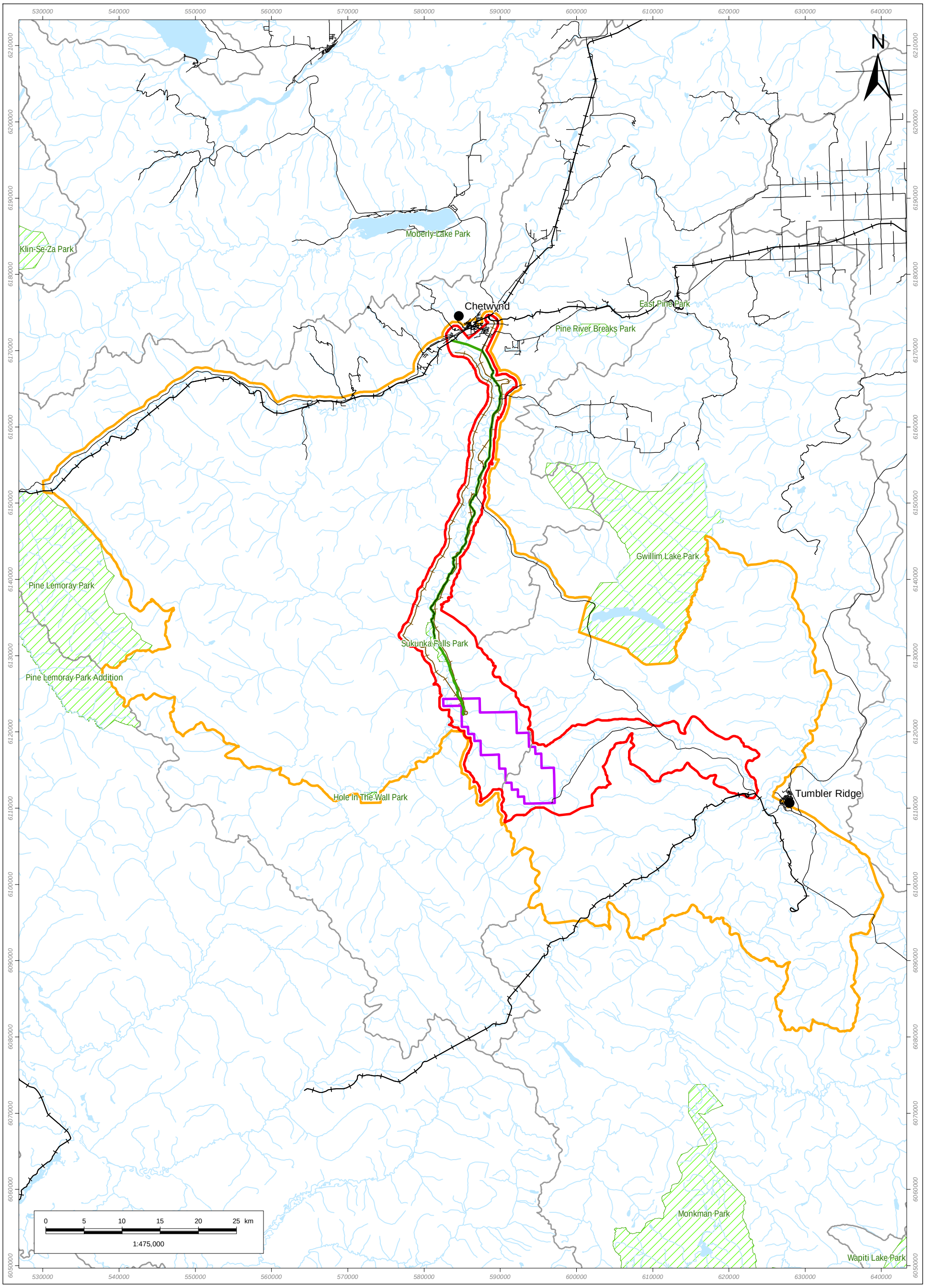
4.2.1.1 Topography and Surface Drainage Features

The Sukunka project area lies almost entirely within the Chamberlain Creek, Skeeter Creek and Bullmoose Creek watersheds within the northern Rocky Mountains in northeastern British Columbia. Chamberlain Creek and Skeeter Creek both flow in a northwesterly direction and discharge into the Sukunka River. Bullmoose Creek flows in a northeasterly direction and discharges into the Wolverine River. Both the Sukunka and Wolverine rivers eventually discharge into the Pine River, which flows into the Peace River near Fort St. John, British Columbia (see Figure 4.2-1 and Figure 4.2-2).

Topography in the Sukunka project area is typified by high elevation (1,800 to 2,000 m) mountain ridges, rounded peaks and steep-sided and relatively flat-bottomed valleys. The Bullmoose Creek watershed is approximately 150 square kilometres (km^2) in area downstream of the Sukunka Project, while the Chamberlain and Skeeter creek watersheds are closer to 40 to 50 km^2 in area. All three creeks exhibit morphologies typical of the mountainous environment. The creeks tend to be steeper in their headwaters, include larger proportions of cobble and boulder material, and are typified by step-pool, rapid and cascade morphologies. The channel gradients lessen as the creeks flow into the larger and flatter primary mountain valleys; the channels correspondingly transition into a mix of rapid and riffle-pool morphologies, with substrates comprised of a larger fraction of finer materials. Channel widths and depths vary in accordance with upstream watershed area and seasonal discharge; however, the mainstem areas are typically about 10 to 20 m wide and 0.3 to 2 m deep.

Discharge (runoff) in the watercourses within the Sukunka project area and surrounding region varies both temporally and spatially. Runoff is typically lowest during the late winter months of February and March when cold temperatures result in nearly all precipitation falling as snow. As the year progresses and temperatures rise, snowmelt during May and June results in the largest monthly runoff volumes. Runoff steadily drops through the summer months as the snowpack is depleted. Early fall rains may increase runoff rates for a short time before winter sets in, with runoff gradually decreasing as baseflow discharge depletes groundwater reserves. Intermittent summer rains often combine with snowmelt runoff to create annual maximum instantaneous runoff events in the smaller watercourses; while annual maximum instantaneous runoff in the larger watercourses, such as the Pine River, are typically driven by spring snowmelt.

The general hydrograph shape described above is fairly standard throughout the region; however, changes in elevation do result in local variability. For example, the colder temperatures at higher elevations result in a larger percentage of precipitation falling as snow, and therefore a larger proportion of annual runoff will occur during the spring snowmelt period. The spring snowmelt period will also occur later in higher elevation systems due to persistent cooler temperatures. Orographic uplift also results in greater volumes of precipitation, and therefore runoff, in higher elevation watersheds. Strong climate gradients also exist perpendicular to the Rocky Mountains in the region, resulting in greater precipitation and runoff to the southeast compared to the northwest for a given elevation. Mean annual runoff within the Sukunka project area is on the order of 800 mm; although, this may vary according to watershed location and elevation.



Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park
- Major Watershed Boundary

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

AQUATICS LOCAL AND REGIONAL STUDY AREAS

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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PREPARED FOR: xstrata coal

FIGURE NO: **4.2-1**

Chetwynd
Highway 97 South
Highway 29 South
Pine River
Pine River Breaks Park
Lone Prairie Road
Dickebusch Creek
Murray River
Gwillim Lake Park
Bluff Creek
Brush Creek
Gwillim River
Blind Creek
Boulder Creek
Sukunka Falls Park
Sukunka FSR
Rocky Creek
Sukunka River
Skeeter Creek
Chamberlain Creek
Highway 29
Bullmoose Creek
Windfall Creek
N
0 2.5 5 7.5 10 km
1:200,000
580000 590000 600000 610000 620000
6170000 6160000 6150000 6140000 6130000 6120000 6110000

Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park
- Watershed Boundary

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

AQUATICS LOCAL STUDY AREA

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PREPARED FOR: xstrata coal

FIGURE NO: **4.2-2**

4.2.1.2 Hydrogeology

There are no existing hydrogeologic data for the Sukunka Project. There are no known monitoring wells, or historical studies on hydrogeologic conditions. Hydrogeologic conditions for the site are currently based on the regional setting and will be further developed as studies are completed in the Sukunka project area.

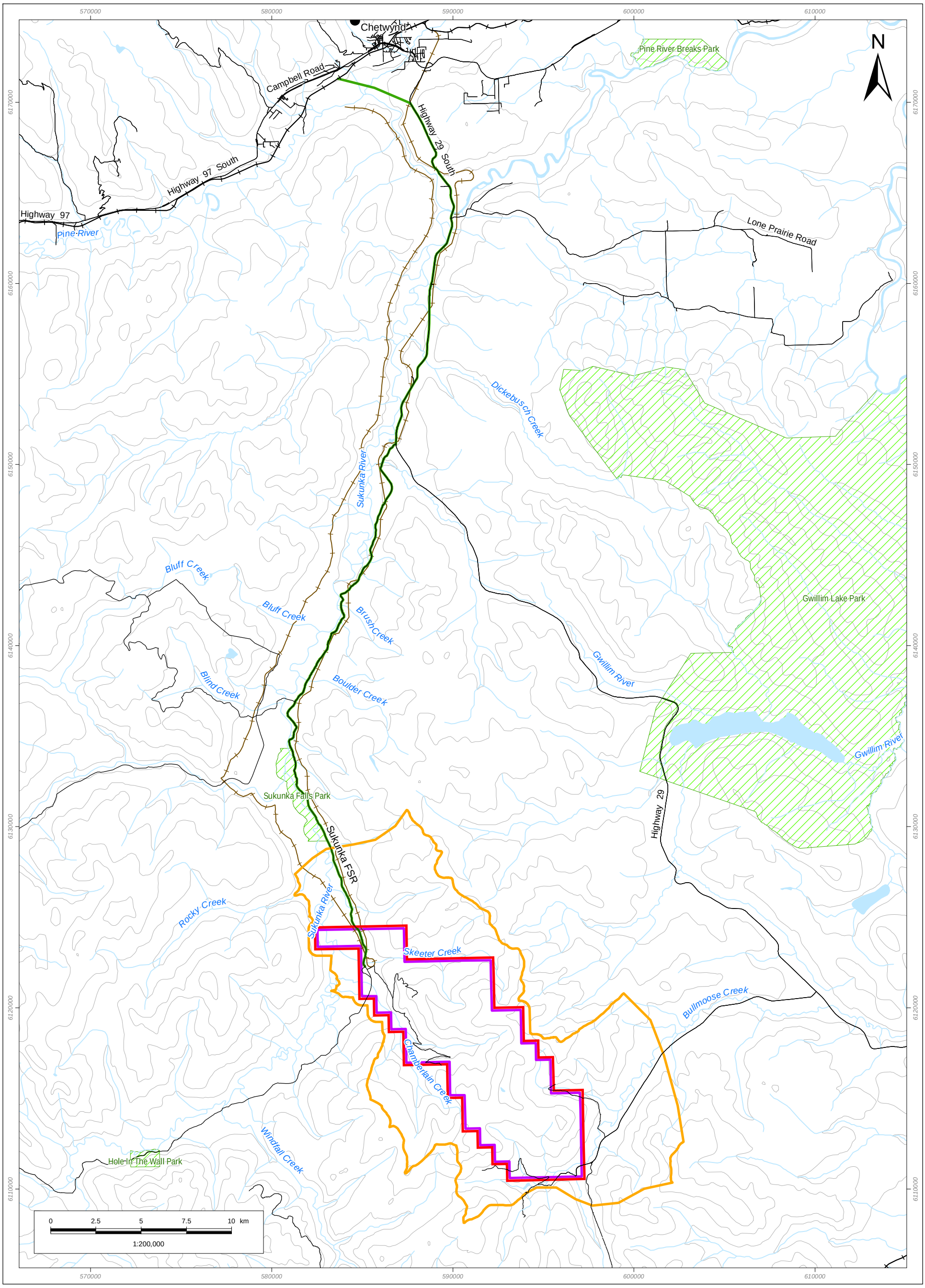
At a large scale, groundwater flow can reasonably be assumed to be topographically controlled. The Sukunka project area encompasses the Chamberlain, Skeeter and Bullmoose creek watersheds. Groundwater within valley bottoms will flow in directions generally parallel to surface water flows. Groundwater flow within the valley bottoms can be expected to discharge to rivers and streams as baseflow.

Bedrock groundwater flow is most likely fracture-controlled, with fracturing a function of lithology, rock properties and structural over-printing. Faults, shear zones or deformation zones—if present and of the appropriate characteristics—may act as conduits or barriers to flow. Within the underground workings, inflows will be influenced by rock storage properties and groundwater recharge rates.

A hydrogeological study will be carried out to characterize the existing groundwater regime within the Sukunka project area to provide a basis for determining potential impacts, mitigation measures, monitoring and contingency planning as mine planning proceeds (see Figure 4.2-3).

Regional hydrogeological data from the XCC's previously proposed Central South project, located 60 km northwest of Sukunka, is available and will be useful to define the regional setting and enhance the understanding of the local groundwater regime in the Sukunka project area. A hydrogeological drilling program will be carried out to initiate baseline data collection in the Sukunka project area. The field program will include drilling and installing monitoring wells at key mine site locations. Hydraulic testing (e.g., response testing), groundwater level measurements, and groundwater samples will be collected from each monitoring well.

The baseline characterization will be used to aid with defining potential effects on groundwater quantity and quality which will be utilized to examine the effect on stream flows (base flows) and aquatic life. Analytical and/or numerical groundwater model(s) will be used as required to evaluate the potential effects as a result of the Sukunka Project.



Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Contour (200m interval)
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

HYRDOGEOLOGY LOCAL AND REGIONAL STUDY AREAS

Sources:
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FIGURE NO: **4.2-3**

4.2.1.3 Surface Water Quality

Historical data regarding the Sukunka River watershed is currently being reviewed. If data is readily available, it will be used as additional datasets to complement the data collected in new studies. This will provide background information on water, sediment, periphyton, invertebrates; and fish for the Sukunka River and its tributaries.

4.2.1.4 Geochemistry

The Sukunka property is in the Gates Formation, in contrast to the Suska and previously studied Central South properties, both of which are in the Gething Formation. While the geochemistry of the two formations is not identical, it is expected to be similar. The Gething Formation tends to have lower potential for developing ARD issues; however, there are still potential concerns with selenium, cadmium and other metals in both formations. The Gates Formation, which will be mined at Sukunka, has acid-generating sandstones and conglomerates, and a different depositional environment than the Gething Formation.

Regionally, selenium is a known issue associated with drainage from mine waste materials. Mines in the vicinity of the Sukunka Project, such as the Brule, Wolverine and Willow Creek mines, are acting to emplace mitigation measures to reduce the impact of selenium leaching. Through the geochemical program that has been budgeted and will be completed as part of the pre-feasibility study, local metal leaching (ML) issues will be considered in developing drainage chemistry predictions in order to assist in developing mitigation strategies.

Drainage predictions from waste rock, tailings, coarse reject and raw coal piles and stockpiles will be used to identify waste material placement strategies and drainage mitigation, and/or treatment options if a need is identified. Typically ML is managed by selective placement of spoils based on their leaching potential, and by avoiding percolation of water through the spoils.

4.2.1.5 Fisheries and Aquatic Resources

The Sukunka project area encompasses Chamberlain Creek (Watershed Code (WSC) 234-443900-42600), Skeeter Creek (WSC 234-443900-40800) and Bullmoose Creek (WSC 234-323900-05100) watersheds. Chamberlain and Skeeter creeks drain into the Sukunka River (WSC 234-443900) near the Sukunka project tenure area.

Fish species reported from the Sukunka project area are listed in Table 4.2-1.

Table 4.2-1 Fish Species Reported from the Sukunka Project Area

Common Name	Scientific Name
Arctic Grayling	*Thymallus arcticus*
Bull Trout	*Salvelinus confluentus*
Rainbow Trout	*Oncorhynchus mykiss*
Longnose sucker	*Catostomus catostomus*
Mountain Whitefish	*Prosopium williamsoni*

Common Name	Scientific Name
Dolly Varden	*Salvelinus malma*
Northern Pike	*Esox lucius*
Slimy Sculpin	*Cottus cognatus*

NOTES:
Source: Habitat Wizard: http://www.env.gov.bc.ca/habwiz/

Chamberlain Creek is a fish-bearing, third order stream with a length of 12.2 km. It flows in a northwesterly direction into the Sukunka River (MOE 2012). Bull trout, longnose sucker, rainbow trout, Dolly Varden, mountain whitefish and slimy sculpin have been reported in Chamberlain Creek (MOE 2012).

Skeeter Creek is a second order stream with a length of 13.2 km. It flows in a northwesterly direction into the Sukunka River. A series of falls and cascades have been reported approximately 4 km upstream of the confluence with the Sukunka River, and appear to define the upper limit of fish presence in Skeeter Creek. Longnose sucker and slimy sculpin have been reported in Skeeter Creek (MOE 2012).

Bullmoose Creek is a fourth order stream with a length of 69.2 km. It flows in a northeasterly direction into the Wolverine River, which drains into the Murray River (MOE 2012). The Murray River flows northward into the Pine River downstream of Chetwynd (MEP 1987). Bullmoose Mine is located at the junction of the west and south Bullmoose tributaries. The open pit mine produced coal for 26 years before its closure in 2003, and was the most substantial activity that has occurred in the Bullmoose Valley. Fish species reported from Bullmoose Creek include Arctic grayling, longnose sucker, rainbow trout, slimy sculpin, bull trout, Dolly Varden, mountain whitefish and coarse (non-game) fish. In Bullmoose Creek, a resident bull trout population has been reported upstream of impassable falls (MOE 2012). Hatfield (1998) reported the presence of moderate slope, gravel/cobble substrate and large woody debris that provide excellent habitat for all salmonids in Bullmoose Creek. While the upper reaches may be preferred by bull trout, due to higher gradient and step/pool morphology, the lower reaches provide habitat requisites for rearing and spawning.

4.2.2 Terrestrial

4.2.2.1 Wildlife

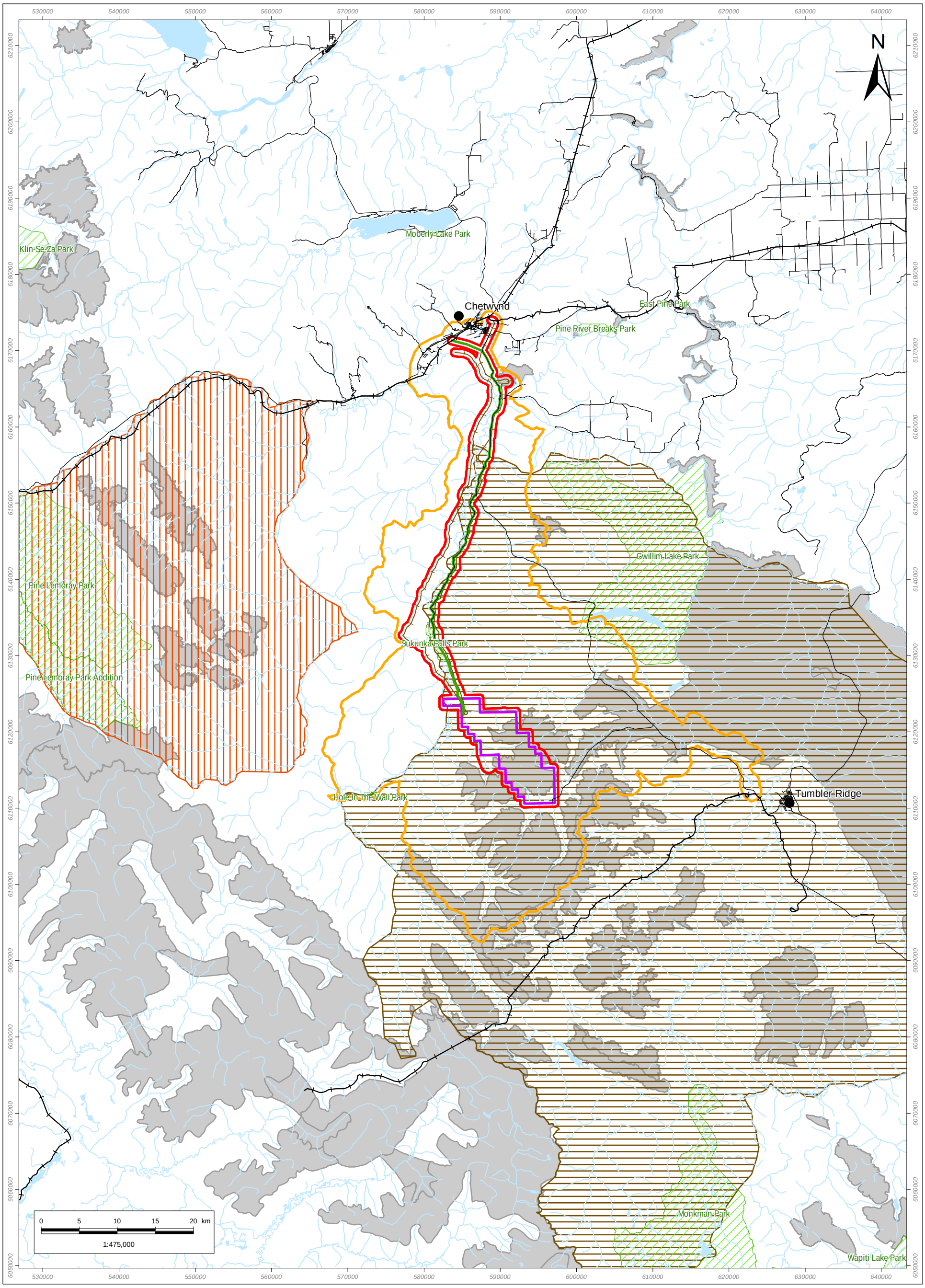
The majority of the Sukunka project area is located within the Engelmann Spruce Subalpine Fir (ESSF) biogeoclimatic zone which is primarily dominated by mature coniferous forest with some mixed coniferous-deciduous forest present at lower elevations. At lower elevations north of the Sukunka Project is the Sub-boreal Spruce (SBS) biogeoclimatic zone. Wet, cool summers and long cold winters influence wildlife composition and distribution in the area.

