CARBON CREEK METALLURGICAL COAL PROJECT

PROJECT DESCRIPTION

Prepared by:

Cardero Coal Ltd.

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Glossary and Abbreviations

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

Abbreviation	Explanation
AEMP	Aquatic effects monitoring program
AIA	Archaeological impact assessment
AIR	Application information requirements
BC	British Columbia
BCEAA	British Columbia *Environmental Assessment Act*
bcm	Billion cubic metres
BEC	Biogeoclimatic ecosystem classification
BMP	Best Management Practices
BRFN	Blueberry River First Nation
BTU	British thermal units
Canfor	Canadian Forest Products Ltd
Cardero	Cardero Resource Corporation
CBG	Coal bed gas
CCME	Canadian Council of Ministers of the Environment
CCP	Carbon Creek Partnership
CCR	Coarse coal rejects
CDC	Conservation Data Centre
CEAA	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CGDL	Crown Granted District Lots
CIM	Canadian Institute of Mining
cm	Centimetres
CM	Continuous miner

CO	Carbon Monoxide
CPP	Coal Processing Plant
dBA	Decibels
DEMP	Decommissioning Environmental Management Plan
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment Application
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office (British Columbia)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ES	Executive Summary
ESSFmv	Engelmann Spruce-Subalpine Fir moist very cold (biogeoclimatic subzone)
FNEATWG	First Nations Environmental Assessment Technical Working Group
FSI	Free swelling index
FSR	Forest service road
GHG	Greenhouse gases
GIS	Geographic Information System
GSC	Geologic Survey of Canada
ha	Hectares
HADD	harmful alteration, disruption, or destruction
HCA	*Heritage Conservation Act*
HRFN	Halfway River First Nations
JCFSR	Johnson Creek Forest Service Road
JV	Joint venture
km	Kilometre
Kt	Kilotons
L	Litres
lb	Pounds
LRMP	Land and Resource Management Plan

LSA	Local study area
m	Metres
masl	Metres above sea level
MDRC	Mine Development Review Committee
MELP	Ministry of Environment, Lands and Parks
MEM	Ministry of Energy and Mines (British Columbia)
MEMPR	Ministry of Energy, Mines and Petroleum Resources
MFLNRO	Ministry of Forest, Lands and Natural Resource Operations (British Columbia)
mg	Milligrams
ML/ARD	Metal leaching/acid rock drainage
MLIB	McLeod Lake Indian Band
mm	Millimetres
MOE	Ministry of Environment (British Columbia)
MPMO	Major Projects Management Office
Mst	Million short tons
Mt	Million metric tons
Mtpa	Million metric tonnes per annum
mvB	Medium volatile bituminous
NAG	Non-acid generating
NI	National Instrument
NO_x	Nitrogen oxide
NRCAN	Natural Resources Canada
^oC	Degrees Celsius
OEMP	Operational Environmental Management Plan
PCI	Pulverized coal injection
PD-ES	Project Description-Executive Summary
PEA	Preliminary Economic Assessment
PEM	Predictive Ecosystem Mapping
PFS	Prefeasibility Study
PM	Particulate Matter

PRC	Peace River Coalfield
PRP	Peace River Partnership
PRRD	Peace River Regional District
PWFWCP	Peace/Williston Fish and Wildlife Compensation Program
RA	Responsible authority
RIC	Resource Information Committee
RMZ	Resource Management Zone
ROM	Run-of-mine
RSA	Regional study area
SARA	*Species at Risk Act*
SBSwk	Sub-Boreal Spruce wet cool (biogeoclimatic subzone)
Se	Selenium
SFN	Saulteau First Nation
SG	Specific gravity
SO_x	Sulphur Oxides
TEM	Terrestrial Ecosystem Mapping
TLFN	Takla Lake First Nations
TKD	Tsay Keh Dene
tpd	Tons (metric) per day
tph	Tonnes per hour
Trend	Trend Exploration Limited
TSS	Total Suspended Solids
TU/TK	Traditional Use/Traditional Knowledge
UWR	Ungulate winter range
VC	Valued Component
VEC	Valued ecosystem component
WHA	Wildlife habitat area
WHIF	Wetland Habitat Information Forms
WMFN	West Moberly First Nation

In this document, the following terms are also used:

"Carbon Creek JV"	The Carbon Creek Joint Venture, as described in Section 3.2.
"Project"	The planned development, construction, operation and reclamation of a coal mine and associated facilities with respect to the Carbon Creek Metallurgical Coal Deposit by the Carbon Creek JV.
"Property"	The lands which are the subject of the mineral tenures held by or to be transferred to the Carbon Creek JV, including any coal licenses/leases issued with respect to the existing applications for coal licenses and the coal lease over the crown granted district lots, all as described in Section 3.2.
"Project Lands"	The Property and any associated lands acquired for Project operations outside the Property (e.g., access and coal transportation routes, power transmission corridor and the coal load-out facility area).
"Project Area"	The Property and the general area surrounding it.

PROJECT DESCRIPTION - EXECUTIVE SUMMARY

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1. Introduction

The proposed Carbon Creek Project involves the development of a metallurgical coal mine with an anticipated average annual production rate of 4.3 million metric tonnes of clean coal once full production is achieved in 2020. The mine has a life of 20 years with a total of 78.4 Mt of clean coal produced. The Project is located in northeastern BC, approximately 40 km west of Hudson's Hope, south of Williston Reservoir, and 50 km north-northwest of Highway 97.

Metallurgical coal is less abundant than thermal coal and is used to produce coke, which is an integral component of the steel manufacturing process. World demand for high-quality metallurgical coal continues to grow to support industrialization in China, India, and many other countries. British Columbia is ideally positioned to satisfy this demand owing to the existence of high-quality coal deposits, an efficient transportation infrastructure for bulk commodity transportation, a skilled workforce and a stable political environment, to develop the province's vast coal resources. Development of the Carbon Creek coal deposits will contribute to expanding and sustaining local communities and will be economically beneficial to the province and the country as a whole.

The information contained in this Project Description is based in part on information provided in the November 2012 Prefeasibility Study. The proposed mine plan and design can be expected to evolve as more scientific and engineering information becomes available and as feedback from Government, First Nations and local communities is received.

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1.1 ENVIRONMENTAL ASSESSMENT REGULATORY CONTEXT

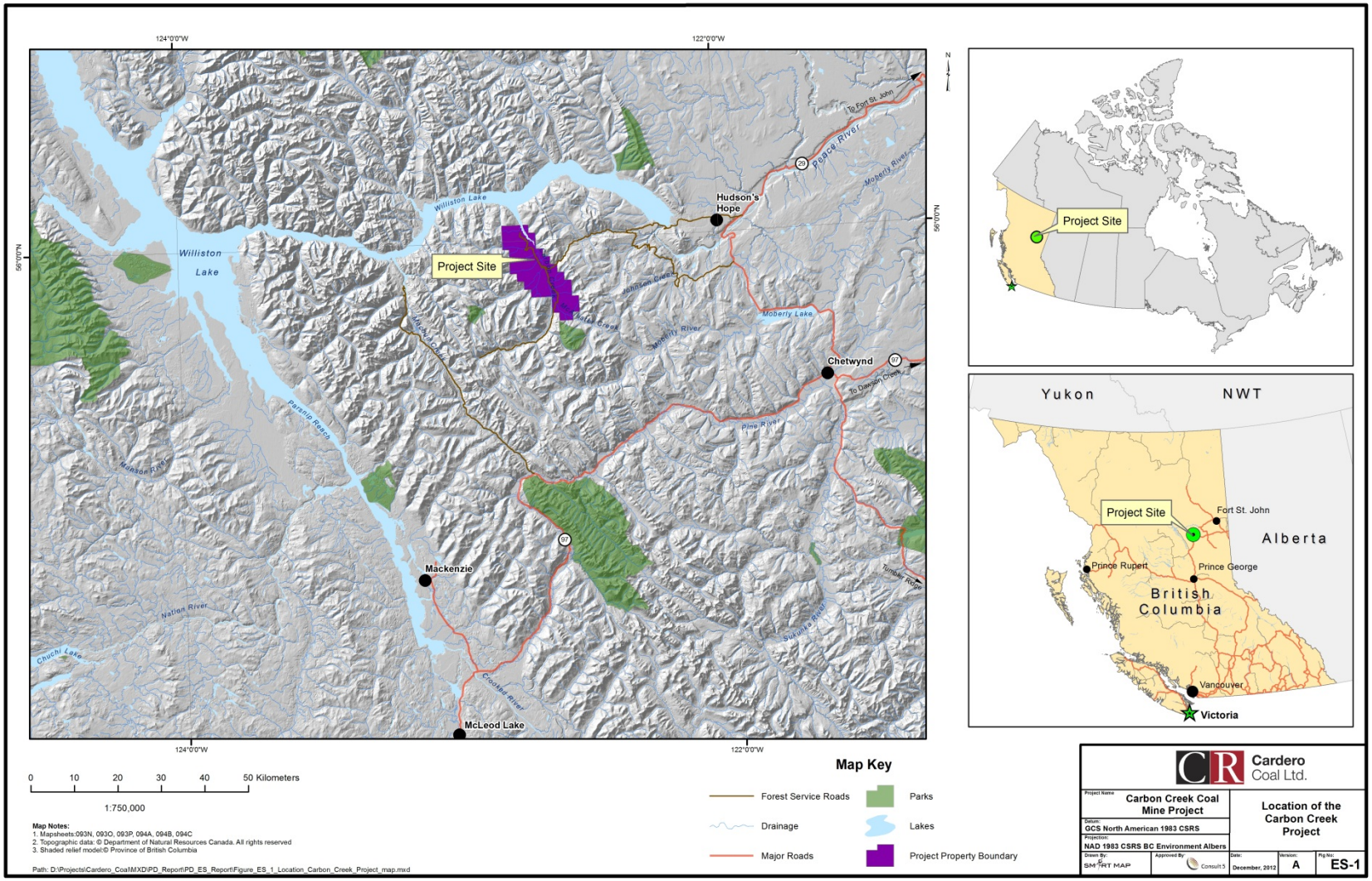
The proposed Project requires an Environmental Assessment (EA) under *CEAA 2012*, as it exceeds the production capacity of 3000 t/d of clean coal under the federal *Regulations Designating Physical Activities* for a coal mine (Section 15(d), Schedule (*Section 2 to 4*)).

The planned annual production rate of the Project also exceeds thresholds stipulated in the BC *Environmental Assessment Act* Reviewable Projects Regulation for new coal mines. As a result, the Project will also require an EA under the BC *Environmental Assessment Act.*

1.2 PROJECT LOCATION

The Project is located in northeastern BC approximately 40 km west of Hudson's Hope, south of the Williston Reservoir, and 50 km north-northwest of Highway 97 (Figure ES-1). The nearest city is Fort St. John, located 110 km

Figure ES-1: Location of the Carbon Creek Project



east of the Project, connected by Highway 29 to the towns of Hudson's Hope and Chetwynd, 60 km southeast of the property. The CN Railway line connecting Fort St. John and Tumbler Ridge with Prince George passes 30 km south of the Property. The Property is centered approximately on latitude 55°56'40" N and longitude 122°40'40" E.

1.3 LAND TENURE

The Project area has been explored by numerous companies under various configurations of licensing and land and mineral tenures over more than 100 years. The Property currently consists of four coal licenses (418174, 418175, 418176, and 418177), ten Coal License Applications, and ten Crown Granted District Lots (CGDL), comprising a contiguous tenure parcel of 17,200 ha. Approximately 14,600 ha of the Property are provincial Crown Lands managed by the Peace River Regional District and the balance of 2,600 ha is Private non-Crown land (CGDL's) managed by the Peace River Partnership (PRP), an Alberta partnership. Cardero Coal has entered into an option, and made all requisite payments, to exercise a coal lease over the coal resources on the CGDL from PRP.

1.4 EXISTING LAND USE

The mine site property, including all components and alternative options assessed, is located in the Peace River Coalfield within the territories of the Tsay Keh Dene (TKD), Takla Lake (TLFN) and Treaty 8 First Nations. The Treaty 8 First Nations affected include: the McLeod Lake Indian Band (MLIB), Saulteau First Nations (SFN), Halfway River First Nation (HRFN), and the West Moberly First Nations (WMFN). The First Nations in the area of the proposed mine use trails on the property for hunting, fishing and berry picking. Caribou hunting is also an established right of the Treaty 8 First Nations in the area. Traditional uses of the proposed mine site currently include: trails, berry picking, fishing and hunting. These activities will possibly be affected by loss of access and will require identification and discussion with the users of the land. The Project mine site facilities are approximately 26 km northwest of the *Twin Sisters* sacred site (also referred to as Beattie Peaks). The designated Project area, although proximal to Aboriginal Reserves and the *Twin Sisters* sacred site, is not anticipated to require access to, or infringe on, these lands. The proposed barge route for the transportation of coal product to market follows Williston Reservoir to Mackenzie and will potentially cross over the TKD statement of intent boundary and will therefore likely require consultation with this group, as well as TLFN.

The Property is located within the 2.9 million ha area covered by the 1999 Dawson Creek Land and Resource Management Plan (LRMP). Current land use activities in the region include: recreation, trapping, mining, energy development exploration, and forestry. Canadian Forest Products Ltd. (CanFor) holds a Tree Farm Licence which covers the non-freehold portions of the Project Area.

There are no federal lands within a 50 km radius of the proposed Project, with the exception of local First Nations' reserve lands. Initial analyses indicate that there are no permanent, seasonal or temporary residences, with the exception of the Project exploration camp, within at least 20 km of the proposed mine site area. The proposed barge load-out will be located approximately five to seven kilometers from the main residential area of Mackenzie in an existing industrialized area serving timber, paper and pulp, and pelletizing industries.

2. Project Information

The information presented in this section is based on the design outlined in the Prefeasibility Study. The mining and coal processing methodologies, as well as the transport systems are described in this section. The following schedule is being used to define how Cardero Coal is proposing to move through the EA process and permitting leading up to construction (Figure ES-2).

Figure ES-2: Anticipated Approval Process

Task	2011		2012				2013				2014				2015	
EA Process	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**
Submit Project Description				■												
Finalize AIR							■									
Baseline/Effects Assessment Studies			■	■	■	■	■	■								
Submit Application Report									■							
Consultation	■	■	■	■	■	■	■	■	→	→	→	→	→	→	→	→
EA review (up to 180 days)										■	■	■				
EA decision by Minister													■			
Permitting									■	■	■	■	■			

2.1 COAL RESERVE ESTIMATES

The total coal reserve tonnage for the 20 years life of mine has been estimated as 121 Mt Run of Mine (ROM), subsequently giving 78 Mt of saleable coal (Table ES-1).

Table ES-1: Project Coal Reserve Estimates

Mining Method	ROM Tonnes (Mt)	Saleable Tonnes (Mt)
Surface	56	38
Highwall	14	7
Underground	52	33
Total	121	78

The accuracy of resource and reserve estimates is, in part, a function of the quality and quantity of available data and of engineering and geological interpretation and judgement (Norwest 2012b). The mine, as described in the Prefeasibility Study document, is expected to have a life of 20 years excluding pre-production evaluation and construction time.

2.2 PROJECT PHASES AND SCHEDULE

Initial Development and Construction phase: Commencement of construction activities will depend on timelines for the review and issuance of an EA Certificate and Mine Permit but are tentatively planned to begin Q3 2014. Initial development and construction is anticipated to continue through to Q3 2015.

Operation phase: First coal production is proposed for Q4 2014. Initially, operations will begin with the surface mine, while underground mine operations will commence in 2016. This will allow time to develop an area to access the underground mineable coal seams. The mining operation has been financially modelled for 20 years, excluding pre-production development and construction time.

Decommissioning phase: Estimated at two to three years, including all activities relating to the decommissioning of mine-site facilities. Closure of the mine site infrastructure may be carried out in steps as certain project components, such as roads, may be required to carry out the monitoring program and therefore cannot be decommissioned at the same time as most other components. Reclamation schedule will be developed as the mining plan is finalized, but will remain iterative.

Abandonment phase: Refers to conditions that will exist on the site after the site is abandoned and fully reclaimed. The waste rock management facilities will require monitoring following closure of the site. Monitoring will be required until the site has stabilized or as required by regulatory agencies – potential timing unknown.

2.3 MINING METHOD AND COAL PRODUCTION

Exploration activities at Carbon Creek have revealed that the nature of the geology lends itself to employing several different mining methods to maximize the recovery of the resource. The proposed mining methods include underground room and pillar mining with continuous miners (CM), surface contour and area mining using hydraulic excavators and trucks, and highwall mining. After a short ramp-up period, all mining methods will be employed concurrently throughout the proposed 20-year mine life.

Approximately 40% of the current defined reserve will be mined underground (Table ES-2). The mine will be designed to achieve an annual average clean coal production rate of 4.1 million metric tonnes (including ramp up; 2014-2020) as shown in Table ES-3. The wash plant will have a single-stream capability of 1,200 tph with the average clean coal production rates shown in Table ES-4.

Table ES-2: Carbon Creek Project – Anticipated ROM and clean coal production by area and mining type

Area	Mining Method	ROM Tonnes (Mt)	Clean Tonnes (Mt)
Northern Surface Mine	Area Mining	16.6	11.3
	Contour Mining	4.8	3.3
	Highwall Mining	5.4	2.6
	Total Northern Surface Mine	**26.8**	**17.2**
Central Surface Mine	Area Mining	26.7	18.5
	Contour Mining	7.8	5.4
	Highwall Mining	8.6	4.4
	Total Central Surface Mine	**43.1**	**28.3**
Underground Mines	Room & Pillar Mining	51.5	32.9
	Total Underground Mines	**51.5**	**32.9**
Combined Total		**121.4**	**78.4**

(Mt) – Million tonnes.

Table ES-3: ROM Coal Production (Mt)

	2014	2015				2016				2017				2018				2019				2020			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ROM Production	1.158					3.545				4.596				4.770				5.385				6.654			
Surface area and Contour mining		1.158				2.257				2.271				1.521				1.492				2.595			
Highwall mining						0.900				0.900				0.900				0.900				0.900			
S14 and S15 underground mining						0.388				1.425				2.349				2.993				3.159			

ROM- Run of mine; Mt – Million tonnes.

Table ES-4: Clean Coal Production

Clean Tonnes (Mt)	2015	2016	2017	2018	2019	Remaining LOM Avg
Surface Operation	0.786	1.641	1.616	0.994	0.970	2.168
Highwall Miner Operation	--	0.476	0.476	0.503	0.504	0.334
Underground Mine Operation	--	0.287	1.054	1.475	1.767	1.890
Total	0.786	2.404	3.146	2.972	3.241	4.392

2.3.1 Overburden Management and Progressive Reclamation

Vegetation removal will precede mining, with selected trees being harvested for local use or for sale to the wood and paper industry where possible, and pine beetle-damaged trees being bucked and scattered. Subsequent to vegetation removal, topsoil will first be salvaged and stockpiled for later use in progressive reclamation. After the topsoil is removed, overburden will be removed to expose the area that will be strip mined. Overburden from the initial cut will be moved by conventional truck-and-shovel methods to an undisturbed area directly down-dip of the open cut. The overburden from each subsequent cut will be used to backfill the previously-mined open strip once sufficient pit room is created. This approach will allow progressive reclamation to occur. The sequential back-filling of open strips will form bench-like topographic features with nearly level tops and sloping faces. These faces will be designed and constructed to reduce the potential for erosion. Since the backfilling will follow the mining progression up-slope, the reclamation will occur in sequence and result in a final shape generally similar to the existing topography. Completed areas having steep slopes will be graded to a more gentle topography, blending with the natural topography of the area. Topsoil will be placed over the returned overburden and re-vegetated to minimize erosion and reduce the footprint of operations.

2.3.2 Surface Mining

Surface mined coal will be produced from two areas, specifically, the Northern Surface Mine Area (located north of Seven Mile Creek), and the Central Surface Mine Area (located between Nine Mile and Ten Mile Creeks) (Figure ES-3). It is expected that in Year 1 of operation, mined coal will be produced from both surface mine areas. In several areas of the property, the coal seams dip gently and approximately parallel to ridges and are at depths which afford favourable strip ratios for complete seam removal.

Northern Surface Mine: ROM production from the Northern Surface Mine, including highwall mining, ranges from 1.1 Mtpa to 1.8 Mtpa and averages 1.4 Mtpa over the mine life with a ROM strip ratio average of 12:1. One highwall mining unit will operate, producing approximately 450,000 tonnes per year. ROM coal is expected to be transported to the processing facility using trucks or conveyors. Clean coal production is expected to be hard

coking coal except for a small amount of thermal coal produced from the oxidized zone along the outcrop lines. Clean coal production ranges from 0.6 to 1.3 Mtpa and averages 0.9 Mtpa over the mine life.

Central Surface Mine: ROM production from the Central Surface Mine, including highwall mining, ranges from 1.4 Mtpa to 3.8 Mtpa and averages 2.3 Mtpa over the mine life with a ROM strip ratio average 7:1. One highwall mining unit will operate, producing approximately 450,000 tonnes per year. ROM coal is expected to be transported to the processing facility using trucks or conveyors. Clean coal production is expected to be semi-soft coking coal except for a small amount of thermal coal produced from the oxidized zone along the crop lines. Clean coal production ranges from 0.8 to 3.0 Mtpa and averages 1.5 Mtpa over the mine life.

2.3.3 Underground Mining

Underground mining will be based primarily on the room-and-pillar method using CM units. The CM units will continuously cut and extract coal from the coal face and load it into cars or conveyors, without the need for drills or explosives. The general plan is to mine the reserve in a clock-wise direction, removing the thickest and most gently-dipping coal first. Roof support will be required, with rock bolts acting as the main support, supplemented by timber where necessary. Bleed holes will be left around the perimeter of the mined area to vent gas liberated by mining.

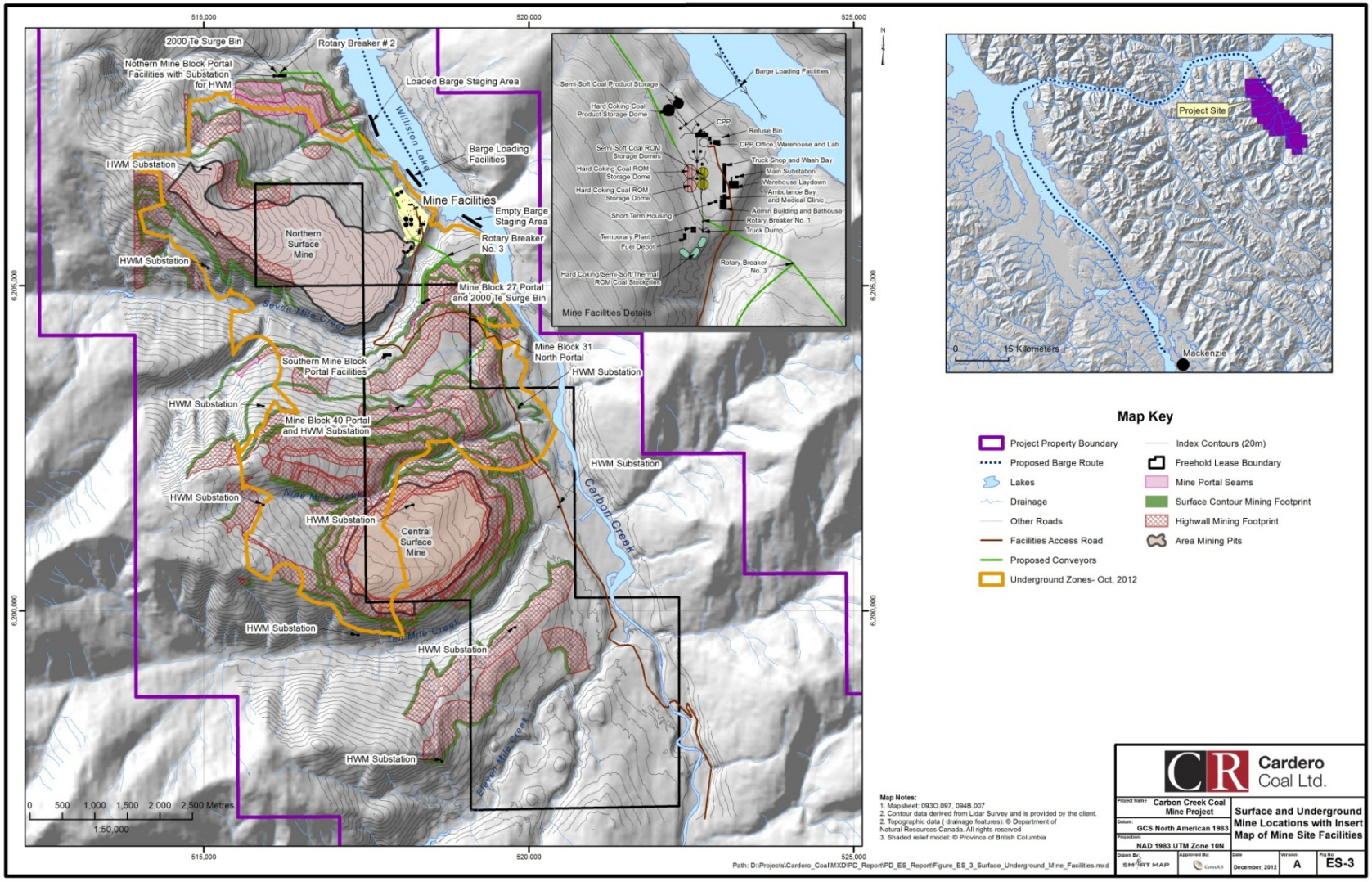
Production from the underground mine operations will be from five separate seams with a minimum thickness of 1.2 m. Underground mining commences in the northern region of the property with Seam 15 in 2016 and expands to Seam 14 in 2018 with separate portals for each seam. Underground mining operations ramp up from one CM to six CM units between 2016 and 2019. As mining reserves in Seam 15 and Seam 14 are depleted, CM units will be relocated south to the three sets of portals for Seams 27, 31 and 40 in the central region of the property, in approximately Year 11 of mining starting with Mine Block 31.

2.3.4 ROM Handling

Prior to coal processing, a system of rotary breakers will size and de-stone the coal. Discard material will be transferred to a storage area at the side of the breaker and hauled to an appropriate waste stockpile at the mine. Three breakers are proposed for the site, one as part of the main processing facility, a second to the north of the site for ROM coming from the portals from mine blocks 14 and 15 and a third to the south of the mine site facilities area for ROM coming from mine blocks 27, 31 and 40 (Figure ES-3). Product from the north and south rotary breakers facilities will be transported back to the ROM coal stockpiles at the main processing facility via approximately seven kilometers of fully enclosed overland conveyors or via trucks. A wind fence will be placed along the south, southeast and east sides of the stockpile area to protect the stockpiles from the prevailing wind at the site.

At the coal processing facility, ROM from the stockpiles will be loaded into the truck dump hopper using a front-end loader. The truck dump will consist of a 300 tonne receiving hopper equipped with a 300 mm X 300 mm grizzly, an apron feeder to pull the material from the hopper and the support structure. The apron feeder will transfer the material to a conveyor that will deliver the material for primary sizing. The Coal Processing Plant (CPP) is designed to process one type of coal at a time, so extra space will be allocated at the truck dump for stockpiling each type of ROM coal.

Figure ES-3: Surface and Underground Mine Locations with insert map of Mine Site Facilities



From the truck dump, ROM coal will then be led through another rotary breaker to size the material and separate the less desirable size material via openings in screen plates. Discard material will be transferred to a storage area at the side of the breaker and hauled to an appropriate waste stockpile at the mine. Rotary breaker product will be collected on a conveyor and transferred for storage into one of three ROM coal domes– hard coking coal, semi-soft coal and thermal coal. Storage domes will each have a 90,000 tonne capacity; this capacity will allow the CPP to operate somewhat independently of the mine. This allows mining activity to continue uninterrupted even if the CPP plant is undergoing scheduled maintenance and the CPP to continue operation if there is a short break in mining production.

2.3.5 Coal Processing

Start-up Phase Temporary CPP: Initially, during the start of operations in late 2014 and early 2015, a small temporary CPP located immediately west of the truck dump area will be used to support the first coal production. The temporary CPP would be erected at grade on a concrete slab. The modular unit is shipped complete with pre-assembled control room and electrics compliant with the requirements of British Columbia. A sprung steel-and-fabric enclosure will be used to protect the plant during the winter.

The temporary CPP would consist of a "push up" feeder-breaker coupled to a feed conveyor. The feed conveyor would deliver coal at a rate of up to 400 tonnes per hour (tph) to a multi-slope double deck vibrating screen as part of a dry-screening operation. The oversize, approximately 1500 mm x 10 mm, would report to a media drum module. The heavy media drum would separate the low ash, coarse product coal from the high ash reject material. The oversize clean coal would then pass through a crusher to produce a 50 mm product. The clean product would be conveyed to a clean coal stockpile, while the dry minus 10 mm raw undersize coal and rejects would be conveyed to separate ground-based stockpiles. The CPP will feature a small thickener and filter press to recover any fines that will be transferred to the rejects area. Depending on product specifications, the raw fines and clean coals would be blended as needed to produce saleable product.

The candidate seams for treatment in the temporary CPP would likely be thermal coals, oxidized crop coals and coking seams that are amenable to mining with minimal dilution. Washing the thermal and oxidized crop coals through this facility may result in improved economics of the larger CPP and allow the latter to be scaled down and designed to reduce operational complexities.

Operational Phase CPP: The operational phase CPP will be a single-module operation rated at a nominal 1200 tph or 7.2 Mtpa of raw feed at a 68% effective utilization. The CPP will have parallel, size-specific circuits:

- A heavy media bath circuit that will wash the 150 mm x 10 mm stream, followed by crushing to reduce the top size to 50 mm;
- A large-diameter heavy media cyclone circuit to wash the 10 mm x 1 mm stream;
- Reflux classifier circuit for the 1 mm x 0.25 mm; and,
- Two-stage froth flotation circuits for the minus 0.25 mm streams.

Each sub-product stream will employ mechanical dewatering centrifuges. Pressure filtration will be used on the < 45 micron material. All wastewaters will be recycled back into the CPP. Total product moisture values for each stream are projected to be below 8% by weight. The proposed CPP process avoids the need for a thermal dryer and this will reduce power consumption and emissions. Dust emissions in the crusher area will be minimized

through the use of dust collectors and mist sprays, where required. Enclosures will be heated and vented according to regulations.

Following beneficiation in the CPP, it is proposed that the respective clean coal products will be fed into hard coking, semi-soft and thermal coal storage domes of approximately 80 Kt, 50 Kt and 2 Kt respectively, prior to loading onto barges. The covered product storage domes will keep coal dry and minimize coal dust liberation.

CPP Coarse Coal Rejects: It is anticipated that coarse coal rejects (CCR) from the CPP will be conveyed to a 300 tonne rejects bin located alongside the CPP building. En route to the rejects bin, fine dewatered reject material in the form of a paste will be loaded on top of the coarse reject material. The order of loading of the reject material will assist in keeping the conveyor belt clean and increase the efficiency of the transfer to the rejects bin and eventually to haul trucks. The combined waste material will be dried and made into a paste that will be spread in landfill cells in previously-minded areas. Reject material will be loaded into 90 tonne capacity end-dump haul trucks, the same trucks used to transport the ROM material to the truck dump. For efficiency, after hauling ROM material the trucks are utilized to back-haul the reject material to a designated disposal site. Clarified water from the process will be pumped back to the plant to be reused as process water.

2.3.6 Coal Transportation

Loading Facilities: From the storage domes, coal will be fed into material draw-down hoppers, then into two reclaim tunnels and fed onto a central collection conveyor that will send the clean coal product to the barge load-out conveyor located in Carbon Inlet. Two reclaim tunnels will be required for each of the hard coking coal and the semi-soft coal products. Dozer or front-end loader access entries will be installed in the domes for occasions when it is necessary to clean out the remaining material.

Barge Transport: The transportation route currently proposed involves loading the washed coal product directly onto barges near the mouth of Seven Mile Creek on Carbon Inlet and transporting the coal approximately 175 km west and then south along Williston Reservoir to an off-loading facility at Mackenzie (Figure ES-4). This would likely involve construction of product storage silos and a barge loading facility on Carbon Inlet near the proposed mine site and evaluation and potential development of the current facilities available at Mackenzie. Once at Mackenzie the product could be loaded onto CN Railway units for transport to Ridley Terminals at Prince Rupert for onward shipment to market. The barge is anticipated to complete a round-trip every 36 hours throughout the year once full production is achieved.

Unloading Facilities: Currently, there are two potential sites in close proximity to each other, being investigated as possible locations for the coal load-out at Mackenzie. Both sites are located within the district of Mackenzie along the Williston Reservoir in a predominantly industrialized area, approximately 5-7 km from the main residential area of Mackenzie. Both of the sites are on inactive industrial land.

Rail Transport to Ports: Clean coal product will be transferred from the incoming barges via a conveyor system into a hopper, which will dispense the coal into waiting rail cars for transport by CN Railway. Loaded coal trucks will be covered or have a latex sprayed over the coal to minimize dust generation and coal loss during transport. Although it is proposed that product logistics will be controlled from the plant site to ensure that clean coal is fed directly onto trains at Mackenzie, Cardero Coal is considering the construction of a storage dome at the terminal.

2.4 LIQUID WASTE MANAGEMENT

The mine will produce wastewater from surface and underground mining operations, the mine processing plant and from office and change room facilities. The sewage water will be treated in a sewage treatment plant with treated water discharged or reused as appropriate.

2.4.1 Surface Water Drainage Control

- The surface water drainage control program is designed to minimize erosion, control sedimentation, and minimize degradation of surface water quality. The surface drainage control plan will consist of a series of ditches, diversions and ponds designed to control water flow from active surface and underground mine areas, external waste storage areas and in-pit waste fills, as well as controlling groundwater in-flow from mine pits. The surface water drainage control is based on:
- Excluding naturally-occurring run-off water (unaffected by the mining operation) from mine areas, which can be released directly, thus reducing the volume of surface water that needs to be stored after contact with active mine areas; and,
- Containing run-off from disturbed areas and moving water into sumps and sedimentation control ponds for clarification, prior to its release once it has met permitted guidelines.

2.4.2 Groundwater

Groundwater will be encountered in both surface mining areas and underground mines. In the surface mine areas, both surface water and groundwater will be collected using a series of ditches and in-pit sumps for water storage. Using diversion ditches and/or pumps, water will be removed from the active pit area and sent to sediment control structures. These sedimentation structures will be designed to clarify the mine run-off and remove sediment so that it has the potential to be discharged back into the adjacent streams. Water discharged from the site will need to meet all applicable permitting requirements prior to release.

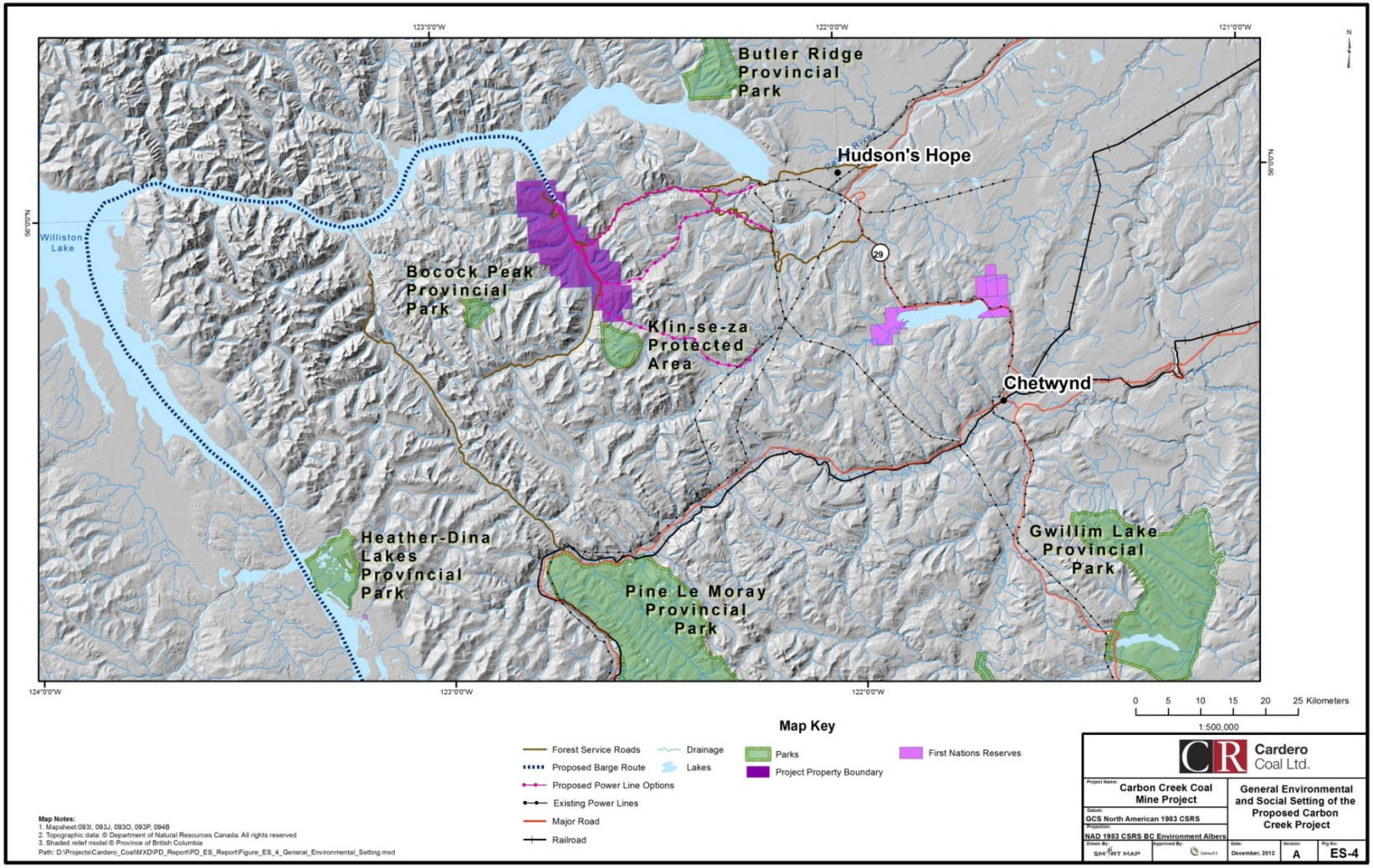
2.4.3 Mine Waste Drainage Management

Temporary and permanent mine waste rock stockpiles will be constructed in the active mine areas:

- **Temporary waste** storage areas external to the pits are needed to ensure that sufficient in-pit space is created prior to backfilling. The stockpile is moved once adequate space in the pit is available. Drainage from the temporary waste storage areas will be managed by a combination of collection ditches, silt fences, straw bale dikes or berms with sumps used to control runoff.
- **Permanent waste** stockpiles will be created in the surface pit footprints. Run-off from these permanent fills will be controlled by the use of collection ditches that will transfer the water to sedimentation control structures.

In areas where stockpiles may be affected by groundwater seeps or springs, a layer of coarse, non-acid generating (NAG) rock will be placed within the seep area. This material will be placed such that it does not affect the structural stability of the waste storage area over the seep area. All stockpiles will be contoured to minimise infiltration. In preparation for final reclamation, pit-waste stockpiles are expected to compare quite closely with the original landforms but it may be necessary to maintain a ditch below the stockpile toe to collect run-off water. Once land is re-vegetated, drainage diversions and treatment are anticipated to be unnecessary.

Figure ES-4: General Environmental and Social Setting of the Proposed Carbon Creek Project



2.4.4 Pit Drainage Water Management

Surface Mines: It is proposed that water discharge from the active mining area will be controlled using ditches and sumps leading discharges to sedimentation control structures. If the water cannot drain directly out of the mine, a sump, pump and ditch system will be used. Water will be ditched so that it flows into a sump and from the sump the water will be pumped to a collection ditch or directly to the sedimentation control facility.

Underground Mines: Water generated in underground mines will be ditched and drained to the portal if the grade of the mine permits, or to a sump where a pump will be used to discharge the water out of the mine. Water from the underground mines will be sent to a sedimentation control structure where it will be treated and released back to the natural drainage system.

Sedimentation Ponds: All sedimentation ponds, settling ponds, ditches, diversions or other drainage structures will be engineered and constructed according to best management practices and applicable regulatory guidelines. Water release will only be implemented when regulatory compliance is achieved.

2.5 GAS MANAGEMENT

The Project may contain coal strata with quantities of coal bed gas (CBG). Such coal strata will typically occur at depths in which hydrostatic pressures have confined gas preventing it from naturally diffusing out of the coal into the surrounding rock and to the surface. CBG primarily comprises methane (CH_4), but does not contain sour gas. It is unknown at this time what quantity or quality of CBG may exist. CBG will be the subject of further study in the mine planning and design for underground operations, primarily for safety reasons. Gas desorption testing undertaken in September 2012 suggests that minimal volume of gas (primarily CH_4) are contained in the coal seams.

2.6 MINE RECLAMATION AND CLOSURE

The final reclamation and closure plan will address the reclamation of all disturbed areas; removal of all structures not required for on-going reclamation monitoring and maintenance and conform with final land use objectives. The mine closure plans will be updated annually to reflect the on-going site activities.

The typical mine closure plan would include the following items:

- Schedule and budget for reclamation and mine closure activities;
- Description of pre-mining land use and post-closure land use objectives;
- Assessment of infrastructure requirements post-mine closure;
- Schedule for removal of all unnecessary buildings, coal processing plant, conveyors, coal stockpile areas and other associated mine infrastructure;
- Plans for final reclamation of all remaining un-reclaimed surface mine areas and underground mine portals;
- Definition of final acceptance criteria to indicate when reclamation and closure is complete and acceptable;
- Plans for the replacement of topsoil/subsoil on final reclamation areas;
- Construction of any required final erosional control structures;
- Selection of plant species, soil amendments, seeding methods and mulching for final reclamation; and,

- Plans for site monitoring and maintenance after final land reclamation is complete.

2.7 POST-CLOSURE

During the post-mine closure, the following activities are anticipated:

- Mine site surface water and groundwater monitoring (quantity and quality) to ensure permit compliance;
- Confirmation that erosion control, seeding and re-vegetation are successful;
- Regular assessment and maintenance of remaining infrastructure; and,
- Final infrastructure removal. Only the infrastructure required for post-mine closure activities will remain.

2.8 GENERAL MINE SITE FACILITIES

The proposed mine site plan includes: coal storage facilities, a CPP, product storage domes, site support facilities, and preliminary waste rock management facilities. The site support facilities planned include: an electrical sub-station, mine office, change house, warehouse, supply yard, coal loading area, and fresh and used water treatment and handling facilities. The inset in Figure ES-3 illustrates the main features discussed in this section.

2.8.1 Road Access Network

A substantial network of roads and trails was built in the Project Area during exploration and development programs prior to 1981 and by CanFor for forestry activities. A reliable connection to the Provincial highway system will be required, and is currently proposed to follow the Johnson Creek FSR route. Roads in the area of the Project are in various states of service, some having been partially decommissioned. Some former road and trail routes may also need to be re-established to support further Project evaluation and construction.

All stream crossings by Project-related linear infrastructure such as roads, transmission line rights-of-way, conveyor, etc. will be fully documented to record their status including whether they are fish-bearing or not. It is envisaged that new crossings required over fish-bearing streams will be constructed as clear-span structures to avoid fish habitat effects and changes to navigability, if deemed navigable by Transport Canada. All haul and access roads will be crowned properly and ditches will be provided to control the run-off from the road. Culverts or bridges will be used to divert water flow under the road. Temporary roads use for mine development, exploration or other miscellaneous mine activities will be ditched with culverts or water-barred to divert water off the roadways. All temporary roads not required will be re-contoured and re-vegetated to control erosion.

2.8.2 Transmission Corridor

The proposed transmission corridor is generally parallel to the Johnson Creek FSR, the main access route from Hudson's Hope to the plant site, and lies in more favourable terrain than other potentially-available options. Positioning the transmission line near, and parallel to, the access road is desirable as it reduces construction and maintenance costs and results in less habitat disturbance as there is only one corridor cutting across the landscape.

The power distribution center at the BC Hydro W.A.C. Bennett Dam is the G.W. Shrum generating station. This is approximately 35 km east of the proposed mine site and is the proposed tie-in point for a new transmission line to supply the Project. Cardero Coal may have to construct a new substation close to the G.W. Shrum generating station in the event that the existing system does not have the capacity to fulfil the Project's needs. It is

anticipated that distribution to the plant and several mine sub-stations will be achieved by a combination of single- and double-pole and line options at appropriate transmission voltages.