Ungulates such as moose (*Alces alces*) and mule deer (*Odocoileus hemionus*) are common in the region with smaller populations of Rocky Mountain elk (*Cervus canadensis*) and caribou (*Rangifer tarandus*), which are limited by habitat types and availability. Mountain goats (*Oreamnos*

americanus) may occur in nearby steep alpine areas, although not within the Sukunka project area. The coniferous forests typical of the study area provide habitat for furbearers such as American marten (*Martes americana*) and fisher (*Martes pennanti*) as well as large carnivores including lynx (*Lynx Canadensis*), cougar (*Puma concolor*), grey wolf (*Canis lupus*), grizzly bear (*Ursus arctos*) and black bears (*Ursus americanus*). A variety of bird species, including migratory birds, also commonly utilize the mature conifer forests for breeding and nesting, including Golden-crowned Kinglet (*Regulus satrapa*), Mountain Chickadee (*Poecile gambeli*), Pine Siskin (*Spinus pinus*), Great Gray Owl (*Strix nebulosa*) and Red-tailed Hawk (*Buteo jamaicensis*).

Subalpine meadows, avalanche tracks and young seral forests found in the study area provide excellent forage and predation opportunities for many species. Moose, mule deer, black bear and grizzly bear may forage on abundant seasonal vegetation while raptors, owls, lynx and coyote (*Canis latrans*) may prey on small mammals such as snowshoe hare (*Lepus americanus*) and deer mice (*Peromyscus maniculatus*).

A number of species listed under the federal *Species at Risk Act* (SARA) are potentially present in the region including Woodland caribou, western toad and a number of breeding birds (see Figure 4.2-4). The mature coniferous forests of the ESSF provide abundant arboreal lichens for late winter and summer foraging while the windswept alpine tundra provides terrestrial lichens and security habitat outside but near the Sukunka project area. Both the Quintette herd and Burnt Pine herd of Woodland Caribou occur in the project region and are species of management concern. The most recent population estimate for the Quintette herd is 173–218 individuals. The most recent survey has shown that the last known individual of the Burnt Pine herd has moved to the Mackenzie area. Although the Burnt Pine herd is potentially extirpated, XCC will treat the Burnt Pine herd range with the same level of concern as if caribou were present in order to provide the best conditions for any recovery efforts. In addition, management approaches as outlined in the Peace Northern Caribou Plan will be considered and utilized as appropriate during the development of the Wildlife Management Plan and mitigation measures. Other species of concern that may potentially occur in the Project region and are all listed provincially as either red or blue are Swainson's Hawk (*Buteo swainsoni*), northern long-eared myotis (*Myotis septentrionalis*), wolverine (*Gulo gulo*), fisher and grizzly bear. Northern Goshawk (*Accipiter gentilis*), although not rare, is a regionally important bird species.



Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park
- Ungulate Winter Range
- Quintette Herd Boundary
- Burnt Pine Herd Boundary

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

WILDLIFE LOCAL AND REGIONAL STUDY AREAS

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

R:\2011Stantec\Xstrata_Suska_Sukunka\123110482_Sukunka\gis\Figures\ProjectDescription\fig_10482_pd_04_02-

DATE:	09-JAN-13	PROJECTION:	UTM 10	DRAWN BY:	R. CAMPBELL
FIGURE ID:	123110482	DATUM:	NAD 83	CHECKED BY:	B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.2-4**

4.2.2.2 Vegetation

The proposed mine is within the Northern Interior Forest Region and the Peace Forest District. The Sukunka Project lies within the Hart Foothills Ecosection of the Central Canadian Rocky Mountains Ecoregion of the Sub-Boreal Interior Ecoprovince. This ecosection consists of low, rounded mountains and wide valleys on the east side of the Hart Ranges of the Rocky Mountains and is located in a rain shadow of easterly flowing Pacific air coming over the main Hart Ranges. Biogeoclimatic units are identified throughout British Columbia and are geographic areas influenced by similar regional climate. The Boreal White and Black Spruce (BWBS) zones occur in the valley bottoms and on lower slopes; SBS zones occur in the valley bottoms along the western boundary as well as on the lower slopes; the ESSF zones occur on all the mid to upper slopes; and the Boreal Altai Fescue Alpine (BAFA) zones occur on the highest ridges and summits and become more continuous towards the western margin of the Hart Ranges (revised from Demarchi 2011).

Project Vegetation

The plant community cover found within the Sukunka project area is estimated as follows:

- BWBS ecosystem units/plant communities—24,368 ha (75 percent of the Sukunka project area)
- ESSF ecosystem units/plant communities—7,013 ha (21 percent)
- BAFA ecosystem units/plant communities occupy a small area—911 ha (3 percent)
- SBS ecosystem units/plant communities cover a very small area—335 ha (1 percent)

The tenure area is located at higher elevations compared to the entire Sukunka project area. Vegetation within the XCC tenure area consists mainly of ESSF and BWBS forests and some alpine BAFA vegetation.

The dominant vegetation within the Sukunka project area consists of boreal black and white spruce forests in lowlands and lower slopes with subalpine fir and Engelmann spruce forest on mid to upper slopes. These forests are often dominated by white spruce (*Picea glauca*) or black spruce on wetter sites and varying amounts of lodgepole pine (*Pinus contorta*) on drier sites. There are also older stands of black cottonwood (*Populus trichocarpa*), which exist within the fluvial channels along the valley bottom of the Sukunka haul route.

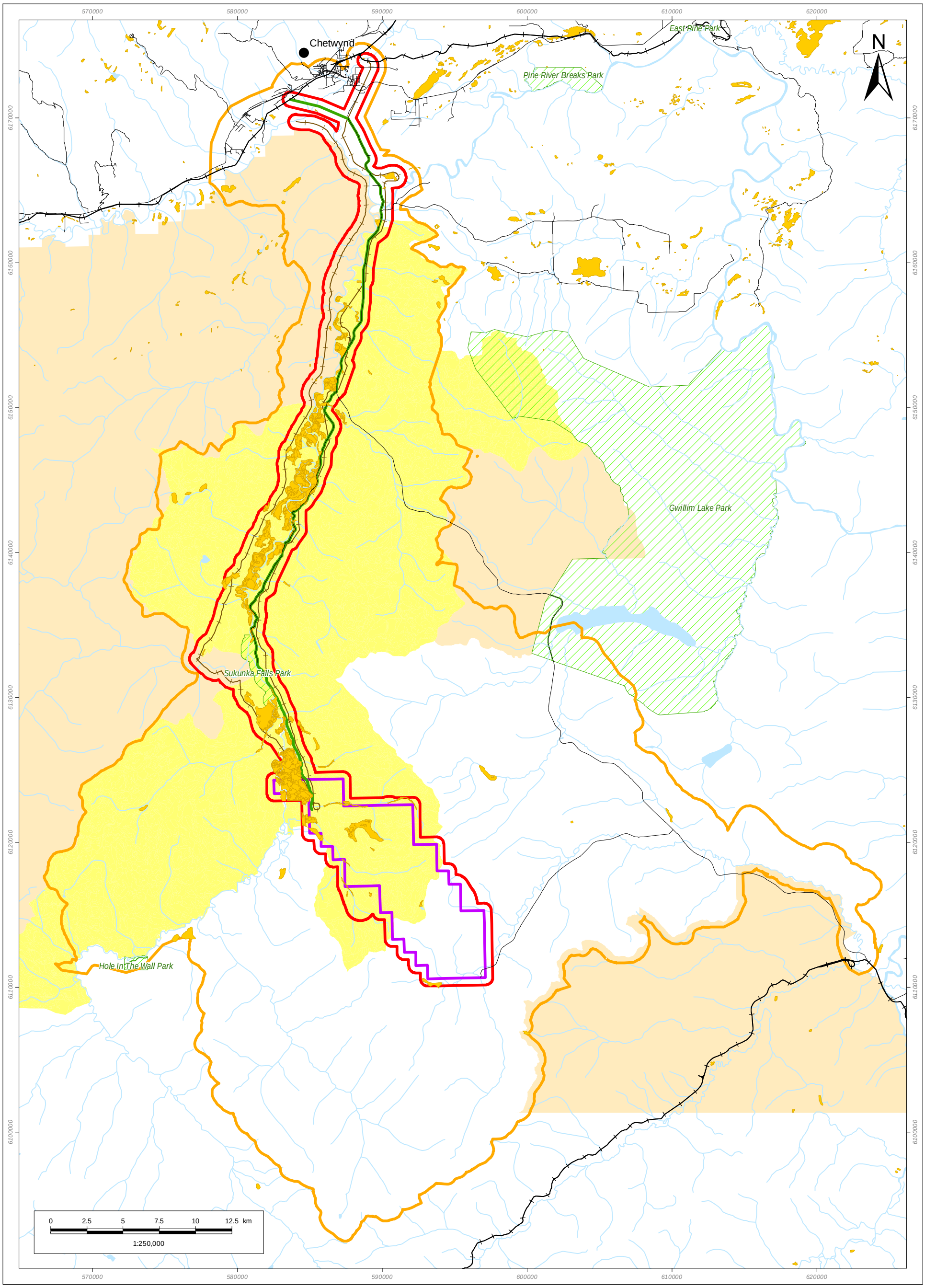
Wetlands

Wetlands within the Sukunka project area cover approximately 500 ha based on a preliminary review of existing terrestrial ecosystem mapping (TEM) information. The total wetland area will be refined upon completion of the 2012 vegetation field surveys. Wetland presence and location is greatly dependent on surficial material and landscape topography. Within the Sukunka project area, wetlands are concentrated in the flatter parts of river valleys and large creeks along the Sukunka River valley.

Rare Plant Species and Ecosystems

Analysis of 2012 British Columbia Conservation Data Center (BC CDC) data shows that as of May 2012 one rare plant species has been recorded within the Sukunka project area at two locations. Pointed broom sedge (*Carex scoparia*), a BC blue-listed plant species is recorded in the BC CDC database as occurring within the Sukunka River tenure area along Skeeter Creek above its confluence with the Sukunka River. An additional recorded occurrence of this species is located within the upper Sukunka river haul route along the Sukunka River above its confluence with Rocky Creek. Overall in the Sukunka project area and the surrounding regional area, upwards of 40 rare plant species listed in the provincial Red and Blue lists (BC CDC 2012) have the potential to be found.

The BC CDC (2012) data shows that 25 rare ecosystems have been identified with the potential to occur in the Sukunka project area. Several rare ecosystems were recorded within the Sukunka project area during the Lower Sukunka TEM (GEOWEST 2002) project (see Figure 4.2-5).



Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Wetland (CANVEC & TRIM)
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Parks
- Sukunka TEM - EcoCat
- PEM Extents

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

VEGETATION LOCAL AND REGIONAL STUDY AREAS

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.2-5**

4.2.2.3 Soils and Terrain

The Sukunka project area is dominated by the Sukunka River valley and its associated terrain in the north, as well as Bullmoose Mountain and its classical alpine glaciation features in the south. Elevations range from 750 m within the broad 2-km wide Sukunka valley to 2,020 m atop Bullmoose Mountain, a difference in relief of 1,270 m.

The Sukunka River valley is characterized by fluvial and alluvial fan deposits from a number of unnamed tributary streams of the Sukunka River. These fan deposits are very gently sloping to the north/northwest and are likely comprised of course-textured materials including sands and gravels; elevations in the upper fans range up to 745 m. The valley walls extend to approximately 1,260 m to the east and are covered by well-drained till materials. This area is underlain by undivided sedimentary rocks of the Minnes Group.

The southern half of the Sukunka area is dominated by Bullmoose Mountain and its associated bedrock-controlled ridge and plateau areas. Elevations in these areas range from approximately 1,700 m atop the plateau to over 2,000 m atop Bullmoose Mountain. Numerous cirques and tarns are found in this area. The area is drained to the south into Bullmoose Creek which flows to the east. Elevations within Bullmoose Creek are 1,090 m. Bedrock outcrops and colluvial-dominated scree slopes are common along the Bullmoose Mountain area. The lower south-facing slopes appear to be overlain by well-drained till materials; some harvesting of the slopes has occurred on the lower Bullmoose Creek slopes. Bedrock geology within this area is complex and is comprised of sedimentary bedrock of Cretaceous age, including the Boulder Creek and Moosebar formations (coarse clastic sedimentary rocks), and the Gates and Hulcross formations (mudstone, siltstone, shale fine clastic sedimentary rocks) of the Fort St. John Group. Undivided sedimentary rocks of the Bullhead Group Gething Formation are the most extensive type and occur in the northern half, especially on the eastern flank of the area and along Bullmoose Creek.

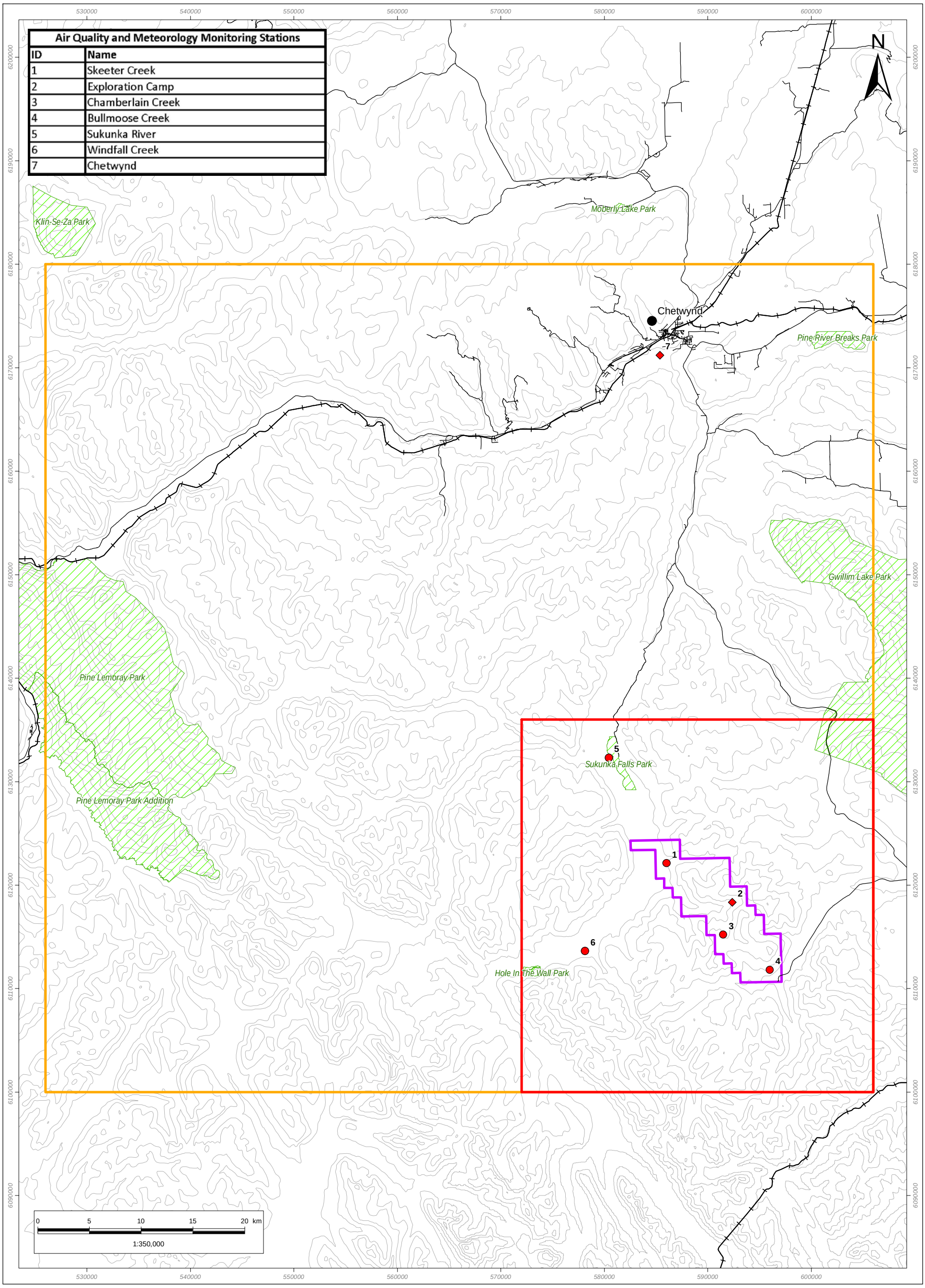
A very small area of poorly drained topography has been identified, associated with the Sukunka valley floor.

4.2.3 Atmospheric

4.2.3.1 Air Quality

Local air flow will be strongly influenced by valleys and other terrain features, and by larger terrain influences on the upper level wind patterns. Strong temperature differences may occur between the valley floors and on the nearby elevated terrain features (Figure 4.2-6). The spatial variation (both horizontally and vertically) will increase the challenge of defining representative conditions for the Sukunka project site. The local terrain influences will affect the transport and the dispersion of contaminants emitted into the atmosphere. In addition, the local ground cover will also have an effect on the dispersion and deposition of these emissions. The influence of local ground cover on air flow is not as strong as the influence from terrain and topography.

Air Quality and Meteorology Monitoring Stations	
ID	Name
1	Skeeter Creek
2	Exploration Camp
3	Chamberlain Creek
4	Bullmoose Creek
5	Sukunka River
6	Windfall Creek
7	Chetwynd



Legend

- City / Town / Village
- Road
- Railway
- Contour (200m interval)
- Provincial Parks

Sample Points

- Dustfall
- PM2.5, PM10, Dustfall, Meteorology
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

AIR QUALITY LOCAL AND REGIONAL STUDY AREAS

Sources:
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R:\2011Stantec\Xstrata_Suska_Sukunka\123110482_Sukunka\gis\Figures\ProjectDescription\fig_10482_pd_04_02-

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FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.2-6**

There has been forestry and oil and gas activity in the area of the Sukunka Project; however, there are no known, currently operating, large sources of emissions within 10 km of the Sukunka Project. Therefore baseline air quality is expected to be at or near background levels. In addition, there are no known residences within 10 km of the proposed mine site.

4.2.3.2 Snow and Climate

The climate of the region is classified as northern temperate. Daily mean temperatures range from a maximum of 7 degrees Celsius (°C) to a minimum of minus 6°C; extreme temperatures range from 32°C to minus 48°C.

Regional data and data collected for the nearby Central South Project suggest that the range of annual precipitation is around 800 mm for the Sukunka project area.

Climatic conditions in the Sukunka project area are influenced by elevation and aspect. Therefore temperature and precipitation regimes at the proposed Sukunka CHPP and mine site may not be accurately represented using long term climate data from the Chetwynd airport meteorological station. The Sukunka project site is located roughly 52 km south of the Chetwynd airport meteorological station at metres above sea level (masl).

The potential future CHPP site is likely to be located between 600 to 800 masl and may see somewhat similar daily temperature fluctuation and precipitation compared to the Chetwynd airport station. The automated meteorology station at the Sukunka project site became operational on September 21, 2012 and will provide data for comparison to the Chetwynd airport meteorology station.

Snow accumulation is strongly influenced by the prevailing conditions for air temperature and wind speed and direction. Local air flow will be strongly influenced by local valleys and other terrain features (i.e., topography), and by larger terrain influences on the upper level wind patterns. Strong temperature differences may occur between the valley floors and on the nearby elevated terrain features. The local terrain influences will affect the transport and the dispersion of snow. In addition, the local ground cover will also have an effect on the dispersion and deposition of snow.

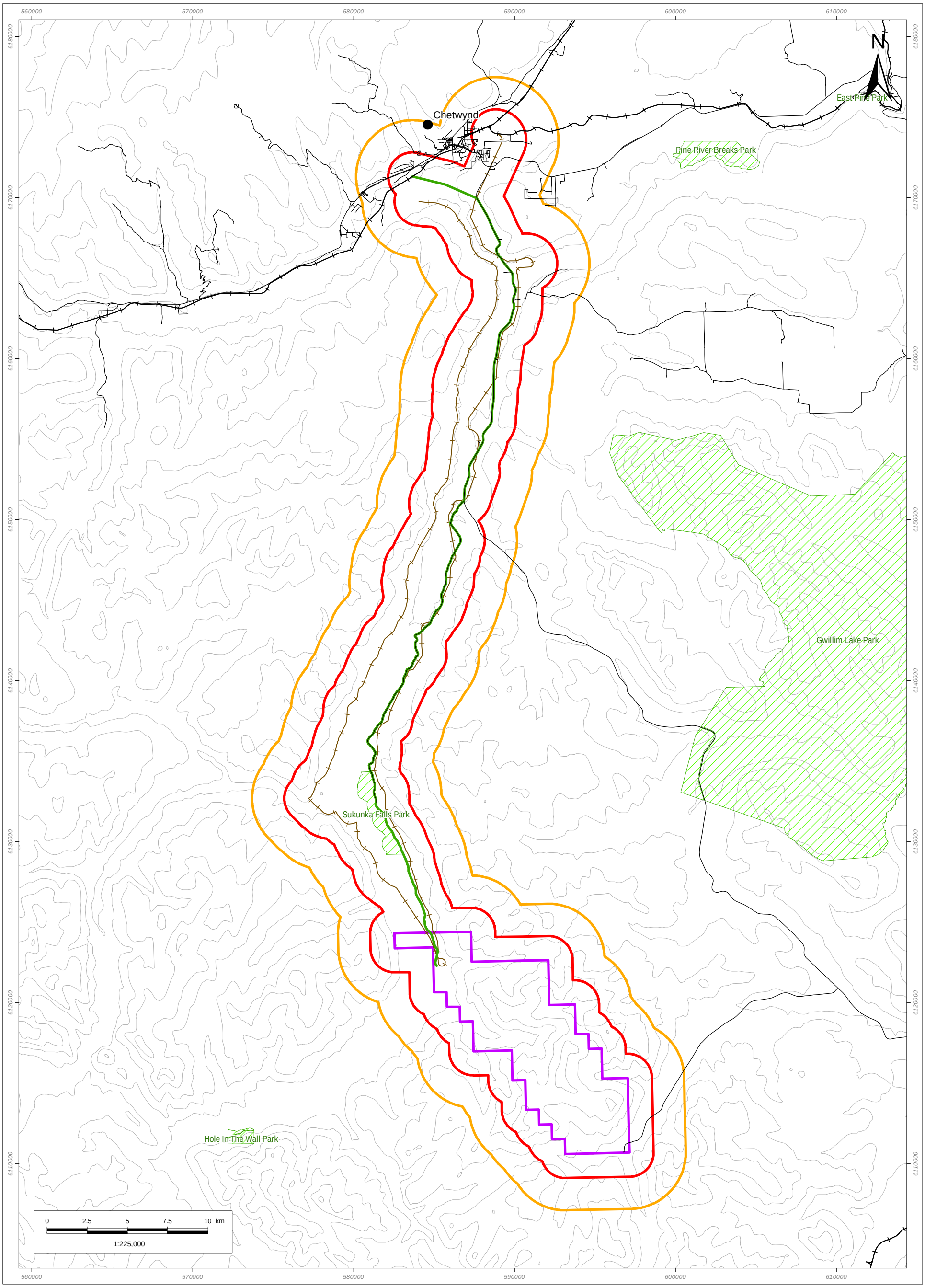
The climate in the Sukunka project area is classified as continental, with cool winters and warm summers. The climate is dictated by a variety of factors such as mountainous topography (causing orographic uplift) and air masses (i.e., the moist, unstable and mild maritime Pacific air mass; and the dry, stable and cold continental arctic air mass).

Climatic conditions in the area are described based on climate normal data from the Chetwynd airport meteorological station, located approximately 50 km north of the Sukunka project site. Daily temperature variations at the Chetwynd airport meteorological station are summarized in the 30-year climate normals from 1971 to 2000. During this period, the average daily maximum temperature was 22°C in July and the average daily minimum temperature was minus 16°C in January. Extreme temperatures ranged from a low of minus 52°C to a high of 34°C.

4.2.3.3 Noise

The Sukunka project area is mountainous, and primarily undeveloped with scattered timber harvesting and natural gas development (see Figure 4.2-7).

Environmental noise levels are currently expected to reflect natural sources of sound such as wildlife and wind generated noise. The region would have experienced intermittent industrial noise from timber harvesting, gas well drilling, and mining activity in the past.



Legend

- City / Town / Village
- Road
- Railway
- Contour (200m interval)
- Regional Study Area
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

NOISE LOCAL AND REGIONAL STUDY AREAS

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.2-7**

4.3 First Nations and Aboriginal Setting

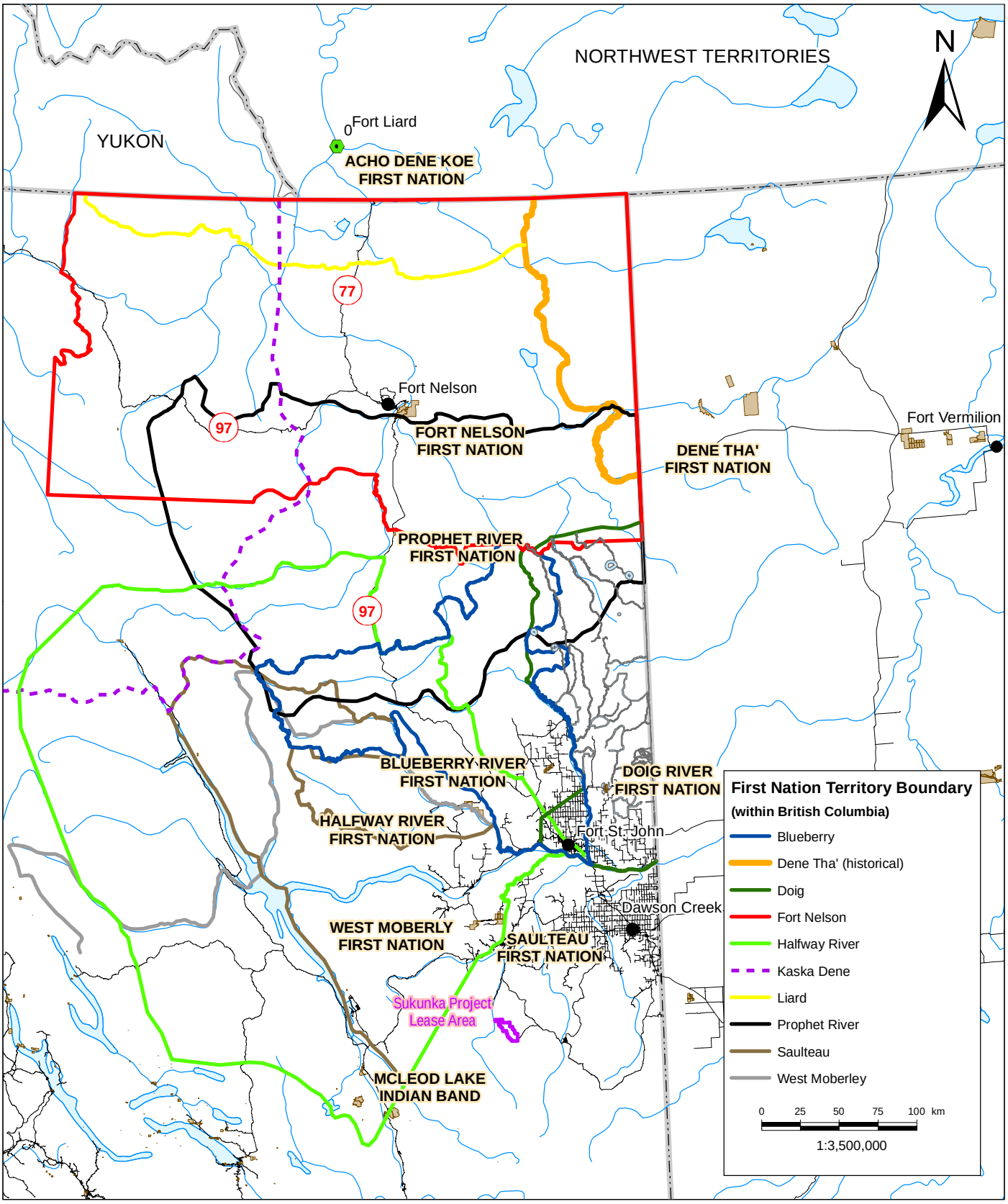
The proposed Sukunka project area is located in the southwestern portion of Treaty No. 8 (Treaty 8) territory. Treaty 8 establishes constitutionally-protected treaty rights for signatory First Nations that may be affected by the Sukunka Project. Treaty 8 First Nations may also have Aboriginal rights or other interests in the area that may be affected as well.

The proposed Sukunka Project is also within the claimed territories of Aboriginal groups at Kelly Lake and their Aboriginal rights and interests may be affected by the Sukunka Project.

Stantec has been informed by Treaty 8 First Nations that they prefer the term “First Nations” to Aboriginal groups. In addition, one of the Aboriginal groups at Kelly Lake has informed Stantec that they prefer not to be termed a “Kelly Lake community.” To accommodate both these requests the phrase First Nations and Aboriginal groups will be used throughout this document to refer jointly to the Treaty 8 First Nations and groups at Kelly Lake who may express an interest in the Sukunka Project.

Figure 4.3-1 shows Treaty 8 First Nations and Aboriginal groups located in the vicinity of the Sukunka project area. Figure 4.3-2 shows the First Nations and Aboriginal groups located closest to the Sukunka Project. Reasonable care was taken to illustrate asserted territories of First Nations and Aboriginal groups although not all communities may agree to the boundaries of the territories as shown.

The Sukunka Project is located on provincial Crown land within the Dawson Creek Land and Resource Management Plan (LRMP). The LRMP provides broad direction for the sustainable use of Crown land and resources, covers 2.9 M ha, and includes Crown lands within the Dawson Creek Forest District, excluding the Kakwa recreation area. In general, there are five types of zones in the plan, with twelve specific resource management zones (RMZ). Each RMZ contains specific resource values and management objectives which set out types of activities (e.g., recreation, timber harvesting, trapping, etc.) and level of intensity permitted in individual zones. There was limited involvement by First Nations at the LRMP table and not all First Nations were formally represented; however, Aboriginal archaeological, cultural and heritage values were strongly endorsed by all of the LRMP participants, which included the recommendations of the Twin Sisters Special Management Committee leading to the creation of the Klin-se-za protected area.



Legend

- Sukunka Project Tenure Area
- Settlement Location
- City or Town
- Provincial Road / Highway
- Watercourse
- Provincial or Territorial Boundary
- First Nations Reserve
- Lake / Waterbody

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

TREATY 8 FIRST NATIONS AND ABORIGINAL GROUPS IN THE VICINITYOF THE PROPOSED PROJECT

Sources:

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 08-JAN-13	PROJECTION: UTM 10
FIGURE ID: 123110482	DATUM: NAD 83
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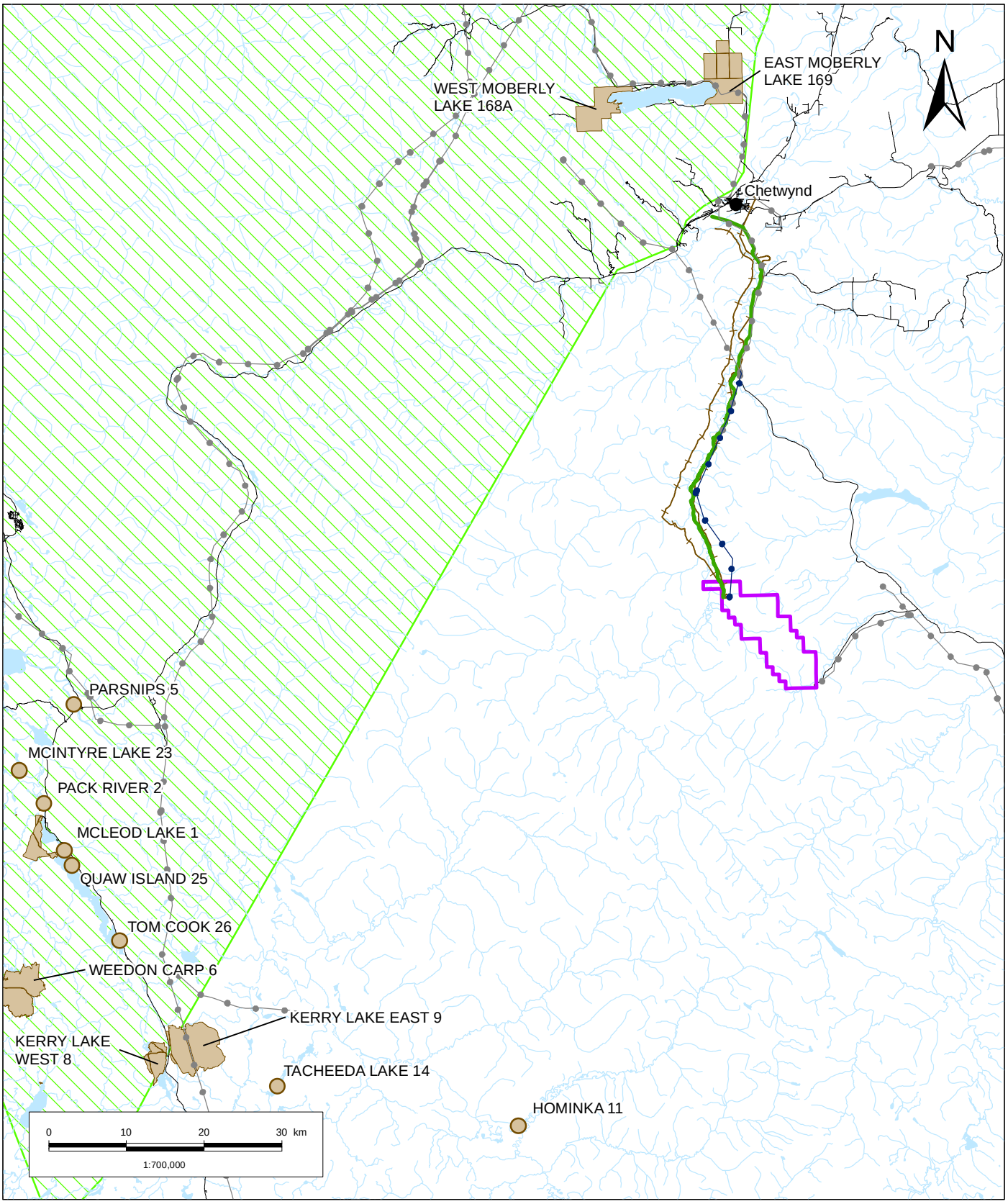
PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.3-1**



Legend

- City or Town
- Proposed Transmission Line
- Existing Transmission Line
- Provincial Road / Highway
- Provincial or Territorial Boundary
- Watercourse
- Lake / Waterbody
- Halfway River First Nations Territory
- First Nations Reserve
- Sukunka Project Tenure Area

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

TREATY 8 FIRST NATIONS AND ABORIGINAL GROUPS CLOSEST TO THE PROPOSED PROJECT

Sources:

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

fig_10482_pd_04_03-02_historical_map_of_treaty_8_first_nations_and_aboriginal_groups_closest_to_the_proposed_project.mxd

DATE: 08-JAN-13	PROJECTION: UTM 10
FIGURE ID: 123110482	DATUM: NAD 83
DRAWN BY: R. CAMPBELL	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.3-2**

4.3.1 First Nations and Aboriginal Groups

The two Treaty 8 First Nation communities located nearest to the Sukunka project area are the West Moberly First Nations (WMFN) at 74 km and the Saulteau First Nations (SFN) at 75 km. The SFN and WMFN are both located on Moberly Lake. The McLeod Lake Indian Band (MLIB) also has traditional ties to the Sukunka project area and is located on Moberly Lake about 95 km from the Sukunka Project. It is anticipated that these three First Nations will be most interested in engaging with XCC regarding the proposed Sukunka project activities because of their proximity to the Sukunka project area.

Other Treaty 8 First Nations located in the vicinity of the Sukunka Project may also have an interest in the potential effects of the Sukunka Project. They are:

- Blueberry River First Nations (BRFN)
- Doig River First Nation (DRFN)
- Fort Nelson First Nation (FNFN)
- Halfway River First Nation (HRFN)
- Prophet River First Nation (PRFN)

Of these groups the DRFN and HRFN, located 169 and 144 km away from the Sukunka Project respectively, have not historically expressed an interest in similar projects as far south as the Sukunka; however, this may change in the future. Table 4.3-1 provides the Chiefs and Land Office contacts of the First Nations most likely to express an interest in the Sukunka Project.

Table 4.3-1 First Nations Potentially Affected by or Interested in the Sukunka Project

First Nation	Chief	Land Office Contact	Contact Information
West Moberly First Nations	Chief Roland Willson	Cec Heron	PO Box 90 Moberly Lake, BC V0C 1X0 Phone: (250) 788-3663 Fax: (250) 788-9792 Email: landusemanager@westmo.org
Saulteau First Nations	Chief Harley Davis	Rick Publicover	Box 1020 Chetwynd, BC V0C 1J0 Phone: 250-788-7260 Fax: (250) 788-7261 Email: reception@saulteau.com
Halfway River First Nation	Chief Russell Lilly	Roslyn Pokiak	PO Box 59 Wonowon, BC V0C 2N0 Phone: 250-772-5058 Fax: 250-772-5200 Email: reception@hrfn.ca

First Nation	Chief	Land Office Contact	Contact Information
Doig River First Nation	Chief Norman Davis	Gabe Harvey	Box 56 Rose Prairie, BC V0C 2H0 Phone: (250) 827-3776 Fax: (250) 827-3778 Email: reception@doigriverfn.com
McLeod Lake Indian Band	Chief Derek Orr	Deborah Prince	General Delivery McLeod Lake, BC V0J 2G0 Phone: (250) 750-4415 Fax: (250) 750-4420

It is anticipated that one or more of these communities will be interested in engaging with XCC with regard to the Sukunka Project. Although the Province does not require that the Aboriginal groups at Kelly Lake be consulted with in the same manner as the Treaty 8 First Nations, XCC will be engaging through the Metis Nation British Columbia and Kelly Lake Métis Settlement Society to determine how their interests may interact with the Sukunka Project.

XCC is committed to working with First Nations and Aboriginal groups during development of the Sukunka Project and will continue to engage with them throughout the environmental assessment process, and into the future. XCC is also committed to working collaboratively with the regulatory agencies in fulfilling their Crown duty to consult with First Nations and Aboriginal groups.

4.3.2 Traditional Knowledge and Traditional Land Use

Traditional Knowledge (TK) and Traditional Land Use (TLU) will be incorporated into the assessment of effects of the Sukunka Project on biophysical components, as well as on treaty and Aboriginal rights and interests. TLU information will inform the assessment with regard to:

- Traditional activities that relate to treaty rights and Aboriginal rights, such as hunting, fishing, and trapping
- Locations of harvestable natural resources
- Animal presence, movement patterns and habitat use
- Locations of human receptors and their spatial relationship to the Sukunka Project
- Human habitation sites, and sites of archaeological and heritage significance
- Travel and movement patterns
- Ceremonial and spiritual values
- Activities of First Nations and other Aboriginal groups within the Sukunka Project vicinity and surrounding areas

This information will add to the data collected through scientific studies, and will enable XCC to incorporate each community's perspective in the identification of potential project effects, and the development of mitigation options.

Traditional knowledge will also be used in the identification of mitigation options, with respect to potential biophysical effects of the Sukunka Project, and potential effects of the Sukunka Project on treaty and Aboriginal rights and interests. Examples of where TK can be used in the development of mitigation measures include:

- Timing of construction to avoid wildlife concerns (e.g., migrations, rutting, birthing, nesting, etc.)
- Relocating key project features if possible to avoid sensitive wildlife areas, sensitive vegetation areas, cultural areas and sacred areas
- Locating areas to be fenced to protect wildlife
- Determining areas for manual vegetation control to protect culturally and ecologically important plants (e.g., berries, food plants, medicines, sacred plants)

Traditional knowledge and TLU studies, or other studies specific to the Sukunka project area, will be an important part of the baseline information collection program, and will aid in identifying project effects and potential mitigation measures.

XCC will facilitate TK/TLU studies for First Nations and Aboriginal groups that are most likely to be potentially affected by the Sukunka Project.

4.4 Human Environment Setting

4.4.1 Communities

The Sukunka Project is located within the PRRD. The communities most likely to be affected by the Sukunka Project are those that fall within the PRRD, and include the Districts of Chetwynd, Tumbler Ridge, Hudson's Hope and Taylor; the Cities of Fort St. John and Dawson Creek; and the Village of Pouce Coupe.

4.4.1.1 Peace River Regional District

The PRRD is the largest regional district in British Columbia, covering an area of 119,000 km^2 (approximately 12 M ha). It is located south of the 58^{th} parallel and is comprised of the land east of the Rocky Mountains and west of the Alberta border. This area was formerly known as the Peace River Liard Regional District and Peace River Liard Hospital District. It was established in 1967 and included the current PRRD lands and the lands north of the 58^{th} parallel and east of the Rocky Mountains (i.e., the Northern Rockies Regional Municipality [NRRM]). The Peace River Liard districts were split in 1987 along the border of the 58^{th} parallel. The lands north of the 58^{th} parallel became the new Fort Nelson jurisdiction (known today as the NRRM), and the area south of the 58^{th} parallel became the PRRD and Peace River Regional Hospital District (PRRD 2011).

The PRRD and Peace River Regional Hospital District were established to facilitate collaboration between municipalities and rural electoral areas in the provision of services to residents. The district

is home to approximately 60,000 residents who reside in the region's seven incorporated municipalities and four electoral areas (i.e., B, C, D, and E). It is home to 1.4 percent of British Columbia's residents. Profiles of communities within the PRRD are presented in Table 4.4-1.

4.4.1.2 District of Chetwynd

The District of Chetwynd is located at the intersection of Highways 29 and 97. Highway 29 runs north-south and provides connection to Hudson's Hope, 66 km to the north, and to Tumbler Ridge, 95 km to the south. Highway 97 runs east-west and provides connection to Prince George and Dawson Creek. Chetwynd has rail service to Fort St. John, Dawson Creek and Prince George. The Chetwynd municipal airport features a paved 4,481 foot long runway and handles chartered flights.