BC Hydro and Knight Piesold recently conducted field reconnaissance surveys of a number of possible power transmission corridors from the W.A.C. Bennett Dam and Dokie sub-stations to the proposed site in the Carbon Creek Valley. Three power line corridors are under investigation and the best option will be selected through an alternatives analysis:

- **Gaylard Creek Corridor:** Running generally parallel to the proposed route being considered for the access road to the plant site. Shorter and lies in more favourable terrain. There are two different connection points demarcated currently being considered for this route.
- **Gething Creek Corridor:** Runs along McAllister Creek before turning north east up Gething Creek. Longest of the three proposed routes at 47 km.
- **McAllister Creek Corridor:** Running to the south all along McAllister Creek. Investigations stopped due to its proximity to the sacred First Nations' site of *Twin Sisters*

2.8.3 Water Supply

Water will be required at the site for the CPP, dust suppression, wash-down and fire protection systems and separate system will be developed for the potable water supply. A hierarchy of water for use in the mining operation will be established, with an emphasis placed on using mine-affected water for industrial activities prior to using unaffected water.

The hierarchy of use will be:

- Collected surface water run-off from mine areas, waste dumps and other mine facilities;
- Constructed surface water impoundments;
- Nearby lakes;
- On-site water wells; and,
- Other water storage facilities.

It is anticipated that water to be utilised for coal processing, equipment washing, and domestic uses will be sourced from Williston Reservoir, rather than depleting groundwater resources. In addition, the current CPP design incorporates re-use and recycling of water from the processing plant with maximum use being made of water captured from run-off drains and recycled water from the plant. All water supply sources will be evaluated for quality, volume, and environmentally-related effects of withdrawal.

3. Federal and Provincial Involvement

Mining projects in BC are subject to regulation under federal and provincial legislation to protect workers and the environment.

3.1 FEDERAL

The designated Project is not taking place in a region that has been the subject of a regional environmental study.

There is no proposed or anticipated financial support that federal authorities are, or may be, providing to the designated Project. No federal lands will be used for the purpose of carrying out the designated project and with the exception of federal First Nations' reserve land, there are no federal lands within 50 km of the proposed Project. Furthermore, no federal lands are expected to be affected by the proposed Carbon Creek mine operations directly, indirectly or through cumulative effects.

It is anticipated that the following federal *Acts* or *Regulations* may apply for the design and operation of the Carbon Creek Coal Project:

- *Canadian Environmental Assessment Act*;
- *Fisheries Act*;
- *Migratory Birds Convention Act*;
- *Species at Risk Act*;
- *Navigable Waters Protection Act*;
- *Explosives Act*;
- *Canada Transportation Act*;
- *Radio Communications Act*; and,
- *Canada Shipping Act*.

3.2 PROVINCIAL

Below is a list of the anticipated provincial *Acts* and *Regulations* which may apply for the design and operation of the Carbon Creek Coal Project:

- *British Columbia Environmental Assessment Act;*
- *Mines Act;*
- *Coal Act;*
- *Environmental Management Act;*
- *Water Act;*
- *Drinking Water Protection Act and Regulations;*
- *Forest Act;*
- *Land Act;*
- *Public Health Act;*
- *Transportation Act;*
- *Motor Vehicles Act;*
- *Heritage Conservation Act;*

- *Wildlife Act; and,*
- *Wildfire Act.*

4. Environmental Context

4.1 GENERAL ENVIRONMENTAL SETTING

The regional topography of the Project Area occurs as a belt of hills and low mountains. The highest elevation on the Property is slightly over 1,600 m above sea level (masl). The moderately to steeply sloping ground descends to an elevation of about 680 masl on the shores of Williston Reservoir. Most of the project area is below the tree line and is densely forested with spruce and pine. Black bears and grizzly bears are present in the area, in addition to moose, caribou, stone sheep, mountain goats, and deer. The creeks are populated with various species including Arctic grayling and various trout species.

Carbon Creek flows from south to north across the Property, and enters Williston Reservoir at Carbon Inlet, located to the north of the Property. Carbon Creek is fed by a number of west- to east-flowing creeks, the most prominent being Seven Mile Creek, Nine Mile Creek, Ten Mile Creek, and Eleven Mile Creek. These tributaries are named according to their approximate distance from Peace River, which is now covered by Williston Reservoir. McAllister Creek is a major east- to west-flowing tributary of Carbon Creek and joins the river in the southeastern portion of the Property (Figure ES-4). Utah Mines Ltd conducted several environmental baseline studies throughout the 70s and 80s at the proposed mine site and some of that data and information has been used to inform and guide the recent program of environmental baseline studies and monitoring currently being conducted as part of this EA process.

4.2 CLIMATE

Climate in the Project Area is influenced by the moist, unstable, and mild maritime Pacific air mass during the non-freezing months and by the dry, stable, and subject to extreme temperatures continental Arctic air mass during the winter months. These two air systems typically create short, warm summers and long, cold winters. The main meteorological parameters are described as follows:

- **Temperature:** Average daily summer July temperatures are typically around 15°C while average daily winter January temperatures are typically around -10°C based on data from Environment Canada meteorology stations Pine Pass Mt. Lemoray (ID 1186A71) and Mackenzie Airport (ID 1184790).
- **Precipitation:** Annual precipitation at the site is expected to be in the range of 655 to 791 mm. Precipitation typically falls as snow from November through March and as rain from June through September, while precipitation in other months consists of a mixture of rain and snow.
- **Wind:** Winds generally blow along a north-south axis near the centre of the Property, along Carbon Creek, with variations dependent on local topography.

4.3 HYDROLOGY

The Property is centred about the locally-named Carbon Creek, one of the ten major sub-basins that drain into British Columbia's Williston Reservoir. Carbon Creek is a third-ordered basin, with a drainage area of approximately 740 km^2. It flows north into Williston Reservoir and features several sediment deposition zones along its main channel. Within the Property, several smaller, steep gradient sub-basins drain from east and west into Carbon Creek and are locally referenced as Five Mile to Eleven Mile Creeks.

Since 1998, Water Survey of Canada has operated a hydrometric station at the mouth of Carbon Creek (Station No. 07EF004). Over the period of record, the hydrograph-based results indicate that extended low-flow periods occur during the colder winter months, from December to early April. The seasonally-high peak discharges typically occur between the first of May and the end of June of each water year. This type of stream flow pattern is indicative of snowmelt-dominated water discharge regimes. Mean annual runoff from Carbon Creek has ranged from 290 mm to 780 mm over the eleven years of available data and is approximately 540 mm.

4.4 HYDROGEOLOGY

Slug tests carried out as part of the groundwater studies in the mid-1970s and early 1980s by Utah Mines Ltd. identified two types of material: poorly–permeable bedrock (Case 1) and aquifer materials (Case 2), represented by sands and gravels and fractured bedrock zones. The current hydrogeological program, being conducted as part of environmental baseline studies will confirm the validity of these findings and further describe site groundwater conditions.

4.5 WATER QUALITY AND AQUATIC RESOURCES

Preliminary baseline data from current 2011/2012 aquatic studies relating to categorization of some of the main waterways likely affected by the Project are presented in Table ES-5.

Table ES-5: Main Waterways' Width, Depth and Gradient, 2011.

Stream	Zone	Northing	Easting	Avg. Channel Width (m)	Avg. Wetted Width (m)	Avg. Gradient (m)	Avg. Bankfull Depth (m)	Avg. Residual Pool Depth (m)
7 Mile Creek	10U	6204887	513359	13.2	7.9	5.0	0.9	0.4
9 Mile Creek	10U	6202890	519821	7.7	3.8	10.5	1.7	0.4
10 Mile Creek	10U	6201361	520566	12.3	5.2	2.2	1.8	0.4
11 Mile Creek	10U	6197005	519457	19.1	14.7	2.0	0.7	0.5
McAllister Creek	10U	6191537	524132	17.2	13.5	1.3	0.6	0.6
Unnamed Tributary	10U	6193867	524840	9.4	3.5	2.5	0.6	0.5
Carbon Creek*	10U	6199882	521546	53	-	0.5	-	-

**Data sourced from Fisheries Inventory Data Queries, B.C. Ministry of Environment.*

The only existing use of waterways in the vicinity of the Project Area is subsistence/recreational fishing, predominantly carried out by First Nations. Detailed information regarding these activities is not currently available; however, this information is being collected as part of on-going baseline studies: Traditional Use/Knowledge Studies in support of the EA.

Surface water quality surveys were conducted during the period 1971 to 1976 for the Utah Stage I EIA. The historical surface water quality data for Carbon Creek and its tributaries indicates that pH was generally alkaline, ranging from 7.0 to 8.6. Suspended solids data were naturally variable over a year, peaking at 115 mg/L, corresponding with a fall rain event in October, although most measurements were below 30 mg/L. The nutrient concentration in streams was low and they are therefore considered to be oligotrophic. Total metals concentrations were generally considered low, as most were often close to or below the available method detection limits of analytical procedures employed at that time, as well as being below domestic and aquatic life water quality guideline values

of the day (Environment Canada 1979; Environmental Protection Service 1977). Selenium concentrations were not reported, however, current baseline and modelling studies are being conducted to determine the Project's potential for selenium effects on valued ecosystem components.

4.6 METAL LEACHING AND ACID ROCK DRAINAGE

The coals occurring within the Property occur in the upper to middle sections of the Gething Formation, consisting of abundant, but relatively thin, coal seams. The percentage of sulphur in these seams reportedly ranges from 0.57% to 1.88%, average 0.94% S. A limited amount of historical metal leaching/acid rock drainage (ML/ARD) testing was conducted for the Carbon Creek coal deposit in the Utah Mines Ltd. Stage II EIA. Five 'acid production potential tests' (i.e., BC Research acid production potential test procedure) were completed on composite samples of mudstone (0.95% S), sandstone (0.14% S), siltstone (0.26% S), roof-and-floor composite (0.18% S), and coal composite (0.59% S). The coal composite sample was classified as potentially weakly acid generating and the other samples as non-acid producing.

4.7 FISHERIES AND FISH HABITAT

Information obtained from previous studies conducted in the vicinity of the Project Area between 1970 and 2000 indicate the existence of the following resident fish populations in Carbon Creek and its tributaries throughout this time:

- Rainbow trout (*Oncorhynchus mykiss*);
- Bull trout (*Salvelinus confluentus*);
- Kokanee (*O. nerka*);
- Dolly Varden (*Salvelinus malma*);
- Sculpin (general) (*Cottus* spp.);
- Slimy sculpin (*Cottus cognatus*);
- Arctic grayling (*Thymallus arcticus*);
- Longnose suckers (*Catostomus catostomus*); and
- Mountain whitefish (*Prosopium williamsoni*).

Williston Reservoir, to the north of the Project Area, provides habitat for:

- Bull trout;
- Rainbow trout;
- Kokanee;
- Lake trout (*S. namaycush*);
- Mountain whitefish; and,
- Lake white fish (*Coregonus clupeaformis)*.

Effects on fish populations will be driven by water quality management at the site from features such as the location of effluent discharges and the effectiveness of water collection and discharge management structures.

The Carbon Creek watershed and tributary creeks within the Project Lands are currently thought to support populations of rainbow trout, bull trout, kokanee and Arctic grayling. The presence or absence of a fisheries' trigger, as decided by Fisheries and Ocean Canada (DFO), will determine the requirement for a fish habitat compensation plan.

Provincial and federal fisheries agencies are anticipated to have specific interest in understanding the potential for selenium redistribution and accumulation in the aquatic environment resulting from mining and waste rock management. The presence of waste rock dumps may also potentially affect water flow to the streams on the site. The repercussions of these changes on fish and fish habitats in the area will be investigated.

The baseline program and results generated from the effects assessment will form the basis for an aquatic effects monitoring program (AEMP) or Environmental Effects Monitoring (EEM) program, that will help determine any potential effects to Valued Components (VCs) in the aquatic environment and identify clear mitigation measures. The AEMP/EEM will be designed to monitor potential effects resulting from development activities during all phases of the Project.

4.8 WILDLIFE

The region encompassing the Project Lands is known to be home to many terrestrial wildlife species including:

- Grizzly bears;
- Black bears;
- Northern caribou;
- Mountain goats;
- Moose;
- Elk;
- Stone sheep;
- Avian species (e.g., birds of prey, migratory songbirds, and waterfowl); and,
- Amphibian species (e.g., western toad).

Based on historical studies, ecological databases, and other observations, these wildlife groups are anticipated to occur within the regional area surrounding the Project Lands and are undergoing more detailed study during the environmental baseline monitoring currently being conducted.

A substantial amount of historical work on wildlife has already been conducted in or near the Project Lands and the region in the late 1970s and early 1980s for the Utah Mines Ltd. Stage II EIA. This relatively high-level baseline assessment yielded limited quantitative information on wildlife populations in the area, but identified the presence of mountain goat and northern caribou as important wildlife species requiring consideration. It also suggested that moose were present in much of the area, although winter habitat use was restricted and had been influenced by the earlier flooding of the Peace River for hydro-electric development. It was also suggested that mule deer may spend summers in the Carbon Creek area, while marten were abundant throughout the area and grizzly bears were also present.

Of note was the substantial number of harlequin duck breeding sites documented along both Eleven Mile and Carbon Creeks. In addition to harlequin ducks, migratory species such as Canada geese and common mergansers have also been observed in the lower section of Carbon Creek. The BC blue-listed Canada Warbler (SARA; Threatened status) has also been detected in the region.

The Provincial government has designated certain areas within the region as important for wildlife, including an approved ungulate winter range (UWR) for caribou, big horned sheep and mountain goat (UWR u-9-002) and

approved Wildlife Habitat Areas (WHAs) for northern mountain caribou (WHAs 9-050 and 9-051). UWRs and WHAs are protected and managed under the *Forest and Range Practices Act* (2002).

UWR u-9-002 covers an extensive area in the region, predominantly located south of the Carbon Creek and McAllister Creek confluence. UWR u-9-002, Unit No. SPC-037, noted as high elevation mountain goat winter range across Mounts Cowper, Wrigley and Rochfort, is the only unit of UWR u-9-002 that overlaps with an area subject to the Project's Coal License Applications (i.e., specifically application 416898) and Coal Licenses (i.e., 418174, 418175, 418176, and 418177). Cardero have already officially established this area as a 'no-go zone' following consultation with interested First Nations and the Province's Mineral Titles Office.

WHAs 9-050 and 9-051 identify high elevation caribou calving and rutting habitats surrounding Mount McAllister and Mount Monteith. These two WHAs overlap the eastern portions of the areas subject to Coal License Applications 416892 and 416891, and extend southeast of the areas subject to these Coal License Applications. These Coal License areas are not resource targets of the current Project and are not intended to be impacted by any planned project components or infrastructure.

4.9 ECOSYSTEMS AND VEGETATION

The Project Lands are set in the Sub-Boreal Spruce wet cool (SBSwk) and Engelmann Spruce-Subalpine Fir moist very cold (ESSFmv) Biogeoclimatic Ecosystem Classification (BEC) subzones. Terrestrial ecosystems and vegetation were mapped in 1981 to 1982 within the area of Utah's proposed mine site and along the haul road and transmission line (Utah 1982b), indicating that the climax vegetation of the Subalpine Zone was coniferous forest dominated by subalpine fir (*Abies lasioscarpa*) and hybrid Englemann with white spruce (*Picea engelmannii X glauca*) which concurs with the ESSFmv BEC classification for the area. However, this mapping will require updating as the terrestrial ecosystems and vegetation have changed over the last 30 years due to extensive logging and the pine beetle epidemic that has occurred in the area.

Drawing on historical studies in the project area, wetlands were also addressed in the 1982 Utah Mines Ltd. Stage II EIA report. The information was collected before formal wetland classification structures were developed by Environment Canada in 1991. In the Utah Mines Stage II EIA, the term "meadow" is used to describe boreal and sub-alpine complexes of grassland, sedge, and low shrub plant communities occurring as intermittent openings, or in saturated, high-water level areas (bogs), in forests, and along valley floors. Wetlands exist predominantly in the Project Area along the lower, shallower slopes and valley floor along Carbon Creek. Wetland distribution in accordance with current classification standards and wetland function will be addressed as this is central to the environmental assessments of wetlands.

4.10 TERRAIN AND SOILS

A review of existing information, aerial photography, and on-site inspections of the proposed Project Area, as identified in the Utah Stage I and II EIAs, indicate that the area was previously glaciated. This has resulted in a range of landforms and glacial deposits occurring in the Project Area. The till of Carbon Creek Valley is generally silt- and clay-textured and consists of a heterogeneous mixture of debris ranging from clay- to boulder-sized materials and is very compact.

Soils mapped in the Project Area were classified as: Brunisols, Luvisols, Regosols, Podzols, and Organic.

Mudslides and mudflows are common on the higher, steeper, and wetter road cuts and clearly involve the poorly-consolidated upper several metres of till. Several slides have occurred on the steep north slope of Seven Mile Valley where it is undercut by Seven Mile Creek.

The soils in the Project Area outlined in the Utah Stage I and II EIAs were assessed for topsoil suitability and salvage depth. The soils were rated as good to poor. The average salvage depth was between 75 and 115 cm. Many of the soils in the Project Area were rated as fair for suitability for reclamation.

4.11 POTENTIAL ENVIRONMENTAL EFFECTS

Although discipline specialists contracted by Cardero Coal are still in the process of collecting baseline data and analysis has not been completed, it is apparent that some environmental components may potentially be affected by the proposed mine development. These potential effects include:

- **Water quality may potentially decline in local creeks:** The water quality in creeks, especially those with small catchments (low receiving water volume), within the proposed mine development may be affected by the proposed mine activities.
- **Water quality in fish-bearing creeks**: Some local creeks with healthy fish population are currently heavily utilized for recreational fishing. The combination of continued aggressive fishing techniques and potential declining water quality from mine activities might make these recreational fishing spot less desirable.
- **Stream flow in project area streams potentially declines**: Mine dewatering activities may affect stream flow as it is anticipated that some of the base flow in the streams is derived from groundwater systems.
- **Stream flow phasing**: The presence of waste rock dumps can potentially reduce water flow to the streams on the site, spreading peaks out over a longer period and therefore reducing the peak flow events. The effects of this on the fish and fish habitats will be investigated, though a more stable flow would be beneficial to fish if the water quality is maintained.
- **Potential selenium bioaccumulation in fish and birds:** Selenium occurs in coal deposits within the Northeast BC coalfield; its potential effects are currently being modelled.
- **Sedimentation zones in Carbon Creek may affect barging in low water conditions:** A bathymetric study is being conducted on the barging points to determine if the sediment zones will affect all year round barging activity.
- **Potential impact on wildlife migration across the Williston Reservoir:** Due to the barging activities for the proposed mine with round trips every 36 hours, it is anticipated that the reservoir will retain an ice-free, open channel through which the barge moves. If wildlife is currently using the Reservoir as a corridor in winter months, this may no longer be possible in the future with the open channel.
- **The presence of the species at risk in the area and potential habitat loss:** Although studies are underway to confirm this, species at risk (e.g., the Western Toad; Special Concern) have been identified as potentially having habitat in the general area of the proposed mine development.
- **Potential for rare plants in proposed mine area:** Although none have been found to date, the potential for encountering rare plants on the mine site exists. The plants and the area in which they could be found would require suitable management measures.
- **Loss of Habitat:** The proposed mine has a surface footprint and there will inevitably be some habitat loss. By maximizing underground operations, the mine footprint is being managed, but cannot be eliminated. Progressive reclamation is to be implemented during the mine life, in order to minimize the overall impact of surface disturbance.

- **Potential deleterious effects on air quality:** Various coal mining activities, such as conveyance, loading and unloading of material, have the potential to generate fugitive coal dust which can affect ambient particulate matter (PM) concentrations. There is also potential for emissions of nitrogen oxides (NO_x), sulphur oxides (SO_x), carbon monoxide (CO) and greenhouse gases (GHG) from mine related activities. Best available technology and management practices will be incorporated into the Project design to minimize potential effects.

4.12 MITIGATION MEASURES

As part of the EA process, Cardero Coal is developing management plans that will give effect to mitigation measures for the potential effects from the proposed mining operation. These plans are being developed in consultation with specialists and First Nations.

5. Social Context

5.1 ENGAGEMENT AND CONSULTATION FIRST NATIONS GROUPS

Cardero Coal has engaged with First Nations (FN) groups in the area prior to the commencement of the 2010 exploration program. This engagement program commenced with potentially-affected FNs in the vicinity of the Carbon Creek property in July of 2010. Engagement activities with these groups have included:

- Introductory letters and meetings regarding exploration plans and programs;
- Site Visits requested by First Nations;
- Draft and final Project Description documents;
- E-mail and telephone updates;
- Attendance at, and support of, various community events; and
- General relationship-building.

To date, the majority of the engagement program has involved Saulteau First Nations, West Moberly First Nations and the McLeod Lake Indian Band. More recently, this engagement has been extended to include Halfway River First Nations, Takla Lake First Nations and Tsay Keh Dene First Nations due to changes in the proposed product transportation route to barging.

Key issues and interests expressed during the initial engagement activities include:

- Proximity to the *Twin Sisters* sacred site;
- Loss and deterioration of wildlife habitat;
- Potential impacts on water quality;
- Potential effects on traditional land use and culture;
- Potential impacts on Aboriginal and Treaty Rights;
- Employment and benefits;
- Air quality deterioration (coal dust); and
- Worker safety.

Cardero Coal continues to engage with all interested FNs to more fully understand the exact nature of interests and concerns, and the potential for Project-related impacts on their communities. Cardero Coal has implemented a comprehensive consultation program to provide all interested parties with the opportunity to learn about the Project, identify issues, and provide input, with the goal of positively enhancing Project planning and development. This will continue to include: meetings and working sessions with FN band leadership and community, public open houses, and information sessions. Consultations will be supported by a variety of information materials and mechanisms to encourage feedback, thereby providing the opportunity to be fully informed about the Project and to have convenient and accessible means to provide input.

5.2 PUBLIC AND OTHER GROUPS

Consultation with various federal, provincial, regional and municipal government departments has been initiated and has continued throughout the recent exploration and Project planning programs on an on-going basis. The objective of the initial engagement was to introduce the company and provide a general overview and relevant

environmental and socio-economic considerations related to the Project to stakeholders ranging from EA regulators to local communities. Cardero Coal also provided information on ongoing consultation opportunities that will occur throughout the EA process.

Cardero Coal wishes to gain a comprehensive understanding of, and involvement in, issues related to: the local economy, land rights, infrastructure, community health care, housing availability, and taxation issues. Key comments gained from consultation activities to date include: the need for a full-time doctor in Hudson's Hope, availability of training and employment opportunities, potential for localised economic prosperity, enhancement of community recreational opportunities, and responsible environmental management of the project and surrounding area.

Engagement and consultation with Federal, Provincial, and municipal governments, the public, and other interested stakeholders are being conducted on an ongoing basis throughout all stages of Project planning, regulatory review, and construction, to provide all interested parties with opportunities to learn about the Project, identify issues, and provide input with the goal of positively enhancing Project planning and development. This will include:

- Meetings and working sessions;
- Public open houses; and,
- Information sessions.

Consultation will be supported by a variety of information materials and mechanisms including posters for open houses, newsletters, and information sheets to encourage feedback, thereby, providing all with the opportunity to be fully informed about the Project and to have convenient and accessible means to provide input.

5.3 POTENTIAL EFFECTS TO FIRST NATIONS LAND USE AND RESOURCES

Although specialists contracted by Cardero Coal are still in the process of collecting baseline environmental data, traditional use studies are being developed and prepared and consultation is on-going, it is apparent that there may be some social components potentially affected by the proposed mine development. These potential effects include:

- **Potential lack of appropriate training** to fully get involved in employment at the mine;
- **Potential influx of "outside" workers** which brings with it factors that could result in disruption of the social fabric of First Nations. Typically this is seen as an increase in the availability of drugs and alcohol in the areas surrounding mine sites.
- **Potential loss of water quality and subsequently aquatic biota** and their habitat which could affect First Nations' treaty rights, including fishing.
- **Potential loss of wildlife and plant habitat** could affect the local First Nations' treaty rights, including hunting and also gathering traditionally-important medicinal plants.
- **Potential loss of access to the mine site** and some of the streams used by First Nations and others for the purposes of trail-walking, berry collection, hunting and fishing. With a mine development some of these areas may temporarily be lost until after mine closure and access to some of the areas may be restricted during operations for safety reasons. There may also be a loss of some of the resources during operations.

- **Archaeological and paleontological resources** may potentially be uncovered or lost during operations. Efforts are currently underway to determine the potential zones for encountering these resources. Management plans will be developed in consultation with the specialists and the First Nations to ensure ways forward can be found that would be acceptable to all parties.
- **The number of projects in the area is steadily growing** and this is likely to result in disruption to First Nations Communities and also their resources. The cumulative effects will need to be determined in consultation with the First Nations Groups.

5.4 CURRENT OVERVIEW OF EFFECTS STATUS

Based on the incomplete information of on-going environmental baseline studies and the need for further analysis and modelling, the proposed Cardero Coal Carbon Creek Metallurgical coal project does not appear, at this stage, to have any effects that cannot be mitigated. Furthermore, the on-going consultation with First Nations has resulted in alternative designs being developed to avoid sensitive areas (e.g., *Twin Sisters*). Where these concerns have been identified, Cardero Coal has responded by seeking alternatives that avoid those areas and which include suggestions from First Nations Groups about what would be more acceptable.

PROJECT DESCRIPTION

1. Project Summary

This document presents a project description for Cardero Coal Ltd.'s (Cardero Coal) designated project, Carbon Creek Metallurgical Coal Mine Project. It has been prepared in accordance with the British Columbia (BC) Environmental Assessment Office *Guidelines for Preparing a Project Description for an Environmental Assessment in British Columbia* (2008) or an Environmental Assessment Application (EA), the old consolidated *Establishing Timelines for Comprehensive Studies Regulations* (2011), the Major Projects Management Office's *Guide to Preparing a Project Description for a Major Resource Project* (2008) and the Canadian Environmental Assessment Agency's Operational Policy Statement: *Preparing Project Descriptions under the Canadian Environmental Assessment Act* (2007) and *Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* (July 2012).

Under the newly issued *Regulations Designating Physical Activity, 2012*, pursuant to the new *Canadian Environmental Assessment Act, 2012*, the Carbon Creek Project falls under the designated activity description, "construction, operation, decommissioning and abandonment of a coal mine with a coal production capacity of 3000 t/d or more" (Section 15(d), Schedule (*Section 2 to 4*)). Current clean coal production capacity of the Project is estimated at 4.1 million metric tonnes per annum over the 20 year mine life, which is approximately 12,000 t/d.

The designated Project is not taking place in a region that has been the subject of a regional environmental study.

1.1 CARBON CREEK PROPERTY

Cardero Resource Corp (Cardero) is a publicly-traded mineral exploration company based in Vancouver, BC. In June, 2011, Cardero acquired the balance of Coalhunter Mining Corporation, now renamed Cardero Coal, which holds a 75% interest in the Project. The Project Lands are located in northeastern BC approximately 40 km west of Hudson's Hope, south of Williston Reservoir, and 50 km north-northwest of Highway 97 through Pine Pass (Figure 1-1). The nearest city is Fort St. John located 110 km east of the Property and is connected to the towns of Chetwynd (60 km southeast of the property) and Hudson's Hope by Highway 29. The CN Rail line connecting Fort St. John and Tumbler Ridge areas with Prince George passes 30 km south of the Property.

Utah Mines Ltd. (Utah), now BHP Billiton, was responsible for the bulk of the historical coal exploration of the Carbon Creek coal deposit. During the period from 1976 to 1981, Utah sought approvals to develop a coal mine at the Carbon Creek Coal Deposit. Utah completed a Stage 1 Preliminary Impact Assessment in November 1976 (Utah Stage I EIA; Utah 1976b) which incorporated environmental survey data for the period from 1971 to 1976. Utah subsequently completed a Stage 2 Environmental Impact Assessment in November 1982 (Utah Stage II EIA; Utah 1982b), which provided additional detailed project information and a detailed project impact assessment.

In Q4 2011, Norwest Corporation (Norwest) conducted a Preliminary Economic Assessment (PEA) and prepared a technical report on the Project entitled *Technical Report: Carbon Creek Coal Property, BC*, dated December 6, 2011, which outlines their findings, on behalf of Cardero Coal (Norwest 2012a). The PEA was prepared in accordance with National Instrument 43-101 (NI 43-101) of the Canadian Securities Administrators and addresses the coal geology and resources (as of October 1, 2011) of the Project as well as providing a preliminary economic analysis. Subsequent to the PEA, Norwest undertook a Prefeasibility Study (PFS) of the Project and published *Technical Report: Prefeasibility Study of the Carbon Creek Coal Property British Columbia, Canada* on November 6, 2012

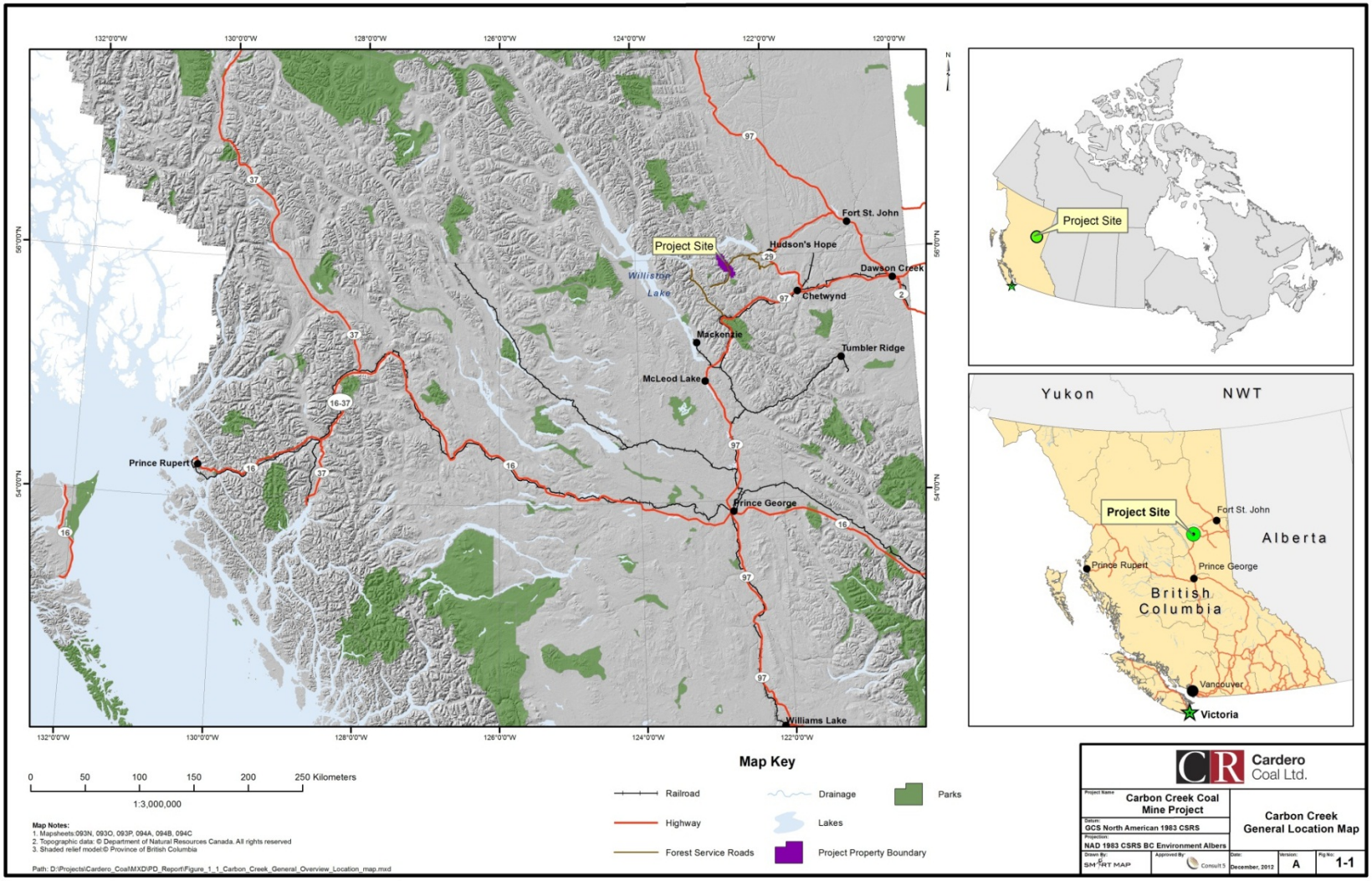
(Norwest 2012b). Much of the description of the Project, including its history, geologic setting, resource estimates, mineralization, discussion of coal quality and preliminary economic analysis are based on information from the PEA and PFS reports (Norwest 2012a & 2012b).

The Property is located within the Peace River Coalfield (PRC) and forms part of the Rocky Mountain Foothills structural belt which lies to the east of the Canadian Rocky Mountain Trend. The two main coal-bearing units occurring throughout the Foothills region are the Gates Formation and Gething Formation, the coal seams occurring within the Property being contained within the latter. According to Norwest (2012b), the Property has an estimated measured and indicated resource of 468 Mt of in-place coal and an inferred resource of 232 Mt (combined; surface, and underground).

The mineralized zones encountered on the Property are predominantly medium volatile bituminous coal seams. Historic coal quality reports indicate that the coals will produce a product with coking properties suitable for metallurgical applications. Thermal coal suitable for electric power generation could be produced with or without further processing in addition to, or as an alternative to, a coking coal product.

In the Project Area, coals of the Gething Formation are primarily ranked as medium volatile bituminous. Gething coals have produced satisfactory metallurgical products, particularly after beneficiation. A full program of sizing, washability, and metallurgical testing will occur in conjunction with more advanced engineering and economic analyses.

Figure 1-1: Carbon Creek General Overview Map



1.2 PROJECT PURPOSE AND RATIONALE

Metallurgical coal is less abundant than thermal coal and is used to produce coke, which is an integral component of the steel manufacturing process. World demand for high-quality metallurgical coal continues to grow to support industrialization in China, India, and many other countries. British Columbia is ideally positioned to satisfy this demand owing to the existence of high-quality coal deposits, an efficient transportation infrastructure for bulk commodity transportation, a skilled workforce and a stable political environment, to develop the province's vast coal resources. Development of the Carbon Creek coal deposits will contribute to expanding and sustaining local communities and will be economically beneficial to the province and the country as a whole.

The proposed Carbon Creek Project involves the development of a metallurgical coal mine with an anticipated average annual production rate of 4.3 million metric tonnes of clean coal once full production is achieved in 2020. The mine has a life of 20 years with a total of 78.4 Mt of clean coal produced. The Project is located in northeastern BC, approximately 40 km west of Hudson's Hope, south of Williston Reservoir, and 50 km north-northwest of Highway 97.

The Project will involve a combination of surface area, contour, high wall and underground mining throughout the mine life. The mine will be designed to achieve an annual average production rate of 4.1 million metric tonnes of clean coal over the 20 year mine life. The wash plant will have a single-stream capability of 1,200 t/h (Norwest 2012b). The life-of-mine has been modelled to 20 years, based on comparable operations in North America.

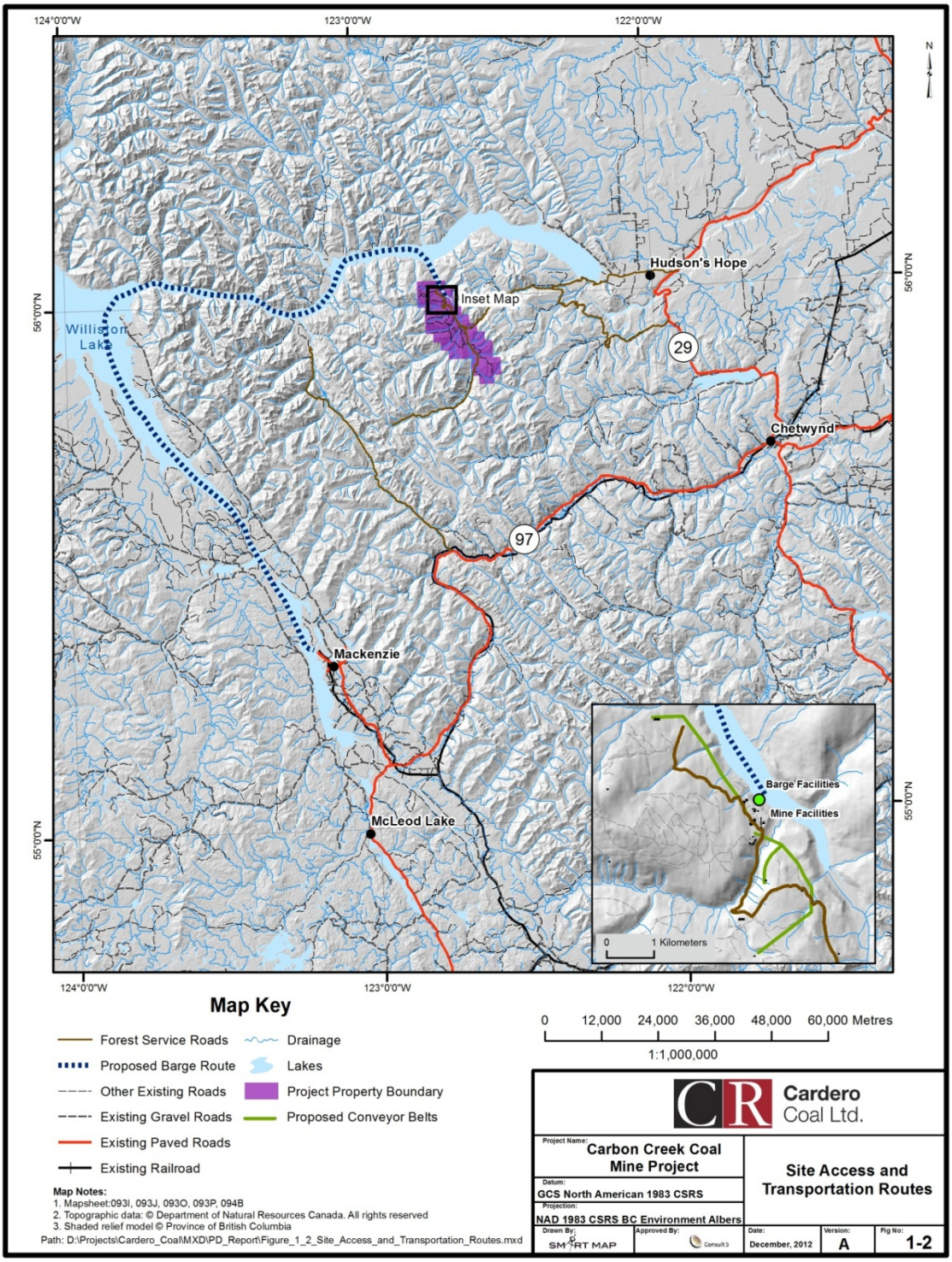
Run-of-mine (ROM; i.e. raw material for the coal processing plant (CPP) including coal, rocks, middlings and minerals) will be upgraded in quality through the CPP and the clean coal will subsequently be loaded onto barges at Carbon Inlet and barged approximately 175 km to a coal load-out facility near the town of Mackenzie (Figure 1-2). Upon arrival at Mackenzie coal will be conveyed from the barge into a hopper and transferred into rail cars, which using CN Railway will be transported for export through ports in Prince Rupert. It is proposed that the mine site's power will be serviced by connection to a B.C. Hydro generating station at G.M. Shrum Dam, located approximately 35 km east of the Project.

The planned annual production rate of the Project exceeds the threshold stipulated in the BC *Environmental Assessment Act* Reviewable Projects Regulation for coal mines. The Project is prescribed as a reviewable project as it will be "a new mine facility that, during operation, will have a production capacity of >250,000 tonnes/year of clean coal or raw coal or a combination of both clean coal and raw coal" (Reviewable Project definition: Part 1 Section 3(1); Established thresholds for mine projects: Part 3, Table 6). As a result, the Project is anticipated to require assessment under the BC *Environmental Assessment Act* to obtain a Project Certificate approving the Project by the BC government prior to construction. Under the newly issued federal *Regulations Designating Physical Activity, 2012*, pursuant to the new *Canadian Environmental Assessment Act, 2012*, the Carbon Creek Project falls under the designated physical activity description "construction, operation, decommissioning and abandonment of a coal mine with a coal production capacity of 3000 t/d or more" (Section 15(d), Schedule (*Section 2 to 4*)). The Carbon Creek Project is not subject to the environmental assessment and regulatory requirements of other jurisdictions outside of BC EAO and CEAA.

1.3 SCHEDULE

The PEA report for the Project was completed in January 2012, followed by the PFS in November 2012 and Cardero Coal proposes to complete a comprehensive Feasibility Study in Quarter 2 of 2013. Cardero Coal's preliminary schedule includes completion of environmental baseline studies, which have already commenced, by Q4 2012,

Figure 1-2: Site Access and Transportation Routes



with a planned submission date of Q2 of 2013 for the Environmental Assessment Certificate (EAC) Application and Mine's Act Permit Application. Commencement of construction activities will depend on timelines for the review and issuance of an EAC and Mine Permit but are tentatively planned to begin in mid-2014, with first coal being produced in late 2014.

1.4 PROJECT SETTING

1.4.1 Environment

The Property is located in the Inner Foothills of the Canadian Rocky Mountains. The regional topography is a belt of hills and low mountains. The highest elevation on the Property is slightly over 1,600 metres above sea level (masl). The moderately to steeply sloping ground descends to an elevation of about 680 masl on the shores of Williston Reservoir. Most of the area is below the tree line and is densely forested with spruce and pine. Black bears and grizzly bears are present in the area in addition to other wildlife, such as moose, stone sheep, mountain goats, caribou, and deer. The creeks are populated with several fish species, details of which can be found in Section 6.1.6 below (Ministry of Environment 2011a & 2011b; PWFWCP 2011; Utah 1982b).

Carbon Creek flows from south to north through the Property and enters Williston Reservoir which is located north of the Property. Carbon Creek is fed by a number of west-to-east flowing creeks, the most prominent being Seven Mile Creek, Nine Mile Creek, Ten Mile Creek, and Eleven Mile Creek (Figure 1-3). These tributaries are named according to their approximate distance from the Peace River now covered by Williston Reservoir. The McAllister Creek is a major east-to-west flowing tributary of Carbon Creek and joins Carbon Creek in the southeast portion of the Property.

The Project Area has a continental highland climate featuring short, warm summers and long, cold winters. Year-round mining operations are common in the area; winter conditions do not preclude surface or underground mining activities.

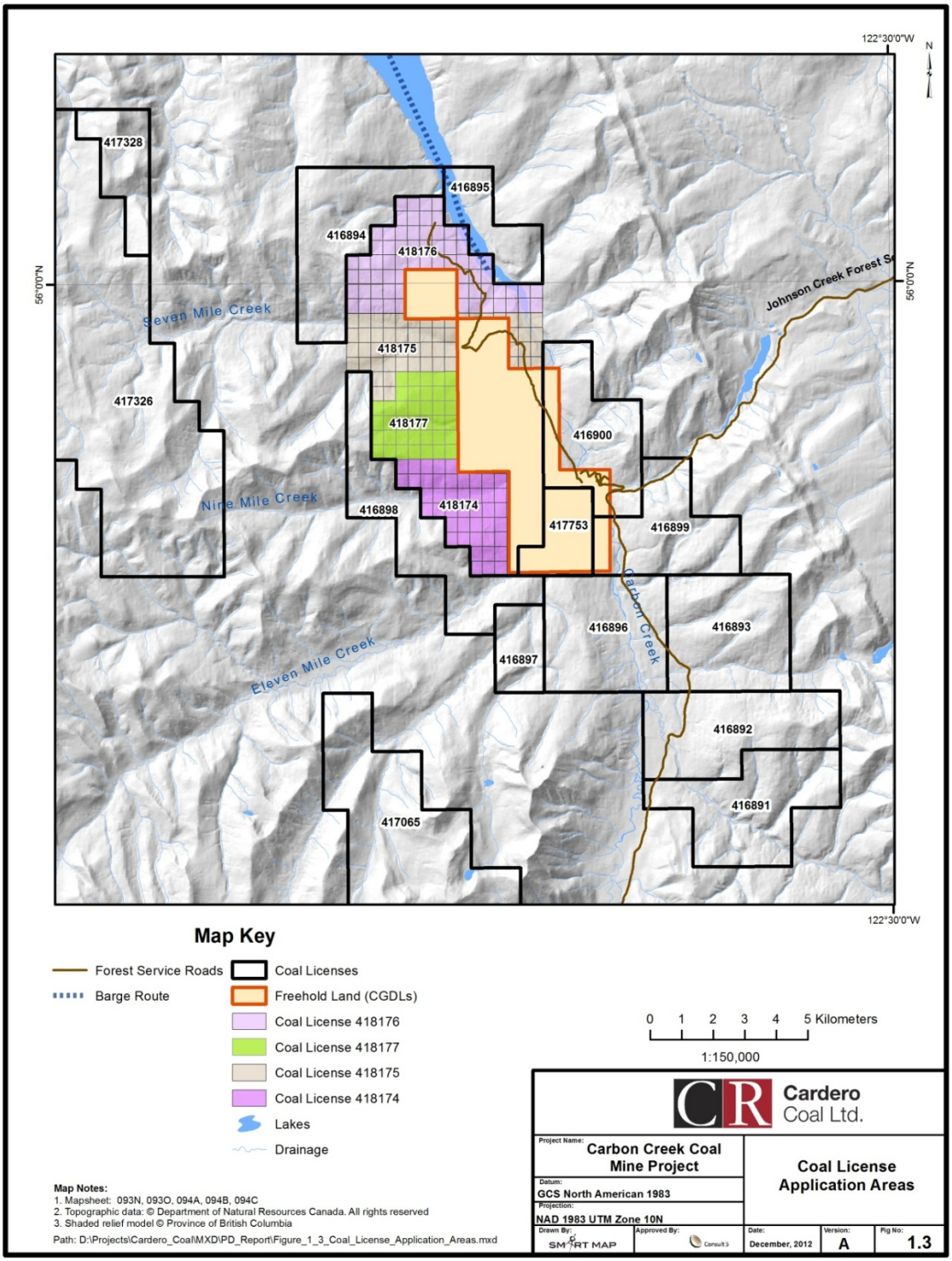
1.4.2 Land and Resource Use

The Property is located within the 2.9 million ha area covered by the 1999 Dawson Creek Land and Resource Management Plan (LRMP). Current land use activities in the region include: recreation, trapping, mining, energy development exploration, and forestry. Canadian Forest Products Ltd. (Canfor) holds a Tree Farm Licence which covers the non-freehold portions of the Project Area. Based on the historical information available regarding the Project Area footprint (e.g., Utah 1982a; PWFWCP 2011), and its recent use for logging by Canfor, the potential for contamination of the site from past land use is highly unlikely.