Population and Demographics

Population grew from 2,633 in 2006 to 2,635 in 2011. Table 4.4-1 provides a population profile for the District of Chetwynd.

Community Services

Emergency services in the District include a fire department, Royal Canadian Mounted Police (RCMP) detachment, British Columbia Ambulance Service and 9-1-1 emergency dispatch service. Health services are provided by the 22-bed Chetwynd General Hospital and Health Centre.

Recreational facilities include a recreation complex with a wave pool, hot tub, sauna, curling rink, ice arena, library, and the Pine Valley Exhibition Park. Outdoor facilities include ball diamonds, a fit-park, skateboard park, hiking and biking trails, two golf courses, and a number of parks and playgrounds (District of Chetwynd 2009). Education facilities include three daycare centres, five elementary schools, one secondary school, and the Chetwynd campus of Northern Lights College.

4.4.1.3 District of Tumbler Ridge

The District of Tumbler Ridge was founded in 1981 when Denison Mines, Teck Corporation, the Japanese Steel Industry, and the Government of British Columbia signed an agreement to facilitate coal development in northeastern British Columbia. Within three years, the town required infrastructure (power, rail, roads), and two coal mines, Quintette and Bullmoose, were built in the District (District of Tumbler Ridge n.d.c).

Population and Demographics

The community had experienced a period of population decline in 2000 and 2001 due to its dependence on the mining sector; however, the 2011 census results indicate that the population of Tumbler Ridge has increased by 10.4 percent since 2006, reaching 2,710 people. A population profile for the District is provided in Table 4.4-1.

Table 4.4-1 Community Profiles

Demographic Parameter	BC	Chetwynd	Tumbler Ridge	Hudson's Hope	Fort St. John	Taylor	Dawson Creek	Pouce Coupe
Population (2011)	4,400,057	2,635	2,710	970	26,380	1,373	11,583	738
Population (2006)	4,113,487	2,633	2,454	1,012	25,136	1,384	10,994	739
Area (km^2)	924,815	64	1,574	869	622	17	22	2
Density (persons/km^2)	4.4	40.9	1.6	1.2	40.4	83.3	492.5	259.3
Median age (2006)	40.8	32.8	42.2	42.7	31.5	30.9	35.6	42.0
Males	40.0	33.3	42.5	43.0	31.4	31.3	33.9	41.6
Females	41.5	32.5	41.7	42.2	31.6	30.2	37.2	43
Median household income (2005)[a]	$52,709	$64,478	$66,298	$54,009	$71,185	$63,704	$50,848	$55,881
Unemployment rate (2006)[b]	6.0%	5.8%	5.6%	13.0%	4.4%	1.7%	6.1%	4.1%
Males	5.8%	6.1%	3.3%	9.7%	5.1%	0.0%	6.3%	0.0
Females	6.3%	4.5%	9.5%	15.1%	3.5%	3.5%	5.9%	5.9%
Aboriginal identity population (% of total area population)	4.8%	19.2%	9.0%	17.3%	9.0%	9.0%	13.4%	14.5%
Males	2.3%	11.2%	4.7%	11.4%	4.6%	4.0%	6.7%	6.9%
Females	2.5%	7.8%	4.3%	5.9%	4.4%	5.0%	6.7%	7.6%

SOURCE:
Stats Canada 2007; Stats Canada 2012

NOTES:
[a] Median before tax household income in all private households
[b] Unemployment rate expressed as a percentage of the labour force

Community Services

The RCMP detachment in Tumbler Ridge maintains an office and detainment facilities. Tumbler Ridge has a full-time fire chief and a volunteer fire department with approximately 12 members. The Fire Hall is located in the town centre and is well equipped with emergency and fire protection vehicles (District of Tumbler Ridge, n.d.b). Health services in the community are provided by the Health and Social Services Centre, located in downtown Tumbler Ridge. Services include medical, optometric, ambulance, public health, counseling and emergency care (District of Tumbler Ridge 2012).

Within the District of Tumbler Ridge there is one elementary school with kindergarten to grade 6, and one secondary school with grades 7 through 12. The Tumbler Ridge campus of Northern Lights College is located in the northeast wing of the Tumbler Ridge Senior Secondary School; campus services include a library and computer/internet access (Northern Lights College 2012).

The District of Tumbler Ridge has a variety of recreational and cultural facilities. The Tumbler Ridge Community Centre services recreation, sport, and cultural needs of the residents. The recreational component consists of an ice arena, four-sheet curling rink, fully equipped weight room, youth centre, climbing wall, and aquatic centre. The aquatic centre consists of a four-lane, 25-m competition style main tank, side lagoon play area, tots pool, whirlpool, dry sauna, steam room, squash court, and racquetball court. The Centre also houses an art gallery show space, library, restaurant, sports lounge, museum displays, and meeting rooms, and is home to the Tumbler Ridge child care facility (District of Tumbler Ridge 2009).

Tumbler Ridge is also equipped with baseball diamonds, an extensive network of walking trails, a nine-hole golf course, and marked cross-country ski routes in the winter months (District of Tumbler Ridge 2005).

4.4.1.4 District of Hudson's Hope

Incorporated in 1965, Hudson's Hope is the third oldest municipality in British Columbia. It was originally used as a fur-trading post and rest stop, with mineral exploration and mining activity dating back to 1923. The municipal government consists of an elected Mayor and six councillors.

Population and Demographics

The community has experienced periods of growth and decline due to its isolated location and dependence on natural resource industries. The population is 970 according to the most recent census for 2011, which indicates a 4.2 percent decline since 2006 when the population was 1,012. Table 4.4-1 provides a population profile for the District.

Husdon's Hope is located on Highway 29, 90 km west of Fort St. John and 66 km north of Chetwynd. The portion of Highway 29 that runs through the centre of the town is known as Beattie Drive, and houses the majority of the commercial businesses in the district. The local airport is located 6 km west of the district, has a 1,524 m paved runway, and provides private and chartered service. The North Peace Regional Airport located in Fort St. John is the closest commercial airport, and is the busiest airport in the region. The nearest rail and bus service are located in Chetwynd.

Community Services

Emergency Services in Hudson's Hope are provided by a RCMP detachment, fire department, British Columbia Ambulance Service, and emergency 9-1-1 dispatch service. Fire and rescue services are provided by 1 full-time chief, and 25 full-time volunteers including 2 deputy chiefs, 3 captains, 1 safety officer, 19 firefighters and 2 junior firefighters. The fire department maintains two stations and has two engines, one pumper/tanker and one rescue engine. The local three-person RCMP detachment is led by a corporal and two constables. British Columbia Ambulance Services are led by a unit chief as well as part-time/on-call primary care paramedics and emergency medical responders. The Hudson's Hope ambulance service has one ambulance. In addition to these emergency services, Hudson's Hope has a municipal emergency program and maintains primary and secondary emergency operations centres and emergency sirens in the event of major disasters.

Health services in the community are provided by the Hudson's Hope Health Centre which offers the services of a registered nurse, home care nurse, and lab technologist. The health centre also hosts additional visiting healthcare professionals including a physiotherapist, public health nurse, mental health practitioner, and dietician. The nearest hospitals are located in Chetwynd and Fort St. John (District of Hudson's Hope 2006).

Educational facilities include a pre-school, and the Hudson's Hope elementary-secondary (K–12) school. There are a variety of recreational and tourism facilities in the district including an ice arena, a curling club, outdoor swimming pool, ski hill, museum, and riding arena. In addition there a number of hiking and cycling trails, local campgrounds and RV Parks; as well as outdoor recreational use areas such as the Beryl Prairie Community Park, the Jamieson Woods Nature preserve and the Outdoor Education Site (District of Hudson's Hope 2006).

4.4.1.5 City of Fort St. John

Fort St. John, the largest city in the PRRD, is located at mile 47 of the Alaska Highway (Highway 97). Due to its size and location, Fort St. John acts as a transportation hub within northeast British Columbia. The North Peace Regional Airport operates two runways and has regularly scheduled flights from a number of commercial airlines. Other transportation services to the city include rail and bus links.

Population and Demographics

The population in Fort St. John was 26,380 in 2011, which is a 4.9 percent increase over its 2006 population of 25,136. A population profile for the community of Fort St. John is provided in Table 4.4-1.

Community Services

Fort St. John's emergency services are provided by the Fort St. John Fire Department, the RCMP, British Columbia Ambulance Service and a 9-1-1 emergency dispatch service. The fire department consists of 19 full-time employees and 13 volunteer firefighters, who provide service to the city and surrounding areas. The local RCMP detachment has 60 full-time staff, 3 auxiliary constables and

2 victim services workers. The RCMP detachment provides service to Fort St. John and the municipality of Taylor. Emergency medical services are provided by three ambulances. Health services are provided by the Fort St. John Hospital and Health Centre, Fort St. John Health Unit and four medical clinics. A hospital replacement is currently underway for the Fort St. John Hospital and Health Centre. The new facility will have 55-acute care beds, an ICU, a maternity ward, 2 operating rooms, and an expanded ER and endoscopy suite. There will also be a new 123-bed residential care building adjacent to the new hospital (Northern Health 2012).

Recreational services in Fort St. John include a pool, arena, sports centre, cultural centre, museum, skateboard park, library, curling club, gymnastics club, spray park and community forest. There are also a number community special events and of recreational programs such as festivals and parades.

4.4.1.6 District of Taylor

The District of Taylor is located on mile 36 of the Alaska Highway, approximately 17 km south of Fort St. John. The community is located on the Taylor Flats along the north bank of the Peace River. There is rail and bus service to Taylor. The closest commercial airport is the North Peace Regional Airport located in Fort St. John.

Population and Demographics

In 2011, the population in Taylor was 1,373, a decrease of 0.8 percent since 2006. There are 563 private dwellings within the district and a population density of 80.4 persons/km^2. Table 4.4-1 provides a population profile for the District of Taylor.

Community Services

Fire protection services are provided by the Taylor volunteer fire department, dispatched through the Fort St. John Fire Department. It consists of 1 fire chief, 17 volunteer fire fighters and 1 junior firefighter. It provides first response, fire prevention, fire suppression and motor vehicle extrication (District of Taylor 2012). There is a medical clinic located in Taylor; however, residents rely on the Fort St. John Hospital and Health Centre for major medical services.

Taylor Elementary (K–6) is the only school in the community, and has an enrollment of 112 students (PRN 2011). Education for students beyond grade six is accommodated by schools in Fort St. John. Recreational and community facilities include a cardio room, community hall and public library.

4.4.1.7 City of Dawson Creek

The City of Dawson Creek is located 58 km south of Taylor, 102 km east of Chetwynd and approximately 15 km from the Alberta border. Dawson Creek is serviced by rail, bus and the Dawson Creek Airport, which has a 1,524 m paved runway.

Population and Demographics

The population in Dawson Creek is 11,583, which is 5.4 percent higher than its 2006 population of 10,994. Table 4.4-1 provides additional population statistics for the City of Dawson Creek.

Community Services

Emergency services in Dawson Creek are provided by a local fire department, British Columbia Ambulance Service, RCMP and 9-1-1 emergency dispatch. The fire department provides service to the city, airport and areas within a five-mile radius of the city. It is led by a fire chief, deputy chief, prevention officer, 16 full-time fire fighters, and 12 auxiliary volunteer fire fighters. The 9-1-1 service provides dispatch services to the city, as well as the surrounding communities of Chetwynd, Tumbler Ridge, Pouce Coupe and smaller remote communities (City of Dawson Creek 2012).

Healthcare in the city is provided by the Dawson Creek and District Hospital (62 acute care beds), three continuing care facilities for the elderly, a child development centre, community mental health programs and counseling services. In addition, the Northern Health Connection service is available for transferring patients seeking medical services in neighboring regions.

Recreational and community facilities in Dawson Creek include the Kenn Borek Aquatic Centre (which offers pools, a walking track and climbing wall), two indoor arenas, one outdoor ice rink, a speed skating rink, a youth centre, arts centre, art gallery, museum, exhibition grounds and the EnCana events centre (City of Dawson Creek 2012). There are also a number of outdoor trails and parks that cater to snowshoers, hikers and cross-country skiers.

Dawson Creek falls within the jurisdiction of School District 59. It has five elementary schools, one middle school and one secondary school (PRS 2009). The Northern Lights College main campus is also located in the city.

4.4.1.8 Village of Pouce Coupe

The Village of Pouce Coupe is located approximately 10 km southeast of Dawson Creek.

Population and Demographics

The population of Pouce Coupe is 738, which is 0.1 percent lower than its 2006 population of 739. Table 4.4-1 provides additional population statistics for the Village of Pouce Coupe.

Community Services

Emergency services in Pouce Coupe are provided by a local volunteer fire department, and 9-1-1 emergency dispatch, British Columbia ambulance services and RCMP detachment services based out of Dawson Creek. The fire department provides service to the Village and areas within a five-mile radius around the Village. It is headed by a volunteer fire chief, and 16 other active volunteers.

The Peace River Haven located in Pouce Coupe is an intermediate care home. Due to the village's proximity to Dawson Creek, residents of Pouce Coupe most commonly receive health services there (see Section 4.4.1.7).

Recreational and community facilities in Pouce Coupe include the Pouce Coupe Museum, municipal library, EnCana Pouce Coupe Regional Community Centre and Pouce Coupe Park. Pouce Coupe Park includes campsites, firepits, a playground, horseshoe pits and a band stand. The village also provides opportunities for canoeing, hiking, biking, fishing, cross-country skiing and snowmobiling (Village of Pouce Coupe 2012).

The Village of Pouce Coupe falls within the jurisdiction of School District 59. The Pouce Coupe Elementary School was replaced in 2008, providing education for children from kindergarten to grade 7. Students in higher grades are transported by bus to Dawson Creek to attend school (Village of Pouce Coupe 2012).

4.4.2 Cultural Sites

Four Provincial Parks are located in proximity to the Sukunka Project; Hole-in-the-Wall Park, Pine Le Moray Park, Sukunka Falls Park and Gwillim Lake Park. Figure 1.2-2 in Section 1.2.3 shows the location of these and other Provincial Parks in the Sukunka project region.

4.4.2.1 Hole-in-the-Wall Provincial Park

Hole-in-the-Wall Provincial Park is located approximately 15 km west of the mine site off of the Sukunka FSR. Named from a resurgence spring that flows from a limestone rock wall, Hole-in-the-Wall Provincial Park is 137 ha in area. It has been traditionally used by the First Nations of the Treaty 8 Tribal Association. Park activities include hiking, hunting, horseback riding and snowshoeing (Province of British Columbia 2011a).

4.4.2.2 Pine Le Moray Provincial Park and Protected Area

Pine Le Moray Provincial Park and Protected Area, located immediately west of the mine site and east of Highway 97, offers scenic mountain views. The boundaries of the park and protected area cover 43,245 ha. Visitors to the park can participate in activities such as camping, hiking, fishing, boating, hunting, horseback riding, cycling and canoeing (Province of British Columbia 2011b).

4.4.2.3 Sukunka Falls Provincial Park

Sukunka Falls Provincial Park is 360 ha, and is located approximately 45 km south of Chetwynd, British Columbia in the Sukunka River valley. The lands within the park were traditionally used by the Sikanni and Beaver First Nations in the area. The park is in close proximity to one of the haul route options for the Sukunka mine. The park is accessible via the Chetwynd-Tumbler Ridge Highway and the Sukunka FSR. Park activities include wildlife viewing, hiking, horseback riding, fishing, canoeing, and wilderness, backcountry or walk-in camping (Province of British Columbia 2011c).

4.4.2.4 Gwillim Lake Provincial Park

Located in the Rocky Mountain Foothills, approximately 65 km southeast of Chetwynd, British Columbia, and east of the Sukunka project area, Gwillim Lake Provincial Park covers 32,326 ha. Accessible via Highway 29, the park offers visitors the opportunity to take in panoramic views of the

Rocky Mountains, and take part in activities such as canoeing, kayaking, fishing, hiking, camping and swimming (Province of British Columbia 2011d).

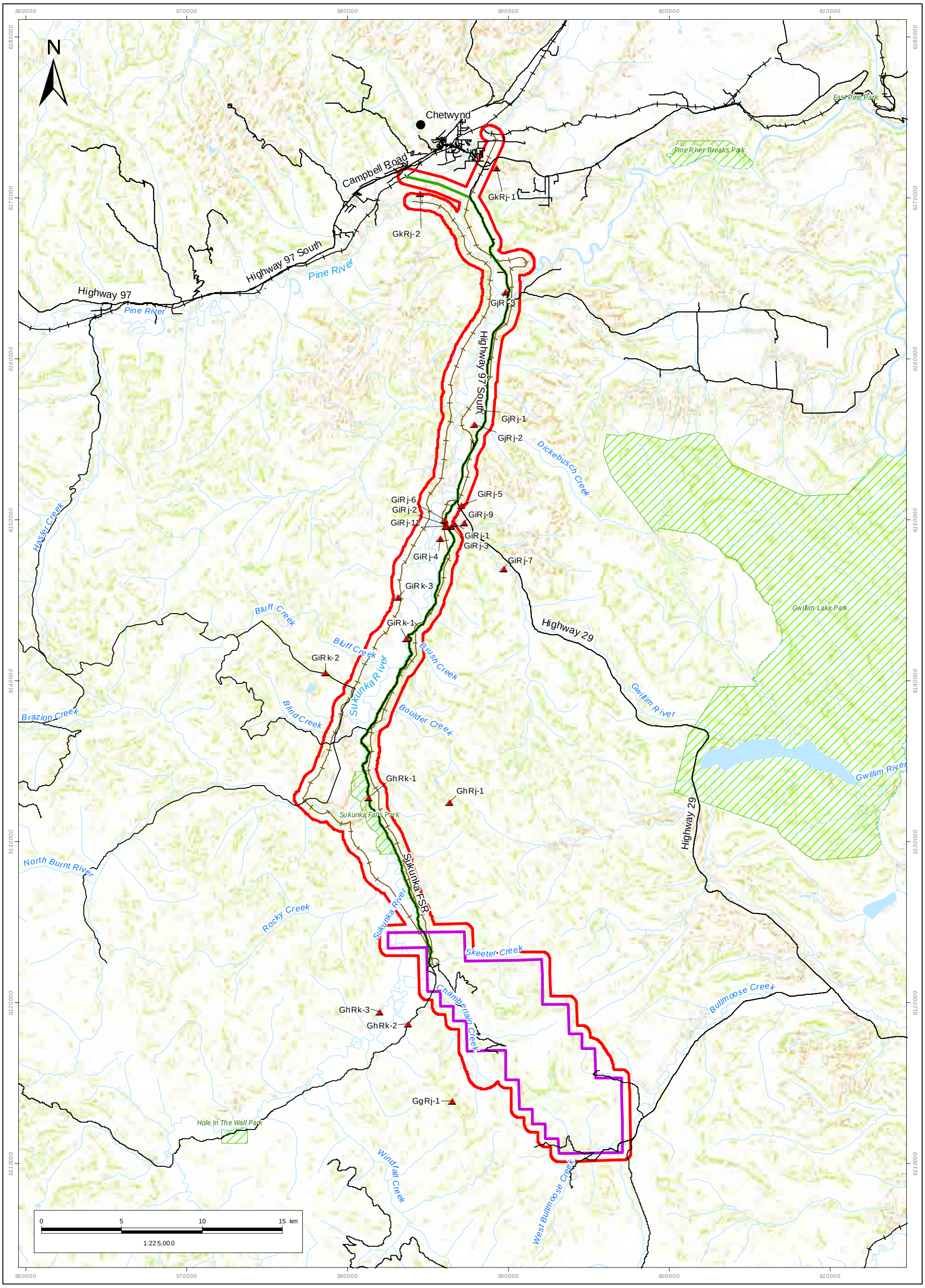
4.4.3 Archaeology

Archaeological evidence indicates that human occupation of northeastern British Columbia has been continuous for approximately the last 11,000 years. At the end of the Wisconsin Glacial Episode, as the Laurentide and Cordilleran ice sheets receded from the British Columbia landscape, small groups of people traveled along the eastern slopes of the Rocky Mountains. Newly re-established flora and associated reintroduction of fauna following glaciation (often concentrated along the shores of proglacial lakes and major waterways) provided resources for hunter-gatherer populations. Archaeological evidence of early human occupation has been recovered from a number of sites in northeastern British Columbia, including: Charlie Lake (Fladmark et al. 1984, 1988), Pink Mountain (Wilson 1989), the Halfway River Valley (Wilson and Carlson 1987) and the Trutch-Sikanni Chief River area (Walde 1994).

With a decrease in parkland-like habitat after approximately 5,500 years before present (BP), bison populations declined and were replaced by rich populations of moose and elk (Fladmark 1996). Small mammals and waterfowl were abundant at this time, allowing inhabitants to maintain a non-sedentary lifestyle focused on the exploitation of seasonal resources and small game. The decline in bison populations occurred over a relatively short time period; however, and there was a significant technological shift from large lanceolate spear points when bison were regularly hunted, to weapons and devices adapted to the hunt of smaller game (Handley 1993; Burley et al. 1996).

The most prevalent archaeological sites in the northeast British Columbia region consist of lithic scatters. Lithic scatters are sites comprised of stone tools, stone tool fragments, and debitage (the discarded fragments of stone that are produced when stone tools are manufactured). These stone artifacts may be found scattered across the ground surface or may have been buried since their original deposition. These sites may vary from a single, isolated artifact (a stone arrowhead, knife, or hide-scraper, for example) to extensive scatters of hundreds of tools, tool fragments and debitage.

Archaeological studies conducted within the Sukunka project area are numerous and have primarily involved site surveys and archaeological impact assessments for the oil and gas, forestry and mining industries. In general, most of the archaeological sites recorded near the Sukunka project area are surface lithic scatters and are located adjacent to major water features. No archaeological sites have been recorded within the Sukunka project tenure area though three have been recorded within 5 km. Fourteen archaeological or heritage sites have been identified within 2 km of the proposed Sukunka Valley rail haul route (see Figure 4.4-1). The potential impacts to these sites will be a factor when selecting a final preferred haul route.



Legend

- City/Town/Village
- Road
- Railway
- Watercourse
- Waterbody
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park
- Archaeological Potential Region 1
- Archaeological Potential Region 2

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

ARCHAEOLOGY LOCAL STUDY AREA

Sources: Xstrata, Stantec, BC Government HRIA

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 09-JAN-13	PROJECTION: UTM 10	DRAWN BY: T. CARDINAL
FIGURE ID: 12310482-007	DATUM: NAD 83	CHECKED BY: R. SPADY

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.4-1**

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4.4.4 Economic Setting

The proposed Sukunka Project falls entirely within the PRRD, and it is anticipated that it will source much of its human resources, supplies and services from within this region.

The PRRD is endowed with a range of natural resources including hydro and wind power, coal, oil and gas, forests, mining and agricultural lands. The economy of the PRRD is driven largely by the resources sector, with the oil and gas and mining sectors having replaced forestry as the principal economic drivers in recent years.

The socio-economic baseline will describe the communities and rural areas most likely to be influenced by the Sukunka Project. The District of Chetwynd is likely to be influenced by the Sukunka Project, since coal would be transported to a load-out point on the CN Rail mainline west of Chetwynd. Fort St. John and Dawson Creek are the large commercial centers within the PRRD. It is anticipated that all three of these communities will provide labour, supplies and services to the Sukunka Project. Other communities within the PRRD potentially affected by the Sukunka Project are Taylor, Tumbler Ridge, and Pouce Coupe. A summary of First Nations and Aboriginal communities potentially affected by the Sukunka Project is provided in Section 4.3.

4.5 Land Use Setting

Land use in northeastern British Columbia is among the most diverse in the province. The land use local study area (LSA) for the Sukunka Project is shown on Figure 4.5-1. Oil and gas activities, mining, tourism, forestry, agriculture, and recreational activities all take place to some degree within the region.

The LSA for land and resource use is based on the largest area in which there is potential for direct interaction between the Sukunka Project and other resource tenure holders. Private lands and rights holders have been identified based on the mine footprint and access corridors, plus a 1.5-km buffer.

4.5.1 Dawson Creek Land and Resource Management Plan

In March 1999, the Dawson Creek LRMP was approved by the Government of British Columbia to guide resource management of Crown land within the Dawson Creek Forest District. Economic development and outdoor and wilderness recreation experiences were deemed important by many residents of the area, and as a result, these initiatives were incorporated into the vision for the management plan (Province of British Columbia 1999). The LRMP covers an area of approximately 2 M ha and with the exception of commercial fisheries, covers all of the major resource uses (e.g., oil and gas, mining, hydroelectricity, forestry, agriculture, tourism and recreation).

Other than within protected areas, overall resource management direction for all areas within the Dawson Creek LRMP are guided by 17 general management directions, which were developed based on the guiding principles established for the Dawson Creek LRMP planning area.

Chetwynd
East Pine Park
Pine River Breaks Park
Gwillim Lake Park
Sukunka Falls Park
Hole In The Wall Park
N
0 2.5 5 7.5 10 12.5 km
1:225,000
560000 570000 580000 590000 600000 610000
6180000 6170000 6160000 6150000 6140000 6130000 6120000 6110000

Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

LAND USE LOCAL STUDY AREA

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.5-1**

In addition to the General Management Direction, direction may be provided at the RMZ and subzone level. The Dawson Creek LRMP subdivides the Dawson Creek Forest District into 13 RMZs which fall into one of six provincial land use categories. RMZs guide land and resource development for the Dawson Creek LRMP, and were identified based on features such as topography, existing land use and access, agricultural land reserve boundaries, environmental concerns and resource values.

The RMZs within the Dawson Creek LRMP fall within the following five broad provincial land use categories:

1. **Agricultural/Settlement**—this provincial land use category includes land used or proposed for settlement, agricultural purposes or agriculturally compatible purposes (e.g., mineral exploration, oil and gas exploration, etc.).
2. **Enhanced Resource Development**—this provincial land use category is for lands where intensive resource development and enhancement may be permitted and/or encouraged.
3. **General Resource Development**—this provincial land use category is for lands managed while considering a broad range of resources. Resource development may take place, or even be encouraged, depending on the degree of potential conflict between proposed development and land use and/or values (i.e., environmental and conservation).
4. **Special Resource Management**—this provincial land use category is subdivided based on major resource values considered important within a given area and which should be examined critically prior to resource exploration and extraction. Although resource extraction in these areas is permitted, special consideration must be given to resource values of importance. Within the Dawson Creek LRMP the following resource values have been identified:
    - **Wildlife Habitat and Wilderness Recreation:** These areas have been identified as containing regionally or provincially valued fish and/or wildlife values and habitat. They may also contain commercial or non-commercial recreational opportunities.
    - **Major River Corridors:** These areas are major rivers or river valleys where resource exploration and extraction are permitted but where special consideration must be given to minimize effects.
    - **Culture and Heritage:** These lands have been identified as having significant cultural or historical value.
5. **Protected Area**—All Goal 1 and Goal 2 lands proposed for protection under the Protected Areas Strategy. Mining, as well as other types of development, are not permitted within this Provincial land use category.

The Sukunka land and resource use LSA intersects seven different RMZ types in the Dawson Creek LRMP area:

- Enhanced—South Peace RMZ

- General—East Slopes RMZ
- General—Multi Value Foothills RMZ
- Special—River Corridor RMZ
- Settlement RMZ
- Sensitive Area RMZ (Sukunka Lousewort)
- Existing Park RMZ (Sukunka Falls Park)

4.5.2 Private Property and Residences

The Sukunka land and resource use LSA crosses three separate settlements where private land may be affected: Chetwynd, Chetwynd South and Tidwell Bend. From preliminary desktop studies, the closest residence is located 28 km north of the north boundary of the Sukunka project tenure area in the Sukunka Valley transportation corridor.

4.5.3 Mining

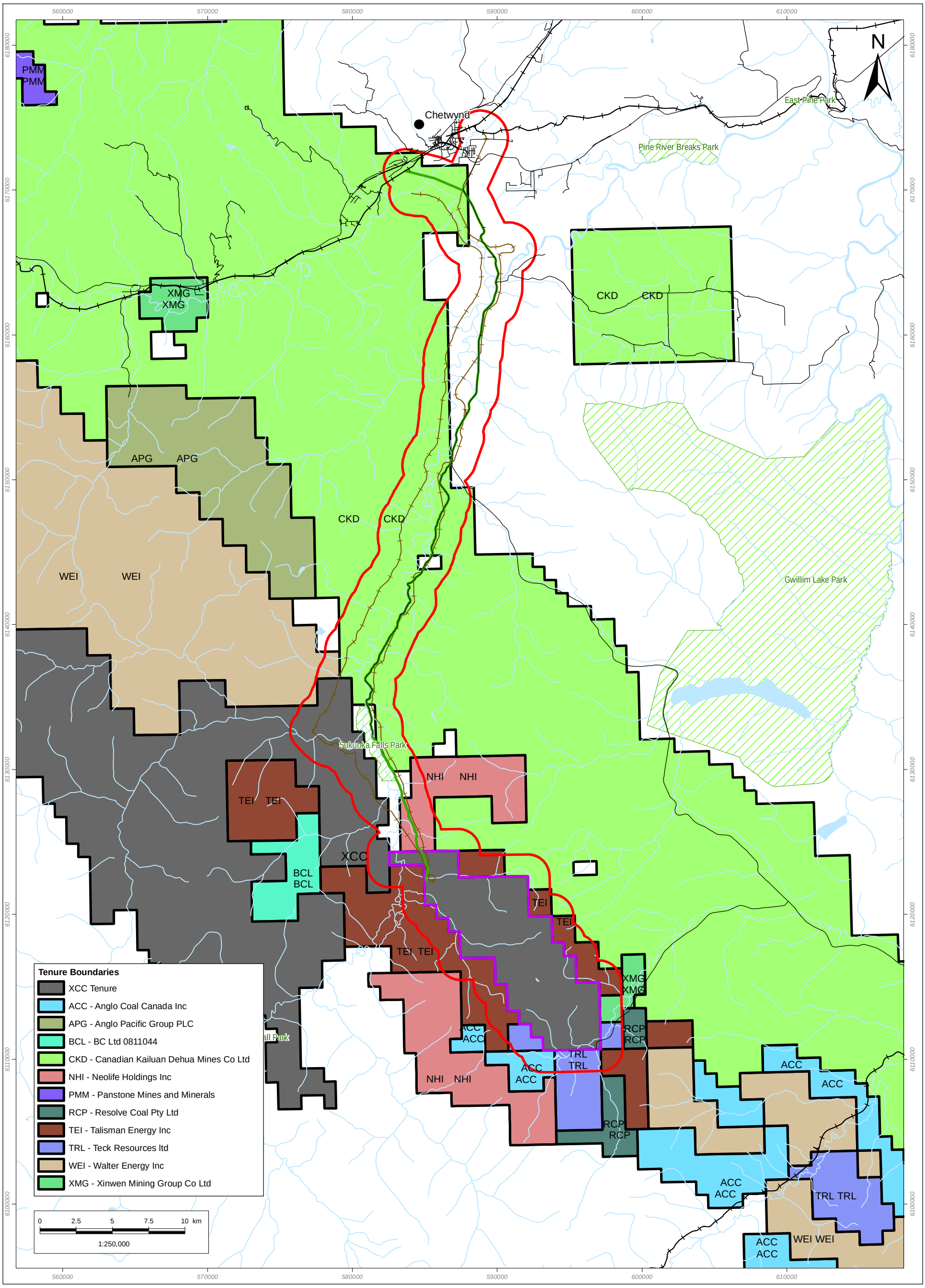
Much of the industrial activity within northeast British Columbia continues to be dominated by mineral exploration and mining, which provides an indication of the baseline conditions within the Sukunka project area. A wide range of mineral development activities have occurred, or are being proposed, in the region and are summarized below. Section 9.1 provides details on past, present and future mining activities in the area.

4.5.3.1 Mineral Rights

Mining tenures in the LSA (Figure 4.5-2) are held by Walter Energy Inc., Teck Resources Ltd., Neolife Holdings Inc., Dunlevy Energy Inc.), Cline Mining Corp., Canadian Dehua International, and Talisman Energy Inc.

4.5.4 Oil and Gas

In recent years, the oil and gas sector has contributed substantially to the economic development of northeast British Columbia. The Dawson Creek LRMP recognizes the abundance of oil and gas resources in the area, and one of its objectives is to provide opportunities for oil and gas exploration, development and transportation. There are 78 oil and gas tenures within the LSA, and 5 active oil and gas wells. These wells are operated by Talisman (4), and Northstar Offshore Group (1). Oil and gas pipelines in the LSA are also operated by Talisman Energy Inc., Plateau Pipeline Ltd., ConocoPhillips Canada Operations Ltd., Westcoast Energy Inc., and Westcoast Transmission Company Ltd. Oil and gas facilities within the LSA include test facilities (11), sales gas meters (3), central gas dehydrators (1), a central dehydrator compressor (1), a compressor station (1), a gas injection station (1), a gathering point (1), a gas plant (1), and a water disposal station (1). These facilities are operated by Exxon Mobil Canada Industry, Talisman Energy Inc., and Westcoast Energy Inc. (Spectra Energy). Figure 4.5-3 illustrates the location of the various oil and gas tenures, well sites, pipelines and facilities within the LSA.



Legend

- City / Town / Village
- Road
- Railway
- Watercourse
- Provincial Park
- Local Study Area
- Sukunka Project Tenure Area

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

MINING TENURES

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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DATE: 08-JAN-13	PROJECTION: UTM 10	DRAWN BY: R. CAMPBELL
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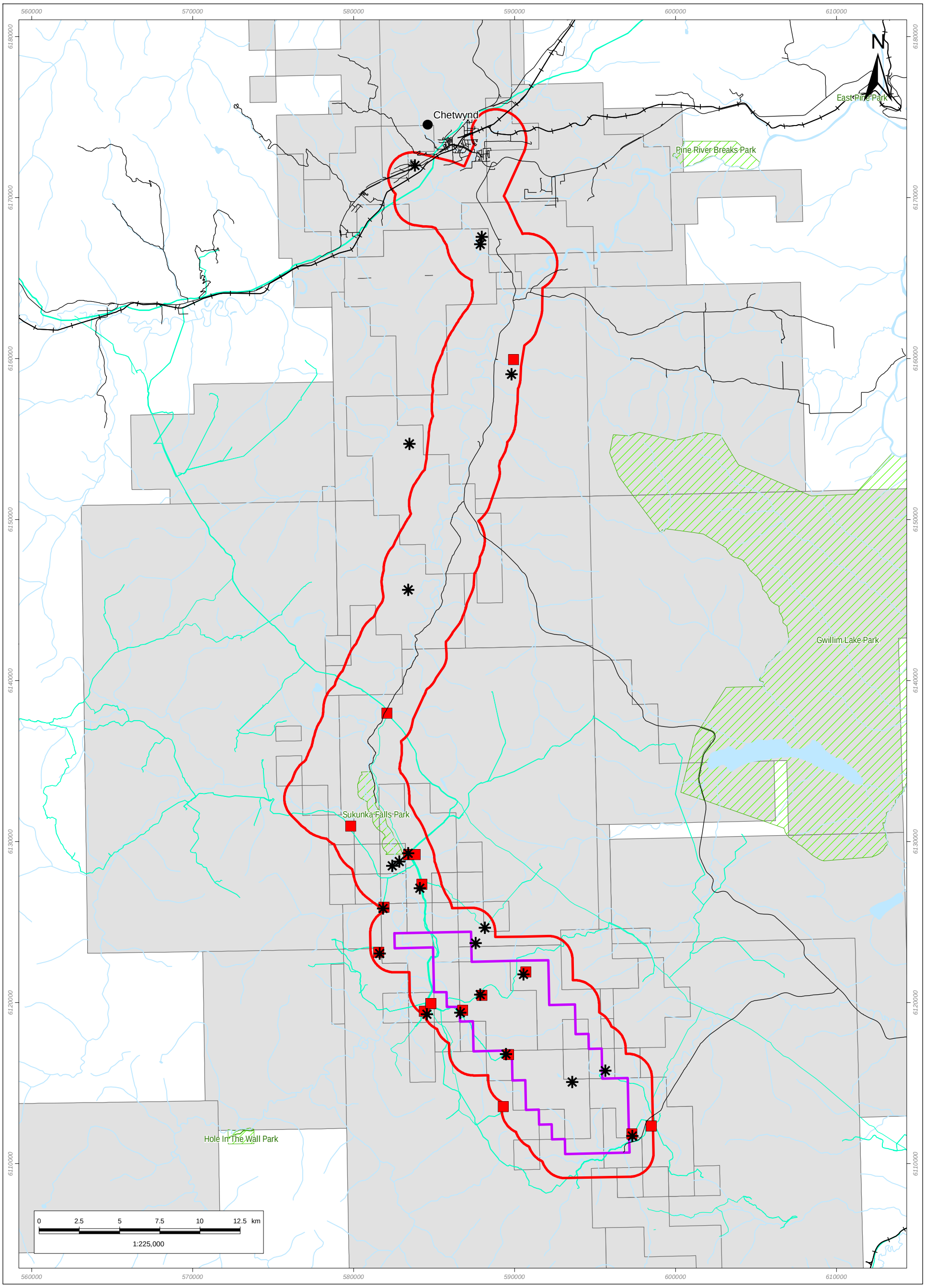
PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.5-2**



Legend

- City / Town / Village
- Well Site (OGC)
- Facility Location (OGC)
- Road
- Railway
- Watercourse
- Pipeline
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park
- Petrolium and Natural Gas Tenure

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

OIL AND GAS INFRASTRUCTURE IN THE LAND USE LOCAL STUDY AREA

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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4.5.5 Forestry

The Sukunka Project falls within the 2.28 M ha Dawson Creek Timber Supply Area (DC TSA). It encompasses the communities of Dawson Creek, Hudson's Hope, Chetwynd and Tumbler Ridge. The total allowable annual cut for the TSA is 1.86 mm^3 with interior spruce, lodgepole pine, subalpine fir, aspen and balsam poplar making up the dominant tree species (BC MOF 2002).

Approximately 60 percent of the DC TSA land base is considered productive forest, 52 percent of which is available for timber harvesting under current forest management assumptions (BC MOF 2002). There are 1,765 ha of active BC Timber Sales (BCTS) forest cut blocks within the LSA, operated by Canadian Forest Products Ltd., Tembec Industries Inc., Wayne Picard, West Fraser Mills Ltd., and Western Coal Corp. A number of forest service roads are also located in the LSA.

4.5.6 Public Recreation and Tourism

The region provides ample opportunity for residents and tourists to enjoy outdoor activities through the use of parks, recreation sites and trails, and roaded and non-roaded areas. Outdoor activities for the region include mountain-biking, all-terrain-vehicle use, horseback riding, hiking, spelunking, hunting, camping, boating, cross-country skiing and snowmobiling. Recreational sites intersected by the LSA intersect the Chetwynd Snowmobile Trail System, Cowmoose Mountain, Sukunka Falls Provincial Park and Martin Falls.

4.5.6.1 Fishing

A number of lakes and rivers in the area provide opportunities for recreational fishing in northeastern British Columbia. Species commonly found include lake trout, Arctic grayling, northern pike, walleye and bull trout (Province of British Columbia 2012).

4.5.6.2 Hunting and Guide Outfitting

Hunting and guide outfitting provides outdoor recreational opportunities and contributes to the local economy. Hunting by First Nations is also valued culturally, socially and economically, and is a Treaty Right under Treaty 8 (AANDC 2010).

Non-residents of British Columbia wishing to hunt big game in British Columbia must be accompanied by a licensed Guide Outfitter. Guide outfitting in British Columbia is estimated to contribute $116 M to the British Columbia economy (Guide Outfitters Association of British Columbia 2012). The LSA intersects with two guide outfitting tenure areas, totalling 50,103 ha.

4.5.6.3 Trapping

Approximately 1,500 trapping licences are issued each year in British Columbia, with trapping contributing approximately $1 M to the provincial economy (Service BC Ministry of Labour and Citizen's Services 2005). The Sukunka project LSA overlaps 11 trap line tenures, totaling 50,103 ha in area. Trapping by First Nations is also valued culturally, socially and economically and a Treaty Right under Treaty 8.

4.5.7 Agriculture and Ranching

Approximately 15 percent of the land within the British Columbia Agricultural Land Reserve (ALR) is located within the Dawson Creek planning area; however, the majority of the ALR land in the planning area has low agricultural capability, which is best suited for forage crops (Dawson Creek LRMP 1999). Approximately 12,230 ha of land within the LSA is ALR. Use of range land in this area is largely limited to use by wildlife.

4.5.8 Infrastructure ROWs

Infrastructure found within the LSA includes rail lines, paved roads, forest service roads, trails, bridges and oil and gas pipelines. Table 4.5-1 provides the length linear infrastructure within the LSA.