Project Lands have not routinely, nor historically, been used as a marine terminal, and are not designated for such use in a land use plan that has been subject to public consultation. Nor is the designated Project is taking place within waters or lands administered by a Canada Port Authority under the Canada Marine Act and its regulations.

The First Nations in the area of the proposed mine use trails on the property for hunting, fishing and berry picking. Caribou hunting is also an established right of the Treaty 8 First Nations in the area. Traditional uses of the proposed mine site currently include: trails, berry picking, fishing and hunting. These activities will possibly be affected by loss of access and will require identification and discussion with the users of the land. The Project mine site facilities are approximately 26 km northwest of the *Twin Sisters* sacred site (also referred to as Beattie Peaks). The designated Project area, although proximal to Aboriginal Reserves and the *Twin Sisters* sacred site, is not anticipated to require access to, or infringe on, these lands.

Figure 1-3: Coal Licenses and Application Areas



The proposed barge route for the transportation of coal product to market follows Williston Reservoir to Mackenzie and will potentially cross over the Tsay Keh Dene (TKD) statement of intent boundary and will therefore likely require consultation with this group, as well as Takla Lake First Nations.

The Project Lands are also located within the boundary of the Moberly caribou herd, which has been highlighted in the Peace Northern Caribou Plan. However, the proposed surface mining (and other associated surface activities) currently will not overlap with lands proposed as highly-suitable core habitat, per the recently-published *Draft Peace Northern Caribou Plan* (MFLNRO, 2012) (Figure 1-4). Moreover, based on prior agreements with regulators and impacted First Nation communities, Cardero has already agreed to treat this sensitive habitat is a "no-go zone" to accommodate concerns regarding impacts on caribou.

The underground mining footprint encroaches into the western border of the designated habitat, however, proposed mining (and associated) activities have little likelihood of impacting elevations of greater than 1400 m. Cardero will document how they intend to avoid impact in wildlife mitigation plans.

The towns nearest to the Property are Chetwynd (approximate population 2,500), located 60 km southeast of the Property, and Hudson's Hope (approximate population 1,200), located 40 km east of the Property. The nearest city is Fort St. John (approximate population 18,300) located 110 km east of Property and connected to the towns of Chetwynd and Hudson's Hope by Highway 29. The CN Rail line connecting Fort St. John and Tumbler Ridge with Prince George passes 30 km south of the Property. The CN Rail line provides direct access to the ports of Vancouver and Ridley Terminals in Prince Rupert, BC.

The Property is accessible by the Johnson Creek forest service road (FSR), approximately 72 km from Highway 29. Cardero Coal has road use agreements with Canfor and is responsible for maintaining access for parts of the roads described in the agreement. The agreements include Johnson Creek FSR from km 0 to km 74.6, sections of the Burns Road from km 0.0 to km 33.5 and numerous side and spur roads within the area. The Johnson Creek FSR enters the Property from the east and crosses Carbon Creek in the center of the Property. There are numerous interconnected roads and trails throughout the Property; these roads service active commercial logging operations in the area and can be negotiated with four-wheel drive vehicles in the summer and with snowmobiles in the winter. Improved FSRs connect the Property with Highway 29.

1.4.3 First Nations

The mine site property, including all components and alternative options assessed, is located in the Peace River Coalfield (PRC) within the territories of the TKD, Takla and Treaty 8 First Nations (Figure 1-5). The Treaty 8 First Nations affected include: the McLeod Lake Indian Band (MLIB), Saulteau First Nations (SFN), Halfway River First Nation (HRFN), and the West Moberly First Nations (WMFN).

1.5 ECONOMIC INPUTS AND BENEFITS

During the construction phase and throughout the operational life of the mine, the Project will result in direct and indirect economic benefits to individuals, local communities, the Province of BC, and Canada. These benefits will accrue through employment, construction materials and contracts, taxes, resource payments, and other levies. Additional information on personnel requirements, construction and operating costs, and contributions to provincial and federal revenue will be generated as part of the Feasibility Study and the EA.

Figure 1-4: Proposed Mine Footprint and PNCP Core Caribou Habitat Range

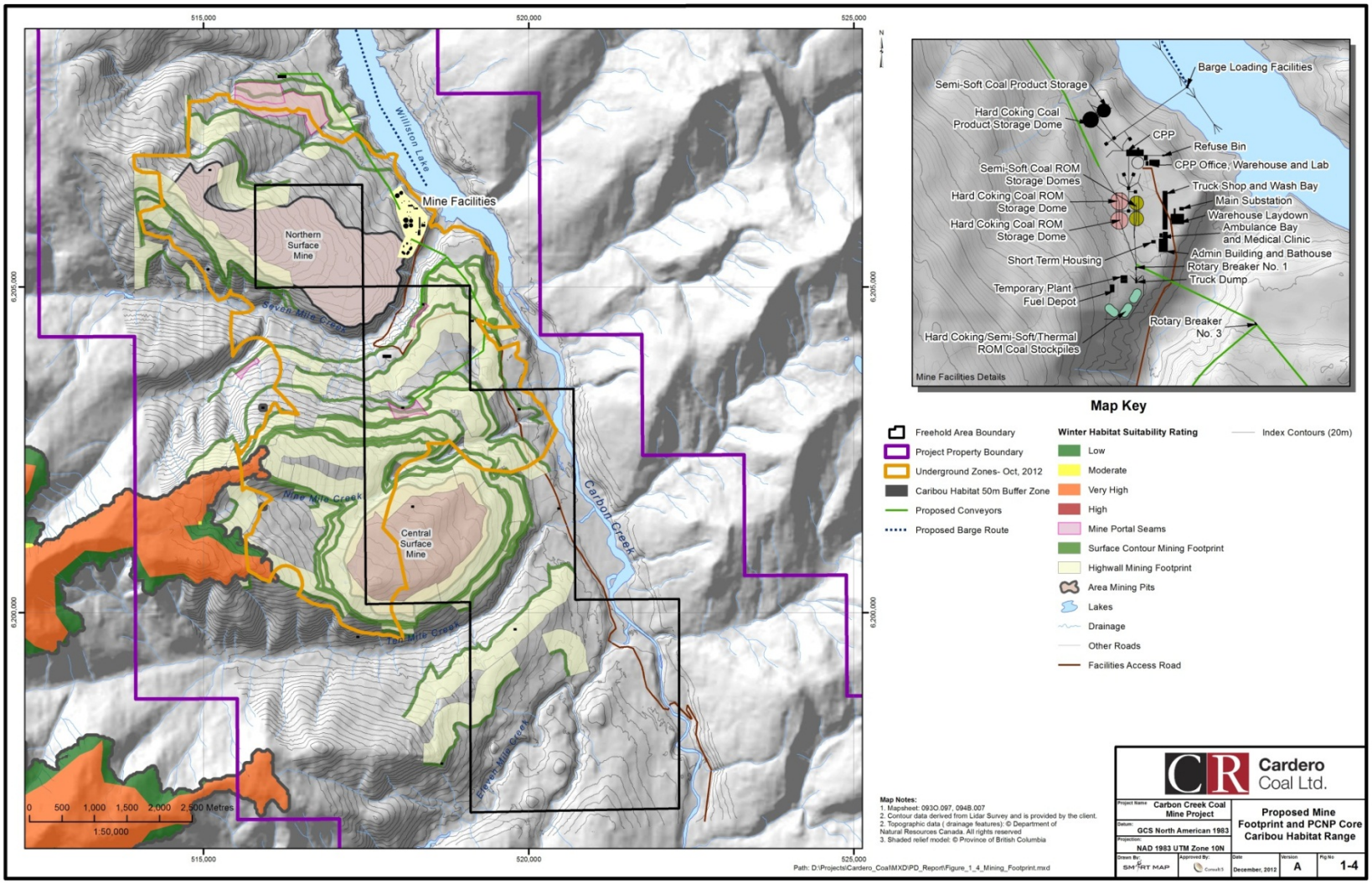
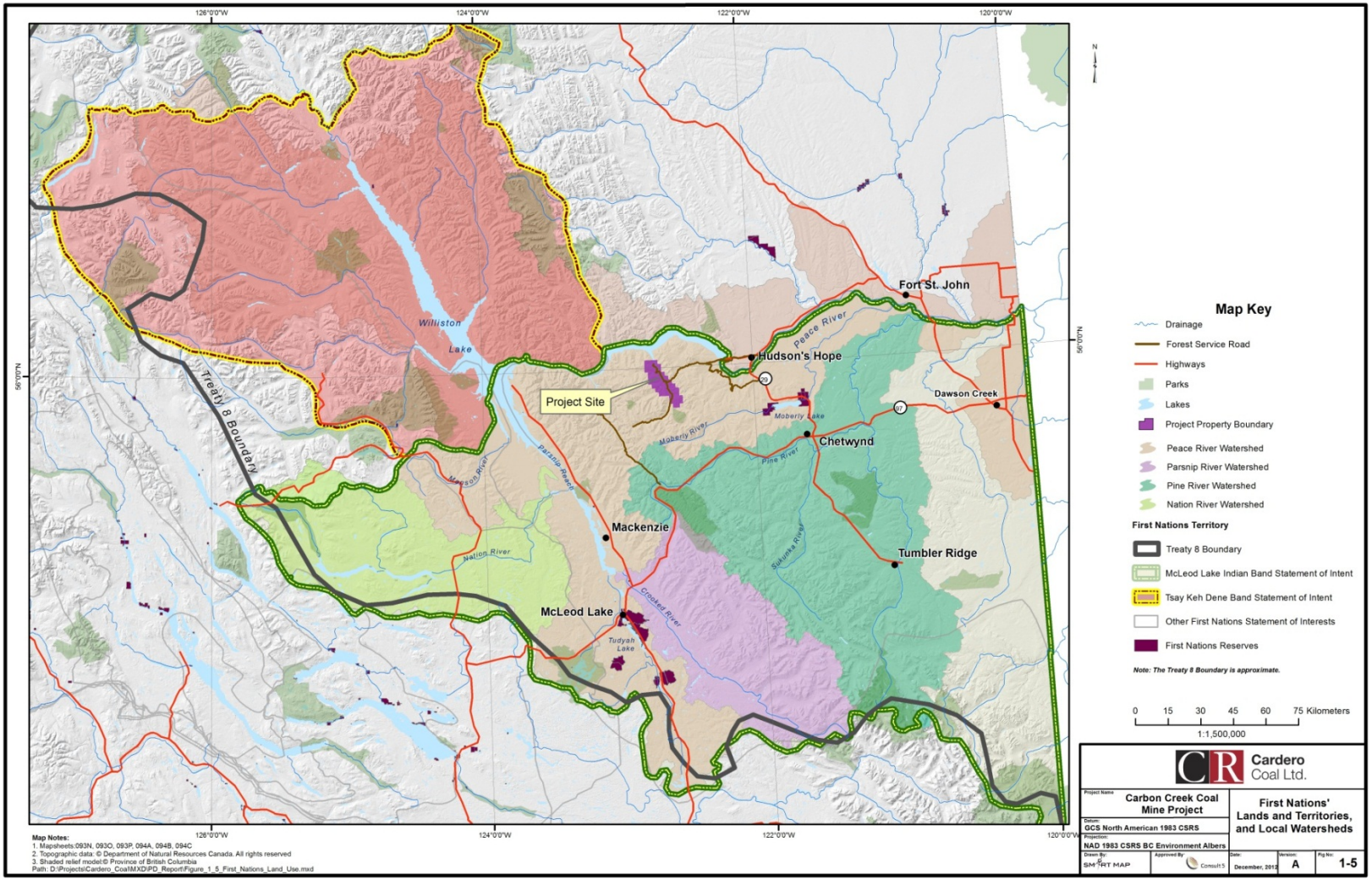


Figure 1-5: First Nations' Lands and Territories, and Local Watersheds



There is no proposed or anticipated financial support that federal authorities are, or may be, providing to the designated project.

1.6 POTENTIAL ENVIRONMENTAL IMPACTS

A preliminary review of the Project suggests that it has the potential to result in environmental effects in several general areas: water quality through selenium (Se) mobilization and water discharge; wildlife directly (e.g., wildlife-vehicle strikes due to increased traffic) and wildlife habitat directly or indirectly (e.g., habitat loss due to disturbances, such as, noise and light); and fish and fish habitat degradation potentially due to erosion and sedimentation in waterways.

The potential for, and significance of, the potential effects listed above will be assessed as part of the EA and mitigation measures will be proposed to ensure that the Project is unlikely to result in significant adverse effects to the environment.

2. Proponent Information

2.1 CARDERO RESOURCE CORP. AND CARDERO COAL LTD.

Cardero is a publicly-traded mineral development company based in Vancouver, BC whose common shares are currently listed on the Toronto Stock Exchange (symbol: CDU), the NYSE-Amex (symbol: CDY), and the Frankfurt Stock Exchange (symbol: CR5). Founded in 1999, Cardero's focus has increasingly been on iron ore and iron-making technologies. Cardero holds interests in the Sheini Hills Iron Ore Project in Ghana and in the Titac and Longnose Iron-Titanium projects in Minnesota, USA. In June, 2011, Cardero acquired the balance of Cardero Coal (then called Coalhunter Mining Corporation), which holds a 75% interest in, and is the operator of, the Carbon Creek JV which owns the Project.

Cardero's management team has a strong regional network and the geological and operational expertise to implement the most economically- and environmentally-sound approach to building its business. Cardero's Chief Executive Officer (CEO) and President, Michael Hunter, has more than 25 years of coal mine operation experience. Mr. Hunter's contact information is as follows:

Michael Hunter, B.A. (Spec.)
President/CEO
Cardero Resource Corp.
#2300 — 1177 West Hastings Street
Vancouver, BC V6E 2K3
Tel: 604-648-2625
Fax: 604-648-2650
Website: www.cardero.com
Email: mhunter@cardero.com

The principal Cardero Coal contact for this Project Description and future liaison for the EAC is as follows:

Guy Gilron, M.Sc., R.P. Bio.
Vice President, Environmental and Regulatory Affairs
Cardero Coal Ltd.
#1800 — 1177 West Hastings Street
Vancouver, BC V6E 2K3
Tel: 604-638-3315
Fax: 604-648-2650
Website: www.cardero.com
Email: ggilron@cardero.com

3. Carbon Creek Property

3.1 LOCATION

The Property lies within the Liard Mining District, Peace River Regional District, and the territories of Treaty 8 and TKD First Nations in northeastern British Columbia. It is approximately 60 km to the northwest of the town of Chetwynd and 40 km west of the village of Hudson's Hope. The nearest major cities are Fort St. John, approximately 110 km to the east, and Prince George, 220 km to the south. The Property is centered approximately on latitude 55°56'40" N and longitude 122°40'40" E. The Property lies within the Carbon Creek watershed, which drains north into Williston Reservoir in the Peace River (Peace Arm watershed) (Figure 1-5).

The commercial airport at Fort St. John provides air access from Vancouver. The CN Rail line connecting the mines of northeast BC to the ports of Vancouver and Prince Rupert passes within 30 km of the south end of the Property. Access to the Property is gained from Hudson's Hope by a network of good quality FSRs.

There are no permanent, seasonal or temporary residences, with the exception of the temporary exploration camp on-site, within at least 20 km of the mine site area. The proposed barge load-out will be located approximately five to seven kilometers from the main residential area of Mackenzie and in an existing industrialized area serving timber, paper and pulp, and pelletizing industries.

The Property is located in the PRC within the territories of Treaty 8 First Nations. The Project mine site facilities are approximately 26 km from the sacred First Nations' site of *Twin Sisters* (also referred to as Beattie Peaks). The proposed barge route for the transportation of coal product to market follows Williston Reservoir to Mackenzie and will potentially cross over the TKD statement of intent boundary.

Below is a table (Table 3-1) showing distances of the Project mine site (using property centre point) from First Nations' reserves in the area.

Table 3-1: Proximity of the Project Mine Site to local First Nations' Reserves

First Nations' Reserves	Approximate Location from Proposed Project Mine Site (Linear distance)
West Moberly First Nations (WMFN)	52 km
Saulteau First Nations (SFN)	68 km
McLeod Lake Indian Band (MLIB)	112 km
Halfway River First Nations (HRFN)	75 km
Tsay Keh Dene First Nations (TKDFN)	180 km
Takla Lake First Nations (TLFN; Takla Landing	201 km

Below is a table (Table 3-2) including distances of the proposed general location of the Project barge load-out at Mackenzie from First Nations' reserves in the area.

Table 3-2: Proximity of the Proposed Barge Load-out, Mackenzie, to local First Nations' Reserves

First Nations' Reserves	Approximate Location from Proposed Barged Load-out, Mackenzie (Linear distance)
West Moberly First Nations (WMFN)	97 km
Saulteau First Nations (SFN)	112 km
McLeod Lake Indian Band (MLIB)	41 km
Halfway River First Nations (HRFN)	130 km
Tsay Keh Dene First Nations (TKDFN)	200 km
Takla Lake First Nations (TLFN; Takla Landing)	179 km

With the only exception being First Nation reserve lands there is no federal land within at least a 50 km radius of the proposed Project. No federal land is being directly used for the purpose of carrying out the designate project. Also no zoning information for the Project Lands could be found on the Peace River Regional District (PRRD) zoning database or in the zoning by-laws documentation (http://prrd.bc.ca/services/development/planning/zoning_bylaws).

3.1.1 Location Relative to Other Projects in the Area

There are a number of energy and mining projects at various stages of environmental assessment in the Project Area. The Dokie Wind Energy Project (EAC issued; 55°53' N, 122°26' W) and the Gething Coal Project (Pre-Application Phase; 55°58' N, 122°23' W) are located approximately 20 km east of the proposed Project mine site facilities. The Willow Creek Project (55°37' N, 122°15' W) is the only certified coal mine project within 50 km (south-east direction) of the Property; this project is currently in the process of amending its EAC due to a proposed operational expansion. The Hackney Hills Wind project (Pre-application Phase; 56°19' N, 122°29' W) is a wind farm development situated approximately 50 km north of the Property and the Wildmare Wind Energy Project (55°42' N, 121°44' W) involving a proposal to construct and operate 37 wind turbines to provide clean energy for B.C., is another project (currently under review) situated approximately 65 km to the south east of the proposed Project mine site facilities.

3.2 CURRENT LAND TENURE AND JOINT VENTURE

The Project Area has been explored under the auspices of numerous companies and various configurations of licensing and land and mineral tenures over a period of more than 100 years. The Property currently consists of four coal licenses (418174, 418175, 418176, and 418177), ten applications for coal licenses (and any coal licenses issued pursuant to such applications and any subsequent coal leases) (Coal License Applications) (Table 3-3) and ten provincial Crown Granted District Lots (CGDL), comprising a contiguous tenure parcel of 17,200 ha (Figure 1-3). Approximately 14,600 ha of the Property are Crown Lands (Peace River Regional District) and the balance of 2,600 ha is private (non-Crown) land (i.e. CGDLs).

3.2.1 Crown Granted District Lots

The CGDL's, totalling approximately 2,600 ha, are controlled by Peace River Partnership (PRP), an Alberta partnership. Cardero Coal has entered into an option, and made all requisite payments, to exercise a coal lease over the coal resources on the CGDL from PRP. The CGDL's consist of fee simple lands (including both surface and sub-surface (mineral) rights to, *inter alia*, coal) that have been granted by the Government of British Columbia to a private owner. Mining of the CGDL's will not require a coal license or coal lease, as the minerals, including coal, are privately owned.

This area will, however, be subject to the *Mines Act* for mining approvals and other provincial environmental, health, and safety regulations in effect for mine permitting, safety, environmental protection, and operations.

Table 3-3: Coal License Details (*as of December 2012*)

License	Area (ha)	Exploration Area	Status	Applicant
418176	1135*	Carbon Creek	Granted	Alan Arthur Johnson
418175	915*	Carbon Creek	Granted	Alan Arthur Johnson
418177	694*	Carbon Creek	Granted	Alan Arthur Johnson
418174	796*	Carbon Creek	Granted	Alan Arthur Johnson
416891	1,400	Carbon Creek	Application	P. Burns Resources Ltd.
416892	1,400	Carbon Creek	Application	P. Burns Resources Ltd.
416893	1,400	Carbon Creek	Application	P. Burns Resources Ltd.
416894	1,330	Carbon Creek	Application	P. Burns Resources Ltd.
416895	630	Carbon Creek	Application	P. Burns Resources Ltd.
416896	1,400	Carbon Creek	Application	P. Burns Resources Ltd.
416897	420	Carbon Creek	Application	P. Burns Resources Ltd.
416898	1,330	Carbon Creek	Application	P. Burns Resources Ltd.
416899	1,050	Carbon Creek	Application	P. Burns Resources Ltd.
416900	950	Carbon Creek	Application	P. Burns Resources Ltd.

* - denotes excludes overlap with CGDLs

3.2.2 Coal License Applications

The Property now includes a total of ten Coal License Applications. Figure 1-3 shows the location of these Coal License Applications.

The Coal License Applications have been submitted by P. Burns Resources Ltd. of Calgary, Alberta and, upon the issuance of any coal licenses thereunder, such licenses are to be transferred to the Carbon Creek Partnership (CCP), an Alberta partnership.

Three of the Coal License Application areas overlie the CGDL's. The Ministry of Energy and Mines (MEM) will modify the Coal License Application areas to exclude any portions of the Coal License Application areas that overlie the CGDL during the approval process for the issuance of the coal licenses, as the coal underlying the CGDLs is already privately owned and therefore not available for grant under a coal license or coal lease.

3.2.3 Joint Venture

Cardero Coal has entered into a joint venture (JV) agreement with CCP, in which Cardero Coal holds a 75% interest and CCP holds a 25% net proceeds interest. Pursuant to the joint venture agreement, each joint venture partner is contributing its resource in the Carbon Creek deposit. The joint venture, known as the Carbon Creek Joint Venture,

will control and operate the Carbon Creek property described above and Cardero Coal is the manager of the Carbon Creek JV.

The joint venture agreement provides that the CCP interest is a carried net profit interest which requires Cardero to fund the exploration, development, construction and operation of the mine. However, CCP will not receive any of its share of the proceeds until Cardero Coal has recovered 100% of its investment including all development monies, exploration expenditures, and capital expenditures as well as the cost of the Johnson coal licences. Following Cardero Coal recovering its investment, the CCP is entitled to 25% of the net proceeds of the Carbon Creek Joint Venture.

3.3 HISTORY

The history of coal exploration and evaluation in the Project Area is summarized in Table 3-4. This section summarizes the exploration history and outlines the coal tonnage estimates at each stage of geologic interpretation, as outlined in the table. These estimates focused on differing areas of the Carbon Creek coal deposit, and were subject to different criteria and objectives over their time span.

Table 3-4: Exploration History and Resource Estimates

Year	Company/Individual	Tonnes (Millions)	Units
1943	Stines	2,700	Short tons
1971	Utah Mines Ltd.	316	Short tons
1972	Utah Mines Ltd.	245	Short tons
1973	Utah Mines Ltd.	188	Short tons
1975	Utah Mines Ltd.	133	Short tons
1976	Utah Mines Ltd.	143	Metric tonnes

There have been two major periods of coal exploration at the Project Area. During the period between 1908 and 1951, exploration was limited to surface mapping, trenching, and sampling along creek beds. The next period of active coal exploration was from 1970 to 1981 when Trend Exploration Limited (Trend), a Colorado-based company, conducted an aerial mapping survey. Subsequently, Utah completed comprehensive exploration, including surface mapping, drilling, trenching, and bulk sampling programs. The sequence of events in the exploration history and estimates of coal tonnages are described in separate sections below.

3.3.1 Period 1908 to 1951

Coal occurrences in the Project Area were first described early in the 19th century from exposures along creek beds. Cowper Rochfort and Senator Patrick Burns (later, the Burns Foundation) were the first mineral claim holders in the area starting around 1908. Various preliminary appraisals were performed by A.B. Christie for Lord Rhonda in 1914 and by Rochfort in 1921, representing the American International Company. The earlier claims by Rochfort and Patrick Burns were surveyed and ten of their claims were converted to leases in 1921 (Stines 1943). In 1928, EW Beltz, representing the Stuart and Batten Company, undertook a formal surface mapping and coal sampling program along Carbon Creek and its immediate tributaries. The coal seams were interpreted by Beltz to be developed within a broad synclinal structure with strata dipping at between 5 and 20 degrees. The axis of this

synclinal structure was interpreted as extending roughly north-south through the property and a few kilometres west of Carbon Creek.

In 1942, Rochfort and Walter Wrigley excavated four trenches along Eleven Mile Creek for geologic mapping and collection of hand samples. This was followed by further surface mapping and sampling of coal bed outcrops by Stines in 1943. The mapping and sampling was largely confined to rocky outcrops along the Nine Mile Creek, Ten Mile Creek, Eleven Mile Creek, and Carbon Creek.

Stines was able to confirm the mapping and interpretation of the 1928 and 1942 surveys and a total of 13 coal samples were taken by Stines, from surface outcrops in the area. Further mapping and sampling of coal exposures from creek beds and trenches were undertaken by the British Columbia Department of Mines in 1944. The results of this sampling and mapping exercise are summarized in the Mathews (1945) report. A total of 45 samples were reported by Mathews.

By 1945, up to ten separate coal seams were identified. The coal seams were exposed over an area approximately 20 km long (north to south) and over 3 km wide (east to west). No drilling took place by 1945 and all interpretations were based on surface mapping along creek beds and trenches.

Stines (1943) estimated a total of 145 million short tons (Mst) from two prominent seams and further stated that the estimate may be as high as 2,700 Mst if all ten Gething seams are included in the tonnage calculations. Later, Mathews (1945) recommended that the reliability and accuracy of coal tonnage estimates could be improved upon by undertaking exploration drilling.

By 1951, the last of the series of investigations was completed by Howells and Davidson (Utah 1972) and the coal leases at Carbon Creek were then consolidated under the name of the Burns Foundation.

3.3.2 Period 1970 to 1981

3.3.2.1 Trend Exploration Limited

In 1970, Trend undertook an aerial survey of the Project Area. Trend's photo interpretation of the surface geology identified the main structural marker beds in the area.

3.3.2.2 Utah Mines Limited

Utah was responsible for the bulk of the historical exploration of the Carbon Creek coal deposit. Their coal exploration programs covered the period between 1971 and 1981 and comprised surface mapping, drilling, seismic survey and interpretation, and bulk sampling from eight surface adits.

Early in 1971, Utah negotiated the transfer of 143 coal licenses from Trend and 10 CGDLs from the Burns Foundation to Utah. The coal licenses covered much of the Project Area and comprised a total of 38,900 hectares (ha) of which 36,320 ha are from Trend and 2,580 ha are from the Burns Foundation. The Utah exploration was completed over several annual phases starting in 1971. Resource estimates were prepared throughout this period, but often had differing objectives and included different areas of the Carbon Creek deposit. The activities and results from 1971 to 1981 are summarized in Table 3-5.

Table 3-5: Summary of Utah Mines Ltd 1971-1981 Exploration

Year	Activity	Results[1]
1971	9 core drill holes in central deposit area.	Utah (1972) reported a total of 300 Mst (million short tons) of potentially mineable in-place coal in central region of the property.
1972	14 core drill holes completed; 5 within southeastern McAllister Creek area.	Utah (1973) reported a total of 245 Mst of potentially mineable in-place coal in the north and central region of the property. McAllister Creek coal deposits not included in estimate due to thin, discontinuous and lenticular nature of coal deposit.
1975	36 core drill holes completed including McAllister Creek area; 4 north-south shallow 2D seismic survey lines completed to determine impact of glaciation on coal-seam development.	Utah (1975) reported a revised estimate of 133 Mst of mineable in-place coal for the central and north regions. No coal tonnage estimate made for areas south of Ten Mile Creek (includes McAllister Creek area).
1976	181 exploration and metallurgical/engineering core drill holes completed almost entirely in north and central region; some drill holes north of Eleven Mile Creek in south. The focus of drilling was to determine the extent of surface weathering on coal quality. 6 adits excavated in north and central region. The purpose of the adits was to obtain sufficient sample mass for coal washability, metallurgical testing, and coal sizing analyses necessary for coal plant design, as well as, for testing underground mining productivity, rock stability, and weathering profile.	Utah (1976a) reported only preliminary estimates of in-place coal tonnages using all prior exploration data. These preliminary estimates totalled 23.7 Mt (million metric tons) and were limited to the area south of Ten Mile Creek and north of Eleven Mile Creek. In-place coal tonnage estimates for the remaining areas, including McAllister Creek, were reported to be 119 Mt in the Utah (1976a) exploration report. This estimate only used exploration data accrued prior to 1976.
1981	45 core drill holes completed to aid mine planning and plant design efforts.	No additional update to resource estimate.
1982-2009	No exploration activity.	

[1] *Note: the resource estimates reported in this table pre-date the formal establishment of guidelines for the public reporting of coal resources and reserves in Canada and are therefore not NI 43-101 compliant.*

1982 to 2009

Following Utah's 1981 exploration program (Utah 1982a), no active coal exploration is reported to have occurred in the Project Area during the period from 1982 to 2009, inclusive.

Stage I and II Environmental Impact Assessments

During the period from 1976 to 1981, Utah sought approvals to develop a mine on the Carbon Creek coal deposit. Utah completed a Stage I EIA in November 1976 (Utah 1976b), which incorporated environmental survey data for the period between 1971 and 1976. Subsequently, in November 1982, Utah completed a Stage II EIA (Utah 1982b), which provided additional detailed project information and a detailed project impact assessment.

3.3.3 Recent Exploration

3.3.3.1 Cardero Coal 2010

Cardero Coal completed an eight-hole validation drilling program during October and November of 2010. Seven of the holes were successfully cored from surface to their total depth, and geophysically logged. The final hole collapsed after total depth was reached but was only able to be geophysically logged to 30 m in depth, due to collapse of the hole. A total of 1,712 m were drilled in the eight holes.

The objective of the validation drilling was to twin (drill close by) a selected group of drill holes previously completed by Utah, in order to confirm the accuracy of the older drilling records. Positive results will permit the Utah drilling data to be used in the estimation of a NI 43-101 compliant resource.

3.3.3.2 Cardero Coal 2011

Cardero Coal conducted a sizable exploration and development drilling project within the CGDL area of the Property beginning August 2011. Data resulting from this program has been assimilated into a geologic model in support of the recently published Prefeasibility Study.

3.3.3.3 Cardero Coal 2012

Cardero Coal was granted a Notice of Work for the Project's 2012 exploration program in June 2012 and the drill program was fully completed in October 2012. Results from this program have not yet been used to define the resource but will be used to update the geological model further in support of the planned Feasibility Study.

3.4 HISTORY OF COAL ANALYSES

Coal quality analyses have been carried out on Carbon Creek coals over the period from 1908 to 2011. Norwest (2012a) has summarized the history and detail of coal quality analyses for the Project Area over this period of time. This information is summarized below.

3.4.1 Period from 1908 to 1945

From 1908 to 1945, coal analyses were restricted to raw (unwashed) proximate analyses, including measurements of moisture, ash, volatile matter, sulphur, and fixed carbon content in coal, as well as caloric value in British thermals units (BTU). The laboratories that analyzed these samples are no longer in operation; however, the techniques and approaches used are expected to be similar to that of current analytical practices for coal. The amount of weathered coal included in the samples and the transport and handling of these samples, including the amount of time the coal samples were exposed to the atmosphere, are unknown.

3.4.2 Period from 1971 to 1981

Sample preparation and analytical methods from the Utah exploration programs are believed to be consistent with current industry standards. The laboratories that carried out the analyses are well-respected and the procedures

were well-documented in the Utah exploration reports and the Stage I and Stage II Impact Assessment reports (Utah 1976b, & 1982b). Methodology of coal sample preparation, laboratory equipment design, and analytical procedures have not changed significantly in the past 30-plus years from the work described. Norwest (2012a) provided the drill core coal sample analyses details and handling procedures, including laboratory handling procedures, slim core froth flotation procedures, and the 1976 on-site core sampling and laboratory procedures. Additional adit bulk samples were sent to Commercial Testing and Engineering (Denver, CO), Cyclone Engineering Sales Ltd (Edmonton, AB), and Energy Mines and Resources (Ottawa, ON). The role of each testing facility and the results of the coal quality tests are described in detail in the PEA (Norwest 2012a).

3.4.3 Recent Exploration

3.4.3.1 Slim Core – SGS

A total of 114 coal samples from the Cardero Coal validation drill program were sent to the SGS laboratory (Beckley, WV). These samples were tested for standard raw coal analyses, including proximate analysis, sulphur, free swelling index (FSI), and apparent specific gravity. Roof and floor samples were also analyzed for most seams with a parameter suite limited to short proximate (i.e., moisture, ash, heating value), sulphur, and apparent specific gravity. Roof and floor data were sampled to be used in dilution calculations for future reserve estimates. A small number of samples were submitted for basic washability testing at 1.5 grams/centimetre cubed float/sink.

3.5 GEOLOGIC SETTING

3.5.1 Regional Setting

The Property is located within the PRC, and forms part of the Rocky Mountain Foothills structural belt which lies to the east of the Canadian Rocky Mountain Range. The Foothills belt is characterized by folded and faulted Mesozoic sediments that are in transition between the relatively gently-dipping, non-deformed formations of the Alberta Plateau to the east and the highly-deformed Rocky Mountain Range to the west.

The coal seams of the PRC were formed within Cretaceous sediments deposited along the western margin of the Western Canada Basin, in a series of transgressive-regressive cycles during the Columbian Orogeny. Environments of deposition varied laterally and vertically from marine through pro-deltaic and near shore, to delta plain and alluvial. Lithologies include mudstone, siltstone, sandstone, conglomerate, and coal. The subsequent Laramide Orogeny resulted in most of the present day faulting and folding of the coal-bearing sediments in the PRC. The two main coal-bearing units occurring throughout the Foothills region are the Gates Formation and Gething Formation. Coal depth of burial, folding, and faulting resulted in increased pressures and heat flows that have imparted metallurgical properties to the coal seams. A summary of the typical stratigraphy for the PRC (Norwest 2012a) is shown in Table 3-6. The stratigraphic units occurring within the property, and intersected by drilling to date, range between the Moosebar Formation and Minnes Group, with the Gething Formation being the primary unit exposed at surface.

Table 3-6: Upper Jurassic-Upper Cretaceous Stratigraphy of Northeastern British Columbia

Coal Seam	Group	Range	Description
Upper Cretaceous		Dunvegan	Fine- to course-grained sandstone; conglomerate; carbonaceous shale; coal.
Lower Cretaceous	Fort St. John Group	Cruiser	Dark grey marine shale with sideritic concretions; minor sandstone.
		Goodrich	Fine-grained, cross-bedded sandstone; shale; mudstone.
		Hasler	Silty dark grey marine shale with sideritic concretions; minor sandstone and pebble conglomerate; siltstone in lower part; basal pebble layer.
		Boulder Creek	Fine-grained, well-sorted sandstone; carbonaceous sandstone; massive conglomerate; siltstone; marine and non-marine mudstone; minor coal.
		Hulcross	Dark grey marine shale and siltstone, with sideritic concretions.
		Gates	Fine-grained, well-sorted marine and non-marine sandstones; carbonaceous sandstone and mudstone; coal; shale; minor conglomerate.
		Moosebar	Dark grey marine shale with sideritic concretions; siltstone; glauconitic sandstone; chert pebble conglomerate at base (Bluesky Member).
	Bullhead group	Gething	Fine- to coarse-grained, brown, calcareous, carbonaceous sandstone; coal; carbonaceous shale and conglomerate; siltstone.
		Cadomin	Massive conglomerate with chert and quartz pebbles; minor coarse-grained sandstone, carbonaceous shale, and coal.
	Regional Erosional Unconformity.		
Jurassic	Minnes		Quartzose sandstone; fine-grained sandstone; silty shale; mudstone; minor carbonaceous sediments.

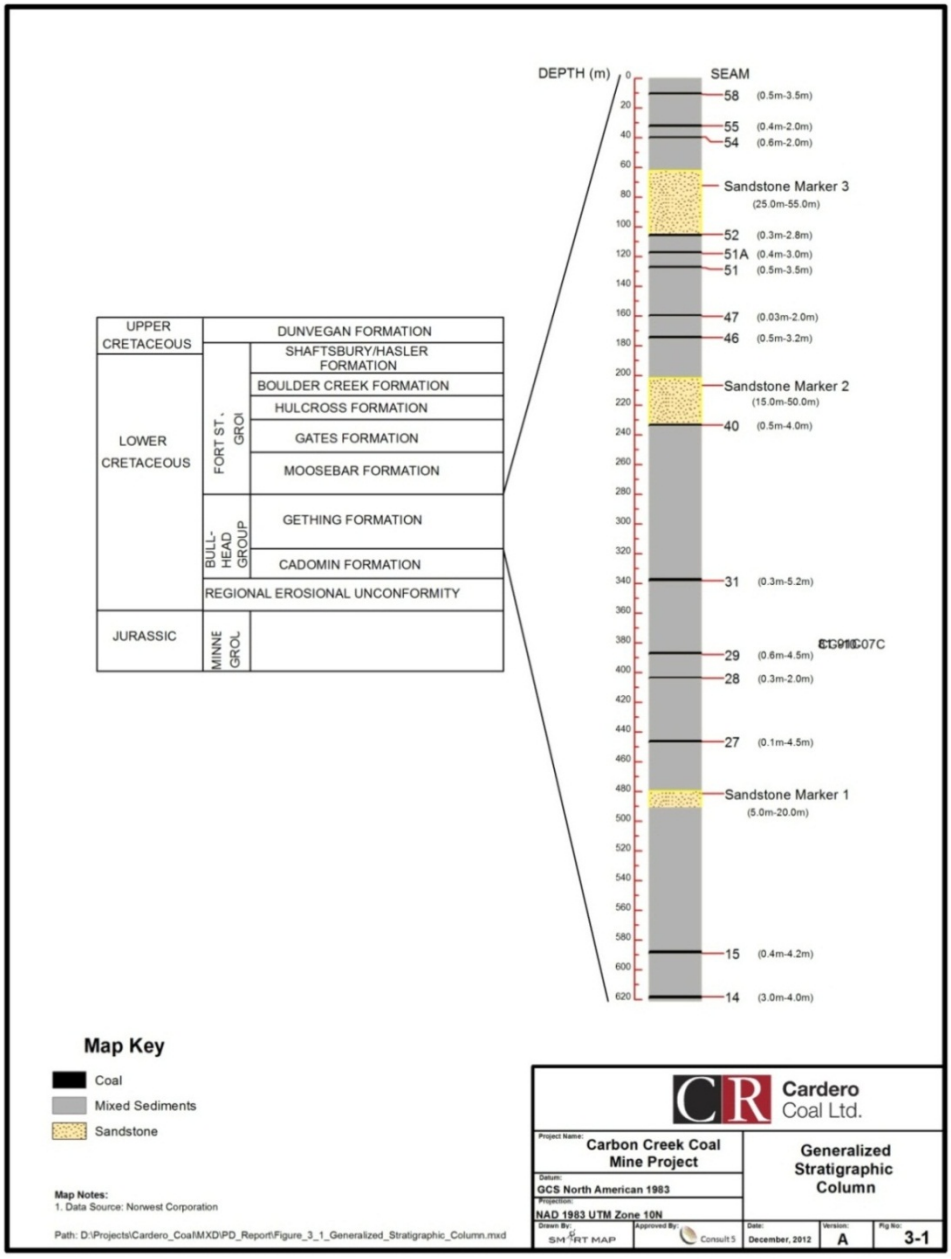
3.5.2 Project Stratigraphy and Coal Occurrences

The coal seams occurring within the Property are contained within the non-marine Gething Formation, as illustrated in Figure 3-1. The Gething Formation consists of dark grey mudstone, siltstone, very-fine to coarse-grained sandstone, carbonaceous mudstone, silty and sandy mudstone, coaly plant debris, minor bentonite, black shale, occasional minor tuffs in the upper part, minor conglomerates, and coal. The sandstone in the upper portion of the formation contains pebbles and coal stringers. These units are cross-bedded and bioturbated. They show evidence of soft sediment deformation. Fossil bivalves and worm burrows are also found in some parts of the formation.

The stratigraphic units occurring within or adjacent to the Property range between the Moosebar Formation and Minnes Group, with the Gething Formation being the primary unit exposed at surface. Units penetrated by drilling within the Property to date typically begin in the upper Gething and terminate in the middle or lower Gething. No record exists of the Moosebar Formation or its distinctive lower unit, the Blue Sky member, being intersected by

drilling within the Property boundaries (Norwest 2012a). A discussion of the coal seam stratigraphy of the Property is presented below in Section 3.7.

Figure 3-1: Generalized Stratigraphic Column



3.5.3 Geologic Structure

The regional trend in the Foothills region, for both fold axes and thrust faulting, is northwest to southeast, with fault planes frequently dipping to the southwest. The folding in the Foothills is generally broad and gentle, with

major fold set axes spaced on the order of 2 to 4 km apart and dips of less than 20º. Smaller-scale folds and undulations modify these larger structures. Faulting tends to be of the thrust variety and occur with varying severity throughout the Foothills. Structural interpretations of the Carbon Creek coal deposit by Utah in their 1981 Exploration Report (Utah 1982a) portray a rather broad, canoe-shaped syncline which lies between two anticlinal belts that straddle the western and eastern boundaries of the Property. The synclinal axis roughly parallels the course of Carbon Creek, as illustrated in Figure 3-2 and the cross-sections in Figure 3-3 and Figure 3-4. Dips in the central portion of the Property are nearly flat, ranging from 0° to 15°, increasing to up to 30° locally along the synclinal flanks in the east and west portions of the Property. Dips through the east and central portions of the target area are very mild, due to their proximity to the syncline axis. Dips are shown to increase to the west moving up the western limb of the syncline, as shown in the structural elevation contour map, Figure 3-5.

Utah interpreted the presence of four north-south faults based on drill and field mapping data. These faults effectively separate the Property into discreet mining blocks (Norwest 2012a). The three western-most faults were interpreted to be high-angle reverse faults with displacements estimated to range from between 50 and 70 m.

The northern half of the Property is significantly better understood geologically than the areas south of Eleven Mile Creek. It is believed that the southwestern portion of the Property becomes geologically more complex and has proven to be more difficult to explore, due to the thicker covering of glacial till. As exploration continues in this area the structural geology will become better understood.

Recent field work completed by Cardero Coal has indicated that the severity of faulting may be less than estimated by Utah during their evaluations in the late 1970s and early 1980s. Definitive data that will permit accurate, detailed mine planning in the areas proximal to suspected faults, has yet to be collected and/or evaluated. The most notable change in interpretation is the intersection of what is believed to be the lower coal seams of the Property's stratigraphic sequence on the east side of the Carbon Creek Fault. This fault was formerly thought to have had sufficient uplift to expose the barren zone of the Gething Formation lying below the coal horizons. The new interpretation is illustrated in the structural cross-sections shown in Figure 3-3 and Figure 3-4.

3.5.3.1 Deposit Type

Criteria applied to coal deposits for the purposes of determination of coal resources and reserves include both "Geology Type" as well as "Deposit Type". For coal deposits, this is an important concept because the classification of a coal deposit as a particular type determines the range-limiting criteria that may be applied during the estimation of reserves and resources.

"Geology Type" and "Deposit Type" for coal deposits are parameters specified in Geological Survey of Canada (GSC) Paper 88-21 (Hughes et al. 1989), which is a guideline reference for coal deposits specified in NI 43-101. Geology Type is a definition of the amount of geological complexity, usually imposed by the structural complexity of the area, and the classification of a coal deposit by Geology Type determines the approach to be used for the resource/reserve estimation procedures and the limits to be applied to certain key estimation criteria. Geology Type ranges from low, to moderate, to complex, to severe.

The bituminous coal deposits that occur within the Project north of Eleven Mile Creek are typical of those in the outer foothills and have been determined by Norwest (Norwest 2012a) to be of the moderate geology type. A complex geology type is believed to be found in the exploration area south of Eleven Mile Creek, west of Carbon Creek.

Figure 3-2: Geological Plan Map

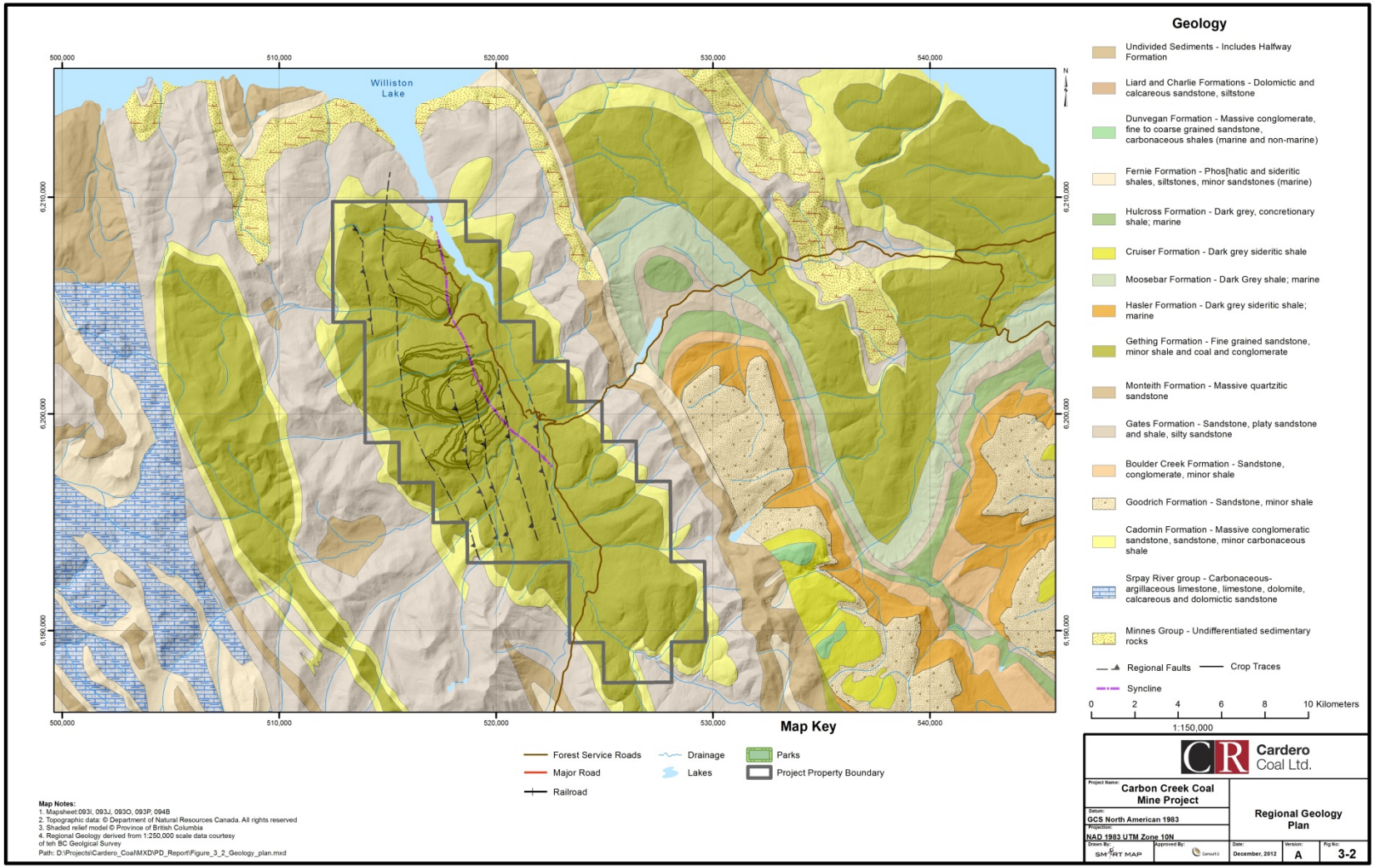


Figure 3-3: Carbon Creek Project – Cross-sections A-A’ and B-B’

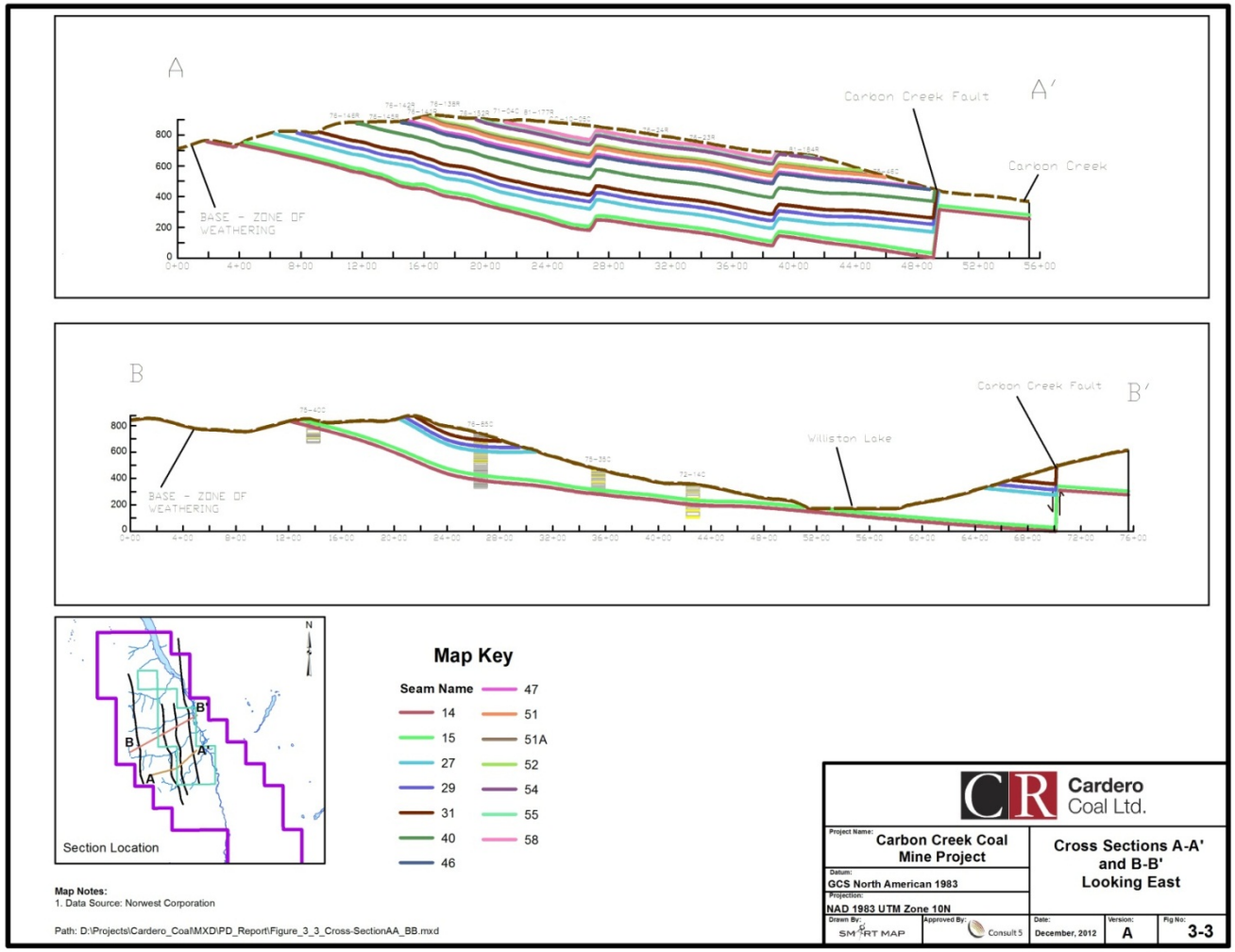


Figure 3-4: Carbon Creek Project – Cross-section C-C′

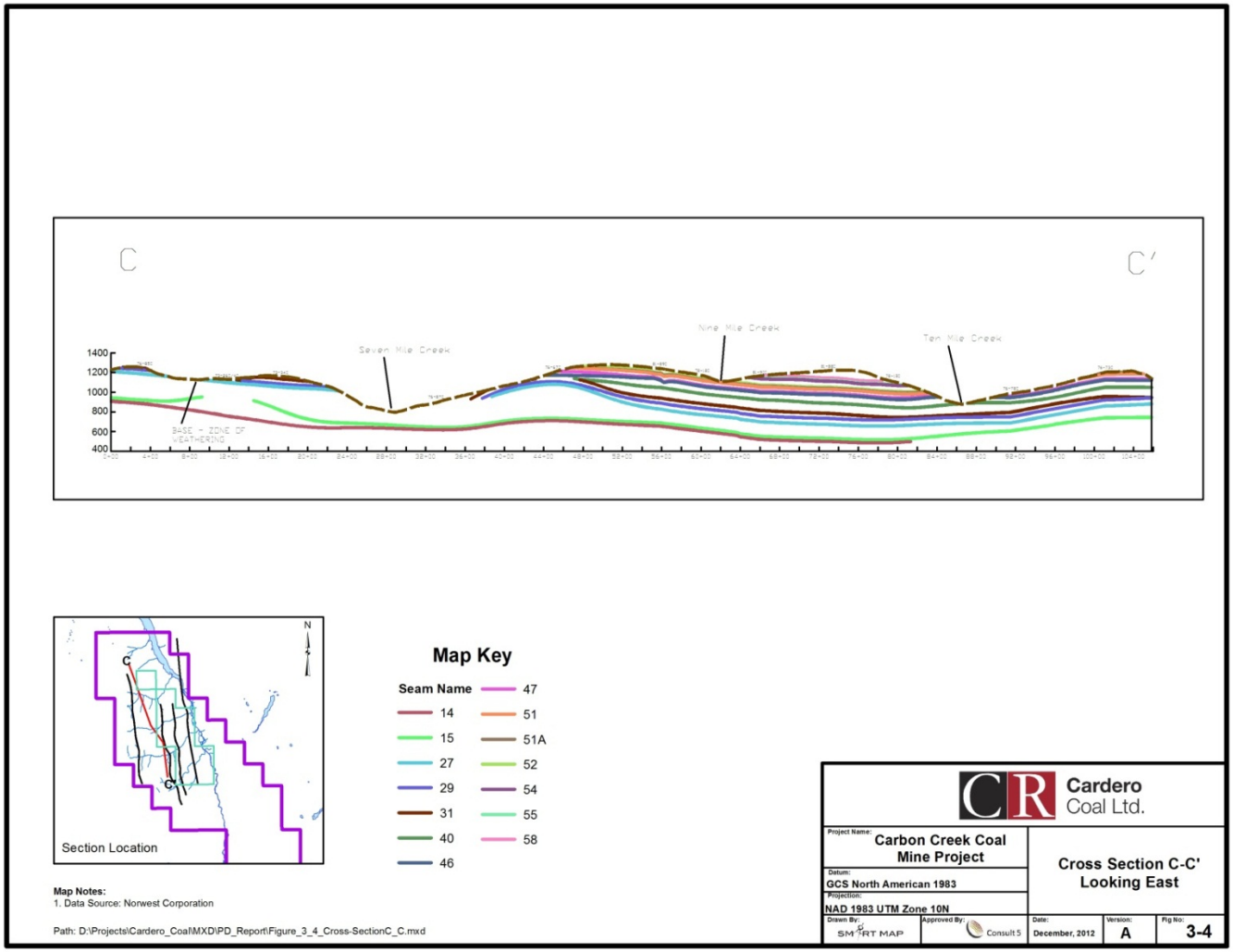
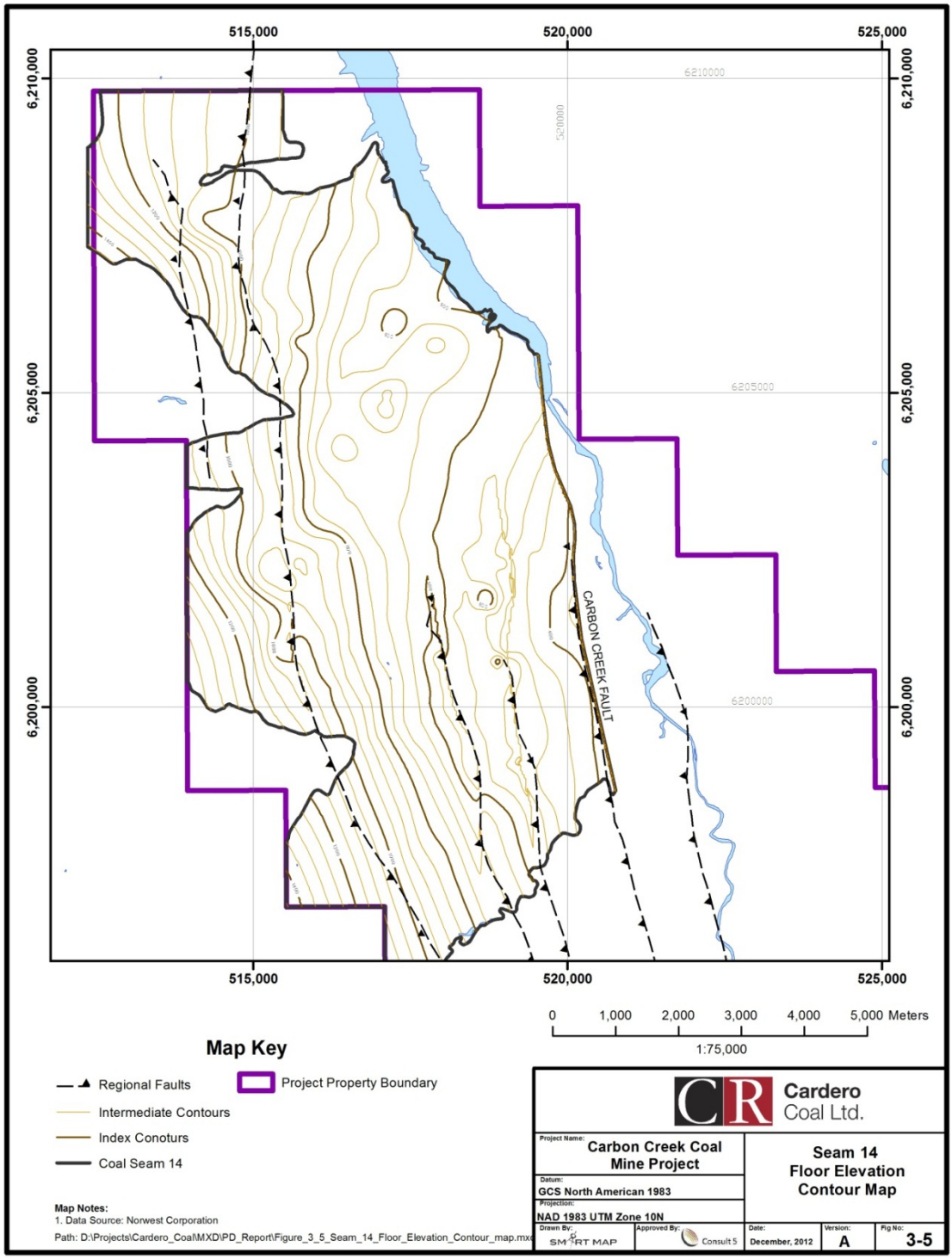


Figure 3-5: Seam 14 Floor Elevation Contour Map



"Deposit Type" as defined in GSC Paper 88-21 (Hughes et al. 1989) refers to the four extraction methods most suited to a coal deposit, specifically: surface, underground, non-conventional, and sterilized. The Carbon Creek coal deposit, based on the reported coal thicknesses, stripping ratios, and depth of the coal occurrence below ground surface, is considered to contain areas of a surface deposit type, as well as, areas of an underground deposit type.

3.6 RESOURCE ESTIMATES

This section discusses the criteria and results obtained for a resource estimation of the Property. It has been completed in accordance with the criteria and procedures given in GSC Paper 88-21 as required by NI 43-101. An independent qualified person, who is an employee of Norwest, has participated in and supervised the resource estimation and classification work.

3.6.1 Approach

In accordance with NI 43-101, Norwest (2012a) has used the Canadian Institute of Mining (CIM), Metallurgy and Petroleum's "CIM Definition Standards on Mineral Resources and Reserves" adopted by the CIM Canada. These were last modified on December 11, 2005. They reference the Geological Survey of Canada Paper 88-21 "A Standardized Coal Resource/Reserve Reporting System for Canada" (GSC Paper 88-21) during the classification, estimation, and reporting of coal resources for the Property.

3.6.2 Coal Resource Estimation

The term "resource" is utilized to quantify coal contained in seams occurring within specified limits of thickness and depth from surface. The resource estimations contained herein are on a geological *in situ* basis; i.e., as an *in situ* tonnage and not adjusted for mining losses or dilution. However, minimum mineable seam thickness and maximum removable parting thickness are considered; coal intervals not meeting these criteria, are not included in the resource estimations. Resources are classified as to the assurance of their existence into one of three categories: Measured, Indicated, or Inferred, with the assignment of each category being based on the relative level of confidence in the geological information available (GSC Paper 88-21).

GSC Paper 88-21 also utilizes criteria adapted to reflect the differing assurance levels associated with varying levels of geological complexity. Four levels of increasing geological complexity are addressed and include:

- low;
- moderate;
- complex; and
- severe.

Norwest (2012a) has determined that the area where resources are calculated for the Project is, using this categorization scheme, considered moderate, based on its shallow dips, broad open folding, and relatively mild faulting. The criteria for coals found in the geology type moderate are provided in Table 3-7.

Table 3-7: Carbon Creek Coal Resource Estimation Criteria (Norwest 2012a)

Surface Resources	
Minimum depth from surface (weathered zone)	15 m
Maximum stripping ratio of surface resource (m^3/tonnes)	20:1
Minimum apparent seam thickness	0.6 m
Maximum mineable parting thickness	0.6 m
Underground Resources	
Minimum depth from surface	15 m
Maximum depth from surface	600 m
Minimum apparent seam thickness	1.2 m
Maximum mineable parting thickness	0.5 m

Coal resources estimated for the Property are considered to be of immediate interest. Coal resources are estimated for both surface and underground deposit types. They are categorized as Measured, Indicated, and Inferred and are classified as medium volatile bituminous (mvB) (Table 3-8). The resource statement is current as of September 5, 2012 (Norwest 2012b).

Table 3-8: Classification of Resources – Carbon Creek Property – Sept 5, 2012 (Norwest 2012b)

Deposit Type	ASTM Coal Rank	Measured (Mt)	Indicated (Mt)	Inferred (Mt)
Surface	mvB	197	31	32
Underground	mvB	143	97	199
Total	**mvB**	**468**		**232**

Mt- Million metric tons

The Property is bounded by Carbon Creek and the Carbon Creek fault in the east and by the north fork of Eleven Mile Creek in the south. Coal License Application boundaries and drill hole density limit the resource estimate to the west and north. Generally seam resources increase in decreasing stratigraphic order because the lower the seam occurrence the more areal extent it covers due to the structural configuration of the deposit.

Table 3-9 shows the proposed surface mineable quantities to be mined divided into contour, highwall and area mining and the associated quantities of waste material to be removed from the various target seams (Figure 3-6) (Norwest 2012c).

3.7 MINERALIZATION

The mineralized zones encountered on the Property are predominantly medium volatile bituminous coal seams. Historic coal quality reports indicate that these coals will, with beneficiation (washing) to remove impurities, produce a product with coking properties suitable for metallurgical applications. Thermal coal suitable for electric power generation could be produced with or without further processing in addition to, or as an alternative to, a coking coal product.

Figure 3-6: Details of Proposed Mining Areas and Waste Rock Stockpiles

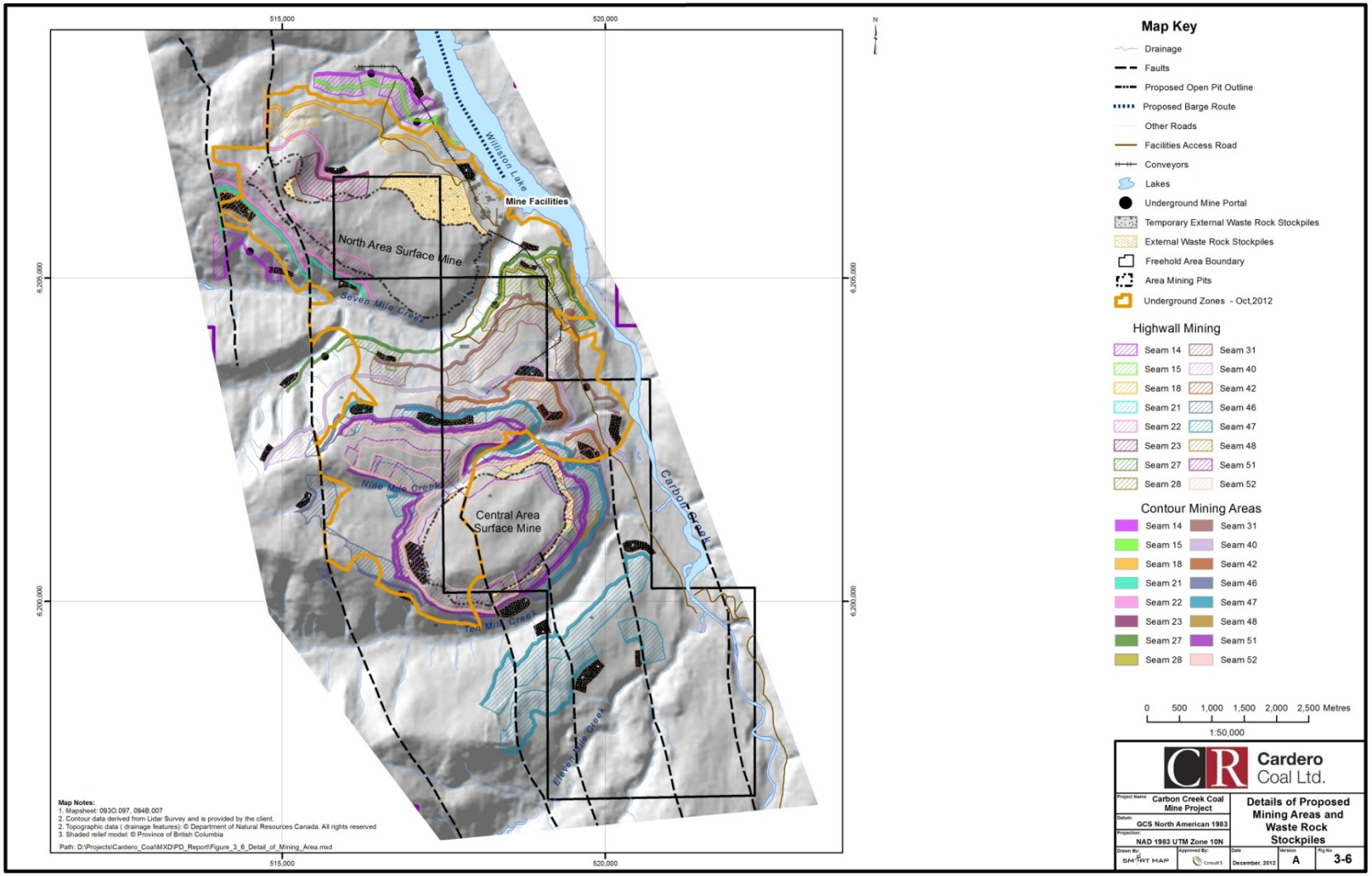


Table 3-9: Proposed Surface Mineable Quantities and Waste Volumes (*estimates*; Norwest 2012c)

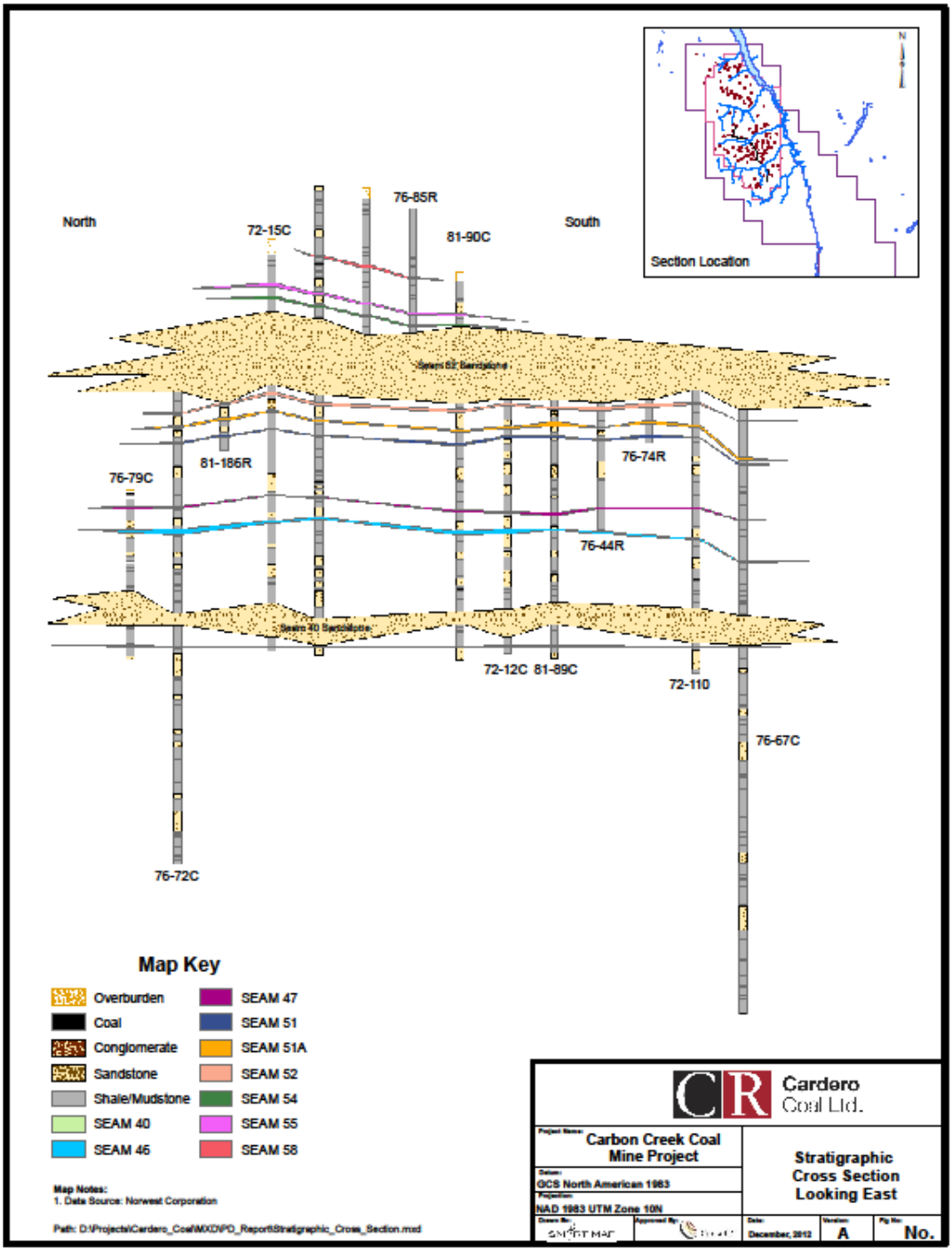
Seam	CONTOUR MINING		HIGHWALL MINING	AREA MINING	
	Waste Volume (bcm)	Run-of-Mine Coal Tonnage (Mt)	Coal Tonnage (Mt)	Waste Volume (bcm)	Run-of-Mine Coal Tonnage (Mt)
63	0	0	-	6,594,400	489
60	0	0	-	39,536,000	2,299
59	0	0	-	8,990,000	2,104
58	0	0	-	17,011,000	3,006
57	0	0	-	10,731,000	1,581
56	0	0	-	24,465,000	2,648
55	0	0	-	29,936,000	6,398
54	0	0	-	23,494,000	6,154
53	0	0	-	21,840,000	3,859
52	5,282,000	980	639	0	0
51A	6,394,000	743	1,194	0	0
51	8,071,000	1,176	1,544	0	0
48	219,000	37	41.3	0	0
47	11,017,000	1,215	2,117	0	0
46	12,975,000	1,530	2,501	0	0
42	2,736,000	326	520	0	0
40	5,306,000	785	1,029	0	0
31	3,594,000	880	860	17,957,000	3,234
29	0	0	0	103,160,000	3,791
28	2,290,000	256	346	23,250,000	3,131
27	6,486,000	493	428	61,783,000	6,479
23	3,349,000	417	675	0	0
22	10,186,000	510	544	0	0
21	8,399,000	332	231	0	0
18	4,432,000	289	274	0	0
15	1,284,000	349	416	0	0
14	3,125,000	495	536	0	0
Grand Total	**92,020,000**	**10,813**	**13,895,300**	**388,747,400**	**45,173**
Grand Total Central Area Surface Mine				**182,597,400**	**28,538**
Grand Total North Area Surface Mine				**206,150,000**	**16,635**

bcm – billion cubic metres

Perhaps 30 or more coal seams occurring in the upper and middle Gething Formation have been found to occur on the Property. Of these, 16 have been identified as having sufficient thickness and continuity for correlation across significant areas. Figure 3-1 showed the generalized stratigraphic column of the Gething coals occurring on the Property, with the positions of major seams, interburden, and marker horizons. Figure 3-7 shows a stratigraphic section of a portion of the Property, using the base of Seam 40 as a stratigraphic datum. The figure illustrates the rather straightforward correlations of most major and minor seams in this area. The Property shows, in this

respect, better seam continuity and simpler coal seam geometry than many of the other northeast BC Gething properties. Several key marker sandstone units aid in identifying seam groups, as illustrated in Figure 3-7.

Figure 3-7: Stratigraphic Cross-section



Historic tonnage estimates, as well as the current estimate presented in Norwest's report (2012b), have focused on 12 of these seams. Table 3-10 shows the average thicknesses of these seams derived from the *in situ* geological model (Norwest 2012a).

Overburden and interburden lithotypes are reported as typical fine- to coarse-grained sediments occurring between coal measures, including mudstones, siltstones, sandstones, and occasional pebble conglomerates. Glacial till occurs in patches or channels spreading erratically, with thickness up to 120 m.

3.8 COAL QUALITY

3.8.1 Regional Quality Characteristics

In the Project Area, coals of the Gething Formation are primarily ranked medium volatile bituminous. Gething coals have produced satisfactory metallurgical products, particularly after beneficiation.

Table 3-10: Average Seam Thickness (Norwest 2012a)

Seam	Thickness (ft)	Thickness (m)
58	4.12	1.25
55	5.16	1.57
54	4.44	1.35
52	4.93	1.50
51A	4.25	1.30
51	4.51	1.38
47	3.71	1.13
46	5.40	1.65
40	4.94	1.50
31	6.58	2.00
15	6.57	2.00
14	6.25	1.91

3.8.2 Coal Quality of the Carbon Creek Area

Prior to 1971, all coal sampling on the Carbon Creek deposit was from surface exposures or from shallow trenches. Following 1971, drill core was acquired and the coal extracted during this drilling was assessed for coal quality.

3.8.2.1 Coal Rank

Coal rank, determined from the current geological model, is predominantly medium volatile bituminous, as indicated in Table 3-11. The upper seams are on the border between medium volatile bituminous and high volatile bituminous A in rank, approaching an average of 31% volatile matter content (i.e., dry, mineral matter-free basis) that separates the two classifications.

Table 3-11: Raw Coal Quality (Norwest 2012a)

Seam	Thickness (m)	Coal Quality (air-dried basis)						
		Moisture (%)	Ash (%)	Sulphur (%)	Volatile Matter (%)	Fixed Carbon (%)	Calorific Value BTU/lb	FSI
58	1.14	2.60	12.56	0.92	28.92	55.93	12,663	2.0
55	1.57	2.74	12.42	0.68	28.59	56.26	12,893	2.5
54	1.39	2.78	5.66	0.83	27.36	64.20	13,926	1.5
52	1.63	2.18	17.14	1.88	28.33	52.35	12,178	4.0
51A	1.29	2.74	6.25	0.80	28.01	63.00	13,902	2.0
51	1.51	2.73	9.63	0.73	26.42	61.23	13,228	2.0
47	1.14	2.53	15.49	0.91	24.00	57.98	12,441	1.5
46	1.70	2.60	6.50	0.83	26.92	63.99	13,907	2.0
40	1.95	2.02	13.99	1.17	27.16	56.83	12,892	5.5
31	1.99	1.50	25.74	1.42	24.33	48.43	10,906	6.0
15	2.17	1.08	17.11	0.57	21.14	60.67	12,602	2.5
14	2.11	0.95	19.03	0.57	19.20	60.83	12,362	3.0
Average	**1.63**	**2.09**	**14.13**	**0.94**	**25.47**	**58.32**	**12,756**	**3.0**

3.8.2.2 Summary Carbon Creek Coal Quality

In-place (raw) coal quality for the Carbon Creek resource base is summarized above in Table 3-11. This information is derived from the combined Utah and Cardero Coal laboratory analyses from slim core (mostly HQ gauge) recorded in the current geological model. The database includes test results for proximate analyses, total sulphur, calorific value (Btu/lb), FSI, and apparent specific gravity (SG).

Values provided in Table 3-11 are for raw, unwashed coal. Processing raw coal using density-specific media (coal washing) is widely used to improve coal quality by reducing ash and sulphur content and raising calorific value. Coals of the Gething Formation have proven to respond very well to processing and can typically be washed to significantly lower ash content, while still experiencing reasonable yields, thus increasing their suitability as metallurgical products.

4. Project Description

4.1 PROJECT OVERVIEW

The Project will involve a combination of contour, area, and highwall surface mining and room and pillar underground mining throughout the 20 year mine life (Norwest 2012b). Approximately 40% (51.5 Mt ROM) of the currently defined reserve could potentially be mined underground (Norwest 2012b). Based on early studies, the mine will be designed to achieve an annual average production rate of 4.3 million metric tonnes of clean coal once at full production, which will be in 2020 approximately (Norwest 2012b).

ROM will be upgraded in quality through a wash plant and clean coal will be barged from the on-site processing facility, west and then south along Williston Reservoir to a coal load-out facility in the district of Mackenzie. Clean coal product will be transferred from the incoming barges via a conveyor system into a hopper, which will dispense the coal into waiting rail cars for transport by CN Railway to export ports in Prince Rupert or Vancouver. Mine site power will be serviced by connection to the G.W. Shrum Generating Station, or equivalent, approximately 35 km east of the proposed mine site. Cardero may have to construct a new substation close to the G.W. Shrum generating station in the event that the existing system does not have the capacity to fulfil the project's needs. The viability and feasibility of this option is currently being assessed.

Mine site layout design is conceptual at this stage in the EA process. The design process that will occur throughout EA will take into account a combination of environmental and social sensitivities combined with economic feasibility.

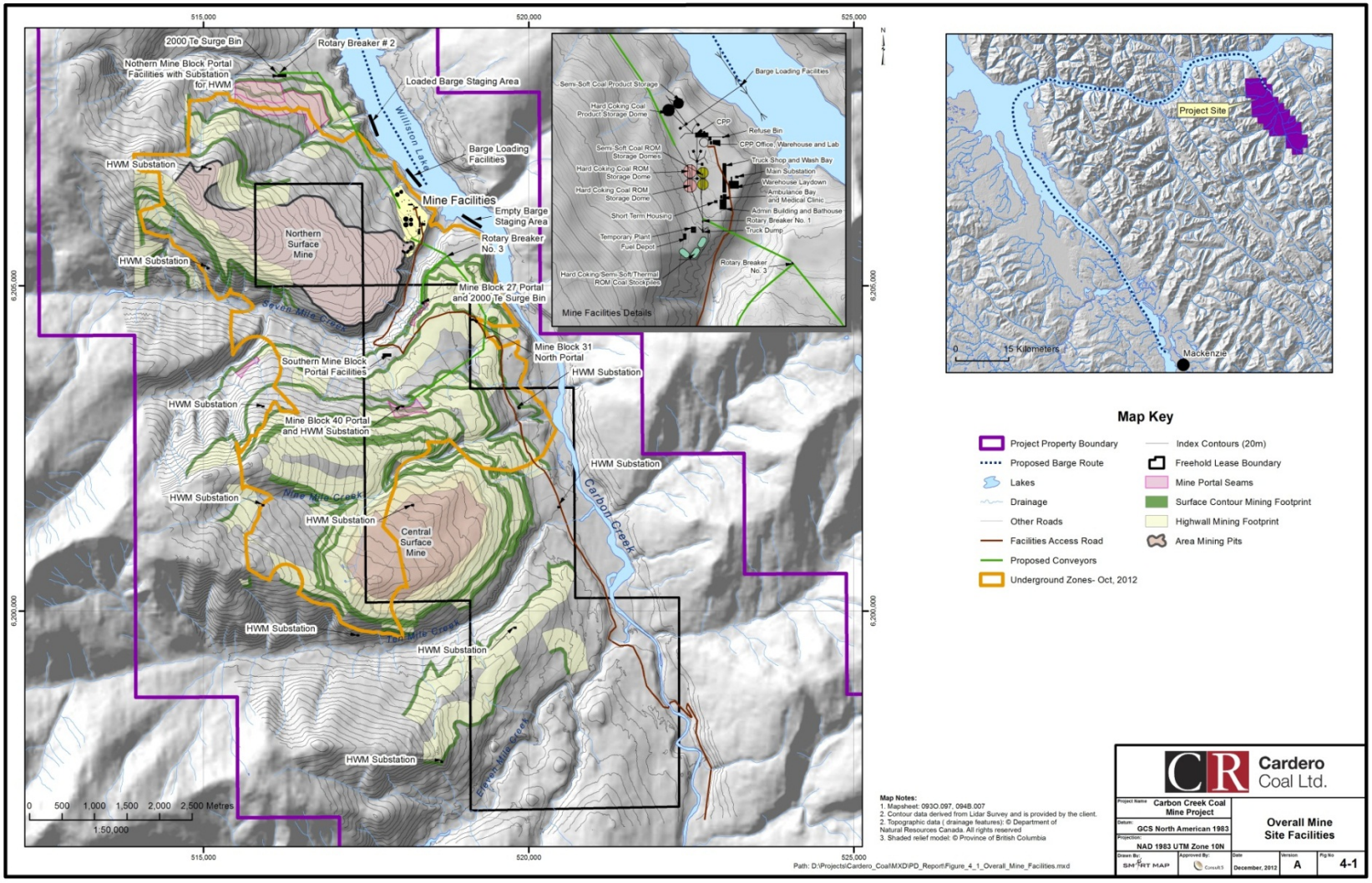
4.2 MINING METHODS

Exploration activities at Carbon Creek have revealed that the nature of the geology lends itself to employing several different mining methods to maximize the recovery of the resource. The proposed mining methods include underground room and pillar mining with continuous miners (CM), surface contour and area mining using hydraulic excavators and trucks, and highwall mining. After a short ramp-up period, all mining methods will be employed concurrently throughout the proposed 20-year mine life.

Surface mining is projected to occur in two areas designated as the Northern Surface Mine and the Central Surface Mine (Figure 4-1). The Northern Surface Mine is adjacent to Seven Mile Creek on the north side of the Carbon Creek property. The Central Surface Mine is just north of Nine Mile Creek. The underground mining operations are projected to have two sets of portals approximately three kilometers north of Seven Mile Creek and three sets of portals approximately two kilometers south of Seven Mile Creek. Highwall mining will occur throughout the surface mining areas along the outcrops of the various seams after contour mining has taken place (Norwest 2012b).

Initially surface contour mining is proposed to commence in 2014, simultaneously in the North and Central areas, which will subsequently allow development of areas for highwall and underground mining. Surface contour mining will continue throughout the life of the mine. Surface area mining will commence in 2016 in both the North and Central areas of the mine and will also continue for the life of the mine. Highwall mining will also commence in 2016 in both areas of the mine. Underground mining is scheduled to commence in 2016 in the North area of the lease with one CM unit operating and ramping up to six CM units by 2019.

Figure 4-1: Overall Site Facilities



4.2.1 Overburden Management and Progressive Reclamation

Vegetation removal will precede mining, with selected trees being harvested for local use or for sale to the wood and paper industry where possible, and pine beetle-damaged trees being bucked and scattered. Subsequent to vegetation removal, topsoil will first be salvaged and stockpiled for later use in progressive reclamation. After the topsoil is removed, overburden will be removed to expose the area that will be strip mined. Overburden from the initial cut will be moved by conventional truck-and-shovel methods to an undisturbed area directly down-dip of the open cut. The overburden from each subsequent cut will be used to backfill the previously-mined open strip once sufficient pit room is created. This approach will allow progressive reclamation to occur. The sequential back-filling of open strips will form bench-like topographic features with nearly level tops and sloping faces. These faces will be designed and constructed to reduce the potential for erosion. Since the backfilling will follow the mining progression up-slope, the reclamation will occur in sequence and result in a final shape generally similar to the existing topography. Completed areas having steep slopes will be graded to a more gentle topography, blending with the natural topography of the area. Topsoil will be placed over the returned overburden and re-vegetated to minimize erosion and reduce the footprint of operations.

4.2.2 Surface Mining Methods

In several areas of the Property, coal seams dip approximately parallel to ridges and are at depths which afford favourable strip ratios for complete seam removal. Seams are spaced so that several could be extracted from each of the major pits.

ROM production from the Northern Surface Mine, including highwall mining, ranges from 1.1 Mt per annum (Mtpa) to 1.8 Mtpa and averages 1.4 Mtpa over the mine life. The ROM strip ratio averages 12:1. One highwall mining unit will operate, producing 450,000 tonnes per year. Clean coal production is expected to be hard coking coal except for a small amount of thermal coal produced from the oxidized zone along the crop lines. Clean coal production ranges from 0.6 to 1.3 Mtpa and averages 0.9 Mtpa over the mine life.

ROM production from the Central Surface Mine, including highwall mining, ranges from 1.4 Mtpa to 3.8 Mtpa and averages 2.3 Mtpa over the mine life. The ROM strip ratio averages 7:1. One highwall mining unit will operate, producing 450,000 tonnes per year. Clean coal production is expected to be semi-soft coking coal except for a small amount of thermal coal produced from the oxidized zone along the crop lines. Clean coal production ranges from 0.8 to 3.0 Mtpa and averages 1.5 Mtpa over the mine life.

Once a pit is well established, stripping, mining, stockpile construction, and reclamation efforts will proceed concurrently.

4.2.3 Underground Mining Method

Underground mining will be undertaken by room-and-pillar methods, which will afford the greatest flexibility to adapt to mining conditions. Room-and-pillar mining uses CM units, which is equipment designed to extract coal or other soft minerals from the face and to load it into cars or conveyors continuously, without the use of cutting machines, drills, or explosives. Roof support will be required, with rock bolts acting as the main support, supplemented by timber where necessary. Bleed holes will be left around the perimeter of the mined area to vent gas liberated by mining.

Production from the underground mine operations will be from five separate seams with a minimum thickness of 1.2 m. Underground mining commences in the northern region of the property with Seam 15 in 2016 and expands

to Seam 14 in 2018 with separate portals for each seam. Underground mining operations ramp up from one CM to six CM units between 2016 and 2019. As mining reserves in Seam 15 and Seam 14 are depleted, CM units are re-located south to the three sets of portals for seams 31, 27 and 40 in the central region of the property, in approximately Year 11 of mining, starting with Mine Block 31.

4.3 COAL PROCESSING

4.3.1 Preliminary Schedule

Annual production is based on the mine plan described by Norwest (2012b). Operations will commence as a surface mine, with an underground mine commencing operations in the second year. This allows for time to develop an area to access the underground mineable coal seams. Within the context of the recently released Prefeasibility Study (Norwest 2012b), the combined mining operation is planned for a life of 20 years, excluding pre-production development and construction time. Surface mined coal will be produced from two areas in Year 1, the Northern Surface Mine Area and the Central Surface Mine Area, and will consist of all three coal types. Mined coal from the underground operations will begin with Mine Block 15 in Year 2 and Mine Block 14 in Year 4. Mine Blocks 14 & 15 are located in the northern region of the property. In the central region of the property are Mine Blocks 27, 31 and 40. Production from these blocks does not begin until Year 11, beginning with Mine Block 31. Mine Blocks 40 and 27 will follow in Year 12 and Year 15 respectively. A preliminary production schedule is depicted in Table 4-1 and ROM and clean coal production by area and mining type is outlined in Table 4-2.