Table 4.5-1 Infrastructure within the Sukunka Project LSA

Type of Infrastructure	Kilometres within the LSA
Oil and Gas Pipelines	257.7
Railway	13.5
Gravel Road 1 Lane	199.5
Gravel Road 2 Lane	101.4
Overgrown Road	13.5
Paved Road 1 Lane	0.1
Paved Road 2 Lane	53.1
Paved Road 3 Lane	2.7
Rough Road	382.9
Gravel Road 1 Lane	199.4
Bridge	0.8
Trail	21.5
Total Distance	**1,246.1**

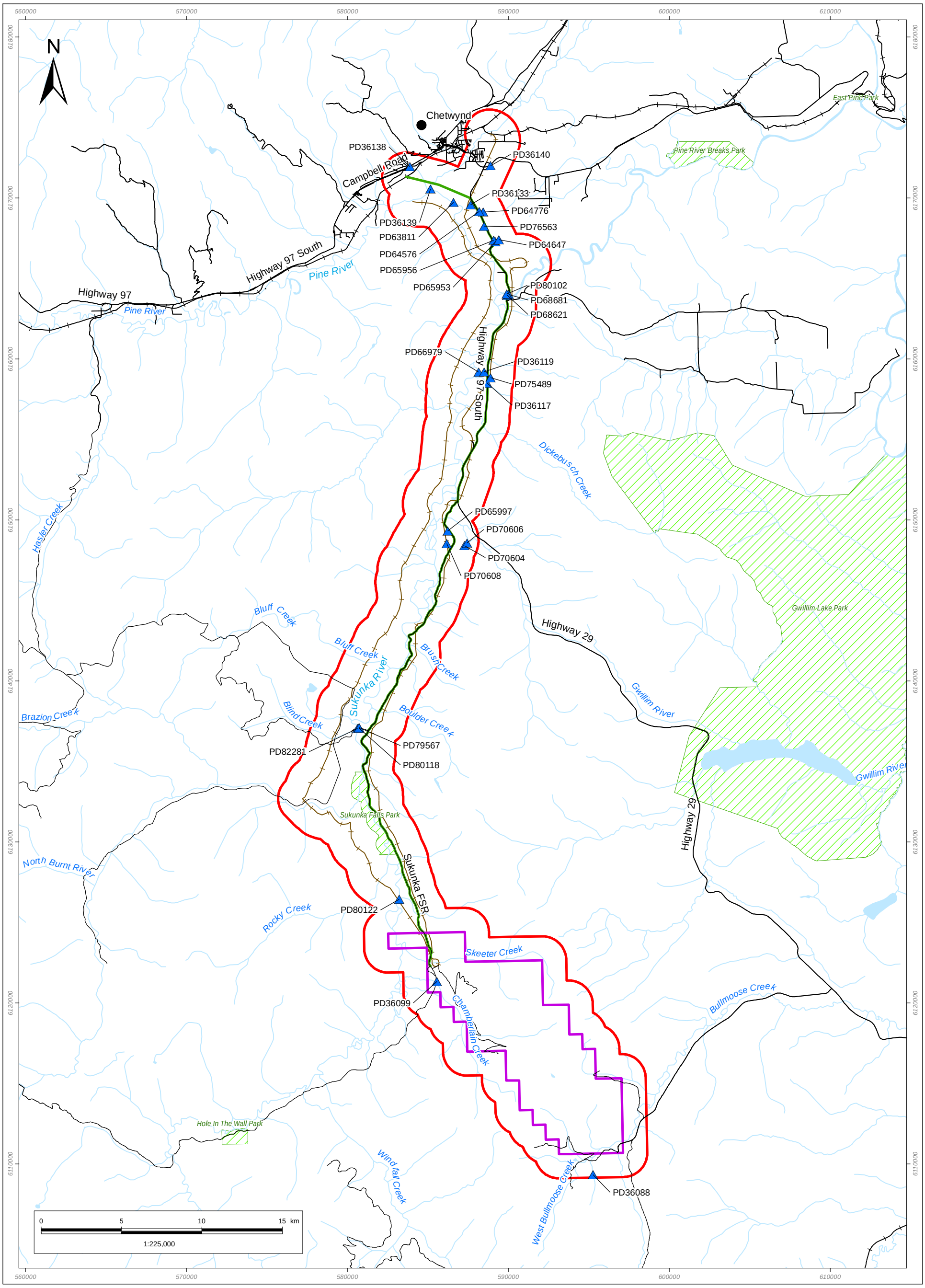
4.5.9 Water Rights

In order to divert and use surface water within the province of British Columbia, a license or approval from the Ministry of Environment (MOE) must be obtained. A total of 30 licensed points of water diversion are found in the land and resource use LSA in the following watercourses: Amber, Howes, Mavis, O'Casey, Rondow, Shadwell, Westgate and ZZ (36098) Springs; Fernando, Shollenburg, Twig, Wilfred and Windrem Creeks; Ki, Yian and Ki Yian Brooks; and the Pine and Sukunka Rivers (Table 4.5-2). Water license holders both within or near the Sukunka tenure area, and along potential access corridors could be affected by the Sukunka Project. Two water licenses, PD36099 on ZZ Spring in the northwest part of the tenure area, and PD80122, located on the Sukunka River 2 km north of the Sukunka Project, could potentially be affected by coal mine operations. Eleven water license holders, located at various distances north of the Sukunka tenure area, may temporarily be

affected by the construction of access Option A (Rail—Sukunka Valley), and potential expansion of the Sukunka FSR to accommodate access Option B (Sukunka FSR/ Highway 29) (Table 4.5-2).

Table 4.5-2 Water Licenses Proximate to Sukunka

Water License	Watercourse / Distance Downstream from Sukunka Tenure Area
PD36099	ZZ Spring/Within tenure area
PD80122	Sukunka River/2 km north
PD82281, PD80118 and PD79567	Sukunka River /13 km north
PD65997 and PD70608	Sukunka River/27 km north
PD66979 and PD 36119	Tributary to Sukunka River/36 km north
PD80102, PD 68621 and PD68681	Pine River/41 km north
PD36139	Sukunka River/49 km north



Legend

- City/Town/Village
- Road
- Railway
- Watercourse
- Waterbody
- Local Study Area
- Sukunka Project Tenure Area
- Provincial Park

Haulage Options

- Option A - Rail Sukunka Valley
- Option B - Sukunka FSR/ Highway 29
- Water Licensing Diversion Point

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

WATER LICENCE DIVERSION POINTS

Sources: Xstrata, Stantec, BC Government HRIA

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **4.5-4**

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5 REGULATORY FRAMEWORK

5.1 Provincial Environmental Assessment Requirements

The BCEAA provides the legal framework for provincial environmental assessments of major projects that fall within thresholds defined under the *Reviewable Projects Regulation*, or which are otherwise determined to be reviewable under the Act. It is anticipated that the Sukunka Project will be subject to review under the BCEAA, as the anticipated production capacity of 7.5Mt/y is greater than the threshold of 250,000 t/y or more of coal listed in Table 6, Section 1(1) of the Reviewable Project Regulations.

5.1.1 Scope of the Assessment

The scope of assessment will include consideration of the potential for social, economic, environmental, heritage (including archaeological and traditional use) and health effects and measures that could be used to avoid or mitigate adverse effects. It is anticipated that the scope of assessment will also include consideration of potential adverse effects of the proposed Sukunka Project on First Nations treaty rights and other interests.

5.2 Federal Environmental Assessment Requirements

It is anticipated that the Sukunka Project would be subject to an EA pursuant to CEAA as the Sukunka Project's production capacity exceeds the threshold identified in *Regulations Designating Physical* Activities Section 15(d) which states that "The construction, operation, decommissioning and abandonment of a coal mine with a coal production capacity of 3,000 t/d or more". The Sukunka Project will have a production capacity of 6 Mt/y (or 16,400 t/d).

Under CEAA the federal environmental assessment focuses on potential adverse environmental effects that are within federal jurisdiction, including:

- Fish and fish habitat
- Other aquatic species
- Migratory birds
- Federal lands
- Effects that cross provincial or international boundaries
- Effects that impact on Aboriginal peoples, such as their use of lands and resources for traditional purposes
- Changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project

No federal financial support for the Sukunka Project is proposed or anticipated, and no federal lands will be used for carrying out the Sukunka Project. The closest Federal lands to the Sukunka Project are reserves. The East Moberly Lake 169 reserve is located 62 km north of the north tenure area boundary and Hominka 11 reserve is located 66 km southwest of the southwest tenure area boundary. No interprovincial or international effects are anticipated.

XCC understands that based on the federal legislation changes currently in progress, the CEA Agency will coordinate and lead the federal review.

Since the Sukunka Project is expected to trigger both provincial and federal review processes, it is expected to undergo an assessment that is managed as cooperatively as possible and following the Canada-BC Environmental Assessment Cooperation Agreement.

5.2.1 Scope of the Assessment

The federal environmental assessment of this project will focus on the environmental effects on changes that may occur to the environment as stated in Section 5(1) of the CEAA.

5.2.1.1 Fish and Fish Habitat

The assessment of potential impacts on fisheries will be driven by water use and water quality management at the mine site and construction of stream crossings along the Sukunka FSR and the preferred coal transportation routes. Chamberlain, Skeeter and Bullmoose creeks and their smaller, unnamed tributaries, are located in the Sukunka project area. The three creeks are classified as fish streams with Chamberlain and Bullmoose creeks supporting trout species and all three creeks supporting other fish species.

The current plans for water supply include harvesting water on site by creating dams and possibly extracting groundwater. In addition to this, water extraction may be required from Chamberlain Creek or Sukunka River during periods of high flow. There is also the potential for diversion of a Skeeter Creek tributary around the Nose pit, the diversion of a Chamberlain Creek tributary around the southwest part of the Window pit and the diversion of a Bullmoose Creek tributary around the east side of the Saddle Creek pit. Effective planning and environmental management will minimize negative impacts on the fisheries resources in the immediate area.

The road and rail haul route options for the Sukunka Project will require several stream crossings. It is likely that authorizations from the Fisheries and Oceans Canada and from Transport Canada under the *Navigable Waters Protection Act* will be required for these crossings.

5.2.1.2 Migratory Birds

The potential effects on migratory birds will be primarily caused by the removal of vegetation for the construction of the Sukunka project components such as the transmission line and the transportation routes. Breeding bird and waterfowl surveys have been conducted to identify migratory birds occurring or potentially occurring in the wildlife LSA. An exhaustive list of identified migratory birds will be provided in the Application/EIS and in the appended technical data reports. The Application/EIS will identify measures to avoid or mitigate the potential for adverse effects on

migratory birds and their nests and will comply with the requirements of the *Migratory Birds Convention Act*.

5.2.2 Federal Permits and Authorizations

The Sukunka Project may require a permit under the SARA if the Sukunka Project is determined to have an effect on habitat for species listed on Schedule 1 of the SARA. This will become clearer as project design details develop and overlaps between proposed project infrastructure and identified habitat are better understood. All efforts to avoid contact with SARA species will be considered during the mine design.

Since authorizations will likely be required from Fisheries and Oceans Canada, Transportation Canada and NRCan, it is anticipated that an environmental assessment will also assess the potential impacts linked to these federal decisions.

The open-pit mine will require blasting on a regular basis to expose the coal seams targeted for mining. Accordingly, explosives would be manufactured and stored on site, requiring an explosive factory license from NRCan under the *Explosives Act*.

The Sukunka Valley rail haul route and potential alternative routes may trigger a requirement for regulatory authorizations under the federal *Railway Safety Act, Canada Transportation Act*, and involvement of the *Canada Transportation Act*.

Because the Sukunka Project may also require a federal agency or department to issue a permit or authorizations, additional changes as a result of the Sukunka Project may be included in the EA.

6 PERMITTING

A detailed list of British Columbia provincial and federal authorizations, licences, tenures and permits that may be required for the operation and construction of the proposed Sukunka Project is included in Appendix A.

7 CONSULTATION AND ENGAGEMENT

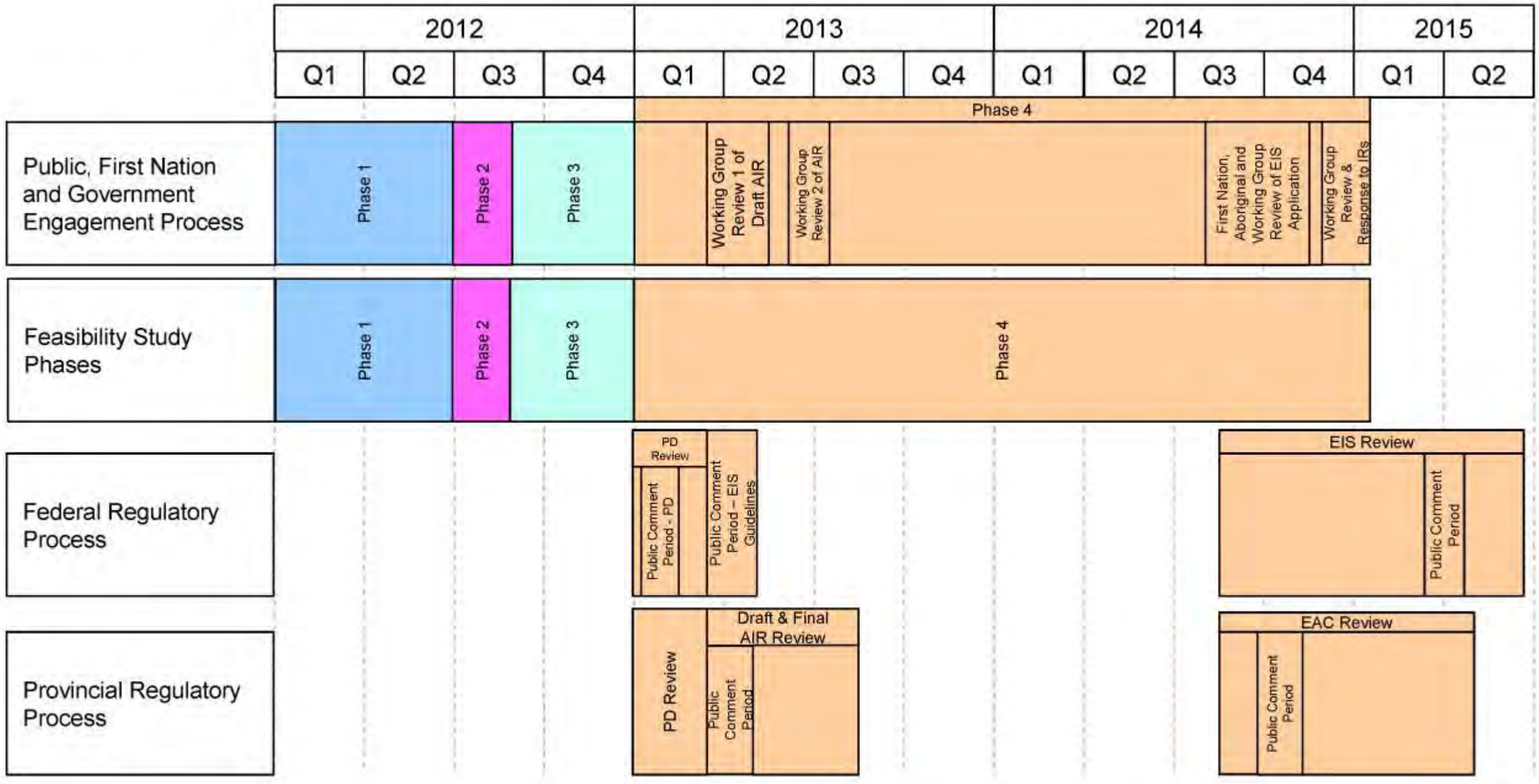
To date, XCC has provided an overview of the Sukunka Project to the following groups; federal, provincial and municipal agencies, WMFN, McLeod Lake First Nation, SFN, HRFN, DRFN. Most of the feedback to date has been positive and XCC has committed to continuing with regular updates to identify each group.

In the future, XCC may engage through the Métis Nation British Columbia and the Kelly Lake Métis Settlement Society during the environmental assessment as appropriate.

7.1 Project Engagement Plan and Phases

The Community Engagement Strategy is continuing to develop as XCC learns more about the provincial and federal governments' planned consultation approaches and through engagement with First Nations and Aboriginal groups, tenure holders and the public. XCC's efforts with the local community and potentially affected First Nations and Aboriginal groups thus far have been very successful in developing strong relationships. A summary of the draft engagement plan is provided below.

The Engagement Plan consists of a phased approach that is reflective of the level of engagement and consultation appropriate for each stage of the Sukunka Project, ensuring evolving expectations and requirements of the provincial and federal agencies are met. Consultation with First Nations, Aboriginal groups, agencies, tenure holders and the public will be implemented in accordance with four project phases as described below. Alignment of these phases with the regulatory process is shown in Figure 7.1-1.



NOTES:
EIS = Environmental Impact Statement
EAC = Environmental Assessment Certificate
AIR = Application Information Requirements
PD = Project Description
IR = Information Request

Figure 7.1-1 Sukunka Project Timeline for Engagement Phases

7.1.1 Phase 1: Introduction to XCC and Proposed Exploration Program

Phase 1 consultation occurred in the first half of 2012. This early engagement focused on introducing the company and project to First Nations, Aboriginal groups, regulatory agencies, tenure holders, the public and other interested parties (i.e., trappers, road users, and oil and gas companies). Objectives of early engagement were to establish collaborative working relationships and to identify issues and concerns related to the proposed Sukunka Project. The scope of consultation included reviewing proposed drilling/exploration activities.

7.1.2 Phase 2: Project Concept Design/Preliminary Economic Assessment

Phase 2 consultation occurred in Q3. 2012 and First Nations and Aboriginal groups were consulted on the mine plan concept. Preliminary issues of interest to First Nations and Aboriginal groups are discussed in Section 7.2.4.

The key objective of this phase was to inform First Nations, Aboriginal groups, regulatory agencies, tenure holders and the public about the new mine concept in order to engage with them on issues of potential concern. This Phase was conducted in parallel with the commencement of the environmental assessment process.

7.1.3 Phase 3: Prefeasibility

Phase 3 began in Q4. 2012 and the key objectives of this phase is to increase the level and scope of engagement with First Nations and Aboriginal groups, public and local/provincial/federal governments in preparation of a Project Description to BC EAO and CEA Agency. Consultation from the first two phases is summarized in Section 7.4 and Section 7.5. Additional consultation will be summarized in subsequent submissions of EA documents.

7.1.4 Phase 4: Feasibility

The fourth and final phase of consultation with First Nations, Aboriginal groups, and stakeholders will be more formalized through the establishment of the Working Group (WG) under the BCEAA. The WG, co-chaired by the BC EAO and the CEA Agency, will be made up of representatives from provincial and federal government agencies, First Nations and Aboriginal groups, local governments and stakeholders. Working Group members will have the opportunity to bring up potential concerns about the Sukunka Project throughout the EA. Most of the First Nations, Aboriginal groups and stakeholders with an interest in the area will have already been consulted about the Sukunka Project; therefore, any unforeseen issues raised by unknown individuals and groups are expected to be minimal.

The key objectives of this phase are to implement the consultation program to meet provincial and federal EA requirements. Scope of consultation will also include XCC's corporate community initiatives and may include the development of a Community Reference Group.

7.2 Aboriginal Consultation and Engagement

7.2.1 Aboriginal Engagement Strategy

7.2.1.1 Phase 1

In early engagement, discussion topics with First Nations and Aboriginal groups covered a wide range of issues such as business opportunities, training and employment, consultation protocols, and capacity funding. These issues were raised at the initial meeting with Chief and Council and it is expected that they will continue to be discussed in subsequent meetings. Members of First Nations and Aboriginal groups were invited to continue to participate in the environmental surveys being conducted for the Sukunka Project.

7.2.1.2 Phase 2

Phase 2 consultation provided conceptual details of the mine concept to First Nations and Aboriginal groups prior to engaging BC EAO and the CEA Agency with a proposed Project Description. A desired outcome was to have First Nations and Aboriginal groups' issues and technical expertise incorporated into a new mine concept/design.

7.2.1.3 Phase 3

The third phase builds on the activities initiated in the previous two phases. Consultation during the prefeasibility phase has begun and will focus on maintaining a working relationship and provide First Nations and Aboriginal groups with updates about the Sukunka Project as more details become available from the prefeasibility study.

7.2.1.4 Phase 4

Concurrent to the consultation activities under BCEAA and CEAA, XCC will provide requested information and responses to inquiries to the Working Group and maintain direct consultation with First Nations and Aboriginal groups.

Ongoing engagement and consultation activities that will enable the sharing of information and maintaining a dialogue between XCC and the First Nations and Aboriginal groups are proposed in **Error! Reference source not found.** below.

Table 7.2-1 Engagement and Consultation Activities

Task Number	Task Name	Activity
1	Chief and Council Meetings	Annual meetings with Chief and Council to occur prior to start of exploration season. Present to Chief and Council exploration activities proposed for upcoming year as well as an update of the prefeasibility work underway Agenda to include other activities currently underway in support of the prefeasibility work, as well as environmental baseline programs to encourage First Nations participation

Task Number	Task Name	Activity
2	Site Tours	Annual site tours for Chief and Council and community members to keep them informed of the exploration program and to maintain familiarity with the Sukunka Project
3	Employment/ Economic Opportunities	Discuss and provide employment and economic opportunities to the First Nations at the start of each exploration season
4	Communication Materials	Communication materials will be developed and distributed to First Nations to provide updates about the exploration program as well as developments related to the prefeasibility study Communication materials will include: ▪ Project information website ▪ Project Fact Sheet ▪ Public notices
5	Community Open Houses	Broader consultation with First Nations members will be required to collect community's perspectives and opinions about the Sukunka Project and potential effects
6	Support for Environmental Programs	Environmental baseline programs are ongoing and assistants from each of the First Nations have participated in the environmental baseline data collection program. Providing First Nations with opportunities to participate will not only build capacity and experience, but will provide employment opportunities
7	Participation Agreements	Initiate negotiations for Participation Agreements

7.2.2 Information Sharing and Consultation Initiatives Undertaken with First Nations and Aboriginal Groups

Agreements for the Sukunka Project are in various stages of negotiation with MLIB, SFN, HRFN and WMFN, although it is worth noting that there is a Memorandum of Understanding in place with the MLIB, a Participation Framework Agreement in place with SFN and a draft Participation Framework Agreement in place for HRFN relative to XCC's nearby Central South Project. There have been initial discussions with First Nations about using a phased approach for the drilling program; initial drilling could be completed in areas that are already disturbed by forestry activities, roads, oil and gas exploration or previous drilling activity and a wider program to further develop the geological model if needed. This approach has been well received by groups including the MLIB, SFN and HRFN.

With regard to reclamation planning, XCC has proposed the following:

- Trail disturbance will be completed on accesses to discourage ungulate, predator and motorized traffic
- Tree planting will be completed prior to the addition of any shrubs so that they are not outcompeted
- Shrub planting will be completed once the trees are sufficiently established

There has been general positive support for this approach to rehabilitation.