Table 4-1: Carbon Creek Project – Proposed Preliminary Production Schedule (*estimates*; Norwest 2012c)

	Year					Remaining
ROM Tonnes (Mt)	**2015**	**2016**	**2017**	**2018**	**2019**	**LOM Average**
Surface Operation	1.158	2.257	2.271	1.521	1.492	3.152
Highwall Miner Operation	0	0.9	0.9	0.9	0.9	0.686
Underground Mine Operation	0	0.388	1.425	2.349	2.993	2.955
Total	**1.158**	**3.545**	**4.596**	**4.77**	**5.385**	**6.793**

	Year					Remaining
Clean Tonnes (Mt)	**2015**	**2016**	**2017**	**2018**	**2019**	**LOM Average**
Surface Operation	0.786	1.641	1.616	0.994	0.970	2.168
Highwall Miner Operation	0	0.476	0.476	0.503	0.504	0.334
Underground Mine Operation	0	0.287	1.054	1.475	1.767	1.890
Total	**0.786**	**2.404**	**3.146**	**2.972**	**3.241**	**4.392**

LOM- Life of mine; *Mt – Million tonnes.*

ROM production from the Northern Surface Mines ranges from 1.1 Mtpa to 1.8 Mtpa and averages 1.4 Mtpa over the mine life. Clean coal production ranges from 0.6 to 1.3 Mtpa and averages 0.9 Mtpa over the mine life.

ROM production from the Central Surface Mine ranges from 1.4 Mtpa to 3.8 Mtpa and averages 2.3 Mtpa over the mine life. Clean coal production ranges from 0.8 to 3.0 Mtpa and averages 1.5 Mtpa over the mine life.

ROM production for the underground mine subsequent to the three year ramp up, ranges between 2.6 Mtpa to 3.3 Mtpa and averages 3.0 Mtpa. Clean coal saleable product from the underground mining operations is

expected to be hard coking coal and is projected to range from 1.6 Mtpa to 2.1 Mtpa with an average saleable production rate of 1.9 Mtpa.

Table 4-2: Carbon Creek Project – Proposed ROM and Clean Coal Production by Area and Mining Type (Norwest 2012b)

Mining Method/Area		ROM Tonnes (Mt)	Clean Tonnes (Mt)
Northern Surface Mine	Area Mining	16.6	11.3
	Contour Mining	4.8	3.3
	Highwall Mining	5.4	2.6
	Total Northern Surface Mine	**26.8**	**17.2**
Central Surface Mine	Area Mining	26.7	18.5
	Contour Mining	7.8	5.4
	Highwall Mining	8.6	4.4
	Total Central Surface Mine	**43.1**	**28.3**
Underground Mines	Room & Pillar Mining	51.5	32.9
	Total Underground Mines	**51.5**	**32.9**
	Combined Total	**121.4**	**78.4**

Mt – Million tonnes.

Figure 4-2, Figure 4-3, Figure 4-4, Figure 4-5, and Figure 4-6 depict the proposed material handling flow of the project.

4.3.2 ROM Handling

Prior to beneficiation, a system of rotary breakers will size and de-stone the coal. It is proposed to have three breakers on-site, one as part of the main mine site facilities, a second to the north of the site for ROM coming from the portals from mine blocks 14 and 15 and a third to the south of the mine site facilities area for ROM coming from mine blocks 27, 31 and 40 (Figure 4-1). Product from the rotary breakers north and south of the main mine site facilities will be transported back to the processing facilities via a network of approximately 7 km of overland, enclosed conveyors or via trucks to ROM coal stockpiles located at the main mine site facilities area.

Material from the stockpiles will be loaded into the proposed truck dump hopper using a front end loader. The truck dump will consist of a 300 tonne receiving hopper equipped with a 300 mm X 300 mm protection grizzly, an apron feeder to pull the material from the hopper and the support structure. The apron feeder will transfer the material to a conveyor that will deliver the material for primary sizing. The coal processing plant (CPP) will allow for one type of coal to be fed into the plant at one time. For this reason, it will be necessary to allow for extra space at the truck dump for stockpiling each type of ROM coal (i.e., hard coking, semi-soft and thermal). A wind fence will be placed along the south, southeast, and east sides of the stockpile area to protect the stockpiles from wind. Weather data indicates the prevailing wind for the site is from the south/southeast.

Figure 4-2: Preliminary Material Handling Flowsheet 1

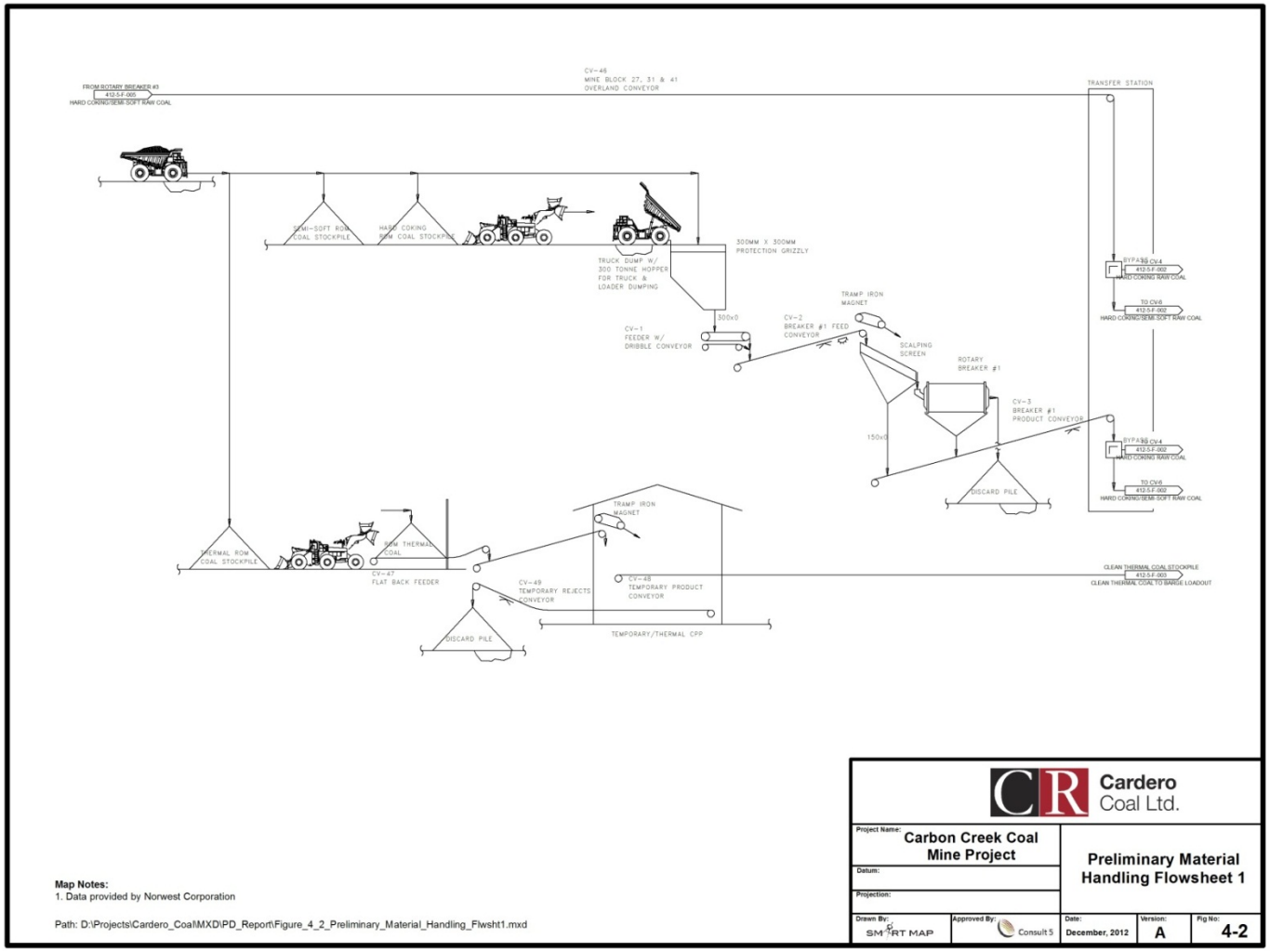


Figure 4-3: Preliminary Material Handling Flowsheet 2

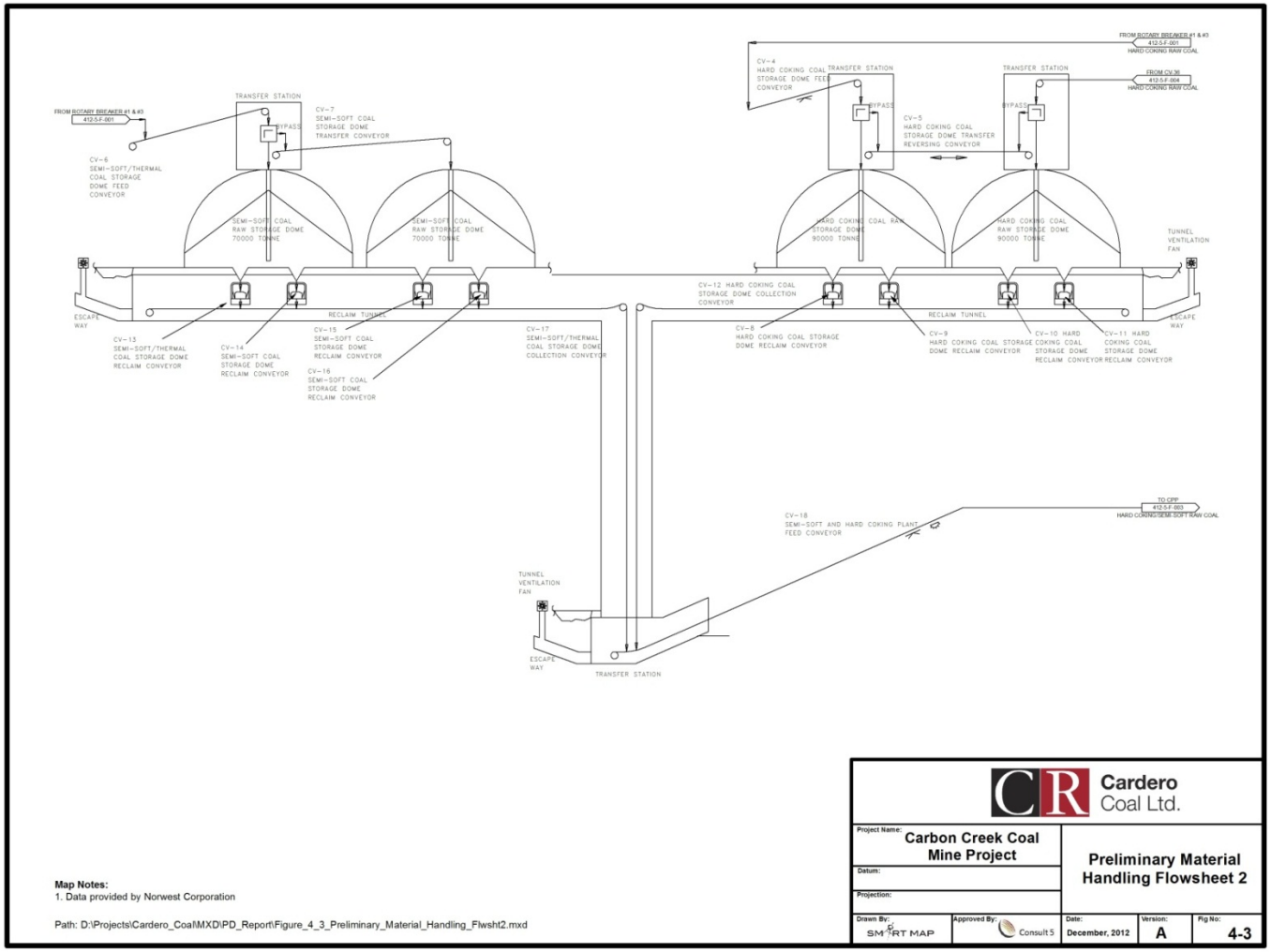


Figure 4-4: Preliminary Material Handling Flowsheet 3

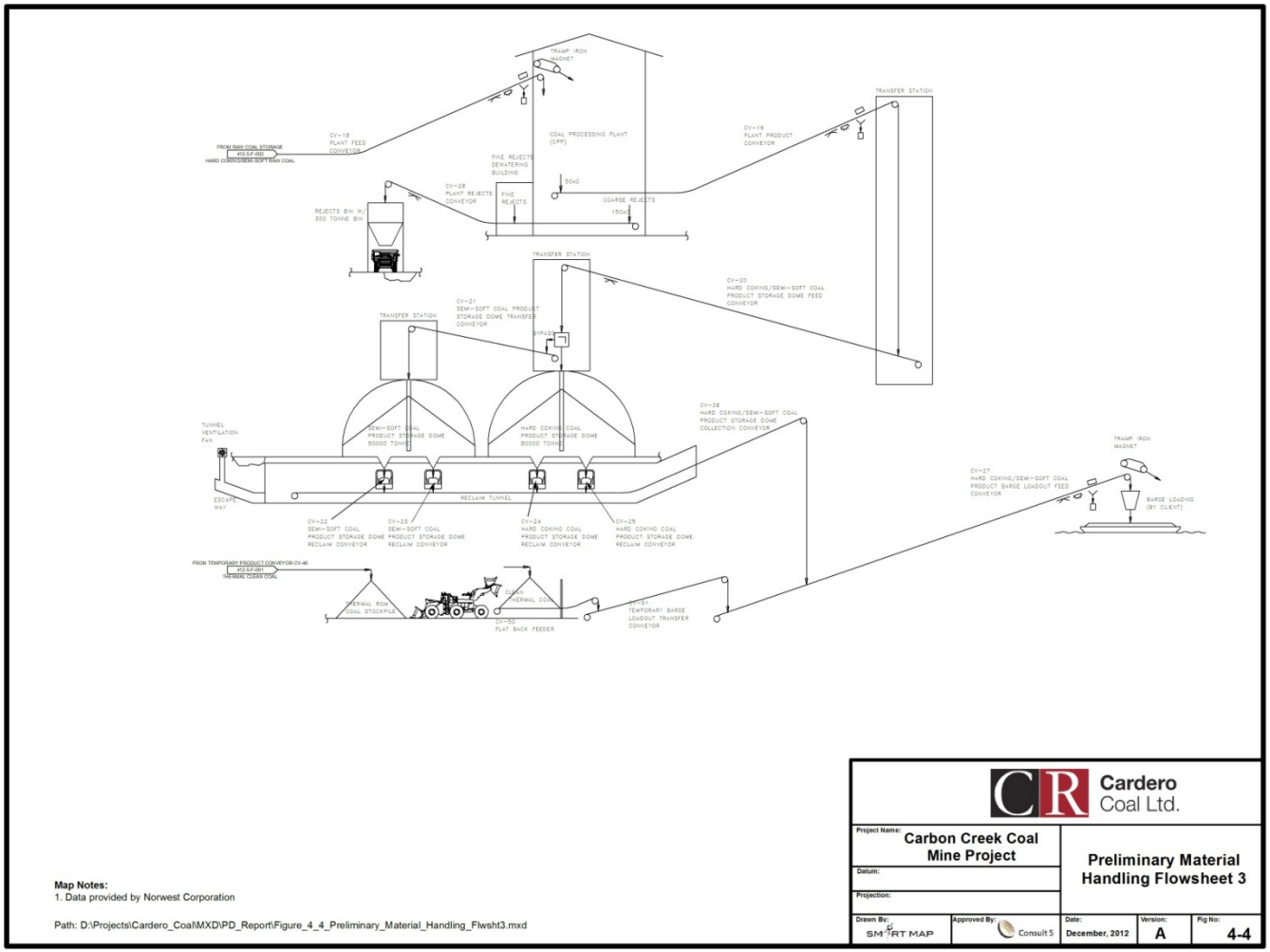


Figure 4-5: Preliminary Material Handling Flowsheet 4

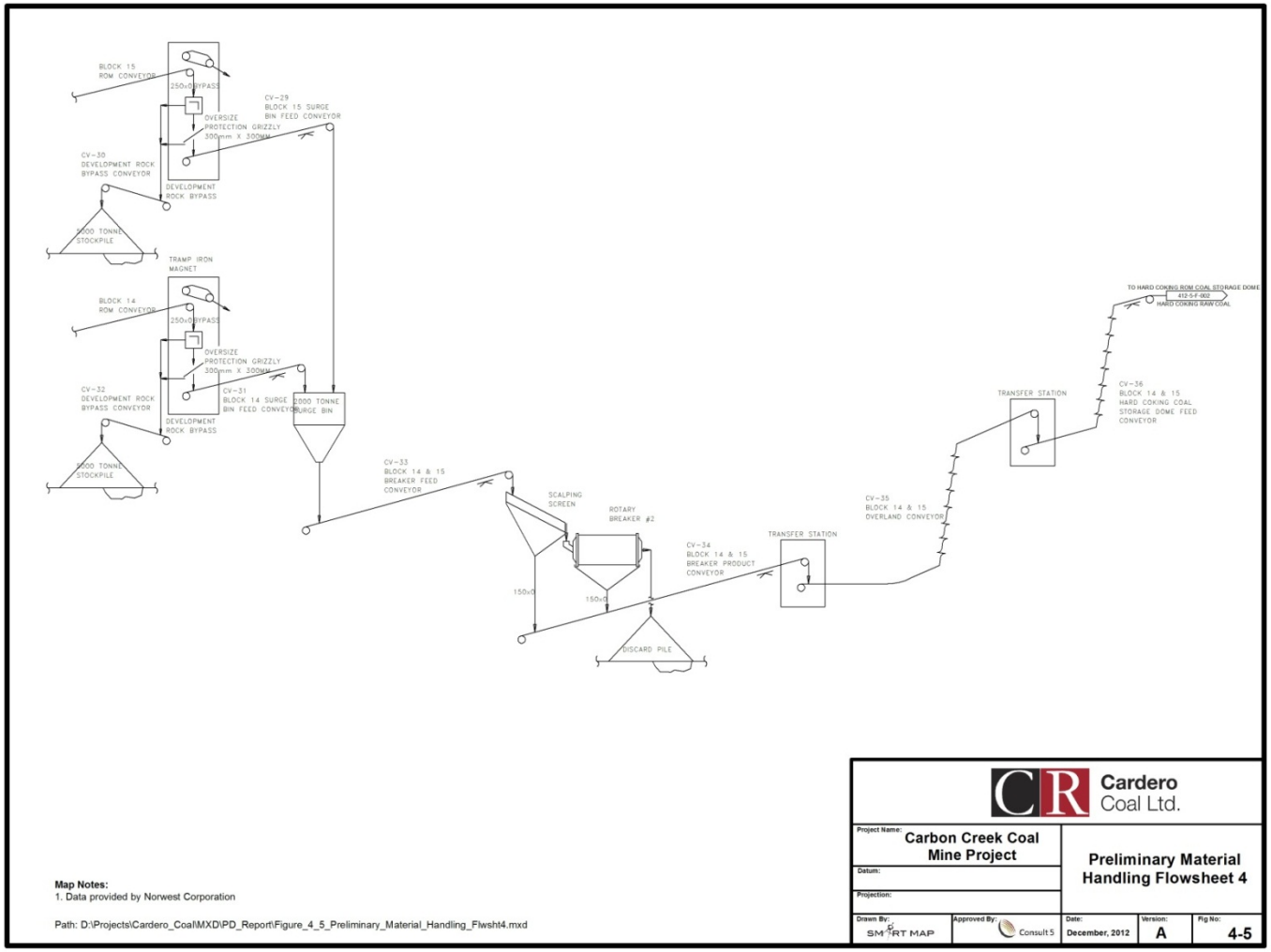
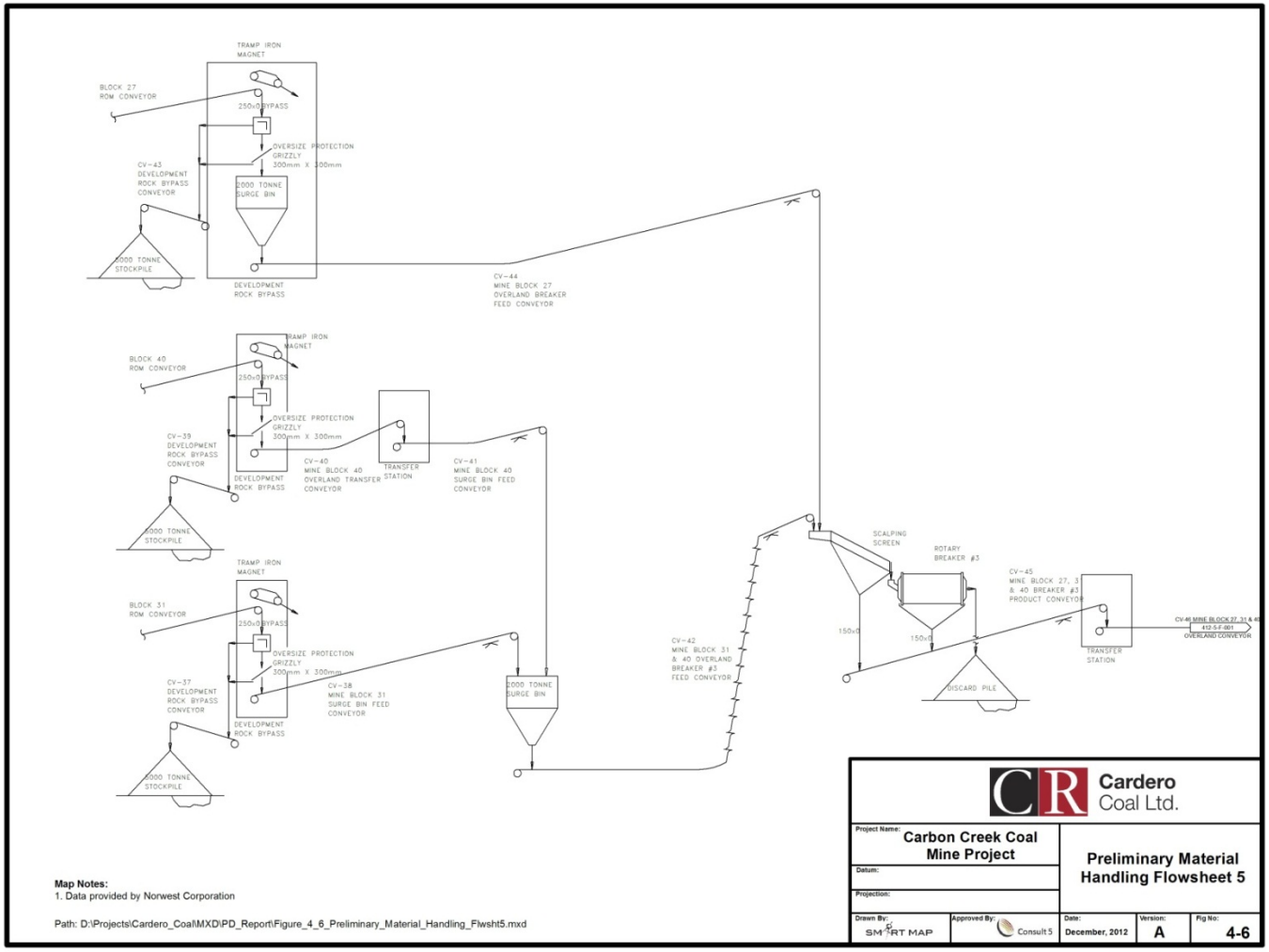


Figure 4-6: Preliminary Material Handling Flowsheet 5



From the truck dump ROM will then be run through another rotary breaker to size the material and separate the less desirable material via openings in screen plates. Rotary breaker product material will be collected on conveyor and transferred for storage into the proposed three categories of ROM coal – hard coking coal, semi-soft coal and thermal coal. It is proposed to have separate storage domes, each with a capacity of 90 kilotons (Kt), for each class of ROM coal. Discard material will be transferred to a pocket off the side of the breaker and hauled to an appropriate waste stockpile at the mine. The ROM storage domes allow the CPP to operate somewhat independently of the mine, providing the CPP operations the ability to schedule maintenance without disrupting mining activity.

4.3.3 Wash Plant

The CPP will be a single-module operation rated at a nominal 1200 tonnes per hour (tph) of raw feed and feature parallel, size-specific processes. The plant will be robust in design with targeted ROM coal throughput of 7.2 Mtpa at a 68% effective utilization (Norwest 2012b). Site schematic diagrams illustrate the proposed plant processes in Figure 4-7 and Figure 4-8.

A heavy media bath circuit will wash the 150 mm x 10 mm stream, followed by crushing to reduce the top size to 50 mm. This process was selected to avoid the need for a thermal dryer. Dust emissions in the crusher area will be prevented through the use of dust collectors and mist sprays, where required. Enclosures will be heated and vented according to regulations. A large-diameter heavy media cyclone will wash the 10 mm x 1 mm stream along with reflux classifiers for the 1 mm x 0.25 mm and two-stage froth flotation for the minus 0.25 mm streams.

Each sub-product stream will employ mechanical dewatering centrifuges. Pressure filtration will be used on the minus 45 micron material. Total product moisture values for each seam are projected to be below 8% by weight.

A small temporary plant will be established to support first coal production anticipated in late 2014 and early 2015 and is allowed for in the capital estimates (Norwest 2012b). The proposed location of the temporary plant is immediately west of the truck dump area.

The conceptual configuration of the temporary CPP would consist of the “push up” feeder-breaker coupled to a feed conveyor. The conveyor would deliver coal at a rate of up to 400 tph to multi-slope double deck vibrating screen. This would be a dry-screening operation. The oversize, approximately 1500 mm x 10 mm, would report to the media drum module. The heavy media drum would separate the low ash coarse product coal from the high ash reject material. The oversize clean coal would then pass through a crusher to produce a 50 mm topsize. The clean product would be conveyed to a clean coal stockpile. The rejects would be conveyed to another ground based stockpile. The dry minus 10 mm raw undersize coal would be conveyed to separate stockpile. Depending on product specifications, the raw fines and clean coals would be blended as needed to produce saleable product (Norwest, 2012c).

The temporary CPP would be erected at grade on a concrete slab. The modular unit is shipped complete with preassembled control room and electrics compliant with the provincial requirements of British Columbia. The CPP would feature a small thickener and filter press to recover any misplaced fines. Typically, these filtered fines would transfer to rejects area. A sprung steel and fabric enclosure would be employed to protect from the winter elements.

Figure 4-7: Preliminary Process Flowsheet 1

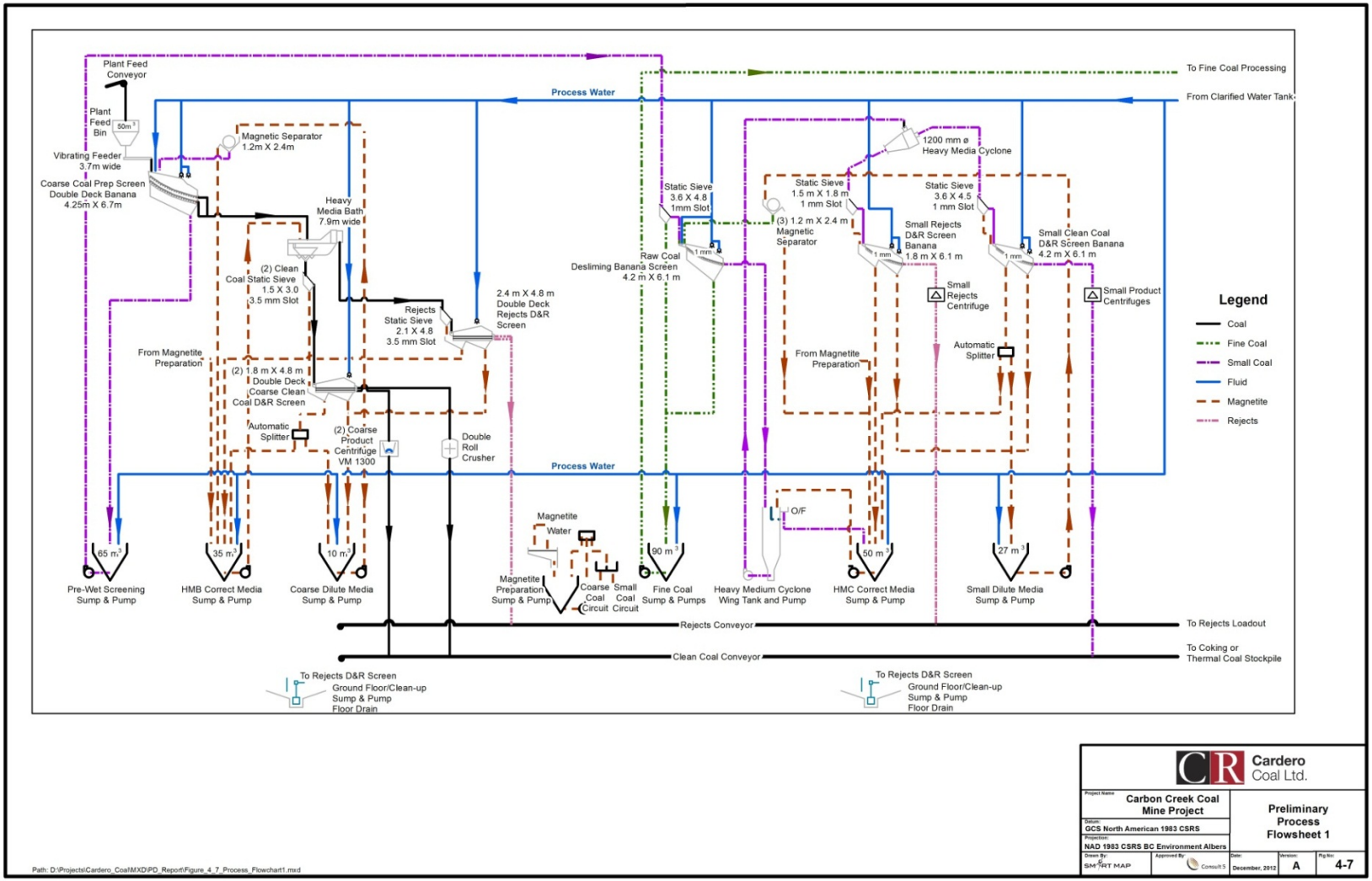
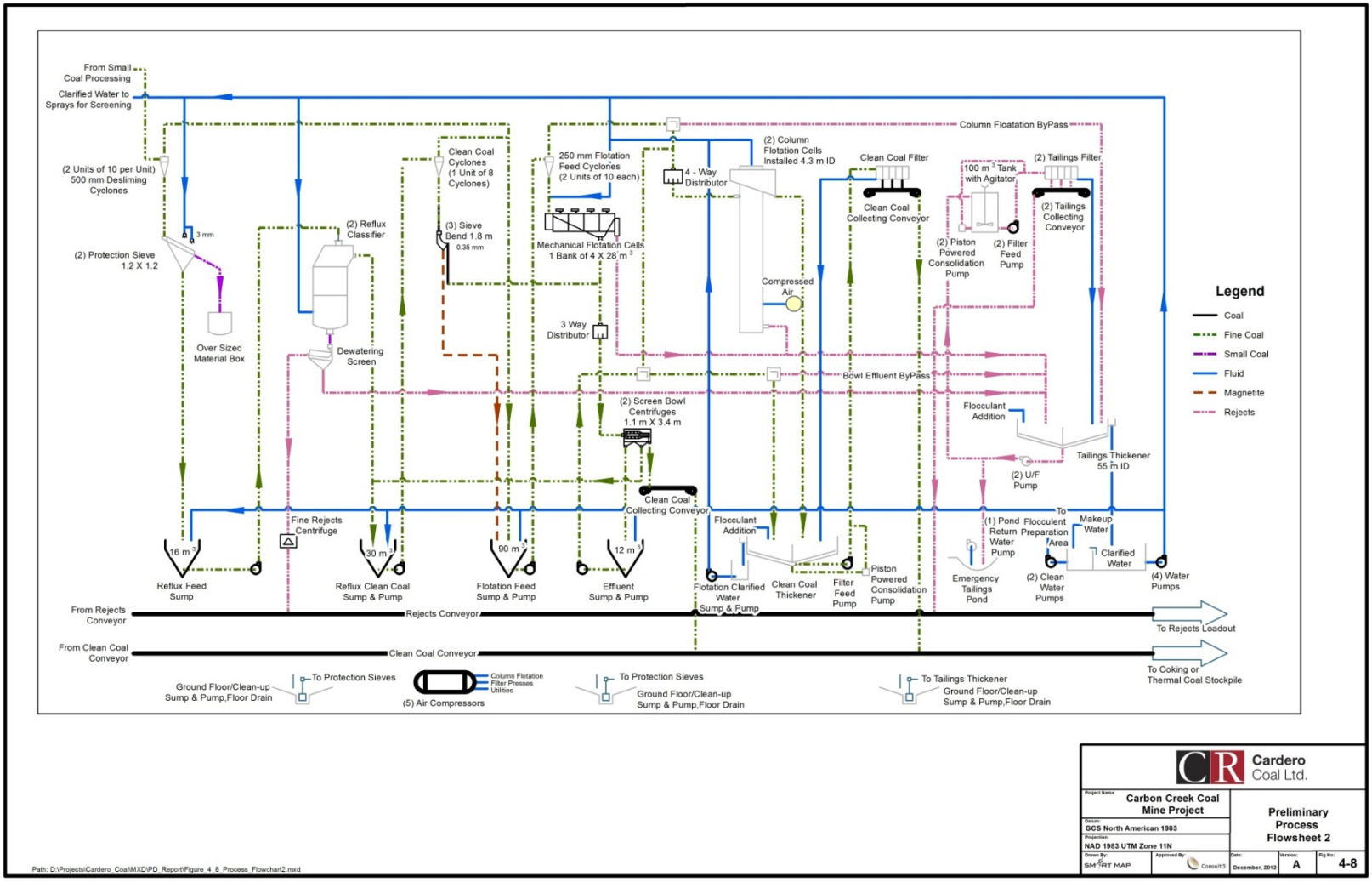


Figure 4-8: Preliminary Process Flowsheet 2



The candidate seams for treatment in this temporary CPP would likely be thermal coals, oxidized crop coals and coking seams that are amenable to mining cleanly, i.e., with minimal dilution. The full feasibility study should attempt to determine if a partial washing plant would provide a cost benefit to maintain its use throughout the life of the mine. Washing the thermal and oxidized crop coals through this facility may result in improved economics of the larger CPP and allow the latter to be scaled down as well as reduced operational complexities.

Following beneficiation, the respective clean coal products will be fed into hard coking, semi soft/Pulverized Coal Injection (PCI) and thermal coal storage domes of 80Kt, 50Kt and 20Kt respectively prior to loading onto barges. The covered product storage domes will ensure that weather doesn't increase the moisture content of the processed coal, as well as, mitigating against blowing coal dust.

It is proposed that material drawdown hoppers, reclaim tunnels and collection conveyors will be used to complete the transfer of clean coal product to the barge load-out on Carbon Inlet (Figure 4-9; Norwest 2012c). Two reclaim tunnels will be required for each of the hard coking coal and the semi-soft coal products. The reclaim conveyors will convey the material to a central collection conveyor, which will transfer product to the barge loadout conveyor. Dozer or front end loader access entries will be installed in the domes for occasions when it is necessary to clean out the remaining material.

It is anticipated that course coal rejects (CCR) from the CPP will be conveyed to a 300 tonne rejects bin located just east of the CPP building. On route to the rejects bin, fine dewatered reject material will be loaded on top of the coarse reject material. The order of loading of the reject material will assist in keeping the conveyor belt clean and increase the efficiency of the transfer to the rejects bin and eventually to haul trucks. The combined waste material will be dried and made into a paste that will be spread in landfill cells in previously-minded areas. Reject material will be loaded into 90 tonne capacity end dump haul trucks. The trucks are the same trucks used to transport the ROM material to the truck dump. After hauling ROM material, the trucks will back haul the reject material to a designated disposal site. Water supply and waste discharge, including dust control, are discussed in Sections 4.7, 4.8 and 4.9, respectively.

4.4 SITE LAYOUT AND FACILITIES

A preliminary mine site facilities plan prepared by Norwest (Norwest 2012b) (Figure 4-10) illustrates the CPP, ROM stockpiles and storage domes, product storage domes, and general site support facilities. The site support facilities planned may consist of an electrical substation, an administrative building, bathhouse, warehouse, short term housing, fuel depot and truck shop and wash. The approximate latitude and longitude of the main mine site facilities location is 55°59'55" N, 122°42'33" W. The designated project, including all components, is not an expansion of an existing project.

Based on the conceptual site plan (Figure 4-10; Norwest 2012b), approximate potential surface disturbance resulting from the various Project components include:

- Northern Surface Mine: 1.123 km^2
- Central Surface Mine: 3.31 km^2
- Underground Mine: 26.17 km^2
  Mine Facilities Footprint: 0.15 m^2

Figure 4-9: Conceptual Barge Load-out System at Carbon Inlet

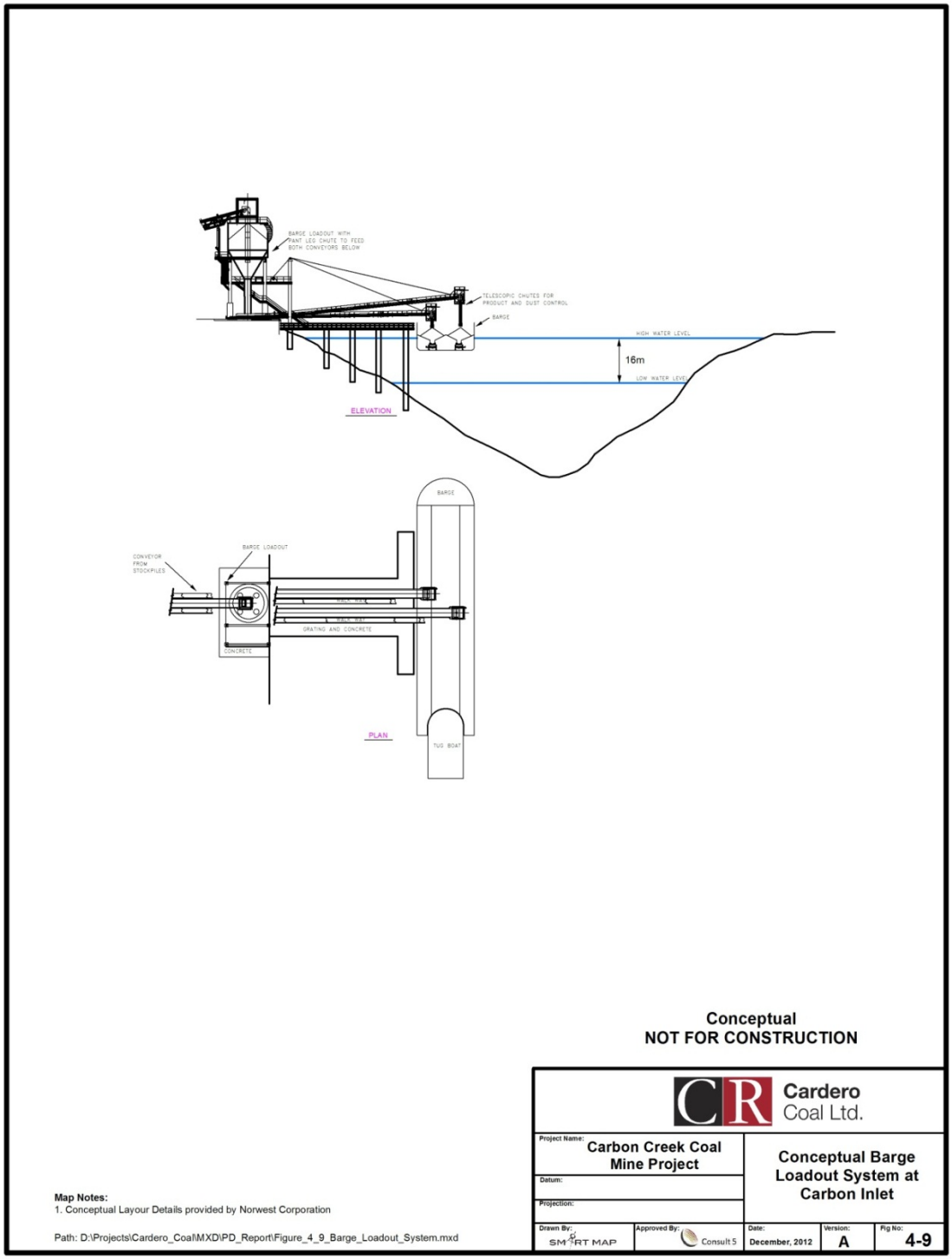
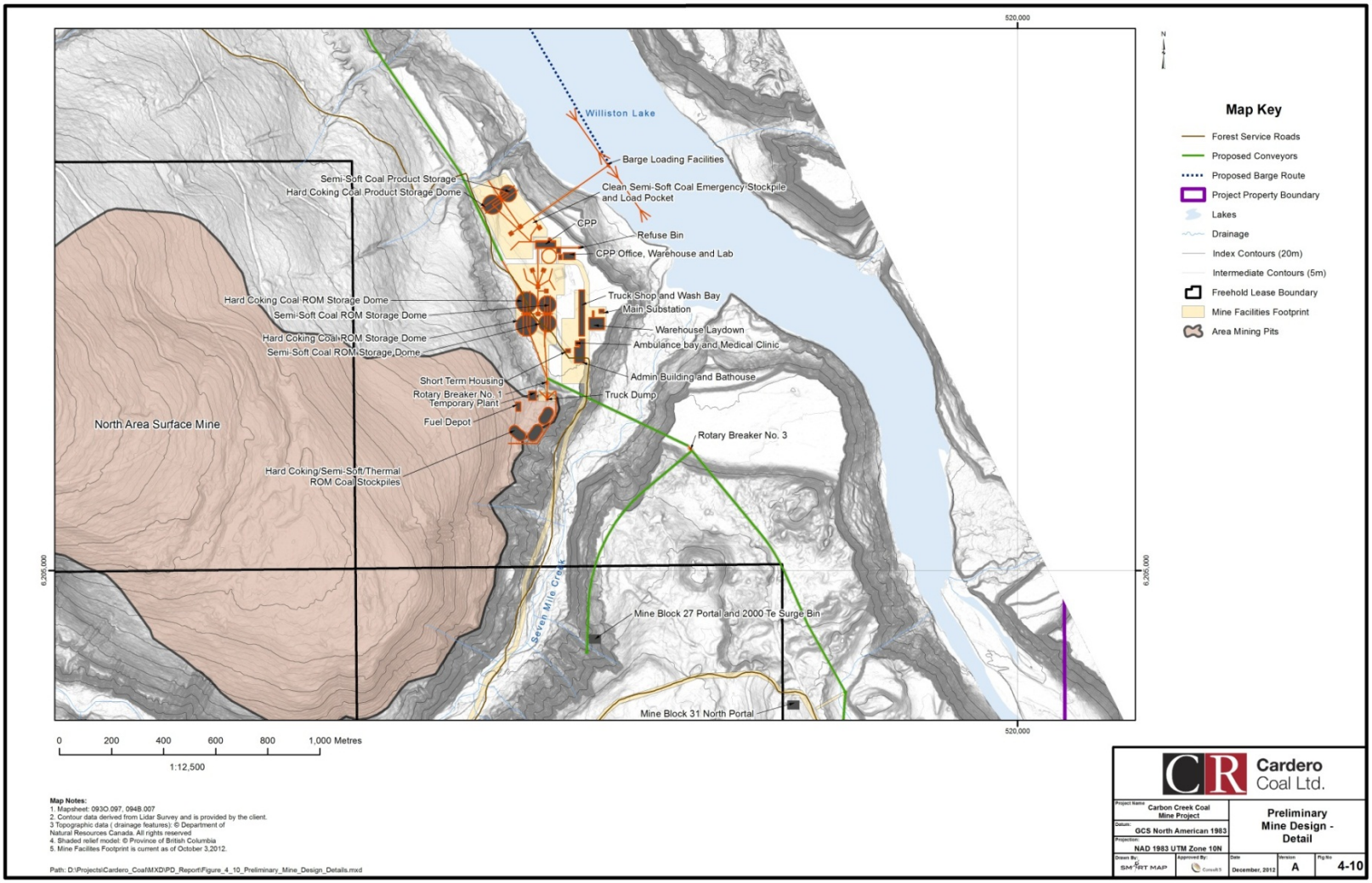


Figure 4-10: Preliminary Mine Design – Detail



4.4.1 Mine Portal

The portal areas for the underground mines will be cleared, excavated, and graded. The excavation for the portal will be made at the lowest seam outcrop possible without requiring excessive overburden removal.

Given the configuration of the area to be mined, and assuming that there are no further restrictions due to faulting, the main entry should be driven in the seam along the strike. The headings will be driven full seam height with five entries on appropriate centers (possibly 24 m centers). When the main entry advances about 30 m from the portal, development will halt until the portal concrete work and permanent fan installation are completed.

4.4.2 ROM Handling

The ROM coal-handling facilities will be designed to minimize the amount of time that ROM is exposed to weathering prior to processing. ROM from the underground mine portals in the north and south of the property will be delivered to the coal processing plant, located at Carbon Inlet, by overland conveyors to the ROM storage domes. Each of the streams will be fed into rotary breakers (no. 2 & 3) near the mine sites for de-stoning prior to delivery to the ROM storage domes. Semi-soft ROM from the Northern and Central surface mines, as well as the contour mining operations, will be trucked to the tip and fed into ROM coal storage domes.

Coal will be moved from the mine via conveyor to the mine site facilities, whereupon it will first transfer to ROM coal stockpiles prior to processing. The ROM coal will then be sized, sorted and fed to the appropriate ROM coal storage dome prior to transfer to the CCP. Once processed clean coal product will go by conveyor to covered product storage domes. Refuse from the washing process is conveyed to the refuse bin facility.

4.4.3 Conveyor Belt System

It is proposed that a 7 km system of overland, covered conveyors will convey ROM material from the surface and underground workings to ROM coal stockpiles at the main mine site facilities. The mine site conveyor network will then transfer ROM material to covered storage domes once it is sized and sorted, and from the storage domes material will be conveyed to the CPP.

Clean coal will then go by conveyor to the product storage domes via the storage feed conveyor, or will bypass storage and go directly to the load-out hopper. Refuse from the washing process will be conveyed to the refuse bin. Conveyor systems will also be used to load coal on and off barges.

The design of the conveyor belt system will be finalized in the Feasibility Study. The construction of the system will be planned so that surface disturbance will be minimal.

4.4.4 Coal Processing Plant and Associated Equipment

As outlined in Section 4.3.3 the CPP will be a single-module operation rated at a nominal 1200 tph of raw feed and feature parallel, size-specific processes. The plant will target a ROM coal throughput of 7.2 Mtpa at a 68% effective utilization. The plant will include a CPP warehouse and refuse bin for waste material. Located to the north of the mine facilities' footprint there will be two product storage domes constructed for semi soft and hard coking coal.

In the processing plant itself a heavy media bath circuit will wash the 150 mm x 10 mm stream, followed by crushing to reduce the top size to 50 mm, a process which was selected to avoid the need for a thermal dryer. A

large-diameter heavy media cyclone will wash the 10 mm x 1 mm stream along with reflux classifiers for the 1 mm x 0.25 mm and two-stage froth flotation for the minus 0.25 mm streams.

Each sub-product stream will employ mechanical dewatering centrifuges appropriate for the particular size ranges. Pressure filtration will be used on the minus 45 micron material. Total product moisture values for each seam are projected to be below 8% by weight. This is a general market specification for metallurgical coal shipped to the Pacific Rim countries from western Canada.

4.4.5 Coal Load-out Facilities

Currently, there are two potential sites in close proximity to each other, being investigated as possible locations for the coal load-out at Mackenzie. Both sites are located within the district of Mackenzie along the Williston Reservoir in a predominantly industrialized area, approximately five to seven kilometres from the main residential area of Mackenzie. Both of the sites are on inactive industrial land. Clean coal product will be transferred from the incoming barges via a telescopic shoot and conveyor system into a hopper, which will dispense the coal into waiting rail cars for transport by CN Rail (Figure 4-11). Loaded coal trucks will be covered or have a latex sprayed over the coal to minimize dust generation and coal loss during transport. Although it is proposed that product logistics will be controlled from the plant site to ensure that clean coal is fed directly onto trains at Mackenzie, Cardero are planning on constructing an emergency storage dome at the terminal should a need arise.

Electrical connection to the BC Hydro grid at this location will also be required. An assessment is currently being conducted to determine optimal location and design of the coal rail load-out at Mackenzie.

4.4.6 General Facilities

The final details of the mine site plan layout will be determined more specifically during the Feasibility Study phase, which will be completed in Q2 of 2013. Below are design stage proposals pertaining to the general facilities of the proposed mine.

4.4.6.1 Offices, Workshops, and Warehouses

The administration block, medical clinic, maintenance shop and warehouses will be located adjacent to the plant site at Carbon Inlet. Each of the underground mine portals will be serviced by satellite warehouses and personnel facilities.

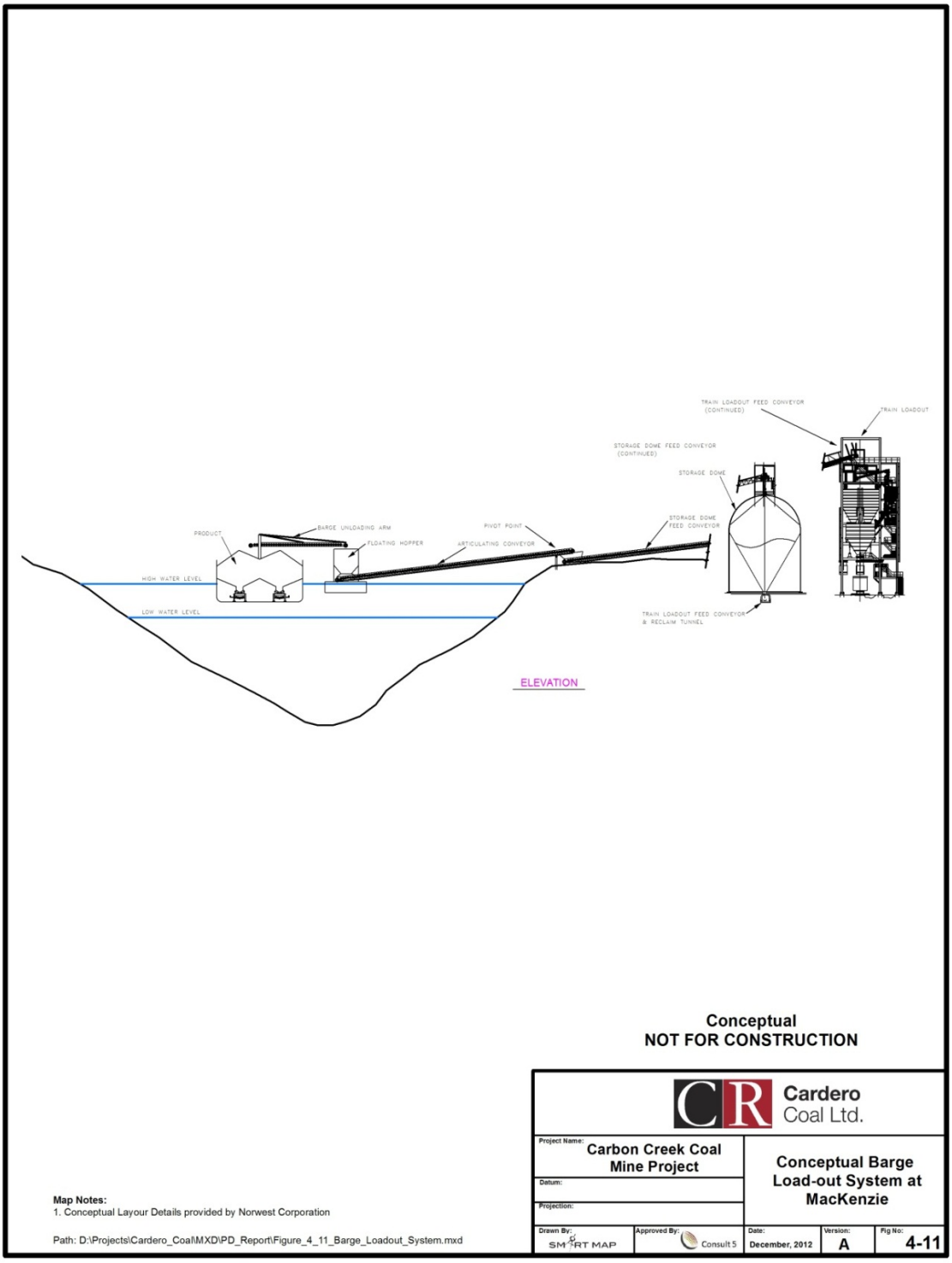
Included in the industrial area will be the administrative and service facilities necessary for the management and supply of the mine, maintenance, and equipment. These facilities should include offices, a laboratory, a change room, a warehouse, shops, maintenance equipment, a welding shed, tire and battery shops, truck wash, mine vehicle parking, and an area designated for employee parking.

The conceptual site plan (Norwest 2012c) proposes that the site support facilities and CPP will be located in close proximity to each other. It is most likely that these facilities will use a common potable water supply and distribution system, sewage treatment facility, and drainage works.

4.4.6.2 Construction Camp Facilities

Both on- and off-site alternatives for housing construction staff will be considered during the Feasibility Study. This could include the option of transporting workers by bus from a camp in Hudson's Hope.

Figure 4-11: Conceptual Barge Load-out System at Mackenzie



4.5 ACCESS AND TRANSPORTATION

4.5.1 Roads

A substantial network of roads and cat trails was built in the Project Area during exploration and development programs prior to 1981, and in connection with ensuing forestry activities by Canfor. Connection to the Provincial highway system is necessary to support the Project and is presently furnished via the town of Hudson's Hope.

During construction, virtually all freight, equipment, and personnel will have to be transported over access roads via Hudson's Hope. At full operation, it is estimated that500 to 600 mine employees will commute daily from Hudson's Hope.

4.5.1.1 Access Road Alternatives

Access to the mine site will be via the Johnson Creek Forestry Service Road (JCFSR) which will be upgraded to accommodate the anticipated high volume of personnel transport and material delivery vehicles.

A number of alternative access roads will be evaluated in support of the Project. To the extent that existing roads can be used, the potential for road upgrades and any environmental impacts will be minimized or mitigated. The general access route will involve the movement of goods and personnel from the Hudson's Hope area.

4.5.1.2 Project Access Roads

Mine exploration and forestry activities have established multiple roads and trails on the Property. Roads are in various states of passability, some having been decommissioned to varying degrees. Former road and trail routes may need to be re-established to support further Project evaluation and construction.

4.5.1.3 Coal Transportation Route

The transportation route currently proposed involves loading the washed coal product directly onto barges near the mouth of Seven Mile Creek on Carbon Inlet and transporting the coal approximately 175 km west and then south along the Williston Reservoir to an off-loading facility at Mackenzie, BC (Figure 1-2). This option would involve construction of product storage facilities (silos) and a barge loading facility on Carbon Inlet near the proposed mine site and evaluation and potential development of the current facilities available at Mackenzie. Once at Mackenzie the product could be loaded onto CN Rail units for shipment.

Cardero Coal had evaluated the concept of hauling coal by truck from the minesite along Johnson Creek FSR, and via a short road extension through a proposed tunnel, to connect with the Clearwater FSR, and then south to the Highway 97 corridor west of Lemoray. Due to environmental, economic and significant social (i.e., proximity to First Nations' sacred site of *Twin Sisters* factors this transportation option has now been disregarded.

4.5.1.4 Upgrade and Extension of Forestry Roads

Existing FSRs requiring upgrades or modification will be identified during the Feasibility Stage of Project assessment, and engineering design, construction, and environmental management of any modifications will be discussed.

4.5.2 Rail Transport

The washed coal product will be delivered via barge from the CPP to a load-out facility at Mackenzie, BC. Coal at the load-out will be transferred to rail cars on a rail loop that will be connected with CN Railway for transport to Ridley Terminals at Prince Rupert. Product will then be shipped to market.

4.5.3 Terrain Hazards

Terrain hazard studies have been undertaken as part of the baseline studies and the environmental assessment in order to identify any natural terrain geohazards and/or risks to the Project infrastructure. This will include the surface and underground mines' workings, permanent locations of waste materials, mine site facilities, transmission line, Project access roads, and the coal load-out facility.

4.5.4 Stream Crossings

All stream crossings by Project-related linear infrastructure (e.g., roads, transmission line right-of-way, conveyor, etc.) will be fully documented and their status regarding whether they are fish-bearing or not, will be determined. It is envisaged that new crossings required over fish-bearing streams will be constructed as clear span structures to avoid fish habitat impacts and impacts to navigability, if deemed to be navigable by Transport Canada.

4.6 POWER SUPPLY

4.6.1 Transmission Line

The proposed transmission corridor is generally parallel to the JCFSR, which is the main access route from Hudson's Hope to the plant site, and lies in more favourable terrain than other potentially-available options. Positioning the transmission line near the access road is optimal for a number of reasons, most importantly, reduction in construction and maintenance costs and less habitat disturbance (i.e., one, rather than two, corridors for both purposes). The power distribution center at the BC Hydro W.A.C. Bennett Dam is the G.W. Shrum generating station. This is approximately 35 km east of the proposed mine site and is the proposed tie-in point for a new transmission line to supply the Project. Cardero may have to construct a new substation close to the G.W. Shrum generating station in the event that the existing system does not have the capacity to fulfil the project's needs. The viability and feasibility of this option is currently being assessed.

4.6.1.1 Right-of-way Alternatives

BC Hydro and Knight Piesold recently conducted field reconnaissance surveys of a number of possible power transmission corridors from the W.A.C. Bennett Dam and Dokie sub-stations to the proposed site in the Carbon Creek Valley. Three power line corridors are under investigation and the best option will be selected through an alternatives analysis:

- **Gaylard Creek Corridor:** Running generally parallel to the proposed route being considered for the access road to the plant site. Shorter and lies in more favorable terrain. There are two different connection points demarcated currently being considered for this route.
- **Gething Creek Corridor:** Runs along McAllister Creek before turning north east up Gething Creek. Longest of the three proposed routes at 47 km.
- **McAllister Creek Corridor:** Running to the south all along McAllister Creek. Investigations stopped due to its proximity to the sacred First Nations' site of *Twin Sisters.*

The preferred corridor to the north (Figure 4-12) runs generally parallel to the proposed route being considered for the access road to the plant site. Having the transmission line near the access road is optimal for a number of reasons, most importantly, resulting in a reduction in construction and maintenance costs, and also, in less habitat disturbance (i.e., one corridor for both purposes, rather than two corridors). It is anticipated that distribution to the plant and several mine sub-stations will be achieved by a combination of single and double pole and line options at appropriate transmission voltages.

4.6.2 Distribution

Power will be delivered to a main substation located near the plant site on the Property. There, it will be transformed to a working voltage for local use (i.e., CPP, industrial area, camp), or transmitted on pole lines to more distant load centers (i.e., the surface mine, the underground mine, the crushers, the overland conveyors). The power distribution equipment and systems to be used in the mining areas will be selected and designed to meet safety, flexibility, and portability requirements.

4.7 WATER MANAGEMENT

A comprehensive water balance for the Project Area will be developed as part of the Feasibility Study and EA. The water balance will document all natural inputs, industrial use, and outputs. The water balance will consider seasonal variations and climatic extremes and will be used for water quality predictions to assess effects on receiving water. In conjunction with the overall water balance, the careful design and management of on-site water management structures will contribute to water conservation and water quality. A comprehensive water management plan will be developed for the application based on the ultimate Project design, water balance, and requirements for water quality protection. A comprehensive sediment control plan, including water management for construction, will be developed for the application. The water management system will predominantly utilize clean water diversions to minimize runoff into disturbed areas and collection ditches to route water to sedimentation sumps and impoundments.

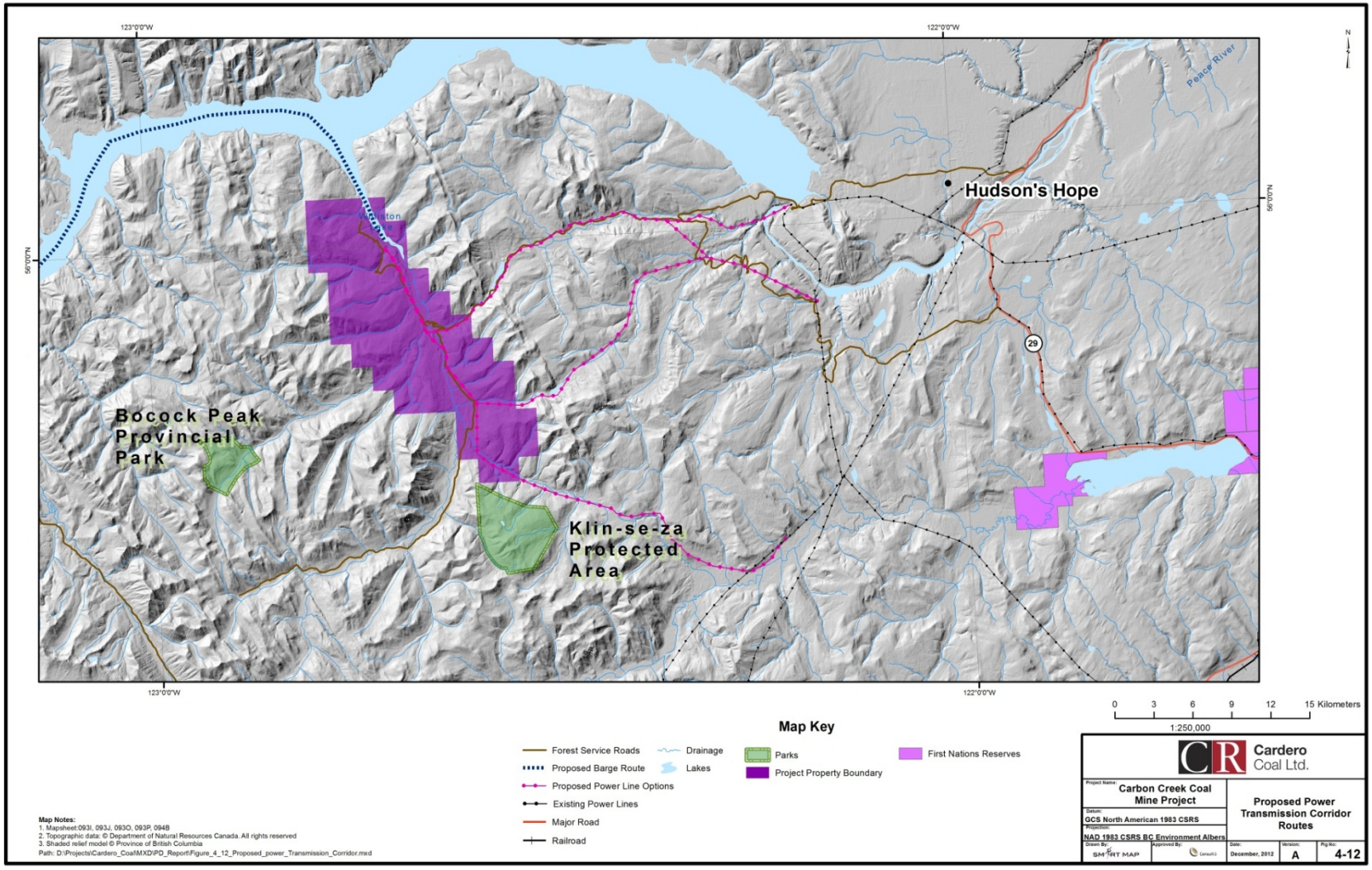
4.7.1 Process Water Supply

Water will be required at the site for the CPP, dust suppression, wash-down and fire protection systems and separate system will be developed for the potable water supply A hierarchy of water for use in the mining operation will be established, with an emphasis placed on using mine-affected water for industrial activities prior to using unaffected water.

The hierarchy of use will be:

- Collected surface water run-off from mine areas, waste dumps and other mine facilities;
- Constructed surface water impoundments;
- Nearby lakes;
- On-site water wells; and,
- Other water storage facilities.

Figure 4-12: Proposed Power Transmission Corridor Routes



It is currently anticipated that water to be utilised for coal processing, equipment washing, and domestic uses will be sourced from Williston Reservoir, rather than depleting groundwater resources. In addition, the current CPP design incorporates re-use and recycling of water from the processing plant with maximum use being made of water captured from run-off drains and recycled water from the plant. All water supply sources will be evaluated for quality, volume, and environmentally-related effects of withdrawal.

4.7.2 Groundwater

Groundwater will be encountered in both surface mining areas and underground mines. In the surface mine areas, both surface and ground water will be collected using a series of ditches and in-pit sumps for water storage. Using diversion ditches and/or pumps, water will be removed from the active pit area and sent to a sediment control structure. These sedimentation structures will be designed to clarify the mine runoff and remove sediment so that it has the potential to be discharged back into the adjacent streams. Water discharged from the site will need to meet all applicable permitting requirements prior to release.

4.7.3 Surface Water Drainage Control

The surface water drainage control program is designed to minimize erosion, control sedimentation, and minimize degradation of surface water quality. The surface drainage control plan will consist of a series of ditches, diversions and ponds designed to control water flow from active surface and underground mine areas, external waste storage areas and in-pit waste fills, as well as controlling groundwater in-flow from mine pits. The surface water drainage control is based on:

- Excluding naturally-occurring run-off water (unaffected by the mining operation) from mine areas, which can be released directly, thus reducing the volume of surface water that needs to be stored after contact with active mine areas; and,
- Containing run-off from disturbed areas and moving water into sumps and sedimentation control ponds for clarification, prior to its release once it has met permitted guidelines.

All haul and access roads will be crowned properly and ditches will be provided to control the runoff from the road. Culverts or bridges will be used to divert water flow under the road. Temporary roads use for mine development, exploration or other miscellaneous mine activities will be ditched with culverts or water-barred to divert water off the roadways. All temporary roads not required will be re-contoured and re-vegetated to control erosion.

External upland surface water runoff will be diverted around the active mine area and facilities to control the volume of inflow into the mine site.

4.7.4 Water Handling Structures

Collection of surface water originating from above and below mine areas will be controlled by diversions, culverts, pipes and other structures designed to convey water while minimizing erosion. Ditches constructed above the active mine area will be used to divert water around the mine area and minimize the volume of water treated within the mine area. Collection ditches, pipes and culverts will direct water into sedimentation control structures where the mine site runoff will be treated and then released when it meets regulatory guidelines. Ditches will be armored when necessary to minimize the potential for down-cutting and sediment generation.

4.7.5 Mine Waste Drainage

Temporary and permanent mine waste rock stockpiles will be constructed in the active mine areas (Figure 3-6):

- **Temporary waste** storage areas external to the pits are needed to ensure that sufficient in-pit space is created prior to backfilling. The stockpile is moved once adequate space in the pit is available. Drainage from the temporary waste storage areas will be managed by a combination of collection ditches, silt fences, straw bale dikes or berms with sumps used to control runoff.
- **Permanent waste** stockpiles will be created in the surface pit footprints. Run-off from these permanent fills will be controlled by the use of collection ditches that will transfer the water to sedimentation control structures.

In areas where stockpiles may be affected by groundwater seeps or springs, a layer of coarse, non-acid generating (NAG) rock will be placed within the seep area. This material will be placed such that it does not affect the structural stability of the waste storage area over the seep area. All stockpiles will be contoured to minimise infiltration. In preparation for final reclamation, pit-waste stockpiles are expected to compare quite closely with the original landforms but it may be necessary to maintain a ditch below the stockpile toe to collect run-off water. Once land is re-vegetated, drainage diversions and treatment are anticipated to be unnecessary.

4.7.6 Pit Drainage Water Management

Surface Mines: It is proposed that water discharge from the active mining area will be controlled using ditches and sumps leading discharges to sedimentation control structures. If the water cannot drain directly out of the mine, a sump, pump and ditch system will be used. Water will be ditched so that it flows into a sump and from the sump the water will be pumped to a collection ditch or directly to the sedimentation control facility.

Underground Mines: Water generated in underground mines will be ditched and drained to the portal if the grade of the mine permits, or to a sump where a pump will be used to discharge the water out of the mine. Water from the underground mines will be sent to a sedimentation control structure where it will be treated and released back to the natural drainage system.

Sedimentation Ponds: All sedimentation ponds, settling ponds, ditches, diversions or other drainage structures will be engineered and constructed according to best management practices and applicable regulatory guidelines. Water release will only be implemented when regulatory compliance is achieved.

All sedimentation ponds, settling pond, ditch, diversions or other drainage structures will be engineered and constructed according to the guidelines established by BC Ministry of Environment, Lands and Parks (MELP) (BC MELP 2001). Other applications for authorizations under the *Environmental Management Act*, *Forest Act* and *Water Act* will be submitted to the appropriate agencies.

4.8 GAS MANAGEMENT

The Project may contain coal strata with quantities of coal bed gas (CBG). Such coal strata will typically occur at depth where hydrostatic pressures have confined gas preventing it from naturally diffusing out of the coal into the surrounding rock and to the surface. CBG primarily comprises methane (CH_4) but does not contain sour gas. It is unknown at this time what the quantity or quality of CBG is that may exist. CBG will be the subject of further study in the mine planning and design for underground operations, primarily for safety reasons. Gas desorption testing

undertaken in September 2012 suggests that minimal volume of gas (primarily CH_4) are contained in the coal seams. The Feasibility Study will address CBG safety management and address solutions for CBG management.

4.9 SOILS AND WASTE MANAGEMENT

A comprehensive soils and waste management plan will be implemented for the Project to optimize the safe and efficient management of the quantity and quality of all handled soils and waste materials including waste rock and tailings. Management of these materials will use the best management practices (BMP) used in mining industry.

4.9.1 Topsoil and Till

The Health, Safety and Reclamation Code for Mines in BC (BC MEMPR 2008) states that all the soils must be salvage from all areas disturbed for mining and used for reclamation. All available topsoil and subsoil material will be removed from areas schedule for disturbance during the mining process. These materials will either be stockpiled for later use or directly re-spread on to areas undergoing active reclamation. Removal, stockpiling and/or direct re-spread of the topsoil and subsoil will be limited to the months between the spring thaw and fall freeze-up.

All stockpiled topsoil and subsoil will be stored in separate stockpiles to eliminate any potential contamination. All topsoil and subsoil stockpiles will be re-vegetated with a quick growing cover to minimize the erosion from the stockpiles. Erosion from the stockpiles will be controlled using straw bale dikes, diversion ditches connected to sedimentation ponds or other Best Management Practices.

For the large area surface mining areas, topsoil/subsoil will initially be removed and stockpile for use in the final reclamation of the internal in-pit waste stockpiles. As mining progresses, topsoil/subsoil will be removed and directly re-spread on to active reclamation areas in the active in-pit waste dumps.

For the contour mining areas, topsoil/subsoil will initial be removed and stockpiled adjacent to the contour mining area. This material will be used to complete reclamation of the contour mining areas.

For mining haul and access roads, topsoil/subsoil will be removed and stockpiled adjacent to these roads. These stockpiles will remain until the road is reclaimed when the material will be re-spread on to the reclaimed roads.

For the facilities areas, topsoil/subsoil will be removed and stockpiled. These stockpiles will be permanent and will remain until coal resources within this mine area are exhausted. Once mining is completed, all the facilities will be removed and transported off-site to be recycled or disposed of in an approved disposal site. All concrete foundations and slabs will be broken up and will be disposed of under the appropriate authorization.

4.9.2 Waste Rock

Overburden material will consist of clay till, a combination of clay, silt, gravel, cobbles and boulders, sandstones, shale, mudstones and other materials. This material will be drilled, blasted and loaded into haul trucks and be placed in external or in-pit waste stockpiles. Materials high in gravel, cobbles and boulders will be placed within these stockpiles and will not be placed on the final reclaimed surfaces.

Waste rock stockpiles will be designed to be structurally stable with the stockpile faces to be constructed to a minimum 2 to 1 slope (2 horizontal to 1 vertical) with slopes not to exceed 26°. Prior to construction of any external or in-pit waste stockpiles, the subsurface surface conditions under these stockpiles will be examined to

determine bedrock conditions, and will be tested to determine geotechnical parameters to be used in design stable stockpiles configurations.

There are two types of waste rock stockpiles, temporary and in-pit stockpiles. The temporary stockpiles will be used to store the initial waste rock from the opening of a contour mine area. This material will be stored adjacent to contour strip area. Once sufficient stockpile space within the contour mine area is available, the temporary waste stockpile material will be backfilled into the contour mine area. The in-pit stockpiles will be created in the large surface mining areas. Initially, waste material will be placed downslope from the opening box cut of the pit. As the mining progresses, the waste rock will be primarily placed within the footprint of the lowest seam to be mined. With the majority of the waste generated by the large surface area mines, some of the waste material will have to be placed in external stockpile areas as an extension of the in-pit stockpiles.

4.9.3 Tailings

It is proposed that course coal rejects from the CPP will be conveyed to a 300 tonne rejects bin located adjacent to the CPP building. On route to the rejects bin, fine dewatered reject material (i.e., tailings) will be loaded on top of the coarse reject material. The order of loading the reject material will assist in keeping the conveyor belt clean and increase the efficiency of the transfer to the rejects bin and eventually to haul trucks. The combined waste material will be dried and made into a paste that will be spread in landfill cells in previously-minded areas. Reject material will be loaded into 90 tonne capacity end dump haul trucks. The trucks are the same trucks used to transport the ROM material to the truck dump. After dumping ROM material the trucks are utilized to back haul the reject material to a designated disposal site.

4.9.4 Dust

Dust will be generated from four main sources; active mining faces, coal and waste haul roads, stockpiles and coal production plants. Water and water with dust suppression agents will be used to control dust. In the active mine area, the waste or coal operating or loading area will be sprayed with water to control dust generation. If required the active waste or coal loading faces may be sprayed with water.

The primary generator of dust will be internal mine haul roads. When needed, all active haul roads will be sprayed with water or water combined with dust suppression agents. The dust suppression agents are designed to join dust particles together so they stay on the road and do not become airborne.

During construction of topsoil/subsoil and waste stockpiles, water will be sprayed on the active working areas during their construction. After the stockpiles are completed, they will be seeded with a fast growing cover crop to help hold the topsoil/subsoil in place.

Dust suppressant sprays will be used throughout the coal production plant. These suppressants will be non-toxic and environmentally friendly. Dust suppression will be used at the ROM coal truck dump, coal crushers, all conveyor transfer points, raw and clean coal silos and any other location where there is a potential for dust generation. All silos will be equipped with dust collection systems as well as methane detectors to check for any concentration of methane. Conveyors will be equipped with belt cleaners, dribble chutes and tight fitting covers where needed. The production plant, all conveyors, all galleries and other facilities will be equipped with complete wash down systems to remove dust accumulations from all structures.

4.10 CLOSURE/RECLAMATION

The final reclamation and closure plan will address the reclamation of all disturbed areas (i.e., removal of all structures not required for on-going reclamation, monitoring and maintenance) and will conform with final land use objectives. The mine closure plans will be updated annually to reflect the on-going site activities.

4.10.1 General Land-use Objectives

The pre-mining land use of the area being disturbed is usually assumed to be the post mining land used unless a higher and better use can be demonstrated for the land. The pre-mining land use for this mine area is commercial forest use and the post-mining land use will be returned to commercial forest use. Wildlife use will potentially be improved as the re-vegetated mine areas will provide increase forage and shelter as the new forest matures. In addition, the recreation potential of this area may improve as access could be provided for hunting, fishing, hiking uses.

4.10.2 Proposed Reclamation and Mine Closure Plan

The typical mine closure plan would include the following items:

- Schedule and budget for reclamation and mine closure activities;
- Description of pre-mining land use and post-closure land use objectives;
- Assessment of infrastructure requirements post-mine closure;
- Schedule for removal of all unnecessary buildings, coal processing plant, conveyors, coal stockpile areas and other associated mine infrastructure;
- Plans for final reclamation of all remaining un-reclaimed surface mine areas and underground mine portals;
- Definition of final acceptance criteria to indicate when reclamation and closure is complete and acceptable;
- Plans for the replacement of topsoil/subsoil on final reclamation areas;
- Construction of any required final erosional control structures;
- Selection of plant species, soil amendments, seeding methods and mulching for final reclamation; and,
- Plans for site monitoring and maintenance after final land reclamation is complete.

4.10.2.1 Program Schedule

A schedule for the final reclamation and closure of the mine will be prepared and put forward in the Feasibility Study. This schedule will include a budget for all reclamation activities including equipment used, manpower and supervision requirements, a cost estimate of all reclamation activities and a reclamation timing schedule. This type of reclamation schedule will be required for the final mine closure program, as well as the annual program when the mine is operating.

The annual reclamation plans will include an estimated of:

- Location of the areas scheduled for final reclamation;
- Number of hectares to be reclaimed;
- Volumes of waste, topsoil and subsoil to be moved or placed;
- Detailed description of the activities to be completed during reclamation;

- Estimate of equipment, materials and supplies and manpower requirements; and
- Projected cost of reclamation activities.

The final closure schedule will include all the same requirements as the annual reclamation planning schedule. In addition, a description and schedule for post mine closure environmental and reclamation monitoring, remedial maintenance, if required, and a schedule of additional mine reclamation research if necessary will be included.

4.10.2.2 Selection and Preservation of Topsoil

Soil salvage is generally based on a soil survey of the mine site. Criteria such as soil texture, coarse fragment content, parent material, and slope, are used to determine the quality, location, and volume of soil to be salvaged.

Clear cutting will typically be conducted as necessary before mining commences. This operation will be accomplished in blocks as mining progresses in an effort to minimize the amount of surface disturbance at any point in time. Removal of topsoil/subsoil will also be done in small blocks to keep the total mine disturbance to a minimum. Usually the topsoil/subsoil will be stored in a temporary stockpile adjacent to the active mine area. Once ongoing reclamation provides sufficient area where the topsoil/subsoil can be replaced, it will be removed from the stockpiles and replaced onto the final graded areas. Available topsoil and subsoil will be replaced on all final graded disturbed areas.

4.10.2.3 Re-grading and Shaping

Final reclamation of all remaining disturbed mining area will be completed as part of the final mine closure process. Activities will include backfilling mining pits and underground mine portal sites, final grading of all disturbed area when mining operations cease. The types of equipment used for these activities will include dozers, trucks, loaders, shovels, motor graders, scrappers, water trucks and other ancillary equipment.

Reshaping of contour-mined areas will generally be accomplished by truck-and-shovel. Final re-shaping will generally be conducted by dozer.

4.10.2.4 Erosion Control Measures

As part of the ongoing mining process, erosional control measures including ditching, diversion channels, terraces, culverts, sedimentation control ponds, mulching, installation of silt fences or straw bale dikes are installed to control erosion during mining. During final mine closure, any additional required erosional control will be installed. Long term stabilization of the disturbed areas will be accomplished by installing a proper vegetative cover.

4.10.2.5 Plant Species Selection

The re-vegetative program at a mine site proposes to have both short and long range goals. The short range goal would be to control erosion on new topsoil/subsoil and waste stockpiles or other freshly disturbed areas. The long term goals includes providing a vegetative cover that would provide for long term erosion control through the use of plant species and tree seedlings that are native to the mine site area. The criteria used for the selection of plant and tree species would include:

- Satisfy requirement for final post mine land use;
- Suitable to mine soil materials; and
- Adapted to grow at various elevations.

Native species will mostly be used during reclamation as they provide the best potential for reclamation success. A mixture of grasses and legumes may be planted, as well as tree seedlings.

As part of the re-vegetation process, mulching could lead to seed and tree seedling establishment and help the soil retain moisture to enhance growth.

4.10.2.6 Soil Amendments

Prior to re-vegetation, fertility analysis is generally carried out in an effort to provide for successful vegetation re-establishment. Other amendments, such as mulches, may also be used. Application rates of all amendments will vary with physical and chemical characteristics of the soil materials.

4.10.2.7 Seeding

Seeding will likely be carried out at the Project during the spring to allow for plant establishment before the fall frost. The primary method of seeding will likely be by broadcasting; however, hydro-seeding and hydro-mulching may also be suitable methods. Seeding rates will vary according to site characteristics, seed size, species composition, and wildlife habitat needs.

4.10.2.8 Mulching

Mulches are highly conducive to seedling establishment and protect the soil surface against moisture evaporation and soil erosion. Seeded areas may be mulched with straw or other suitable materials, if these issues exist.

4.10.2.9 Management Techniques

Management of rehabilitated lands will be dictated by the end land-use plan. The management may include:

- fencing;
- monitoring of wildlife utilization; and
- application of soil conservation techniques.

The site will continue to be managed and reclaimed areas monitored until prescribed conditions are met, or until Cardero Coal is released from further management by the Province.

Reclamation research may need to be conducted on site to develop reclamation techniques that could help enhance the success of the reclamation process. Usually during the early stages of mining, a company may develop a series of test plots which are treated with various seeding rates, mulch rates, soil amendment rates, fencing or other factors. These test plots could provide valuable information to help develop methods to increase the potential for final reclamation success.

4.11 POST-CLOSURE

During the post-mine closure, the following activities are anticipated:

- Mine site surface water and groundwater monitoring (quantity and quality) to ensure permit compliance;
- Confirmation that erosion control, seeding and re-vegetation are successful;
- Regular assessment and maintenance of remaining infrastructure; and,
- Final infrastructure removal. Only the infrastructure required for post-mine closure activities will remain.

4.11.1 Assessment of Infrastructure Post Mine Closure

An assessment of the infrastructure required during the post mine closure may be needed. Once the final reclamation of the disturbed mining areas has been completed, the mine operator will likely need to monitor the surface and ground water, reclamation success and provide maintenance and repair of any sites requiring care once mine closure is complete. The mine may then need to maintain office space for site personnel in charge of these activities as well as storage of equipment that may be required to repair damaged areas.

4.11.2 Infrastructure Removal

A schedule will be developed to remove all site facilities and infrastructure that is not required after post mine closure. All office buildings, CPP and equipment, conveyors, transfer building, barge loading equipment and facilities, coal stockpile conveyors and feeders, roads, power lines, substations and other miscellaneous infrastructure will need to be demolished and disposed of in an authorized manner. Only the infrastructure required for post mine closure activities should remain.

4.12 ASSESSMENT OF ALTERNATIVES

Cardero Coal have, and continue to, consider alternatives to conducting the Project in regard to mining methods, access, delivery of power, and coal load-out facility location. The consideration of alternatives is a requirement of project assessment to address regulatory interests.

4.12.1 Mining Method

The development of the Project will utilize a combination of contour, highwall, and area surface mining methods along with underground mining methods, as described in Section 4.2. The detailed mine plan forming part of the Feasibility Study will prescribe the most appropriate method for optimizing the extraction of coal.

4.12.2 Access

Road access to the Project Lands will be evaluated from the perspective of a number of alternative scenarios; both for personnel and contractors during mine operations and for coal transportation to a rail load-out facility. These are further described in Section 4.5.

4.12.3 Power

Proximity of the Project to the G.W. Shrum generating station at the W.A.C. Bennett hydroelectric facility lends itself to economic connection to the Provincial electrical grid. Dokie generating station has also been considered and there is the possibility that Cardero will have to construct a new substation in order to tie into the grid and provide the project with the required capacity of power. Alternative routes and configurations of the transmission line that will need to be connected to the BC Hydro facility may also be considered.

4.12.4 Coal Load-out Facility

Cardero will evaluate the use of lands to the west of the town of Mackenzie, both an industrialized zone proximal to a CN Rail terminal and an alternative location a little further south on private land.

5. Project Activities and Schedule

Cardero Coal's preliminary schedule for the Project has coal being produced in 2014. The schedule includes completion of environmental baseline studies by Q4 2012, with a planned submission date of Q2 of 2013 for the EA Application and *Mines Act* Permit Application. The PEA was completed in December 2011 and Cardero Coal is proposing to complete a PFS in Q4 2012 and a Feasibility Study in Q2 2013.

Initial Development and Construction phase: Commencement of construction activities will depend on timelines for the review and issuance of an EAC and Mine Permit but are tentatively planned to begin in Q2-3 2014. Initial development and construction is anticipated to continue through to mid-2015, approximately one to two years in duration (Norwest 2012b).

Operation phase: First coal production is proposed for Q4 2014. Initially, operations will begin with the surface mine, while underground mine operations will commence in 2016. This will allow time to develop an area to access the underground mineable coal seams. The mining operation has been financially modelled for 20 years, excluding pre-production development and construction time.

Decommissioning phase: Estimated at two to three years, including all activities relating to the decommissioning of mine-site facilities. Closure of the mine site infrastructure may be carried out in steps as certain project components, such as roads, may be required to carry out the monitoring program and therefore cannot be decommissioned at the same time as most other components. Reclamation schedule will be developed as the mining plan is finalized, but will remain iterative.

Abandonment phase: Refers to conditions that will exist on the site after the site is abandoned and fully reclaimed. The waste rock areas will require monitoring following closure of the site. Monitoring will be required until the site has stabilized or as required by regulatory agencies – potential timing unknown.

5.1 MAIN ACTIVITIES IN EACH PHASE OF THE PROJECT

5.1.1 Construction Phase

The following list includes potential construction phase Project activities:

- Vegetation harvesting and clearing
- Site preparation
- Top Soil Stockpiling
- Blasting activities
- Access road construction, including access roads, and associated bridges
- Construction of load-on and load-out facilities for barge route option
- Preparation, use and clean-up of ancillary construction areas such as laydown areas and storage activities
- Construction of camp, bridges, processing facilities, water conveyance system, and switchyard
- Construction of an overhead transmission line from the Project switchyard to an interconnection point on the BC Hydro grid
- Work force, work force skill requirements
- Work force accommodations

- Schedule of all construction activities
- Construction Environmental Management Plan (CEMP) and related Environmental Protection Plans (EPPs). Conceptual components of the Environmental Management Plans (EMPs) will be outlined in the Application Information Requirements (AIR) document.

5.1.2 Operations Phase

The following list includes potential operational phase Project activities:

- Open pit mining
- Underground mining
- Mine site and facilities maintenance
- Processing facilities maintenance
- Waste rock sites and Metal Leaching/Acid Rock Drainage (ML/ARD) management
- Maintenance of on-site access
- Internal haul road usage and maintenance
- Coal transportation route maintenance
- Maintenance of barge load-on and load-out facilities
- Transmission line and onsite distribution management
- Drainage management
- Water resource management
- Work force and work force skills development
- Provision of work force accommodation and personnel transportation
- Railhead use and maintenance
- Operational Environmental Management Plan (OEMP) and associated EPPs. Conceptual components of the OEMP will be outlined in the AIR document.

5.1.3 Decommissioning Phase

The Environmental Assessment Application will provide a framework for the main components of a Decommissioning Environmental Management Plan (DEMP). It is anticipated that the DEMP may address plans for various aspects of mine closure such as:

- Reclamation of disturbed areas
- Anticipated applicable regulations
- Preliminary end land-use objectives
- Methods and approaches for decommissioning of all mine infrastructure
- Plans for on-going monitoring and maintenance
- Site restoration and safety
- Removal of infrastructure
- Access management
- Management of waste rock and over burden facilities

The end land-use objectives for a mine site are generally based on pre-mining use to the extent possible.

5.1.4 Abandonment Phase

- On-going monitoring and maintenance

6. Project Setting

6.1 BIOPHYSICAL CONTEXT

6.1.1 General Environmental Setting

The regional topography of the Project Area occurs as a belt of hills and low mountains. The highest elevation on the Property is slightly over 1,600 masl. The moderately to steeply sloping ground descends to an elevation of about 680 masl on the shores of Williston Reservoir. Most of the area is below the tree line and is densely forested with spruce and pine. Black bears and grizzly bears are present in the area as well as moose, caribou, stone sheep, mountain goats and deer. The creeks are populated with various fish species, discussed below.

Carbon Creek flows from south to north through the Property and enters Williston Reservoir located to the north of the Property. Carbon Creek is fed by a number of west- to east-flowing creeks, the most prominent being Seven Mile Creek, Nine Mile Creek, Ten Mile Creek, and Eleven Mile Creek. These tributaries are named according to their approximate distance from the Peace River now covered by Williston Reservoir. The McAllister Creek is a major east- to west-flowing tributary of Carbon Creek and joins the river in the southeast of the Property.

Utah Mines Ltd conducted several environmental baseline studies throughout the late 70s and early 80s (Utah 1976a, 1976b, 1982a & 1982b) to support the EA process of the day, in an effort to obtain permit approvals to launch the project. Some of the data and information collected during those studies have been used to inform and guide the recent program of environmental baseline studies and monitoring currently being conducted as part of this EA process.

6.1.2 Climate

Climate in the Project Area is influenced by the maritime Pacific air mass (moist, unstable, and mild) during non-freezing months and by the continental Arctic air mass (dry, stable, subject to extreme temperatures) during winter months. These two air systems typically create short, warm summers and long, cold winters.

The closest, long-term Environment Canada meteorology stations to the Property are Pine Pass Mt. Lemoray (ID 1186A71) and Mackenzie Airport (ID 1184790), which are approximately 47 km south-southeast and 77 km southwest of the Property centre, respectively. The 1971 to 2000 climate normals for the two stations are presented in Table 6-1 and Table 6-2. Average daily summer (July) temperatures are typically around 15°C while average daily winter (January) temperatures are typically around -10°C. Extreme temperatures range from -45°C to 35°C which is typical of northern, continental climates. The region's mountainous topography likely indicates that temperatures are colder at higher elevations except during winter months, when inversion conditions may be present.

Annual precipitation climate normals at Mackenzie (690 masl) and Pine Pass (680 masl) stations are 655 and 791 mm, respectively. Similar to the temperature gradient, precipitation typically increases at higher elevations. The two regional stations are at similar elevations to the lowest elevation within the Project region (680 masl); therefore, annual precipitation on site should be expected to be at least 655 to 791 mm. Precipitation typically falls as snow from November through March and as rain from June through September, while precipitation in other

months consists of a mixture of rain and snow. On average, 55 to 61% of the total precipitation falls as rain while the remainder falls as snow.