7.2.3 Information Sharing and Consultation Initiatives Planned with Potentially Affected First Nations and Aboriginal Groups

XCC has initiated engagement with First Nations and Aboriginal groups in the area regarding coal development to encourage cooperation and communication, to introduce and provide information on the Sukunka Project, and to understand and begin to address their interests and concerns. XCC has committed to working with First Nations and Aboriginal groups during the development of the Sukunka Project and will continue to engage with them throughout the EA process and through the life of the mine.

Error! Reference source not found. provides a summary of ongoing and proposed engagement nd consultation activities.

7.2.4 Key Issues Raised to Date

Key issues raised to date by First Nations are:

- Employment and training opportunities
- Support for First Nation communities
- Financial support for resources such as land officers
- Potential effects on caribou habitat and other wildlife due to habitat loss and increased predation from vegetation clearing and disturbance from project activities including road use
- Water management

Key issues for Métis community members will likely include, but not be limited to:

- Potential effects on wildlife, fish and plant health and abundance due to habitat loss from vegetation clearing, watercourse diversions and construction surface disturbances
- Potential effects on water quality and quantity from project discharges, seepage (e.g., tailing storage facility), water diversion and management
- Protection of Métis access to important hunting and gathering sites which may be affected by access restrictions during active mining
- Protection of the health, safety, and Aboriginal rights of Métis community members

7.3 First Nations and Aboriginal Environmental Assessment Requirements

The objectives of consultation include:

- Providing information on the Sukunka Project to potentially affected First Nations and Aboriginal groups
- Identifying and discussing potential project interactions with First Nations' and Aboriginal groups' land and resource use

- Identifying opportunities for First Nations and Aboriginal groups to engage with XCC on the Sukunka Project
- Identifying First Nations' and Aboriginal groups' issues of concern and interest

An important objective of consultation efforts is to examine how the Sukunka Project may impact the exercise of Treaty 8 rights and/or Aboriginal rights and interests, and to identify strategies that could be used to avoid or mitigate such impacts. As well, the Aboriginal groups at Kelly Lake may have Aboriginal rights or interests in the Sukunka project area.

As will be set out in more detail in the Consultation Plan, XCC will report on and respectfully consider all assertions of treaty and Aboriginal rights and other interests.

The Application/EIS will be based on all available information acquired during the pre-Application phase (prior to entering the environmental assessment process, and during the environmental assessment process prior to the Application/EIS) and will:

- Identify past, present and anticipated future uses of the proposed Sukunka project area by the First Nations and Aboriginal groups
- Identify any specific asserted Aboriginal Rights (including title) that XCC may receive from the groups themselves or other sources
- Identify the potential effects of the proposed Sukunka Project on the use and availability of land and resources for the purpose of exercising treaty rights (in the case of First Nations that are adherents to Treaty 8) or Aboriginal rights
- Identify the potential effects of the proposed Sukunka Project on First Nation and Aboriginal culture
- Incorporate appropriate measurable parameters for addressing potential effects of the proposed Sukunka Project on First Nations and Aboriginal groups
- Describe mitigation measures to avoid or reduce effects of the Sukunka Project on treaty and Aboriginal rights
- Incorporate both scientific and traditional knowledge in the assessment of potential effects of the Sukunka Project and in the development of mitigation measures

The spatial boundaries for the assessment will reflect, in part, First Nations and Aboriginal community advice on the exercise of treaty and Aboriginal rights. The Consultation Plan will set out opportunities for First Nation and other Aboriginal groups to articulate the geographic scope of their treaty and Aboriginal rights. The temporal boundaries for the assessment will encompass historical, current and intended or future uses of land for the exercise of treaty and Aboriginal rights. The assessment will incorporate traditional knowledge and traditional land use in the development of assessment criteria and mitigation options.

Over the course of consultation during the pre-Application and Application/EIS review periods it may become apparent that measures to accommodate treaty rights and/or Aboriginal rights are

necessary. XCC, BC EAO and potentially affected Aboriginal groups will consult further on accommodation measures, if necessary.

7.4 Public and Stakeholder Engagement

The public engagement plan will also be implemented through a four phased approach that is reflective of the level of engagement and consultation appropriate for each stage of the Sukunka Project, ensuring evolving expectations and requirements of the provincial and federal agencies are met. As with First Nations and Aboriginal groups, consultation with agencies, tenure holders and the public will be implemented in accordance with the following project phases.

7.4.1 Public and Stakeholder Engagement Strategy

7.4.1.1 Phase 1

During baseline studies in Q2, Q3, and Q4 of 2012, land uses and land users were identified from local media, public records and interviews. Engagement with land users identified specific types and areas used, and this information will inform mine design and potential mitigation strategies. Early engagement with land users such as trappers, guide outfitters and recreational users minimizes land use conflicts during early stages of exploration. Identifying areas of interest for both XCC and land users increases both parties' awareness of each other's activities in the area.

7.4.1.2 Phase 2

XCC has continued to engage land users to ensure they are informed and updated about the Sukunka Project as information became available about the mine plan concept throughout the third and fourth quarters of 2012. During this phase land users had the opportunity to provide feedback on the Sukunka Project.

7.4.1.3 Phase 3

XCC has begun Phase 3 consultation and provided information about its mine plan concept to municipal governments closest to the Sukunka Project, including the District of Chetwynd and PRRD. Phase 3 consultations with local government consists of information sharing to assist with preliminary issues identification with the Mayor, Council and city planners.

7.4.1.4 Phase 4

XCC will provide information through a variety of communication mechanisms including updates on a project websites, Community Open Houses hosted by XCC, meetings and direct correspondence where appropriate. During this phase, XCC will inform the public about the proposed Sukunka Project with respect to jobs, employment opportunities, housing needs, power options, access and transportation. The Community Open Houses will provide opportunities for community members to express their perspectives and opinions about the Sukunka Project and the potential effects.

The public will also have opportunities to provide input on the Sukunka Project through open houses led by BC EAO during comment period of the review process. The public can also provide comments

and identify issues through BC EAO's web-based Project Information Centre where all project related documents submitted to BC EAO are posted. Local municipal governments will continue to be involved through the WG to review the Sukunka Project. Lastly, a long-term sustainable development strategy will be made available to stakeholders in the form of a Community Reference Group if enough stakeholders are interested in working with XCC.

7.4.2 Information Sharing and Consultation Initiatives Undertaken with the Public and Stakeholders

XCC has initiated discussion with the public and other stakeholders. No significant issues have been raised thus far. Discussions that have raised some initial concerns are described in Section 7.4.4.

During the baseline data collection program XCC has engaged with local land owners regarding access to their land and the proposed Sukunka Project.

7.4.3 Information Sharing and Consultation Initiatives Planned with the Public and Stakeholders

Tenure holders and the public will be interviewed to assess the potential impacts of the Sukunka Project on their areas of interest or expertise. Public open-houses, news announcements and targeted communications are planned throughout the EA process and are intended to meet the requirements of both BCEAA and CEAA.

7.4.4 Key Issues Raised to Date

Most of the feedback received to date has been positive and limited to issues with access to private land for environmental baseline studies. A log of all communications including any issues raised is being kept on an on-going basis. The key issue raised to date is

- Chetwynd Township—there is already limited accommodation in Chetwynd and there is hesitancy for investment given that the area has experienced "boom-bust" cycles. A strategy to address accommodation shortages will be required for the Sukunka Project.
- Popular snowmobile area—there are some popular snowmobile trails near the Sukunka Project. The snowmobilers normally park further north than the Sukunka project area, but some publically advertised trails extend down to near the northwest side of the Sukunka project area.

7.5 Agency Engagement

7.5.1 Agency Engagement Strategy

XCC will need to apply for permits, licences, approvals and authorizations to construct and operate the mine and associated infrastructure. Consultation with provincial agencies in Phase 3 will be to identify required permits and approvals before requesting for concurrent permitting in Phase 4.

Consultation with the BC EAO and the CEA Agency in Phase 3 will be to establish how the BCEAA applies to XCC's proposed Sukunka Project.

Therefore, consultation with federal departments in Phase 3 will introduce the proposed Sukunka Project in order to: 1) identify required federal approvals, and 2) determine level of review appropriate for XCC's Sukunka Project.

7.5.1.1 Provincial Consultation

Consultation with provincial agencies will be carried out under the BCEAA process, led by the BC EAO and WG. Provincial permitting, licensing and approval processes may proceed concurrently with the BCEAA review, or be initiated following the issuance of the EAC. XCC must apply in writing for concurrent review of applications for other regulatory approvals (including copies of the completed applications and evidence that the applications have been properly filed with appropriate regulatory agencies) within seven days of BC EAO accepting an application for EAC.

7.5.1.2 Federal Consultation

Consultation with the federal government agencies will be carried out throughout the environmental assessment process. In most situations, the activities will occur concurrently with consultation with the provincial agencies either though WG meetings or other appropriate venues, as the key steps in the CEAA process are similar to the provincial BCEAA process. Wherever possible, CEA Agency representatives have worked closely with the BC EAO to ensure harmonization of consultation and technical review efforts.

In cooperation with the BC EAO and its provincial EA process, the CEA Agency coordinates the review of the Sukunka Project and makes recommendation concerning the Sukunka Project to the Minister of the Environment under the CEAA process.

7.5.2 Information Sharing and Consultation Initiatives Undertaken with Agencies

To date XCC has provided an overview of the Sukunka Project to the following agencies:

- Mayor of Chetwynd, Chetwynd Chamber of Commerce
- BC Ministry of Transportation and Infrastructure
- BC Ministry of Energy, Mines and Natural Gas
- BC Ministry of Forests, Lands and Natural Resource Operations

Office of the Premier XCC applied for a Notice of Work for the Sukunka Phase 1 exploration program in July 2012. XCC has also participated in the BC MOE's Caribou Management Planning process for the Northern Peace as a member of the Mining Association of British Columbia.

7.5.3 Information Sharing and Consultation Initiatives Planned with Agencies

Information-sharing and consultation initiatives that XCC plans to undertake with agencies are described in Table 7.5-1, Table 7.5-2 and Table 7.5-3.

Table 7.5-1 Federal Government Phase 3 Consultation Tasks

Task Number	Task Name	Scope of Work
1	CEA Agency	Consult with CEA Agency to introduce the proposed Sukunka Project and determine level of review, information requirements and establish ongoing dialogue associated with the submission of the Project Description
2	DFO	Discuss and consult with Fisheries and Oceans Canada harmful alteration, disruption, or destruction related issues to determine if authorization is required under the *Fisheries Act*
3	Transport Canada	Discuss and consult with Transport Canada water crossings related issues to determine if authorization is required under the *Navigable Waters Protection Act*
4	Environment Canada	Discuss and consult with Environment Canada metal mining effluent related issues to determine if authorization is required under the *Fisheries Act*

Table 7.5-2 Provincial Government Phase 3 Consultation Tasks

Task Number	Task Name	Scope of Work
1	BC EAO	Submission of the Project Description to BC EAO and development of a working group. Also discussion of other related permits
2	Energy and Mines	Discuss and consult with Ministry of Energy and Mines to identify permit required under the *Mines Act* in order to construct and develop the proposed Sukunka Project
3	Forests, Lands and Natural Resource Operations	Discuss and consult with Ministry of Forests, Lands and Natural Resource Operations to identify permits in order to construct and develop the proposed Sukunka Project
4	Environment	Discuss and consult with Ministry of Environment to identify permits required under the *Waters Act* in order to construct and develop the proposed Sukunka Project

Table 7.5-3 Local Government Phase 3 Consultation Tasks

Task Number	Task Name	Scope of Work
1	Mayor and Council	Meet with Mayor and Council to introduce the Sukunka Project. Presentation to include an overview of the Sukunka project timeline (construction and development; environmental assessment and permitting). This will allow council and planners to prioritize development with respect to housing, infrastructure and social services over the next few years in anticipation of the proposed Sukunka Project
2	Open Houses	Open Houses scheduled for second half of prefeasibility stage when more information is available about the proposed Sukunka Project with respect to jobs, employment opportunities, housing needs, power options, access and transportation Open Houses will collect community's perspectives and opinions about the Sukunka Project and potential effects

8 POTENTIAL PROJECT EFFECTS

The information collected to date has been used to identify potential environmental and social issues that will be considered in the environmental assessment of the proposed Sukunka Project. Information collected during ongoing baseline studies and through consultation with First Nations, Aboriginal groups, agencies and stakeholders will be used to further refine these key issues.

It is anticipated that the scope of the EA for the Sukunka Project will include consideration of the potential environmental, social, economic, health and heritage effects and potential effects on First Nations and Aboriginal groups' rights and interests. The assessment will also identify and evaluate practical means of preventing or reducing to an acceptable level, any potential adverse effects of the Sukunka Project, while maximizing benefits wherever possible.

8.1 Potential Key Issues or Effects

A preliminary list of potential issues or effects is presented in Table 8.1-1

Table 8.1-1 Preliminary list of Potential Issues or Effects

Environmental Component	Issue/Potential Effect
Aquatics	
Water Quality and Aquatic Biota	Deviations from background levels of metals, turbidity and nutrients can potentially occur in the Sukunka River watershed due to seepage and discharges associated with project activities. Similarly, increases in metal concentrations and shifts in benthic communities may also occur in these watersheds
Fish and Fish habitat	Fish habitat quality and quantity may be affected by the Sukunka Project. Entry of sediment-laden water to fish habitat as a result of surface disturbances during construction increases the turbidity and causes deterioration of habitat quality

Environmental Component	Issue/Potential Effect
	Direct effects on the existing watercourses as a result of construction of various mine components (open pit, processing plan, water management plan components, etc.) may affect the availability of habitat quantity Alteration of instream flow in watercourses in the Sukunka project area as a result of the site water management plan may cause a decrease in the quantity and quality of available fish habitat Groundwater level and groundwater flow reductions as a result of the site water management plan could be included as a potential effect with an impact to stream flow (base flow) and fisheries
Fish and Fish habitat	Potential effects of the proposed Sukunka Project on existing fish habitat (i.e., direct effects on watercourses and effects on habitat quantity) may reduce productive capacity
Fish and Fish Habitat	Fish habitat quality and quantity may be affected by construction of stream crossings. Entry of sediment-laden water to fish habitat increases the turbidity and causes deterioration of habitat quality Direct effects of construction of watercourse crossing structures (i.e., bridges) on the existing watercourses may affect the available habitat quantity
Fish and Fish Habitat	Potential effects of the proposed Sukunka Project on physical habitat (i.e., direct effects on fish habitat as a result of construction of crossing structures may reduce productive capacity)
Terrestrial	
Terrain stability	Disturbance of the ground surface through construction, operation and decommissioning of all access roads, mine sites and staging sites could have the potential to impact the natural stability of the ground. Alterations to natural drainage patterns from any of the mine infrastructure (e.g. access roads, pits, tailing, etc.) may result in an increase in landsliding and/or sediment erosion
Terrain	Loss of critical terrain features (i.e., fluvial systems, eskers, wetlands) caused by construction and operation of the various mining infrastructure (e.g. access roads, pits, tailing, etc.) and changes to terrain integrity as expressed through terrain stability
Terrain	Slope and Terrain stability may affect some elements of the Sukunka Project, including road, rail mine pit, underground gallery and rock stock pile locations during the entire length of the Sukunka Project (i.e. construction, operation and decommissioning). Potential for subsidence may also affect underground gallery locations
Soils	Potential for an adverse change in soil productivity as it relates to reclamation and agriculture
Vegetation	Loss of vegetation due to clearing and grubbing associated with Sukunka Project activities
Vegetation	Changes in abiotic conditions necessary for vegetation development due to the direct effects of ground disturbance and the indirect effects of changes to hydrological conditions (i.e., drainage patterns, water quality and quantity)
Vegetation	Changes in the structure, composition or function of vegetation communities due to the direct effects of clearing and a variety of indirect effects occurring in edge areas adjacent to project disturbance and areas of activity (e.g., vegetation management, dust deposition, wind throw, introduction of invasive species)
Wildlife	Change in habitat availability due to vegetation clearing for the Sukunka Project and sensory disturbance from project activities during construction and operations

Environmental Component	Issue/Potential Effect
Wildlife	Change in wildlife population dynamics due to alteration of predator prey relationships and cumulative landscape changes associated with vegetation clearing in the tenure area and along the transportation routes and the transmission line
Wildlife	Change in wildlife mortality risk associated with vegetation clearing and potential interactions with traffic associated with transportation routes
Wildlife	Change in wildlife movement patterns as a result of the project activities and infrastructure, including sensory disturbances
Wildlife	Change in wildlife health
Human Environment	
Human Health	Degradation of ambient air quality as a result of CAC emissions from the use of diesel powered vehicles and other diesel generators can lead to potential inhalation-based health effects to local people.
Human Health	Deposition of contaminant-laden dust into the terrestrial environment from blasting, coal hauling/processing and equipment and earth movement can lead to potential uptake by humans through incidental soil ingestion and consumption of local plants and animals.
Human Health	Discharge of mine-affected waters, effluents and non-intentional release of such waters through seepage and leakage into the surrounding groundwater and surface waters, leading to potential health effects to humans consuming local waters. This may occur through the release of process water for coal washing, seepage from coal storage and waste rock stockpiles and storm water discharges from the site.
Human Health	Discharge of mine-affected waters, effluents and non-intentional release of such waters through seepage and leakage into the surrounding groundwater and surface waters, leading to potential health effects to humans consuming local country foods connected trophically to aquatic systems. This may occur through the release of process water for coal washing, seepage from coal storage and waste rock stockpiles and storm water discharges from the site.
Ecological Health	Deposition of contaminant-laden dust into the terrestrial environment from fugitive coal dust and road dust emissions may potentially lead to uptake by local vegetation leading to adverse effects in plant populations or in herbivorous birds and mammals or their predators
Heritage Resources	Damage to or destruction of terrestrial archaeological or heritage sites as a result of ground disturbing construction activities (grading, trenching, excavation, terraforming, blasting, vehicle/heavy machinery traffic)
Heritage Resources	Destruction of CMT sites as a result of clearing and/or grubbing during construction activities
Atmosphere	
Snow	Drifting snow near the Sukunka project infrastructure may have wildlife interactions as it may change the forage cover and available movement corridors. Drifting snow downwind of the Sukunka project infrastructure also has the potential to reduce operational efficiency for the open pit mining and transportation
Snow	Future climate change on the Sukunka Project: over the life of the Sukunka Project, there is the potential that future climate could change due to anthropogenic greenhouse gas emissions, and influence project operations and also influence the effects of the Sukunka Project on the environment
Air Quality	Trains and trucks will have air emissions; trucks will be associated with fugitive road dust

Environmental Component	Issue/Potential Effect
	emissions; and there is the potential for fugitive coal dust emissions from all three types of transportation (rail, road and conveyor).
Air Quality	Coal mines are a source of GHG emissions (primarily from on-site transportation, stationary fossil fuel combustion and waste), which are understood to affect global climate
Noise	Sukunka Project noise emissions will result from overburden removal, coal extraction, material handling, breaking and screening, conveying, and processing
Noise	Trains, trucks and conveyors will be sources of noise emissions

8.2 Other Potential Effects or Considerations

8.2.1 Water Quality

Deviations from background levels in water quality and aquatic biota due to the proposed Sukunka Project may be related to activities that are expected to occur in the Sukunka River watershed, potentially extending to the Pine River. Mitigation measures for management of parameters of concern will need to be developed, and will include source controls (management of selenium, potentially acid generating rock and blasting processes) and water management (collection ditches for contact water, sedimentation ponds, treatment if indicated). Both direct toxicity (sulphate, nitrate, metals) and bioaccumulation potential (selenium) to aquatic organisms will be considered in designing the mitigations. Information about mitigation measures, including potential treatment options, will be developed in the EA.

Selenium has been identified as a contaminant of potential concern in several coal mining operations, particularly in surface and groundwater, due to release from seleniferous waste rock. Therefore, this element is a regional element of concern for the receiving aquatic environments. Based on the mine plan, monitoring of water quality and aquatic biota is planned for the Sukunka River watershed, Wolverine River and Bullmoose Creek, to establish background conditions, in addition to the development of a selenium management plan for the watershed. Long term monitoring for project related effects in the receiving aquatic environment is planned.

8.2.2 Potential Social Effects

While the Sukunka Project would contribute to local and regional economic development, it has potential to affect the quality of life in a region that is only lightly populated. Potential socio-economic issues associated with the Sukunka Project may include, but are not limited to:

- Economic benefits for local and regional communities, First Nations and Aboriginal groups, including employment, business opportunities, and tax revenue
- Increase in labour demand
- Potential sensory disturbances such as noise affecting rural lifestyle values

- Potential effects from increased traffic along Highway 97 and local roads
- Potential effects on access, value, and use of private property
- Potential effects on use of traditional territories by First Nations and Aboriginal groups
- Potential effects on hunting and trapping
- Potential loss of merchantable timber
- Potential effects on tourism, business development, and recreational opportunities
- In-migration to local communities during both construction and operations phases
- Increased pressure on local accommodations and community, emergency, and health services
- Potential effects on visual landscape values
- Potential effects on navigable waters
- Potential cumulative effects

8.2.3 Potential Effects of the Environment on the Sukunka Project

Some elements of the environment have the potential to negatively affect the Sukunka Project development or operation.

8.2.3.1 Snow

Drifting snow at the proposed Sukunka Project near the waste rock stockpiles and other major infrastructure has the potential to cause operational delays to open pit mining and site transportation if it is not managed properly. Snow drifts may result from natural landforms and from landform changes associated with the Sukunka Project (e.g., open pits and waste rock stockpiles). Excess snow is expensive to remove and drifting snow can also result in visibility restrictions and operational delays caused by snow removal operations.

8.2.3.2 Terrain

Terrain, including topography, soil material and bedrock geology, plays a large role in the overall development of the proposed infrastructure and mine pits, especially from the perspective of slope stability and engineering design. Potential flooding along the Sukunka River and avulsion within the alluvial fans may impact road and infrastructure development in the valley bottoms, while steep, bedrock scree slopes have the potential to affect downslope activities. Debris slides and debris flows may occur within a number of the unnamed tributary streams of Sukunka River, Bullmoose Creek and the unnamed tributary streams—these could lead to road washouts on lower slopes and damage to bridge structures and other infrastructure.

9 ASSESSMENT OF ALTERNATIVES

XCC is aware that the approach to this project is not necessarily the normal approach as there are still many alternatives to carrying out the Sukunka Project that have not yet been narrowed down. However, this approach will allow the potential environmental effects to be a factor in the mine design and project planning processes. XCC is committed to completing a comprehensive environmental assessment of all potential alternatives; the Application/EIS will report, track and monitor the decision-making process and explain why alternatives were discarded or chosen as appropriate.

The EA process is a decision-making and planning tool that supports project impact assessment. This approach considers the evaluation of alternatives in the early stages of project planning before irrevocable decisions on the Sukunka Project are made to reduce or avoid potential environmental effects. The alternatives that will be considered will be technically and economically feasible ways the Sukunka Project can be implemented or carried out. This could include, for example, alternative locations, routes and methods of development, implementation and mitigation.

The assessment of alternative process will:

- Identify the alternative means to carry out the Sukunka Project
- Identify criteria to determine the technical and economic feasibility of the alternative means
- Describe each alternative means in sufficient detail
- Identify those alternative means that are technically and economically feasible
- Identify the environmental effects of each alternative means
- Identify the preferred means

XCC will use regulator comments, results from environmental analysis, First Nations and Aboriginal consultation, and public comments to evaluate the relative environmental impacts and their potential significance to determine the best alternatives.

All potential alternatives will be fully assessed up until a point where the particular alternative is deemed not technical or economically feasible or that the mine plan changes.

9.1 Potential Cumulative Effects

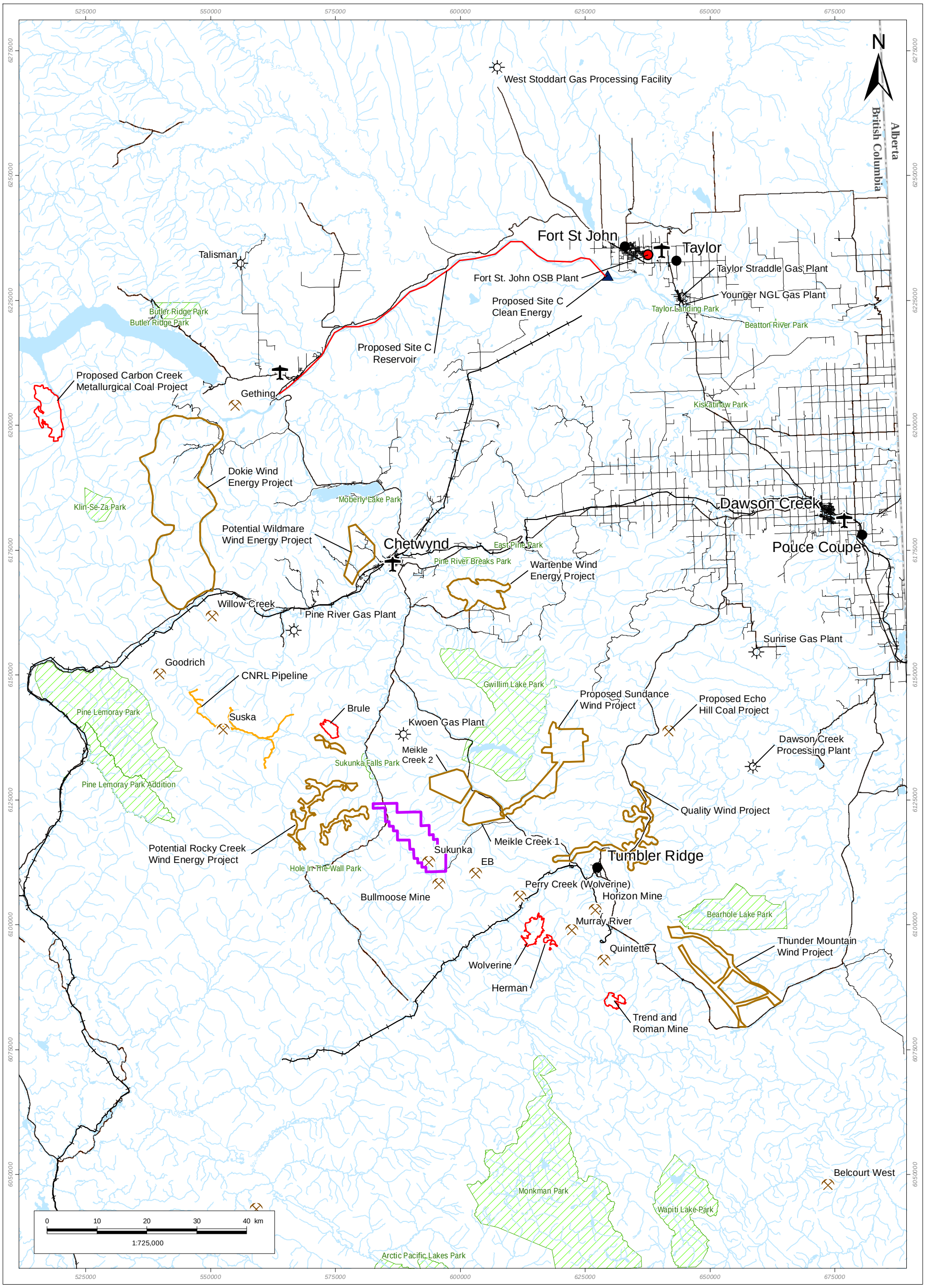
There has been widespread exploration and development of energy and mining projects that could interact with the proposed Sukunka Project.

Table 9.1-1 below provides a preliminary list of projects that could be included in a cumulative effects assessment for the proposed Sukunka Project (see Figure 9.1-1 for locations).

Table 9.1-1 Proposed, Current and Past Operations

Timing	Project Name	Proponent	Type of Project
Existing	Willow Creek Coal Mine	Western Canadian Coal (Walter Energy)	Coal mine
Existing	Perry Creek (Wolverine) Mine	Western Canadian Coal (Walter Energy)	Coal mine
Existing	Brule Mine	Western Canadian Coal (Walter Energy)	Coal mine
Existing	Trend Mine	Anglo American (Peace River Coal	Coal mine
Closed in 2000; could reopen in 2013	Quintette Coal Mine	Teck Coal	Coal mine
Potential	Gething Coal Project	Canadian Kailuan Dehua	Coal mine
Potential	Suska Coal Project	Xstrata Coal Canada	Coal mine
Potential	Carbon Creek Metallurgical Coal Project	Cardero Coal	Coal mine
Potential	Murray River Project	HD Mining	Coal mine
Potential	Hermann Mine Project	Western Canadian Coal (Walter Energy)	Coal mine
2014 to 2019	EB Pit Mine	Western Canadian Coal (Walter Energy)	Coal mine
Potential	Horizon Mine Coal Project	Anglo American (Peace River Coal	Coal mine
Potential	Roman Mountain Mine	Anglo American (Peace River Coal	Coal mine
Potential	Echo Hill Coal Project	Hillsborough Resources	Coal mine
Potential	Belcourt West Mine	Belcourt-Saxon Coal (Western Canadian Coal/Peace River Coal)	Coal mine
Cancelled	Goodrich/Central South Coal Mine	First Coal (XCC)	Coal mine
Closed	Bullmoose Mine	Teck Coal	Coal mine
Existing	CNRL Pipeline	Canadian Natural Resources	Natural gas pipeline
Existing	Pine River Gas Plant	Spectra Energy	Natural gas processing plant
Existing	Kwoen Gas Plant	Spectra Energy	Natural gas processing plant
Existing	West Stoddart Gas Processing Facility	Novagas Canada	Natural gas processing plant
Existing	Taylor Straddle Plant	Novagas Canada	Natural gas processing plant

Timing	Project Name	Proponent	Type of Project
Existing	Younger NGL Plant	Taylor Gas	Natural gas processing plant
Existing	West Stoddart Gas Processing Facility	Novagas Canada	Natural gas processing plant
Existing	Sunrise Gas Plant	ARC Resources	Natural gas processing plant
Existing	Dawson Creek Processing Plant	Spectra Energy	Natural gas processing plant
Potential	Talisman (88-I South) Gas Plant	Talisman Energy	Natural gas processing plant
Potential	Site C Clean Energy Project	BC Hydro	Hydro-electric power
Existing	Dokie Wind Energy Project	GE Energy/Plutonic	Wind power
Potential	Rocky Creek Wind Energy Project	Rupert Peace Power	Wind power
Potential	Wildmare Wind Energy Project	Finavera Renewables	Wind power
Potential	Meikle Wind Energy Project	Finavera Renewables	Wind power
Potential	Sundance Wind Project	Sundance Wind Project LP	Wind power
Potential	Quality Wind Project	Capital Power	Wind power
Potential	Thunder Mountain Wind Project	Thunder Mountain Wind	Wind power
Potential	Wartenbe Wind Energy Project	Avro Wind Energy	Wind power
Existing	Fort St. John OSB Plant	Slocan	Manufacturing (oriented strand board)



Legend

- Road
- Railway
- Provincial Border
- Watercourse
- Waterbody
- Provincial Park
- Fort St. John OSB Plant
- Proposed Site C Clean Energy Project
- Gas Plant Projects
- Mining Projects
- Sukunka Project Tenure Area
- Wind Projects
- CNRL Pipelines ROW
- Project Area

SUKUNKA COAL MINE PROJECT

PROJECT DESCRIPTION

PROPOSED, CURRENT AND PAST OPERATIONS IN THE PROJECT REGION

Sources:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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DATE: 17-JAN-13	PROJECTION: UTM 10	DRAWN BY: R. CAMPBELL
FIGURE ID: 123110482	DATUM: NAD 83	CHECKED BY: B. BYRD

PREPARED BY: Stantec

PREPARED FOR: xstrata coal

FIGURE NO: **9.1-1**

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APPENDIX A

Table of Permits and Authorizations

Table A-1 Environmental Permits and Authorizations that could be required for the Sukunka Coal Mine Project

Legislation	Regulator (Level of Government)	Purpose	Approval Period	EA Prep.	Post-EAC	Con.	Ops.
Environmental Permits							
Environmental Assessment Act	CEA Agency (Federal)	To predict the environmental effects of proposed initiatives before they are carried out	90 days plus 365 days (Government time only)	✓			
BC Environmental Assessment Act	BC EAO (Provincial)	The process provides for the thorough, timely and integrated assessment of the potential environmental, economic, social, heritage and health effects that may occur during the lifecycle of these projects, and provides for meaningful participation by First Nations, proponents, the public, local governments, and federal and provincial agencies	180 days (after application submission)	✓			
Land Act Permits							
Land Act	MFLNRO (Provincial)	Authorization to carry out feasibility level investigations of the proposed rail corridor		✓			
Archaeology Permits							
Heritage Conservation Act	MFLNRO – Archaeology Branch (Provincial)	Conduct a field study to assess the archaeological significance of land or other property	45 days	✓			
Heritage Conservation Act	MFLNRO – Archaeology Branch (Provincial)	Conduct a systematic data recovery (excavation) to recover information which might otherwise be lost as a result of site alteration or destruction	45 days	✓	✓		
Heritage Conservation Act	MFLNRO – Archaeology Branch (Provincial)	Authorizes the removal of residual archaeological deposits once the inspection and investigation are completed	45 days			If needed	
Fish and Fish Habitat Permits							
Fisheries Act	Fisheries and Oceans Canada (Federal)	Fish salvage for data collection	~ 10 days	✓		✓	
Wildlife Act	MFLNRO (Provincial)	Fish salvage for data collection	~ 21 days	✓		✓	✓
Fisheries Act	Fisheries and Oceans Canada (Federal)	Harmful alteration, disruption or destruction (HADD) for fish habitat	~ 60 days			✓	✓
Fisheries Act	Fisheries and Oceans Canada (Federal)	Operational statements for installing clear-span bridges, temporary stream crossings, bridge and culvert maintenance, overhead line construction, and riparian maintenance	~ 10 days			✓	✓
Waste / Hazardous Materials Management Permits							
Environmental Management Act	Ministry of Environment (Provincial)	Authorization to discharge waste under the *Environmental Management Act* for mining effluent (sediment, tailings and sewage, discharge from filter plant), air emissions (crushers, coal dryer), and refuse	6 – 12 months *			✓	✓
Environmental Management Act	Ministry of Environment (Provincial)					✓	✓
Environmental Management Act	Ministry of Environment (Provincial)	Open Burning Permit for land clearing activities				✓	
Environmental Management Act, Hazardous Waste Regulation	Ministry of Environment (Provincial)	For temporary storage of hazardous waste.		If needed		✓	✓
Safety Authority of BC	British Columbia Safety Authority (Provincial)	For building a new piece of gas equipment					
Environmental Management Act	Ministry of Environment (Provincial)	Authority to discharge sewage into holding tank or construct subsurface disposal system					
Water Management Permits							
Navigable Waters Protection Act	Transport Canada (Federal)	Authorizes the construction, placement, repairing or modification of any work which will substantially interfere with navigation in, over, under, through or across any navigable waterway	3 – 6 months*		If needed	If needed	

Legislation	Regulator (Level of Government)	Purpose	Approval Period	EA Prep.	Post-EAC	Con.	Ops.
Water Act	MFLNRO (Provincial)	Notifications are typically used for works that do not involve any diversion of water, may be completed within a short period of time and will have minimal impact on the environment or third parties	45 Days			✓	
Water Act	MFLNRO (Provincial)	An Approval is a written authorization for changes in and about a stream that are of a complex nature	140 Days			✓	
Water Act	MFLNRO (Provincial)	Short Term Water Use	140 Days	If needed		If needed	
Water Act	MFLNRO (Provincial)	Authority to divert and use surface water	140 Days	If needed		If needed	✓
Wildlife Permits							
Wildlife Act	MFLNRO (Provincial)	For possessing, taking or destroying a bird / nest	2 – 4 weeks				If needed
Wildlife Act	MFLNRO (Provincial)	Destroying beaver dams or muskrat dens	2 – 4 weeks			✓	
Wildlife Act	MFLNRO (Provincial)	For amphibian / small mammal capture and release	2 – 4 weeks	If needed	If needed	If needed	If needed

Table A-2 Exploration, Construction and Operational Permits and Authorizations that could be required for the Sukunka Coal Mine Project

Permit	Legislation	Regulator	Purpose	Approval Period	EA Prep.	Post-EAC	Con.	Ops.
Construction / mining permits								
Mine / Exploration Permits								
Notice of Work	*Mine Act*	Ministry of Energy and Mines (Provincial)	Coal exploration permits		✓	✓	✓	
Mine Plan and Reclamation Program Permit	*Mines Act*	Ministry of Energy and Mines (Provincial)	Approval of mining projects with respect to the *Mines Act* R.S.B.C. 1996, c. 293 (*Mines Act*) and its accompanying Health, Safety and Reclamation Code for Mines in British Columbia (Code)				✓	
Sand / Gravel Quarry Permit	*Mines Act*	Ministry of Energy and Mines (Provincial)	For the extraction of sand and gravel and/or quarry materials	<45 days			If needed	If needed
Coal Lease	*Coal Act*	Ministry of Energy and Mines (Provincial)	Provides surface right to occupy land for commercial mine production				✓	✓
Radio Licences	*Radio Communication Act*	Industry Canada (Federal)	License for radio frequencies for the project				If needed	
Land Use / Construction Permits								
Occupant Licence to Cut	*Forest Act*	MFLNRO (Provincial)	The right to harvest timber on Crown Land			✓	✓	
Special Use Permit	*Forest Act*	MFLNRO (Provincial)	Access road construction and maintenance on Crown land (off-tenure)				✓	✓
Free Use Permit	*Forest and Range Practice Act*	MFLNRO (Provincial)	Authority to harvest timber less than 50 m3 otherwise requiring an Occupant Licence to Cut					
Road Use Permit	*Forest Act*	MFLNRO (Provincial)	For use of existing roads				✓	✓
Forest Service Road	*Forest Act*	MFLNRO (Provincial)	For use of existing roads				✓	✓
Highway Access Permit	*Highway Act*	Ministry of Transportation (Provincial)	Highway access permits are required for all accesses				If needed	
License of Occupation	*Land Act*	Ministry of Energy and Mines (Provincial)	for Borrow and Gravel Pits; Staging Areas, power line right of way.	Varies			✓	✓
Surface Lease	*Land Act*	Ministry of Energy and Mines (Provincial)	Surface leases with property owners	Varies			✓	✓
Road Users Agreement	*Forest Policy*	MFLNRO (Provincial)	Shared maintenance costs and conditions of use for industrial users of permitted road				✓	✓
Crown Land Tenure	*Land Act*	MFLNRO (Provincial)	Authorization to conduct work on Crown Land				✓	✓
Approval to Connect to FSR's & PDR's	*Forest and Range Practices Act Road Use Regulation; Oil & Gas regulation*	MFLNRO & BCO&GC (Provincial)	Authority to connect to crown status road					
Pipeline Permits								
Pipeline Permit	*Pipeline Act*	BC Oil and Gas Commission (Provincial)	For pipeline construction				If needed	If needed
Approval to Decommission, Certificate	*Petroleum and Natural Gas Act*	BC Oil and Gas Commission (Provincial)	Approval for well and pipeline decommissioning and/or relocation.				✓	

Permit	Legislation	Regulator	Purpose	Approval Period	EA Prep.	Post-EAC	Con.	Ops.
of Compliance, Certificate of Restoration	*(PNGA)*							
Approval for Road Crossing of Pipeline	*Petroleum and Natural Gas Act (PNGA)*	BC Oil and Gas Commission (Provincial)	Approval required for crossing of pipeline right of way with road			✓	✓	
Railway Permits								
Railway Construction Permit	*Canada Transportation Act (CTA)*	Canadian Transportation Agency (CTA; Federal)	Approval to construct a railway line.			**98.** (1) A railway company shall not construct a railway line without the approval of the Agency		
Industrial Operating permit	Railway Safety Act (BC)	Registrar of railway safety (appointed by the BC ministry of transportation) (Provincial)	Demonstrate that the railway will operate in compliance with the adopted regulations, rules, and standards				If needed	
Rail Load-out Permits								
Crossing Agreement	*Transport Canada Act; Railway Safety Act*	CN Rail (Federal)	Agreement with CN Rail for culvert upgrade under rail line and power line crossing rail line				If needed	
Siding Agreement	*Railway Safety Act*	CN Rail (Federal)	Required to construction and operate railway siding; also delegate responsibility for operation				If needed	
Certificate to Operate Industrial Railway	*BC Railway Safety Act*	BC Safety Authority (Provincial)	Required to Operate Siding				If needed	
Rezone or Amend Regional By-Law	*Local Government Act; Regional District By-Law*	Peace River Regional District (Municipal)	Rezoning to Industrial use (if required)				If needed	
Transmission Line Permits								
Permit to Connect Powerline	*Safety Standards Act; Electrical Safety Regulation*	BC Hydro (Provincial)	Approval of plans to connect private powerline to the BC Hydro powerline at coal load-out.					
Right of Way	*Land Act*	MFLNRO (Provincial)	For transmission line construction and operations				✓	✓
Live Line Permits (LLP)	*Operating Order 1T-18*	BC Hydro (Provincial)	Must obtain permit if line work involves live lines as defined in the link					
Explosives Permits								
Explosives Magazine Storage and Use Permit	*Explosives Act*	Ministry of Energy and Mines (Provincial)	For explosive use and storage				✓	✓
Explosives User Magazine Licence	*Explosives Act*	Natural Resource Canada (Federal)	Storage of blasting explosives and any other type of industrial explosives				✓	✓

Permit	Legislation	Regulator	Purpose	Approval Period	EA Prep.	Post-EAC	Con.	Ops.
Mechanical Ammonium Nitrate & Fuel Oil (AN/FO) Certificate	*Explosives Act*	Natural Resource Canada (Federal)	Authority to produce AN/FO with powered equipment to discharge directly to borehole					
Factory Licence	*Explosives Act*	Natural Resource Canada (Federal)	Explosives Manufacture					✓
Approval	*Canada Transportation Act*	Transport Canada (Federal)	To store ammonium nitrate and ammonium nitrate mixed fertilizers				If needed	If needed
Camp Permits								
Camp Kitchen Health Permit	*Health Act*	Northern Health Authority (NHA) (Provincial)	responsibility of camp service provider				If needed	If needed
Camp Operation Permit	*Health Act*	Northern Health Authority (NHA) (Provincial)	Authority to operate camp				If needed	If needed
Domestic Water System Health Permit	*Public Health Act*	Northern Health Authority (NHA) (Provincial)	Approval for domestic water system for camp					