Table 6-1: Pine Pass Mt. Lemoray Climate Normals (1971 to 2000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average Temperature (°C)	-9.4	-6.9	-2.2	4	8.9	13.3	15.4	14.4	10	4.4	-3.6	-7.9	3.4
Daily Maximum Temperature (°C)	-5.6	-2.7	2.4	10	15.4	19.4	21.6	20.7	15.3	8.1	-0.4	-4.3	8.3
Daily Minimum Temperature (°C)	-13.2	-11.1	-6.9	-2	2.3	7.1	9.1	8.1	4.7	0.7	-6.7	-11.4	-1.6
Rainfall (mm)	12.1	11.1	7.2	17.7	55.2	72	84.1	67.8	**62.8**	63.2	21.4	7.4	481.9
Snowfall (cm)	64	57.9	38	9.3	1.8	0	0	0	1	14	55.2	67.6	308.8
Precipitation (mm)	76.1	69	45.2	27	57.1	72	84.1	67.8	63.8	77.2	76.6	75	790.7

Table 6-2: Mackenzie Airport Climate Normals (1971 to 2000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average Temperature (°C)	-11.4	-9	-3	3.1	8.5	12.6	14.9	14.1	9	3.5	-4.4	-9.9	2.3
Daily Maximum Temperature (°C)	-7.3	-4	3	9.6	15.6	19.3	21.9	21.1	15	7.8	-1.3	-6.1	7.9
Daily Minimum Temperature (°C)	-15.5	-13.9	-9	-3.5	1.4	5.9	7.9	7	3	-0.8	-7.5	-13.6	-3.2
Rainfall (mm)	1.9	4.3	7.1	13.7	42.2	63.2	61.5	50.9	51.6	48	10.3	3.6	358.3
Snowfall (cm)	75.5	52.4	35.4	11.3	1.3	0	0	0	1.2	15	58.7	74.9	325.5
Precipitation (mm)	68.3	49.9	39.6	24.5	43.6	63.2	61.5	50.9	52.8	62.5	66.5	71.5	654.7
Snow Depth at Month-end (cm)	72	74	49	1	0	0	0	0	0	2	24	53	23
Wind Speed (km/h)	6.7	6.9	6.7	7.1	7.4	7.5	7	6.3	6.3	7.4	6.9	6.8	6.9
Most Frequent Wind Direction	SE	SE	SE	S	S	S	SE	SE	SE	SE	SE	SE	SE

Winds likely blow along a north-south axis near the centre of the Property, along Carbon Creek, with variations dependent on local topography.

Utah (1982b) commenced air quality surveys at 13 dustfall stations and 2 Hi-Vol Particulate sampler locations from late 1981 to mid-1982. Eight sites were in proximity to the mine site and the five other sites were located where there was road access, including in the Pine Pass area. The short-term data collection program indicates that all values were well within the air quality standards for 1982.

Initial noise baseline measurements were undertaken by Utah in 1976 and 1982 on the proposed mine site area. The background noise levels were at approximately 25 decibels (dBA), with occasional higher noise levels to 40 to 60 dBA due to wind. They were within 70 to 80 dBA near fast flowing streams.

6.1.3 Hydrology

The Property is centred about locally-named Carbon Creek, which is one of the ten major sub-basins that drain into British Columbia's Williston Reservoir. Carbon Creek is a third-ordered basin, with a drainage area of approximately 740 km^2. It flows north into Williston Reservoir and features several sediment depositional zones along its main channel. Within the Property, several smaller, steep gradient sub-basins drain from east and west into Carbon Creek. The stream tributaries are locally referenced (as Five Mile to Eleven Mile Creeks) as a function of distance upstream from Carbon Creek's drainage outlet into Williston Reservoir.

Since 1998 Water Survey of Canada has operated a hydrometric station at the mouth of Carbon Creek (i.e., Station No. 07EF004). Over the period of record, the hydrograph-based results indicate that extended low-flow periods occur during the colder winter months, from December to early April (Figure 6-1). The seasonally-high peak discharges typically occur between the first of May and the end of June of each water year. This type of streamflow pattern is indicative of snowmelt-dominated water discharge regimes. Secondary streamflow peaks also occur between the months of September and November.

These lower magnitude peak flow events tend to occur in response to rainfall events that are produced by frontal systems that occur during the fall period. This streamflow pattern is considered to be consistent with drainage basins within the region. Mean annual runoff from Carbon Creek is approximately 540 mm and has ranged from 290 mm to 780 mm over the eleven years of available data.

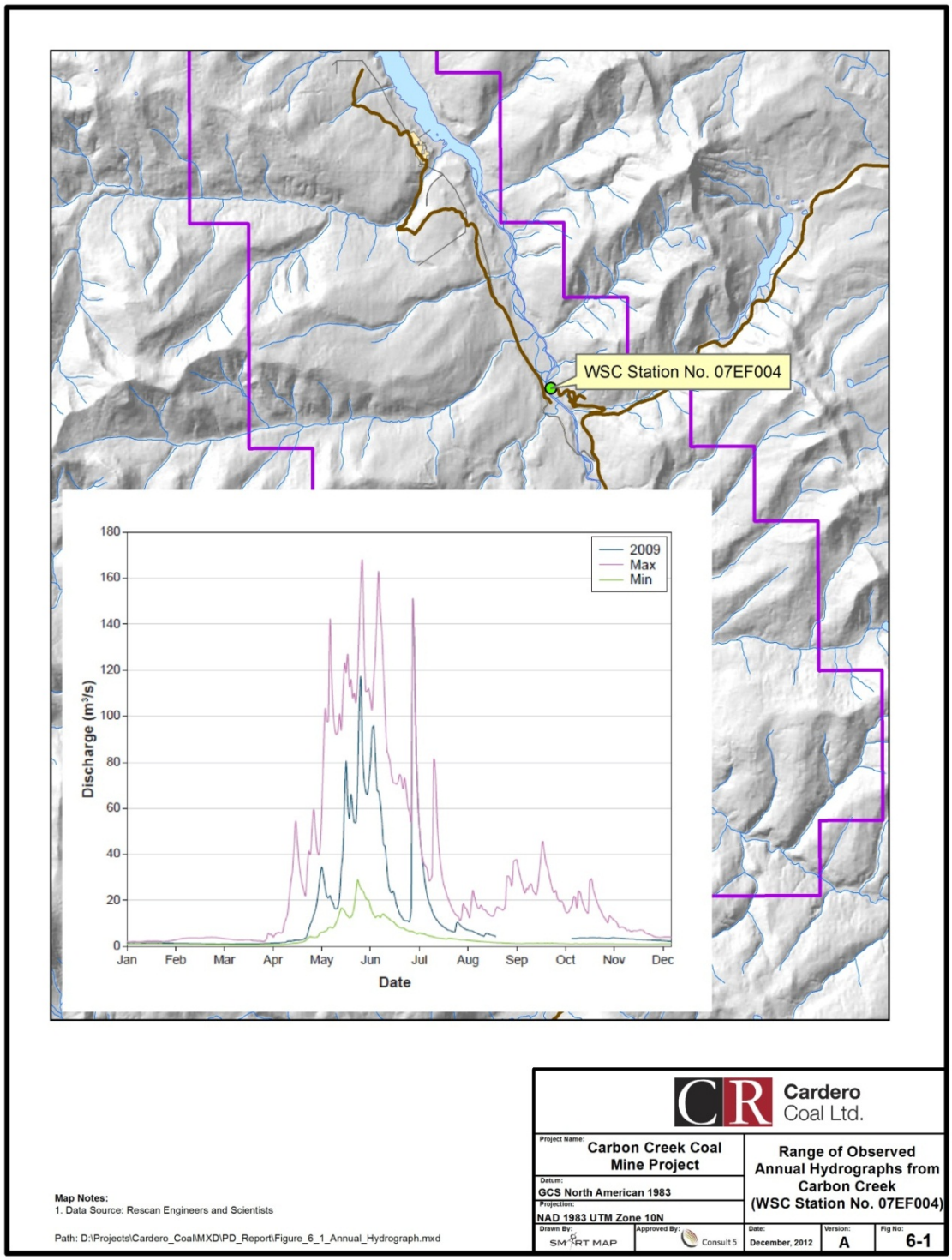
6.1.3.1 Requirements and Objectives of the Hydrological Assessment Program

As part of a hydrological assessment in support of the EAC application, Cardero Coal plans to collect additional hydrology data to supplement the existing data set and to determine baseline hydrological conditions of surface water bodies within the Project area; potential impacts of the proposed Project, such as the impact of potential subsidence due to extensive underground mining on surface water features proximal to the underground mining footprint, sedimentation and acid rock/metal leaching; and potential mitigation and monitoring measures.

6.1.4 Hydrogeology

Slug tests carried out as part of the groundwater studies in the mid-1970s and early 1980s (Utah 1976b & 1982b) identified two types of material: poorly–permeable bedrock (Case 1) and aquifer materials (Case 2), represented by sands and gravels and fractured bedrock zones. Twelve multi-level piezometers were installed between the Six- and Ten-mile Creeks and groundwater levels were measured several times between September and October 1976. The status of these wells is unknown, but if commissionable, will be integrated into the future baseline assessment and monitoring program.

Figure 6-1: Range of Observed Annual Hydrographs from Carbon Creek (WSC Station No. 07EF004)



A limited program of groundwater and spring water quality sampling and analysis was undertaken in 1976, 1978, and 1981. The groundwater was analyzed for a smaller range of parameters than the surface waters (Utah 1982b).

6.1.4.1 Requirements and Objectives of the Hydrogeological Assessment Program

Cardero Coal plans to undertake a detailed hydrogeological assessment to supplement existing datasets, in support of EAC application. The objectives of this assessment include:

- identifying the extent, use, and potential of the groundwater resource in and around the Property and specific proposed Project infrastructure sites;
- defining and assessing the potential impacts of the proposed development on the groundwater resource and its users, including fisheries habitat needs;
- outlining mitigation and monitoring measures to ensure that the integrity of the groundwater resource in its present condition is maintained for present and future use.

6.1.5 Water Quality and Aquatic Resources

Surface water quality surveys were conducted during the 1971 to 1976 period for the Utah Stage I EIA (Utah 1976b). In addition, a program of stream bed flow velocity, stream bed characterization, and aquatic invertebrate presence was undertaken between 1971 and 1973 at 22 sites, primarily on tributaries to Carbon Creek (Utah 1976b). Baseline data from the Utah Stage II EIA (Utah 1982b) for the Project Area are also available. Preliminary baseline data from current 2011 aquatic studies relating to categorization of some of the main waterways likely affected by the Project are tabularized below (Table 6-3).

Table 6-3: Main Waterways' Width, Depth and Gradient, 2011

Stream	Zone	Northing	Easting	Avg. Channel Width (m)	Avg. Wetted Width (m)	Avg. Gradient (m)	Avg. Bankfull Depth (m)	Avg. Residual Pool Depth (m)
7 Mile Creek	10U	6204887	513359	13.2	7.9	5.0	0.9	0.4
9 Mile Creek	10U	6202890	519821	7.7	3.8	10.5	1.7	0.4
10 Mile Creek	10U	6201361	520566	12.3	5.2	2.2	1.8	0.4
11 Mile Creek	10U	6197005	519457	19.1	14.7	2.0	0.7	0.5
McAllister Creek	10U	6191537	524132	17.2	13.5	1.3	0.6	0.6
Unnamed Tributary	10U	6193867	524840	9.4	3.5	2.5	0.6	0.5
Carbon Creek*	10U	6199882	521546	53	-	0.5	-	-

**Data sourced from Fisheries Inventory Data Queries, B.C. Ministry of Environment.*

The only existing use of waterways in the vicinity of the Project Area is subsistence/recreational fishing, predominantly being carried out by First Nations. Detailed information regarding these activities is not currently available; however, this information will be collected during on-going baseline studies (e.g., Traditional Use/Knowledge Studies) to be conducted in support of the EA.

The historical water quality sampling occurred at 10 sites (including an upstream and downstream Carbon Creek site, at Williston Reservoir, and on seven tributary streams entering Carbon Creek from the west, over the period between 1971 and 1981 (excepting 1974 and 1980). Samples were analyzed for many parameters including temperature, pH, dissolved oxygen, dissolved solids, total solids, turbidity, alkalinity, inorganic carbon, organic carbon, total carbon, sulphates, calcium, magnesium, hardness, nitrogen, ammonia, nitrate/nitrite, phosphate, dissolved ortho-phosphate, and metals. Selenium was not reported, however, future studies to determine the Project's potential for effects and impacts on valued ecosystem components will include Se as it is a potential leachate from waste rock (see below Section 9.1.1).

The historical surface water quality data for Carbon Creek and its tributaries indicates that pH was generally alkaline, ranging from 7.0 to 8.6. Suspended solids data were naturally variable over a year, peaking at 115 mg/L (corresponding with a fall rain event in October), although most measurements were below 30 mg/L. The nutrient concentration in streams was low and considered oligotrophic. Total metal concentrations were generally considered low, as most were often close to or below the available detection limits of the analytical procedures employed at that time, as well as, being below water quality domestic and aquatic life guideline values of the day (Environment Canada 1979; Environmental Protection Service 1977).

The list of aquatic invertebrates identified from 1971, 1972, and 1973 is provided by Utah (1976b). A total of 15 families of insects were distinguished, as well as, aquatic annelids and free-living flatworms. The organisms appeared to be non-homogeneously distributed as presence for any one of the 35 types collected did not occur in all years.

Metal Leaching and Acid Rock Drainage

The coals occurring within the Property are thought to occur in the upper to middle sections of the Gething Formation, consisting of abundant, but relatively thin, coal seams. The percentage of sulphur in these seams ranges from 0.57% to 1.88% (average 0.94% S). A very limited amount of ML/ARD testing has been conducted for the Carbon Creek coal deposit. In the Utah Stage II EIA (Utah 1982b), five 'acid production potential tests' (i.e., BC Research acid production potential test procedure) were completed on composite samples of mudstone (0.95% S), sandstone (0.14% S), siltstone (0.26% S), roof-and-floor composite (0.18% S), and coal composite (0.59% S). The coal composite sample was classified as potentially weakly acid generating and the other samples as non-acid producing.

6.1.5.1 Requirements and Objectives of the Water Quality and Aquatic Resources Assessment Program

An important application of baseline water quality data is water quality modelling for effects predictions. An annual baseline study involving surface water, sediment quality and aquatic biota will be undertaken to assess aquatic resources in select water bodies within the Project Area.

This work will account for past exploration activities, as well as other developments, such as logging, which have potentially resulted in historical impacts to water quality and aquatic resources. There will be a focus on determining background concentrations for parameters of concern, such as sulphate, nitrogen compounds, metals, selenium, and total suspended solids (TSS).

The host lithology and coal seams will be tested for selenium to determine if it is present at elevated concentrations and rock composition and kinetic testing will be undertaken to determine selenium leaching potential. Water quality modelling will predict the extent to which selenium may mobilize in the environment as a result of the mining activity and determine the potential for uptake and biological effects. The potential exposure pathways and target species that will be considered for fish tissue analysis will be identified.

The project scale and quantities of waste rock production estimated throughout the operational phase increase the potential for impacts to water quality and the requirement for Cardero to put into place the best management and mitigation practices in order to limit these impacts.

The BC MEM specifies prediction methods to assess ML/ARD potential and to prevent or reduce ML/ARD. These guidelines will be followed and a comprehensive testing plan will be developed for the Project that includes a sufficient number of static and kinetic tests to characterize the leaching potential of deposits and to allow development of waste and water management strategies.

6.1.6 Fish and Fish Habitat

BC Research previously described fish habitat and community composition for most of the streams in the Project Area between 1971 and 1982 (Utah 1976b & 1982b). A list of streams surveyed during baseline studies for the Utah Stage I EIA is presented in Table 6-4. All streams were subject to a reach-break analysis that was confirmed in the field.

Table 6-4: Summary of Streams Surveyed during Baseline Studies, 1971 to 1982

Stream Name	Description
Carbon Creek	Nine reaches of Carbon Creek are described from Williston Reservoir to the wetland in the headwaters of the system. A seasonal barrier is present in Reach 2 and permanent barriers to fish migration are described in Reach 6
Seven Mile Creek	Two reaches of Seven Mile Creek are described. No barriers to fish migration were observed
Nine Mile Creek	One reach is described. A possible barrier is present very close to the confluence of Carbon Creek. A second definitive barrier is present 800 m upstream of the confluence. No fish habitat is thought to be present.
Ten Mile Creek	One reach is described. Poor quality habitat is present throughout.
Eleven Mile Creek	One reach is described; however, the stream splits approximately 1 km upstream of the Carbon Creek confluence and both branches were considered to be part of Eleven Mile Creek. A potential barrier is described just downstream of the split. Fish habitat is present below the barrier.
Little Carbon Creek	Enters Carbon Creek from the east side of the valley. No reaches are described, but there is good fish habitat throughout with no barriers.
Creek A	Located on the east side of Carbon Creek, limited information was collected in 1981 and 1982.

Table 6-4: Summary of Streams Surveyed during Baseline Studies, 1971 to 1982 (continued)

Stream Name	Description
Creek B	Located on the east side of Carbon Creek, limited information was collected in 1981 and 1982.
McAllister Creek	Two reaches are described. The first reach may run dry at low flows, limiting fish access. No permanent barriers are noted.
Peck Creek	Enters Carbon Creek in Reach 6, upstream of barriers.

Information summarized from Utah (1976b & 1982b).

Fish habitat surveys in the 1970s were conducted according to methods described by Herrington and Dunham (1967) and Lagler (1964). These surveys were mostly descriptive and were summarized in Utah (1976b). No raw data for these measurements was found. Fish habitat surveys were conducted in 1981 and 1982 using the Aquatic System Inventory methodology (Chamberlin 1980), which appears to be a precursor to the Resource Inventory Committee (RIC) standards (RIC 2001) used today.

Fish sampling methods from 1970 to 1973 were limited to angling and observation. Electrofishing, gillnetting, and fry traps were added in 1975. These earlier studies documented at least six species in the Carbon Creek watershed:

- Arctic grayling (*Thymallus arcticus*);
- Dolly Varden (*Salvelinus malma*);
- rainbow trout (*Oncorhynchus mykiss*);
- mountain whitefish (*Prosopium williamsoni*);
- sculpins (*Cottus* spp.); and
- longnose suckers (*Catostomus catostomus*).

Observations in 1975 raised the possibility that the whitefish observed were actually lake whitefish (*Coregonus clupeaformis*); however, this was not confirmed. In addition to the species captured during these studies, bull trout (*S. confluentus*) and Kokanee salmon (*O. nerka*) have also been documented in Carbon Creek (BC MOE 2009).

Fish sampling was also conducted as part of the Utah Stage II EIA in 1981 and 1982 (Utah 1982b). These studies focused on Carbon Creek and its tributaries near the proposed mine site and were conducted using electrofishing, gill-netting, minnow trapping, and angling. In contrast with previous years, only three species were observed during sampling in the 1980s, specifically Dolly Varden, rainbow trout, and slimy sculpin (*Cottus cognatus*).

A fish presence/absence sampling program was carried out in Carbon Creek and results indicated that many of its tributaries had fish passage barriers along various stream reaches, rendering those tributaries as non-fish bearing. Carbon Creek was subdivided into nine distinct reaches and assessments were undertaken for each reach. Reach 6 of Carbon Creek above km 35 of the mouth of Carbon Creek, contains an 18 m high falls and high gradient chutes effectively preventing upstream fish passage. Seven Mile Creek, despite its moderate gradient and stepped nature, did not appear to present fish barriers along much of its distance in the Project area. Nine Mile Creek contains a fish barrier near its confluence with Carbon Creek that probably excludes fish access. Ten Mile Creek is a high gradient, high energy stream that also appears to offer little potential fish habitat. Fish passage into the lower portion of Eleven Mile Creek is possible at all flow levels, but not further than the 4 m high bedrock-controlled falls immediately downstream of the north and south fork confluence. Some fish stream investigations were also

undertaken at key crossings along the potential access and concentrate haul routes investigated for the Utah Stage II EIA (Utah 1982b).

Analyses of fish data in historical reports were basic due to the limited computer resources available at the time. Sampling effort was usually summarized for each site sampled and average fish length, weight, and condition factor were calculated.

Arctic grayling were the dominant species observed and captured through angling from 1971 to 1973; however, by 1975, declines in the number of Arctic grayling and Dolly Varden observations were noticed. It was speculated that the declines were likely due to extreme fluctuations in the level of the reservoir (Utah 1976b). All of the Arctic grayling captured in Carbon Creek and its tributaries between 1971 and 1975 were adults, raising the possibility that these fish were not successfully spawning in the watershed. No spawning habitat was observed in Carbon Creek downstream of McAllister Creek during studies in the 1970s. Fish sampling in 1981 and 1982 did not encounter any Arctic grayling. This pattern of Arctic grayling decline has since been observed in several other tributaries of Williston Reservoir (Blackman 2002), and possible explanations for the decline include overfishing, competition with introduced species, habitat loss, and reservoir management.

6.1.6.1 Requirements and Objectives of the Fish and Fish Habitat Assessment Program

Assessment will consist of fish community and fish habitat assessments in streams, rivers, ponds, and/or lakes in the receiving environment to fill data gaps identified in the pre-field literature review. One or more reference watershed(s) outside the local study area (LSA) may also be studied for comparison with the receiving environment.

In particular, the objective of the fish and fish habitat sampling program will be to examine the current species distribution and habitat quality within the Carbon Creek watershed. In terms of the evaluation of potential selenium bioaccumulation in the local watersheds, resident species such as sculpin, bull trout, and Dolly Varden will be of interest.

Critical habitat features will be identified, and spawning surveys may be conducted to determine the current value of the Carbon Creek watershed to resident species. Baseline data on fish health, diet, and tissue metal concentrations will also be collected.

6.1.7 Wildlife

The region encompassing the Project Lands is known to be home to many terrestrial wildlife species including grizzly bears, northern caribou, mountain goats, moose, elk, avian species (e.g., birds of prey, migratory songbirds, and waterfowl) and amphibian species (e.g., Western toad; a *Species at Risk Act* (SARA) listed species of Special Concern). Based on historical studies, ecological databases, and other observations, these wildlife groups are anticipated to occur within the regional area surrounding the Project Lands and will require more detailed study.

A substantial amount of historical work has already been conducted on wildlife in or near the Project Lands and the region. Baseline information on wildlife was collected in the late 1970s and early 1980s for the Utah Stage II EIA (Utah 1982b). This relatively high-level assessment yielded limited quantitative information on wildlife populations in the area, but identified the presence of mountain goat and northern caribou as important wildlife species requiring consideration. It also suggested that moose were present in much of the area although winter habitat use was restricted and had been influenced by the earlier flooding of the Peace River for hydro-electric development. It was also suggested that mule deer may summer in the Carbon Creek area, while marten were abundant throughout

the area and grizzly bears were also present. Of note was the substantial number of harlequin duck breeding sites documented along Eleven Mile Creek and Carbon Creek. In addition to harlequin ducks, migratory species such as Canadian geese and common mergansers have also been observed in the lower section of Carbon Creek. Additional work has been conducted since the Utah Stage II EIA was conducted. Its applicability for evaluating the Project on wildlife habitat needs to be assessed.

The Provincial government has designated certain areas within the region as important for wildlife, including an approved ungulate winter range (UWR) for northern mountain caribou, big horned sheep and mountain goat (UWR u-9-002) and approved Wildlife Habitat Areas (WHAs) for northern mountain caribou (WHAs 9-050 and 9-051). UWRs and WHAs are protected and managed under the *Forest and Range Practices Act* (2002). UWR u-9-002 covers an extensive area in the region (above 1,400 m), which is predominantly located south of the Carbon Creek and McAllister Creek confluence. UWR u-9-002, Unit No. SPC-037, which is noted as high elevation mountain goat winter range across Mounts Cowper, Wrigley and Rochfort, is the only unit of UWR u-9-002 that overlaps with an area subject to the Project's Coal License Applications (i.e., specifically 416898) and Coal Licenses (i.e., 418174, 418175, 418176, and 418177). Cardero have already officially established this area as a 'no-go zone' following consultation with interested First Nations and the Province's Mineral Titles Office (Figure 1-4).

The WHAs 9-050 and 9-051 identify high elevation caribou calving and rutting habitats surrounding Mount McAllister and Mount Monteith. These two WHAs overlap the eastern portions of the areas subject to Coal License Applications 416892 and 416891, and extend southeast of the areas subject to these Coal License Applications. These Coal License areas are not resource targets of the current Project and are not intended to be impacted by any planned project components or infrastructure.

In addition to the baseline research conducted in support of the proposed Utah mine project, a variety of other wildlife inventory and research has been conducted in the Project Area including the following:

- A multi-year grizzly bear telemetry project involving 49 collared bears between 1998 and 2002 to evaluate population and habitat selection in the Parsnip River watershed (Ciarniello 2006);
- A multi-year telemetry project monitoring radio-collared mountain goat within the area between 1995 and 1998 (BC MOE Fort St John);
- An ungulate survey in area north of the Peace Arm (Hatler 1989);
- An inventory of Stone's sheep in the south Peace arm including headwaters of Carbon and McAllister Creeks (Wood 1992);
- A reconnaissance ungulate inventory and snow depth study undertaken south of the Peace Arm including the area associated with Carbon and McAllister Creeks (Backmeyer 1991); and
- Stone's sheep and caribou inventory south of the Peace Arm (Wood 1995a, 1995b).

This list does not represent an exhaustive search. Additional wildlife and habitat inventory and research projects are likely to occur that have further applicability to baseline conditions in the vicinity of the Project Lands.

6.1.7.1 Requirements and Objectives of the Wildlife Assessment Program

The first step in the wildlife program will be a detailed review to compile the available studies in the Project Area. Subsequent baseline studies for the Project will focus on the LSA to evaluate this area as wildlife habitat within the regional context. This work will put the past results in context of the development and address the information shortfalls.

Identifying species, communities, and key wildlife habitat in the Project Area will be conducted to meet the obligations of all federal and provincial regulations for species protection in Canada. Further, species such as birds that migrate between countries receive protection under the *Migratory Bird Convention Act*, which is an international agreement. Other species, such as raptors, are afforded additional protection under the *Wildlife Act*, while species at risk are protected under the federal *Species at Risk Act* (SARA) (e.g., Western toad and several bird species in this area) (2002). Finally, species of importance to residents of BC, including Aboriginal groups, will be considered in order to protect resource species that are not necessarily at risk, but important for the lifestyle and the economic viability of communities.

Habitat Mapping

Habitat mapping will be conducted for selected species to evaluate the potential area of lost habitat due to the construction of the Project. In some cases, important habitats have already been mapped by BC MOE, such as, the WHAs described in the previous section for mountain caribou and goat. These approved Provincially-designated WHAs will be used, where they overlap with the Project wildlife LSA and regional study area (RSA) to aid in the assessment of impacts and where they spatially and/or temporally overlap with proposed Project activities. Proposed areas of core northern caribou habitat detailed in the Peace Northern Caribou Plan (2012) will also be taken into account. The associated General Wildlife Measures from each designated Wildlife Habitat Area Order will apply.

6.1.8 Ecosystems and Vegetation

The Project Lands are set in the Sub-Boreal Spruce wet cool (SBSwk) and Engelmann Spruce-Subalpine Fir moist very cold (ESSFmv) Biogeoclimatic Ecosystem Classification (BEC) subzones. The SBSwk is dominated by white spruce on mesic sites, while both lodgepole pine and white spruce are found on dry sites. Wet sites contain white spruce and black spruce, with black spruce becoming dominant in organic bogs. Many stand age classes are present within the SBSwk, due to extensive fire, disease, pests, and logging history. Many of these stands contain a large component of lodgepole pine, a mid-seral species, which has suffered very high rates of mortality due to the mountain pine beetle epidemic. Due to the longer periodicity of stand replacement events in this ESSFmv, forested areas are often climax forests dominated by hybrid white spruce and subalpine fir. Lodgepole pine is generally only common on sites drier than mesic. On upland sites with cool aspects, black spruce may occur with lodgepole pine. Lowland wetlands are dominated by black spruce. Deciduous species are limited to the lower elevations of this variant, occurring on favourable aspects.

Terrestrial ecosystems and vegetation were mapped in 1981 to 1982 within the area of Utah's proposed mine site and along the haul road and transmission line (Utah 1982b). This mapping will require updating for the following reasons:

- The extent of mapping does not cover the entire area that needs to be mapped due to changes in the location of proposed infrastructure since 1982;
- The mapping does not conform to today's ecosystem mapping standards (i.e., RIC 1998a); and
- The terrestrial ecosystems and vegetation have changed over the last 30 years due to logging and the pine beetle epidemic.

Vegetation mapping from 1982 included field surveys which examined soils and vegetation. The soils information is not expected to have changed in the last 30 years and will be utilized as part of the ground-truthing work for the updated Terrestrial Ecosystem Mapping (TEM) and Predictive Ecosystem Mapping (PEM).

Wetlands were also addressed in the Utah Stage II EIA (Utah 1982b). The information was collected before formal wetland classification structures were developed by regulatory agencies (Environment Canada 1991). In the Utah Stage II EIA, the term "meadow" is used to describe boreal and sub-alpine complexes of grassland, sedge, and low shrub plant communities occurring as intermittent openings, or in saturated, high water level areas (bogs), in forests, and along valley floors. Wetlands exist predominantly in the Project Area along the lower, shallower slopes and valley floor along Carbon Creek. Wetland distribution in accordance with current classification standards and wetland function will be addressed as this is central to environmental assessments of wetlands.

6.1.8.1 Requirements and Objectives of the Vegetation and Ecosystems Program

Ecosystem Mapping

Ecosystem mapping stratifies the landscape into ecological units and allows for the display of their spatial extent and distribution. In British Columbia, ecosystem mapping is based on standards and procedures that have been in place and tested throughout the Province for a number of years (RIC 1998a, 1999). The maps are generated using GIS technology and can be easily linked to other spatial data. Both TEM and PEM will be conducted for the Project. TEM will be used to characterize the LSA, which includes the mine site and associated infrastructure. PEM will be used to map the ecosystems in the RSA and to produce habitat suitability maps for identified wildlife species.

The British Columbia Conservation Data Centre (CDC), which is part of the Environmental Stewardship Division within the MOE, classifies plant species and ecosystems at risk in the Province as either red-listed (i.e., extirpated, endangered, or threatened) or blue-listed (i.e., of special concern), and tracks information regarding their conservation status and individual locations. Best management practices and guidelines for developments recommend that red- and blue-listed plants and ecosystems be protected (BC MOE 2006). Additionally, some listed plant species and ecosystems are federally protected by SARA (2002). Certain ecosystems or parts of ecosystems are also protected provincially and federally as wildlife habitat under the BC *Wildlife Act* (1996) and under *SARA* (2002). Some areas, such as riparian ecosystems, are protected by a variety of acts, including the *Forests and Range Practices Act* (2002) and the BC *Wildlife Act* (1996), as critical wildlife habitat. Where necessary, rare plant/ecosystem surveys may be conducted. Invasive plant species will be further mapped, where identified.

The abundance and extent of wetland ecosystems will be surveyed and mapped in the Project Area at 1:5,000 scale to describe wetland function. Field evaluation of wetlands in the LSA will follow the methods outlined in the Field Descriptions of Wetlands and Related Ecosystems in British Columbia (MacKenzie 1999), and Wetlands of British Columbia: a Guide to Identification (MacKenzie and Moran 2004). Wetland Habitat Information Forms (WHIFs) will be used to record field notes.

Some characterization of the metal levels in plant tissue (including wetland vegetation) will also be undertaken as this is a requirement of the mine permit application and is used to guide reclamation planning and end land-use objectives.

6.1.9 Terrain and Soils

A review of existing information, aerial photography, and on-site inspections of the proposed project area, as identified in the Utah Stage I and II EIAs (Utah 1976b & 1982b), indicate that the area has been previously glaciated. This has resulted in a range of landforms and glacial deposits occurring in the Project Area. Morainal surficial materials have been deposited on the side slopes in the area with deposits generally thin (1 m) over bedrock with localized deposits which may be 90 m or thicker, while typically deep deposits average 45 m thick. The till has been

re-worked by surface processes to form colluvium and a till and colluvium mix frequently occurs on the steeper slopes. The till of Carbon Creek Valley is generally silt and clay textured and consists of a heterogeneous mixture of debris ranging from clay to boulder size materials. It is very compact. Slumping of till occurs on some over-steepened slopes.

The last major ice sheet carried erratics of granitic and metamorphic rocks from source areas along and west of the Rocky Mountain Trench. Striations occur in the Carbon Creek area at between 1,341 and 1,615 m trending between 60° and 125°. As well, water draining from, or flowing alongside, the ice deposited poorly-sorted gravel and sand sediments on the lower slopes of the valley forming steep-sided or irregular mounds (kames) or crudely flat-topped deposits (kame terraces). In some places, these effluent streams carved steep-sided ravines (meltwater channels) into pre-existing deposits or into bedrock. Most drained northward along the west side of the ice tongue in Carbon Creek Valley. Alluvial fans commonly occur at the bottom of gullies. Terraces and floodplains, underlain by alluvium, occur in the valley bottoms.

The kames and kame terrace deposits consist of poorly-sorted gravels and sands with horizontal or inclined stratification. They may have irregular topography with small mounds, ridges, and hollows (kettles) and may also occur as terraces. They are generally associated with meltwater channels in the lower valleys, at elevations usually less than 900 m. Kames along the west side near the mouth of Carbon Creek Valley, may reach 122 m in thickness.

The alluvial fans are composed of moderately well-sorted gravels and are common at the mouths of streams tributary to Carbon Creek. They generally extend to about 30 m above present water levels.

The floodplains and terraces developed by post-glacial stream action are confined to an area approximately 1 km wide along Carbon Creek, and to lesser widths along its principal tributaries. The gravel mantle forming these terraces can reach 4.5 m in thickness and may be underlain by kame terrace deposits, till, or bedrock.

Small slides and mudflows are not uncommon in wet and over-steepened slopes mantled by till. The largest in the valley is located immediately downstream from the bridge over Carbon Creek at Thirteen Mile Creek. This slide was precipitated through undercutting by Carbon Creek and is still active. A second, smaller slide, immediately south of this area, was created on the same steep slope by adding a load of soil during road construction. Mudslides and mudflows are common on the higher, steeper, and wetter road cuts and clearly involve the poorly consolidated upper several metres of till. Several slides have occurred on the steep north slope of Seven Mile Valley where it is undercut by Seven Mile Creek.

Soil mapping conducted previously divided the Project Area into 15 mapping units, which were differentiated, based on landform, slope, soil drainage, soil texture, parent material, coarse fragment content, soil depth, and soil classification. Soils mapped in the Project Area were classified as Brunisols, Luvisols, Regosols, Podzols, and Organic.

The 1976 soils mapping program indicates that sufficient quantities of surficial materials are available for reclamation purposes. However, most surficial soils in the study area have moderate to low permeability when disturbed and a generally weak soil structure with high silt content. These factors tend to produce a less desirable physical soil medium when disturbed and compacted during surface manipulation. The surface soils are generally referred to as topsoil and some of the sub-soil can be used as a base for the topsoil.

The soils in the Project Area outlined in the Utah Stage I and II EIAs (Utah 1976b & 1982b) were assessed for topsoil suitability and salvage depth. The soils were rated as good to poor. The average salvage depth was between 75 and 115 cm. Many of the soils in the Project Area were rated as fair for suitability for reclamation.

6.1.9.1 Requirements and Objectives of the Soils and Terrain Assessment Program

The objectives of the terrain and soils program will be to:

- map the terrain and soils of the Property that were not previously mapped;
- delineate any soils that are subject to erosion and are sensitive to disturbance;
- assess the chemical properties of the soils;
- field check the terrain and soils that were not previously checked;
- identify areas with potential for liquefaction;
- undertake snow avalanche mapping;
- undertake seismological assessment including the location of the main earthquake epicenters that have occurred close or within to the Project Area the regional ground peak acceleration; and
- undertake slope stability assessment based on the terrain classification, including other components such as the slope angle, the presence of landslides within any polygon, and the potential presence of a snow avalanche path.

6.2 HUMAN RESOURCES

6.2.1 Archaeology and Heritage

Archaeological work was completed for Utah in 1982 (Utah 1982b). Past activities in the Project Area focussed on Seven Mile and Eleven Mile creeks, the northeastern end of Carbon Creek, and at Carbon Lake. The latter two are outside the Property. The portions of Seven Mile Creek and Carbon Creek proper that were utilized historically have since been inundated by the Williston Reservoir.

The main focus of the archaeological baseline study will be to identify archaeological sites in the Project Area that may be directly or indirectly impacted by the Project. According to development plans existing at the time of the Utah Stage II EIA (Utah 1982b), no heritage sites were located in the proposed Utah mining and industrial areas with the exception of a pack trail between Nine Mile and Ten Mile creeks.

The Utah Stage II EIA (Utah 1982b) identified four heritage sites in the area of the proposed Utah coal haul road, located during field reconnaissance in the Carbon Creek Valley:

- Dinosaur footprints, located near the intersection of the commuter road and coal haul road;
- A site consisting of a collapsed cabin (locally referred to as the Burns Foundation cabin), a collapsed lean-to, two fire pits, and a garbage pile. A pack trail runs in front of the cabin. The site is located on the north side of Eleven Mile Creek, immediately east of the first set of falls;
- An old exploration site associated with the Burns Foundation cabin. The site is located approximately 0.5 km from the cabin along the old pack trail and is on the lower terrace on the north side of Eleven Mile Creek.
- A site locally referred to as Peck's cabin, consisting of a partially-collapsed 4 m^2 cabin, a poorly defined trail, and tree stumps. The cabin was named for a trapper who worked the upper Carbon Creek area

from around 1942 until 1966. The site is located on the west side of Carbon Creek, on a knoll adjacent to a swampy area.

6.2.1.1 Requirements and Objectives of the Archaeological Assessment Program

In British Columbia, specific types of heritage resources, primarily archaeological sites, are protected by the *Heritage Conservation Act* 1996 (*HCA*). Archaeological Impact Assessments (AIAs) and any alterations to archaeological sites require permits issued by the British Columbia Archaeology Branch of the MFLNRO (Archaeology Branch). Archaeological sites on both private and Crown land are automatically protected by the *HCA* if they predate 1846 AD. Burial sites and Aboriginal rock arts sites are protected, regardless of age. As-yet unrecorded archaeological sites and archaeological materials from disturbed contexts are also protected. The objectives of the archaeological program will be to conduct an AIA under the *HCA*. The objectives of the AIA are:

- to identify (locate and map) the distribution and density of cultural materials and deposits that are associated with the proposed Project mine site and associated development impact zones;
- to evaluate the overall integrity and heritage significance value of all identified cultural deposits within the proposed Project impact zones;
- to determine the nature, extent, intensity, and duration of proposed Project land-altering activities and how they could affect any intact cultural deposits; and
- subsequent to the fieldwork, to formulate and present recommendations for the management, protection, and/or mitigation of any significant archaeological deposits within proposed Project impact zones that will be subjected to land-altering activities.

For the archaeological baseline study, background research will be conducted in the RSA; however, field work will be limited to examining the Project footprint within the Project Lands.

6.2.2 Human Health

Human health is one of the five *British Columbia Environmental Assessment Act* (BCEAA) assessment categories. Consequently, baseline information regarding aspects of the environment that may affect human health (e.g., air quality, noise, drinking water quality, and country foods) will be collected and assessed to support the Project human health effects assessment component of the EA.

Country foods are animals, plants, or fungi used by humans for medicinal or nutritional purposes that are harvested through hunting, gathering, or fishing. The harvesting and degree of use of country foods within the Project LSA will be addressed through consultation with local communities and First Nations. The concentration of chemicals in country foods is directly related to the quality of the surrounding environmental media (e.g., soil, water, and vegetation). A baseline assessment of country foods used by country foods harvesters in the Project Area will be conducted. The methodology for the country foods baseline assessment will be based on Health Canada's guidelines for assessing food issues in EAs (Health Canada 2004a & 2004b).

Other elements of human health (air quality, noise, drinking water) will also be investigated through coordination and shared use of concurrent baseline work from these related disciplines. These data will be used to provide an integrated evaluation of potential risks to human receptors in the Project Area.

6.2.3 Land and Resource Management

The Project Lands are located within the 2.9 million hectare area covered by the 1999 Dawson Creek Land and Resource Management Plan (LRMP). The plan was prepared as part of the Provincial land use strategy to ensure sustainable, integrated land and resource management on Crown lands within the boundaries of the Dawson Creek Forest District. The Project Lands fall within the Carbon Creek subzone of the LRMP's East Slopes Resource Management Zone (RMZ). This RMZ has been designated as "General Resource Management."

The LRMP's objectives with respect to coal and minerals are to:

- provide opportunities for environmentally-responsible exploration and development of surface and sub-surface resources; and
- plan and manage coal, mineral, and aggregate exploration and development activities with sensitivity to identified wildlife (e.g., grizzly bear).

The Dawson Creek LRMP identifies several existing land uses in the East Slopes RMZ (BC MEM and BC MELP 1999), including wilderness recreation, horseback riding, fishing, hiking, snowmobiling, trapping, and guide outfitting. Coal, oil, gas, and mineral exploration and development, as well as, energy production and distribution and forestry have also been identified. Canfor holds a Tree Farm Licence which covers the Project Area.

6.2.3.1 Requirements and Objectives of the Land and Resource Use Program

The land and resource use component of the EA considers how existing land uses, users, values, and activities could be affected by the Project. This includes a wide variety of potentially interested parties, including both tenure holders (e.g., mining, agriculture, forestry, guide outfitting, trapping), and non-tenured activities (e.g., some forms of recreation, First Nations subsistence harvests, resident hunting). Land use patterns have, to some degree, changed since the Stage II EIA (Utah 1982b) was prepared, in part, driven by the changes in accessibility afforded or limited by Williston Reservoir and forestry roads developed in the area.

The objectives of the land and resource use study are to:

- Determine the nature, scale, and distribution of existing land and resource use activities within and adjacent to the Project Area, including:
  - land titles and tenures;
  - industrial development, including mineral and energy resources;
  - subsistence activities (hunting, fishing, trapping, gathering);
  - tourism and recreation, including trails and cabins;
  - parks and protected areas;
  - forestry;
  - agriculture;
  - oil and gas activities;
  - areas proposed for energy generation such as wind farms; and
  - LRMPs and stated objectives.
- Determine the potential effects of the Project on the aforementioned land uses, users, values, and activities; and
- Develop strategies to avoid adverse effects and enhance beneficial effects.

6.2.4 Visual Resources

The Utah Stage II EIA (Utah 1982b) describes and evaluates the visual landscape of the Project Area as it was at the time of writing. The report assigns a scenic quality rating from various vantage points based on five criteria. The presence and diversity of landforms, vegetation, water, and colour improved a rating while the presence of cultural modifications lowered it. The Dawson Creek LRMP identifies the south shore of Williston Reservoir, including Carbon Inlet, as scenic areas (BC MEM and BC MELP 1999). The broad valley in which the mining and industrial site will be located was assigned a relatively low scenic quality rating.

Since 1982, disruptions to the landscape have occurred through forestry activities and the construction of forestry roads, as well as, the onset of the mountain pine beetle infestation. These activities have likely affected the visual quality of the proposed Project area since the completion of the Utah Stage II EIA.

6.2.4.1 Requirements and Objectives of the Visual Resources Program

The present-day visual quality around the Project LSA will identify features that are sensitive to visual disturbance with the use of Geographic Information System (GIS) technology. This will be used to develop a viewshed model, a line-of-site model, and to produce 3D renderings for key locations.

The objective of the visual quality assessment is to assess how the proposed Project infrastructure areas may affect the visual landscape, especially in and around areas such as:

- settled land (e.g., along the access corridor from Hudson's Hope and in Pine Pass);
- Provincial and regional parks (e.g., Bocock Creek and Klin-se-za Provincial Parks);
- designated scenic areas as specified by the MFLNRO and/or LRMPs (where applicable);
- road and highway corridors (e.g. Hwy 97 through Pine Pass in relation to the coal load-out); and
- areas of high recreational use (i.e., camping sites, rivers, trails, and undesignated, informal sites used by local residents primarily during fishing or hunting season).

The study area for the visual landscape baseline study will be the Project Lands.

6.2.5 Social and Economic Conditions

The socio-economic component of the EA will identify and assess the potential effects and impacts of the Project on the social, economic, cultural, health, and community aspects of any potentially-affected populations. Potential effects/impacts may be positive or adverse, and may be experienced at a variety of 'scales' (e.g., individual, family/household, community, regional, trans-boundary). In order to comply with BC Environmental Assessment Office (EAO) requirements, the information and scope of work presented below will be drafted into thematically-distinct social and economic reports.

The baseline study will summarize the existing social, economic, health, and community aspects of the communities, which could be potentially affected by the Project.

The study area will include:

- LSA: the communities of Hudson's Hope, Fort St. John, Taylor, Dawson Creek, Chetwynd, and Tumbler Ridge and the MLIB, SFN, HRFN, WMFN, TLFN and TKD territories and communities.
- RSA (Northeastern BC): Peace River Regional District.
- Provincial study area: the Province is studied because of the broad economic implications on Provincial economic and natural resource development.

6.3 FIRST NATIONS

6.3.1 Traditional Use and Knowledge

The Project Lands lie within the territories of TKD, TLFN and Treaty 8 First Nations, including the MLIB, the SFN, the HRFN, and the WMFN. It is likely that local First Nations in the surrounding area use trails on the Property for hunting, and it is known that aboriginal groups access the site for fishing. Also an established right of the Treaty 8 First Nations in the area is to hunt caribou in this area. Although proximal to aboriginal reserves and the sacred site of *Twin Sisters* (as referred to Beatty Peaks, in Klin-se-za Park; see Figure 1-5) the designated Project is not proposing to require access to, use or occupation of, or the exploration, development and production of lands and resources currently associated these reserves and sacred site. There are also two cultural camps located at sites in the vicinity of Project property along the JCFSR: (a) approximately between km 13-16; and, (b) another close to Carbon Lake, between km 65-67. The additional volume of traffic on the JCFSR related to transportation of mine workers is likely to be the main impact of the Carbon Creek Project on these camps.

Traditional Use and Traditional Knowledge (TU/TK) studies for the Project will be developed during baseline studies and the EA process. TU/TK studies complement contemporary science studies, provide important information on First Nations' interests, and elucidate technical, academic, and indigenous information relating to the traditional and contemporary use and knowledge of the Project Area. The First Nations Environmental Assessment Technical Working Group (FNEATWG) provides the following broad definition of TK:

> *"The wisdom and understanding that Aboriginal peoples have developed through living close to the earth is unique and is part of the ongoing cultural heritage of Aboriginal peoples"* (FNEATWG 2004:2).

6.3.1.1 Requirements and Objectives of the TU/TK Program

TU/TK information is used as a source of knowledge for all dimensions of an EA, including baseline studies and Project design. The TU/TK data help:

- design and implement baseline studies;
- identify or strengthen rationale for valued ecosystem components (VECs);
- understand values associated with the study area;
- identify areas that will be lost or patterns that will be changed;
- provide input to issues scoping and identification, impact prediction, determination of impact significance, and cumulative effects assessment; and
- identify suggested project design changes, mitigation measures, and/or management and monitoring plans.

Overlapping with a TU/TK study is the need for specific information on wildlife, fish, and vegetation presence, abundance, and trends, as well as the uses of country foods in the Project study area. As a result, information from

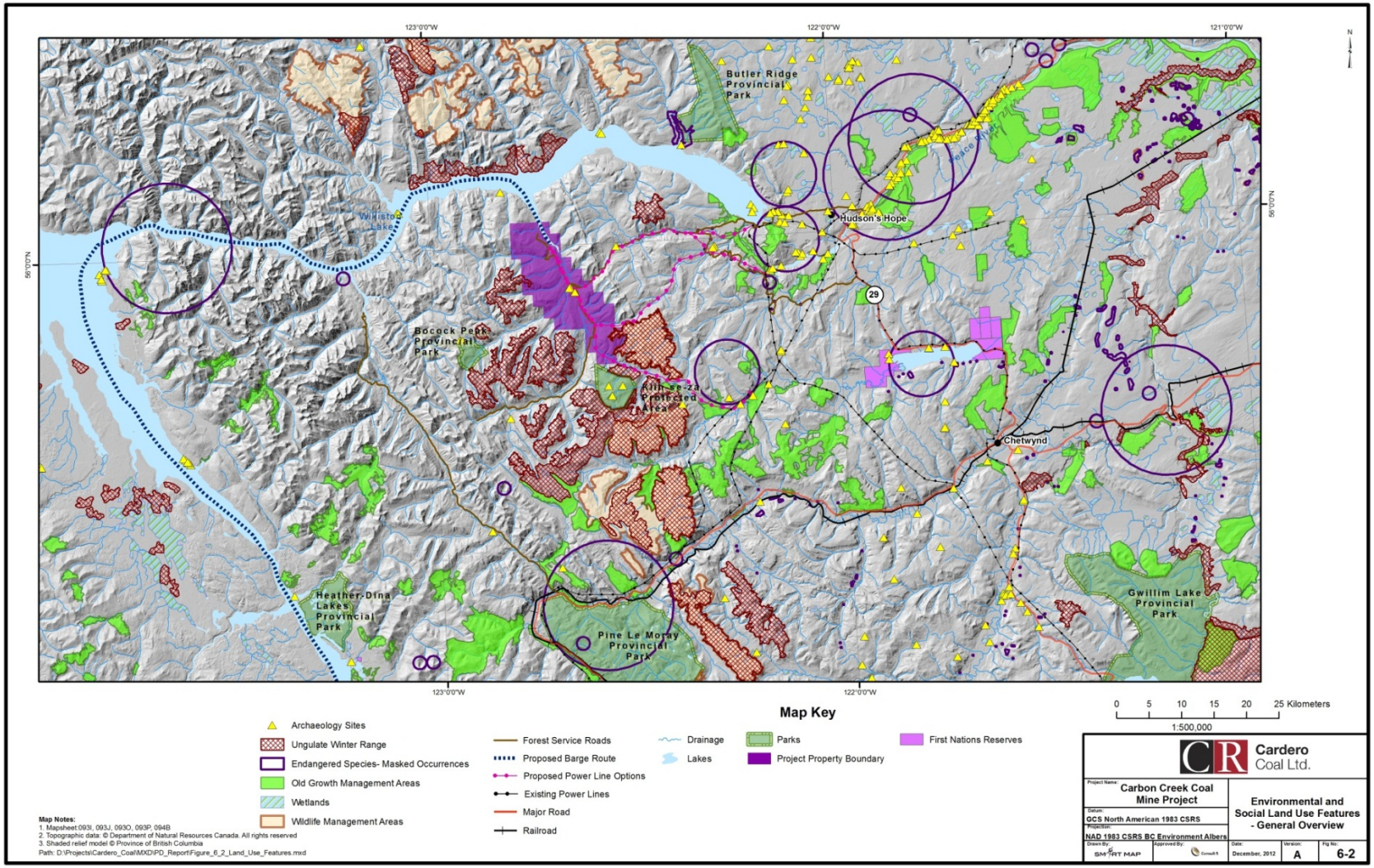
this study from trappers, hunters, and other local resource users will likely supplement wildlife, archaeology, vegetation, fisheries, land and resource use, socio-economics, and country foods baseline studies.

For the Project, the information collected will relate directly to traditional use and ecological and cultural knowledge around the Project study area. Based on the current understanding of the Project and its potential impacts, First Nations proposed to be involved in the study, to date include the MLIB, the SFN, the WMFN and more recently, the HRFN, TLFN and TKDFN. These six FNs have been involved, as the Project Lands are closest to these communities and fall within the area upon which these First Nations typically focus their efforts. The area of study will reflect the Project footprint (e.g., mine site, power transmission line, access route and coal transportation route etc.) and an extended buffer zone to fully accommodate the complexity and extent of ecological systems, for example, wildlife migration, watersheds, etc., as defined and determined by the aforementioned First Nations. The study area will be developed in collaboration with leadership from each First Nation.

There are two components to the TU/TK studies: contextual information and site-specific data. Contextual information includes historical and ethnographic accounts of past Aboriginal land use, harvest statistics on current land use, and information from previous TU/TK studies. For example, historical and ethnographic sources provide a nation-wide and temporal context for the land uses that exist today. Cardero Coal will work with the leadership and knowledge holders of each First Nation to collect and capture site-specific TK information.

Figure 6-2 below gives a general overview of environmentally- and socially-relevant land uses within the region, which have been discussed to some extent in the above section.

Figure 6-2: Environmental and Social Land Use Features - General Overview



7. Consultation and Engagement

7.1 INTRODUCTION

As part of the EA, a consultation program will be developed. The program will be consistent with guidelines derived from the BC *Environmental Assessment Act* (BC*EAA*), the BC*EAA*'s *Public Consultation Policy Regulation* (2002); the *Provincial Policy for Consultation with First Nations* (2010), and the *Supplementary Guide to Proponents: BC Environmental Assessment Process*. Consultations with First Nations, local communities, and the public in general, will be conducted during the pre-application and application review phases. Consultation with First Nations is required and interests will be reflected in arrangements to address and/or accommodate First Nations issues, values, and concerns. The Crown will be required to exercise its responsibility in discharging its consultation requirements during the EA review period.

The EAO have issued an order under Section 11 of the BC*EAA* that specifies the Project consultation and consultation reporting requirements.

The *Public Consultation Policy Regulation* (2002) is used with respect to public consultation. The regulation sets out guidelines related to the proponent's consultation program, public notice, public comment periods and, if it is determined to be a reviewable project under the BC*EAA*, documents to be available through the EAO's Project Information Centre (e-PIC).

7.2 CONSULTATION PROGRAM

Engagement and consultation with provincial, federal, and First Nations' governments, the public, and stakeholders will be conducted throughout all stages of Project planning, regulatory review, and construction to provide all interested parties with opportunities to learn about the Project, identify issues, and provide input with the goal of positively enhancing Project planning and development. This will include meetings and working sessions, public open houses, and information sessions. Consultation will be supported by a variety of information materials and mechanisms including posters for open houses, newsletters, and information sheets to encourage feedback, thereby, providing all with the opportunity to be fully informed about the Project and to have convenient and accessible means to provide input. The scope of the environmental workplans will include support for consultation efforts which will be consistent with meeting the terms of either the Section 11 Order under the BC*EAA* or guidance through the Technical Working Group.

A comprehensive approach to informing and consulting with the public will include the following elements:

- Open public process: two-way communication, constructive dialogue with an informed audience;
- Meaningful consultation: expectations may vary among people, and may change over time;
- Transparency and accountability: provided access to relevant information, and informed/notified of any changes to the Project on a timely basis; and

- Consultation, not consensus: while input of the public will be considered, information gathered from technical studies (e.g., environmental and social impact studies) will help to inform decisions related to the Project.

Public consultation activities have been carried out on an informal, *ad hoc* basis, to date. Moving forward, as part of the EA process, Cardero Coal and its consultants will host: open houses, information sessions, and other similar events in the local community aimed at achieving the above-mentioned goals of the consultation process.

As part of the integrated EA process, the EAO have, upon acceptance of the Project Description, established a formal EA working group with the following parties: Cardero Coal (the proponent), potentially affected First Nations, and relevant provincial, federal, and local government representatives (Technical Working Group). The working group's goal will be to provide guidance to Cardero Coal with respect to objectives related to data acquisition, avoidance of potential effects from the Project, and mitigation strategies for those effects that cannot be avoided. Some of the identified consultation partners are outlined in the schematic depicted in Figure **7-1**.

7.3 FEDERAL GOVERNMENT AGENCIES

A preliminary introductory meeting with the Canadian Environmental Assessment Agency (CEAA) was held on October 11, 2011. This was to introduce the Project, specifically, to provide a general overview and relevant environmental and socio-economic considerations related to the Project, and to discuss the submission of the draft Project Description and subsequent EA process activities. Since that initial meeting, contact has continued through e-mail and telephone discussions to receive further direction.

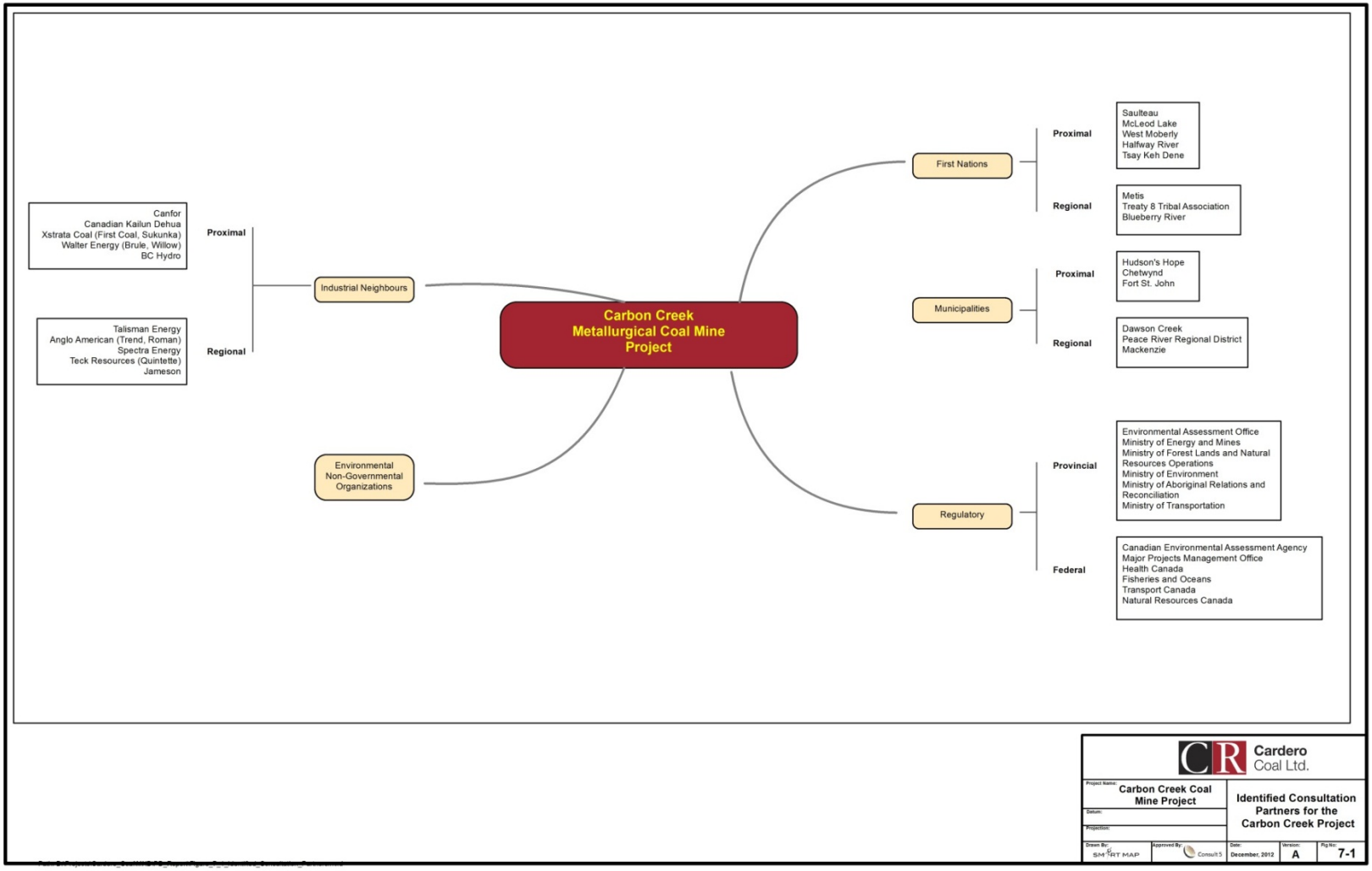
A follow-up introductory/consultation meeting with CEAA was held on November 22, 2011. Additional liaison with the Major Project Management Office (MPMO) was also undertaken, in order to assure that elements of the Project Description and subsequent activities meet federal requirements.

7.4 PROVINCIAL GOVERNMENT AGENCIES

A preliminary introductory meeting with the EAO (i.e., Gerry Hamblin and Yasmeen Qureshi) was held on October 14, 2011 to introduce EAO to the Project. The focus of this meeting was to provide a general overview and relevant environmental and socio-economic considerations and to discuss the submission of the draft Project Description and subsequent EA process activities. Numerous meetings and discussions – which have now resulted in biweekly progress updates - have resulted in the issuance of a Section 10 Order (related to acceptance of a Project Description), preparation for, and conduct of, a Working Group meeting in Hudson's Hope and a site tour at the Carbon Creek camp in July 2012, submission and comment on a draft AIR document, submission and comment on a draft Section 11 document, and other numerous consultations related to the Carbon Creek EA, and the associated permitting.

In addition, and given the importance of ensuring that environmental baseline studies will be adequate for supporting the EA, preliminary meetings and teleconferences with regulators from various Ministries relating to various disciplines of the Project have been conducted over the past year. For example, issues related to the Project have been discussed in various teleconferences and other correspondence. Contact with EAO, BCMOE and MFLNRO has continued through e-mail and telephone discussions to receive further direction.

Figure 7-1: Identified consultation partners for the Carbon Creek Project (Note: list is not exhaustive)



7.4.1 Key Comments and Concerns Expressed

Consultations undertaken with provincial government have resulted in the following key comments:

- Provincial Government (Mineral Titles Office) – as part of both a Coal License Application and the 2012 Exploration program, Cardero Coal has agreed to establish a "no-go zone" related to core winter caribou habitat adjacent to the Project Lands (Figure 1-4).

7.5 REGIONAL AND LOCAL GOVERNMENT AGENCIES

Consultation with various regional governments has been initiated and has continued on an on-going basis. This engagement aims to introduce the Project to local communities, and also for Cardero Coal to gain a comprehensive understanding of, and involvement in, the local economy, land rights, infrastructure, community health care, housing availability, and taxation issues.

Meetings with officials (mayors, councillors) from the following municipalities have been held over the past two years:

- District of Hudson's Hope;
- Town of Chetwynd;
- City Fort St. John; and,
- Town of Tumbler Ridge.

It is anticipated that consultation with the District of Hudson's Hope, Town of Chetwynd, and the Peace River Regional District (PRRD) will likely continue throughout the life of the Project. Additionally, it is expected that future consultation will be established with Northern Health, and the local Chambers of Commerce.

7.5.1 Key Comments and Concerns

Consultations undertaken with regional and local governments have resulted in the following key comments:

- Local Municipalities (District of Hudson's Hope) – Discussions with the District have generally related to potential economic opportunities, accommodation for mine personnel, community development and support he acquisition of a full-time physician for Hudson's Hope (Cardero Coal sits on an official Medical Services Group focussed on this issue).

7.6 FIRST NATIONS

The Project is within the asserted territory of the Treaty 8 First Nations, TLFN and TKD First Nations, and below is a list of aboriginal groups that may be interested in, or potentially affected by the designated project (Table 7-1).

Table 7-1: Aboriginal groups interested, or potentially affected by, the Carbon Creek Project

Aboriginal Group	Contact	Address	Phone & Fax	Email
Saulteau First Nation	Chief Harley Davis	1717 Boucher Road, PO Box 1020, Chetwynd, BC, V0C 1J0	P:(250)788-7258 F:(250) 788-7261	hdavis@saulteau.com
McLeod Lake Indian Band	Chief Derek Orr	General Delivery, McLeod Lake, BC, V0J 2G0	P:(250)750-4415 F:(250) 750-4420	dorr@mlib.ca
West Moberly First Nation	Chief Roland Willson	PO Box 90, Moberly Lake, BC V0C 1X0	P:(250) 788-3663 F:(250) 788-9792	rwillson@westmo.org
Blueberry River First Nations	Chief Joe Apsassin	P.O. Box 3009, Buick Creek, BC, V0C 2R0	P:(250) 630-2584 F:(250) 630-2588	chiefapsassin@blueberryfn.ca
Doig River First Nation	Chief Norman Davis	Box 56, Rosa Prairie, BC V0C 2H0	P:(250) 827-3776 F:(250) 827-3778	ndavis@doigriverfn.com
Halfway River First Nation	Chief Russell Lilly	P.O. Box 59, Wonowon, BC V0C 2N0	P:(250) 772-5058 F:(250)-772-5200	russell_lilly@hrfn.ca
Prophet River First Nation	Chief Lynette Tsakoza	Box 3250, Fort Nelson, BC V0C 1R0	P:(250) 773-6555 F:(250) 773-6556	ltsakoza76@hotmail.com
Fort Nelson First Nation	Chief Kathi Dickie	Mile 295, Alaska Highway, Fort Nelson, BC V0C 1R0	P:(205) 774-7257 F:(250) 774-7260	kathi.dickie@fnnation.ca
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7.6.1 Engagement

As required, this section provides a brief summary of the informal engagement activities that Cardero Coal has undertaken to date with First Nations in the vicinity of the Property, and with interest in various aspects of the Project. Initially, all Treaty 8 First Nations and Metis were contacted (November 2, 2011) and notified about the Project, and were provided with a draft copy of the original draft and final Project Description. The majority of engagement which has taken place to date has been with four First Nations that responded to contact regarding the Project (including consultations on Notices of Work Permits), namely: the Saulteau First Nation (SFN), the West Moberly First Nation (WMFN), the McLeod Lake Indian Band (MLIB), and the Blueberry River First Nation (BRFN).

Engagement activities with First Nations – to a greater or lesser extent - have generally included:

- introductory letters and meetings regarding exploration programs, and the intention of developing a mine;
- draft and final Project Description documents;
- e-mail, telephone, and face-to-face updates;
- attendance and support of community events; and,
- general relationship-building.

Saulteau First Nation

Cardero Coal Ltd. (as 'Coalhunter Mining Corporation') introduced the company/project to the SFN in July of 2010. This was followed up with meetings and correspondence pertaining to the 2010 exploration program conducted at the Property and the development of a proposed TU/TK Study. The CTS was proposed by SFN in 2010 for the Project Area, which included an agreement with respect to scope, schedule, and budget. The scope of the TU/TK Study was focussed on a better understanding of the current use of lands and resources, physical and cultural heritage. Cardero Coal supported the SFN proposal however, due to delays in the process, has not yet initiated the study[1].

Cardero Coal subsequently contacted and met with the SFN in May, June, and July of 2011, to advise them of the 2011 exploration program. SFN responses at the time indicated that the program was acceptable to them, provided that Cardero Coal allowed environmental monitors to observe and report on site activities, including: borehole drilling, trail clearing, environmental baseline studies, etc., consistent with that implemented during the 2010 drilling program. This request was acceptable to Cardero Coal, resulting in the hiring of SFN monitors at the site during all drilling programs and environmental baseline studies.

[1] Cardero Coal is currently in discussions with SFN to initiate and move forward with the CTS.

In July 2011, severe climate events left many roads in the Peace River region impassable due to flooding and resulted in the closure of the Johnson Creek FSR. The road normally provides access to the trailhead for the *Twin Sisters* sacred site. Aware that the community is involved in a number of cultural programs at the *Twin Sisters* site during the summer, Cardero Coal expedited reconstruction of the road and associated bridges, covering the associated costs of this effort. This allowed the SFN to move forward with their remaining summer community programs.

Most recently, due to relationships established early in the process and the fact that SFN has had the greatest interest and involvement in various aspects of the project (e.g., employment of camp and drilling program staff), the majority of First Nations consultation to date have been with SFN. Since the engagement activities conducted prior to the commencement of the 2011 drill program (described above), Cardero Coal staff have met with SFN members on 5 occasions, specifically:

- October 21, 2011 (meeting with Chief & Council);
- November 23, 2011 (meeting with Chief & Council);
- February 21, 2012 (meeting with Chief & Council & presentation to community);
- April 10, 2012 (meeting with Chief & Council & presentation to community);
- August 2, 2012 (site tour for council, lands office and community members); and,
- November 6, 2012 (meeting with Chief & Council).

In addition to these face-to-face meetings, on-going telephone and e-mail correspondences and consultations have taken place between Cardero Coal staff and SFN Lands Office staff, relating specifically to the Notice of Work permit application for the 2012 exploration drill program and the *Water Act* permit for the 2012 program. During these consultations a number of issues relevant to SFN relating to the project have emerged, including: potential impact on treaty rights (incl. hunting, trapping, and fishing), proximity of the project to culture camps and the *Twin Sisters* sacred site, water quality (specifically, selenium levels in mine discharge), coal dust and potential impacts on human health, and cumulative impacts of the coal mining in the northeast coal block.

West Moberly First Nation

Cardero Coal (at the time, Coalhunter Mining Corporation) introduced the company and the Project exploration plans to WMFN Chief and Council in a meeting in July of 2010. This meeting was followed up by correspondence regarding a 2010 exploration program in September and another meeting in November of the same year. The WMFN was subsequently contacted on three occasions: March, June, and July, 2011 – all three occasions to discuss Cardero Coal's exploration plans for 2011, as well as requesting a meeting to consider options for caribou management, given the project's proximity to the Moberly herd[2].

[2] In a subsequent meeting (April 16, 2012) it was acknowledged by the WMFN Chief and Council that the project was not in critical caribou habitat.

Most recently, Cardero Coal staff met with WMFN Chief and Council on April 16, November 9, November 22 (with CEAA and EAO representatives), 2012. The goals of these meeting were:

- to provide updates on:
    - the progress of the project in general, including the historical background (i.e., exploration program conducted by Utah Mines), and the proofing of resources by Coalhunter/Cardero Coal; and,
    - the repairs made by Cardero Coal to the JCFR due to flooding the previous year, in the context of Cardero Coal wishing to work collaboratively with WMFN (i.e., the JCFR provides FN access to the *Twin Sisters* site).
- to discuss issues and concerns that WMFN have regarding the Carbon Creek project.

The major issues/concerns discussed at this meeting related to the following: caribou management, cumulative effects, the sourcing of underground mine workers, impacts on treaty rights (i.e., hunting and trapping), and the most important concern, the proximity of the project to the *Twin Sisters* sacred site. It was acknowledged by WMFN Chief and Council that concerns about the project would be alleviated, if the site facilities and the coal transportation route were not so close to the *Twin Sisters* site. Moreover, it was WMFN's position that barging would be a preferred option for the transportation of coal product.

<u>McLeod Lake Indian Band</u>

Cardero Coal met with the MLIB during July and August, 2010 to introduce and discuss the Project, and to advise them of Cardero Coal's plans for an exploration drilling program. They responded with a letter on September 14, 2010, indicating that the program was acceptable to them. Since that time, correspondence with MLIB related to the request to review the draft and final Project Description documents. Moreover, MLIB was invited to participate, and attended the EAO Working Group meeting in Hudson's Hope at the end of July 2012.

Most recently, Cardero Coal staff met with staff from the MLIB Land Referrals Office and the Duz Cho construction company on August 29, 2012, and with Chief and Council on November 8, 2012. The goals of these meetings were:

- to provide an update on the progress of the project in general;
- for Cardero Coal to make an informal request for feedback on the draft Application Information Requirements (dAIR);
- to discuss issues and concerns that MLIB have regarding the Carbon Creek project; and,
- to discuss a TU/TK Study for MLIB.

The main issue for MLIB was clearly a strong desire to be given opportunities to provide services to the project through the Duz Cho construction company, which is owned and operated by MLIB workers. Subsequently, Cardero Coal and Duz Cho staff have recently met to discuss these opportunities, particularly barge off-load facilities and operations at Mackenzie.

Finally, it was agreed that Cardero Coal and MLIB would continue work together on establishing and implementing a TU/TK in the very near future.

Halfway River First Nation

Cardero met with Halfway River First Nation (HRFN) on December 17, 2012 to initiate discussions on the proposed Project and to establish their participation in the consultation process. Cardero explained aspects of the Project and the proposed transportation route, and encouraged HRFN to participate on the EA Working Group. Cardero also discussed the potential for entering into a protocol agreement and capacity funding in relation to ongoing consultation meetings between Cardero and HRFN. HRFN requested a presentation on the EA and CEAA processes.

Blueberry River First Nation

BRFN initially made contact with Cardero Coal staff in response to Cardero Coal's request for feedback on the draft Project Description (November 1, 2011). Most recently, Cardero Coal staff met with BRFN Chief and Council (and consultant) on two occasions: February 7, 2012 and April 26, 2012. The goals of these meeting were:

- to provide updates on the progress of the project in general, including the historical background (i.e., exploration program conducted by Utah Mines), and the proofing of resources by Coalhunter/Cardero Coal; and,

- to discuss issues and concerns that BRFN have regarding the Carbon Creek project.

The major issues/concerns discussed at these meeting related to opportunities for BRFN to secure economic opportunities related to the project, through provision of services through the BRFN-owned Blueberry River Enterprises. Discussions regarding these opportunities are on-going. Cardero Coal continues to engage with area First Nations to more fully understand the exact nature of their interests and concerns, and the potential for Project-related impacts on their communities. As well, Cardero Coal will implement a comprehensive consultation program to provide all interested parties with the opportunity to learn about the Project, identify issues, and provide input, with the goal of positively enhancing Project planning and development.

7.6.2 Overview of Key comments and potential concerns

Key issues and interests expressed during the initial engagement activities include:

- Proximity to the *Twin Sisters* sacred site;
- Loss and deterioration of wildlife habitat;
- Potential impacts on water quality;
- Potential effects on traditional land use and culture;
- Potential impacts on Aboriginal and Treaty Rights;
- Employment and benefits;
- Air quality deterioration (coal dust); and
- Worker safety.

Cardero Coal continues to engage with all interested FNs to more fully understand the exact nature of interests and concerns, and the potential for Project-related impacts on their communities.

7.6.3 Current Use of Lands and Resources for traditional purposes by aboriginal groups

Available historical information, engagement with identified First Nations, and initial desktop studies indicate that some of the activities pursued by Aboriginal groups in the Project area include: medicinal and edible plant/fruit collection, hunting, fishing, and trapping. However, full consultation on the current use of lands and resources for traditional purposes by Aboriginal groups or people has yet to fully commence. The comprehensive TU/TK study proposed for area First Nations will include this information.

7.6.4 Consultation and Information Gathering Plan

The First Nations consultation program will be designed to meet the requirements as set forth by the EAO, within the legal context of Section 35 of the *Constitution Act* (1982), and the BC Provincial Consultation Policy (2010). The consultation process will therefore adhere to legal and policy requirements as they relate to an EA, while taking into account issues and concerns that are identified and addressed.

Cardero Coal has already committed, through early pre-consultation meetings, to work with the identified First Nations during the early stages of Project development (i.e., the pre-application phase) to ensure that the EA consultation program will be designed and implemented in a manner that is reflective of priorities and needs of First Nation communities.

Engagement and consultation with First Nations' governments (comprising Chiefs & Councils) will be conducted throughout all stages of Project planning, regulatory review, and construction, to provide all interested parties with opportunities to learn about the Project, identify issues, and provide input with the goal of positively enhancing Project planning and development. This will include: meetings and working sessions, public open houses, and information sessions. Consultation will be supported by a variety of information materials and mechanisms including posters for open houses, newsletters, and information sheets to encourage feedback, thereby, providing all with the opportunity to be fully informed about the Project and to have convenient and accessible means to provide input.

The objectives of the consultation and engagement program are to:

- Facilitate relationship-building and ensure a respectful and effective two-way flow of information between the proponent (Cardero Coal and their consultants) and local First Nations;
- Inform and support baseline studies and the EA as issues and concerns are identified;
- Provide First Nations with opportunities to benefit from the Project; and,
- Ensure that the methods, issues, resolutions, and outcomes of this process are documented in support of the Project's EA in a way that is informative and transparent.

Traditional Use and Traditional Knowledge (TU/TK) studies for the Project will also be developed during baseline studies and the EA process. TU/TK studies complement contemporary scientific studies, provide important information on First Nations' interests, and elucidate technical, academic, and indigenous information relating to the traditional and contemporary use and knowledge of the Project area. Cardero Coal will work with the leadership and knowledge-holders of each First Nation to collect and capture site-specific TK information. Initial engagement to discuss these studies with the various communities is tentatively scheduled for Q3 2012.

7.7 LOCAL COMMUNITIES

Planned public consultation activities for local communities, businesses, and stakeholders include the following:

- open houses, information sessions, and meeting to raise awareness about, and interest in, the Project, and identify and address any public issues and concerns;
- meetings with key stakeholder groups;
- website and printed material development;
- engagement with local media;
- issues tracking and response;
- public notification of events and meetings, status of the Project; and
- comprehensive reporting of the consultation process, including a consultation summary to support the EA.

Public engagement and participation is fundamental to the EA. All consultations will be well advertised, well informed, tracked, reported on, and documented for government review agencies.

7.8 OTHER INTERESTS

Tenure holders and other interest groups will also be engaged during the environmental assessment process. Tenure holders may include:

- property owners;
- guide outfitters;
- trappers;
- commercial recreation;
- oil and gas, wind farm, and other energy producers;
- forestry and timber harvesters; and
- others.

Various other groups may express an interest in being included in the consultation process, such as Non-Government Organizations, citizens' groups, and industry-based groups. These groups will also be engaged/consulted.

7.9 CONSULTATION WITH OTHER JURISDICTIONS

The Mine Development Review Committee (MDRC) process will be established as part of provincial permitting – in particular, the *Mines Act* permit - in support of the project. There will be significant consultation as part of this process.

Otherwise, there are no other jurisdictions that have EA or regulatory decisions to make with respect to the Project and therefore no other consultation will take place other than that mentioned above.

8. Projected Economic Inputs and Benefits

8.1 PERSONNEL REQUIREMENTS AND LOCAL EMPLOYMENT

During construction and operations, the Project will create substantial direct and indirect employment opportunities for neighbouring communities, and beyond. There will be employment opportunities at the mine site and in adjacent communities, to service the barge load-out facility, railway, and port transhipment. As well, there will be employment opportunities remotely, through specialized equipment and materials suppliers. Employment estimates have been provided in the PFS (Norwest 2012b), and will be refined during the Feasibility Study (to be completed in Q2 2013). Manpower requirements to operate and maintain the surface and underground mines and coal processing plant at full production are shown in Table 8-1.

Table 8-1: Manpower Requirements – Surface Mine and Four Underground Units (Norwest 2012b)

Area	Hourly Workers	Supervisory	Totals
Mine Management and Administration	0	41	41
Surface Mine	244	36	280
Underground Mine	397	91	488
Prep Plant	58	9	67
Totals	**699**	**177**	**876**

8.2 COSTS

8.2.1 Project Infrastructure - Capital Costs

Table 8-2 summarizes the major categories of expenditure for project infrastructure, as estimated in the PFS (Norwest 2012b). Expenditure primarily will comprise surface facilities in support of the surface and underground workings, development access to intercept the coal seams and to prepare for production. Construction and development costs will be refined during the Feasibility Study.

Table 8-2: Carbon Creek Project Estimated Development Capital (Norwest 2012b)

Description	Cost ($M)
Office Buildings	$10
Main Shop and Warehouse	$15
Portal Shop and Warehouse	$12
Power to Site and Substation	$18
Power Distribution and Substations within Site	$24
Site Access Road Upgrade	$3
Haul Roads	$6
Water Treatment and Management Facilities	$2
Fire Protection Systems	$2
Site Prep, Fuel Depot, Explosives Storage, Other	$5
Total	**$97**

8.2.2 Operating Costs

Norwest have detailed projected operating costs in the PEA (Norwest 2012a) and the recently published PFS (Norwest 2012b). Annual operating costs will be further refined in the Feasibility Study, which is planned to be completed in Q2 2013.

8.3 PROVINCIAL AND FEDERAL REVENUES

The Project will generate substantial provincial and federal revenue through taxation, resource payments, and other levies. An economic analysis using the Provincial Input-Output model will be undertaken as part of the EA Socio-economic impact assessment. At this time, a detailed profile of forecast revenue will be provided.

9. Potential Effects

The main potential negative effects from the Project are likely to be the degradation of water quality through potential release of contaminants (i.e., metals and acids) into the water course (operations and closure phases), the disturbance to wildlife through anticipated land clearance and dust and noise emissions (construction and operations phases) and impact on local First Nations' communities through potential land use changes. There will be potential positive effects on the local and provincial economy, as well as associated benefits that arise from such economic opportunities via direct and indirect job creation in the area and re-training and up-skilling opportunities for local employees.

The designated project is not being carried out on federal lands, in a province other than the province in which the project is proposed to be carried out, nor outside of Canada. Therefore there can be no description of changes to the environment that may occur as a result of carrying out the designated project on such lands.

The Project effects discussed below are only indicative and are based on current knowledge of the Project and the local environment.

9.1 WATER QUALITY AND AQUATIC RESOURCES

Potential release of chemicals to the aquatic environment may cause deterioration of aquatic habitat and result in mortality or reduction in utilization of habitat by aquatic species (i.e., fish and marine plants, as defined in the *SARA*). Reduced water quality could also have negative impacts on any human users.

Habitat loss may occur in areas where Project infrastructure encroaches on aquatic habitat or where water diversions result in the dewatering of fish and marine plant habitat. Also habitat degradation may occur as a result of construction practices that result in increased erosion and sedimentation, degraded stream banks, or altered riparian vegetation. Cardero will attempt to minimize and mitigate these potential impacts through the implementation of best management practices, particularly with regard to the construction of stream crossings.

The baseline program and results generated from the effects assessment will form the basis for an Aquatic Effects Monitoring Program (AEMP) that will help determine potential effects to Valued Components (VCs) in the aquatic environment from further development and identify clear mitigation measures. The AEMP will be designed to monitor potential effects resulting from development activities during all phases of the Project.

9.1.1 Selenium Mobilization and Toxicity

Selenium (Se) leaching from mined coal deposits and the potential for biological/ecological effects due to oxidation of waste rock materials (e.g., coarse coal refuse), has been identified as a specific concern of the MOE and MEM and will be addressed in the EA. The host lithology and coal seams will be tested for Se to determine if it is present, and if so, at what concentrations, and if factors are present which could result in mobilization into the environment. Monitoring of the water quality and aquatic biota in the vicinity of the Project will be conducted to determine background Se concentrations. Water quality modelling will predict the extent to which Se may mobilize in the environment as a result of leaching from waste rock. The results will be compared to the MOE or Canadian Council of Ministers of the Environment (CCME) water quality guidelines for aquatic life and background concentrations and will also be used to look at the potential and incremental impact of the Project on baseline

concentrations. Site-specific water quality objectives (site performance objectives) will possibly be developed based on the background concentrations or considering the impacts on local species.

9.1.2 ML/ARD Potential

The MEM specifies prediction methods to assess ML/ARD potential and to prevent or reduce ML/ARD. These guidelines will be followed and a comprehensive testing plan will be developed for the Project. This work will include a sufficient number of static and kinetic tests to characterize the deposit and Project contaminant loadings from all mine related drainage sources.

In accordance with the MEM and MELP's *Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia* (1998), all materials exposed, excavated, or disturbed by a proposed mine development are required to be assessed for ML/ARD.

9.2 AQUATIC BIOTA AND HABITAT

Potential impacts of the Project on aquatic species (i.e., fish and marine plants as defined in the *Fisheries Act*) and habitat include: habitat degradation or loss and aquatic biota health effects resulting from the potential release of chemicals from waste rock stockpiles into surface water bodies during operations. Release of chemicals to the aquatic environment may cause deterioration of aquatic habitat and result in mortality or reduction in utilization of habitat by aquatic species. Habitat degradation may also occur as a result of proposed construction practices (e.g., logging and site clearance), which could potentially result in increased erosion and sedimentation, degraded stream banks, or altered riparian vegetation.

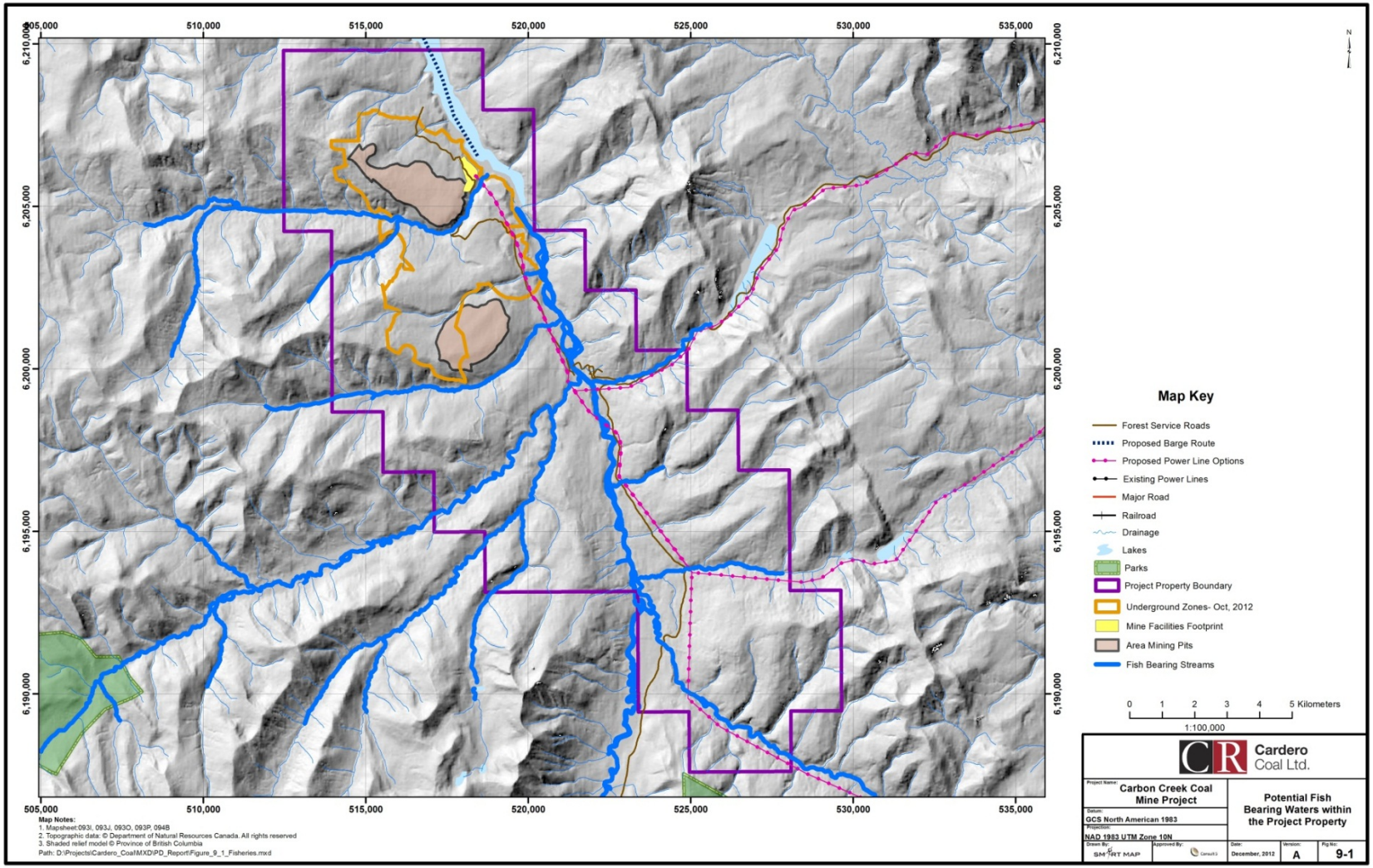
As indicated in Section 9.1 above, habitat loss may occur in areas where Project infrastructure encroaches on habitat or where proposed water diversions result in the dewatering of aquatic habitat. These effects may be mitigated through alterations in Project design and water management practices. Where habitat loss cannot be avoided, it must be compensated for through the implementation of an aquatic biota habitat compensation plan.

Increased fishing pressure may arise due to improved access to the study area. For example, high fishing pressure has been cited as a possible contributing factor in the decline of Arctic grayling in the Williston Watershed (Blackman 2002). Historic information indicates that the Carbon Creek watershed, at one time, contained abundant Arctic grayling populations.

Again, the environmental baseline program and results generated from the effects assessment for the Project will form the basis for an AEMP that will help determine potential effects to VCs in the aquatic environment from further development and identify clear mitigation measures that will aim to minimize impacts. The AEMP will be designed to monitor potential effects resulting from development activities during all phases of the Project.

Figure 9-1 below depicts water resources within, and proximal to, the property which potential contain suitable aquatic biota habitat and subsequently fish and other aquatic biota.

Figure 9-1: Potential Fish Bearing Waters within the Project Property



9.3 WILDLIFE

Potential effects of the Project on wildlife and wildlife habitat fall into two categories: direct and indirect effects. Direct effects include the loss or alteration of habitat within the Project footprint wherever habitat is removed or altered. Other direct effects include increased wildlife-vehicle strikes on roads due to increased traffic.

Indirect effects on wildlife pertain to the indirect loss of habitat when wildlife avoid facilities due to disturbances such as light, noise, dust, helicopter fly-overs, or human presence. The magnitude of indirect habitat loss is species-specific based on the nature and use of species habitat and sensitivity to disturbance. Other indirect effects include increased access for hunters due to an increased road network and attraction of wildlife to sights or smells produced by the Project, such as waterfowl being attracted to aviation warning lights on towers or bears being attracted to wastes in camps.

Environmental Canada's Canadian Wildlife Service may be engaged if the Project's water quality management protocols affect waters frequented by migratory birds. Harlequin duck breeding sites have been documented along Eleven Mile Creek and Carbon Creek and other migratory species, such as Canada geese and Common Mergansers, have been observed in the lower section of Carbon Creek. Physical disturbance of habitat is also a potential risk if Project infrastructure encroaches on habitat. However, based on the preliminary data available it is not believed that the Project footprint will directly disturb or destroy migratory species breeding grounds or habitats. These potential direct and indirect impacts, including dust and noise, will have to be further assessed upon completion of the wildlife baseline studies and throughout the EA process.

Due to barging activities for the proposed mine - with round trips every 36 hours - it is anticipated that the reservoir will retain an ice-free, open channel through which the barge moves. If wildlife is currently using the Reservoir as a corridor in winter months, this may no longer be possible in the future with the open channel.

The EA will include an evaluation of the various direct and indirect effects for each species of concern (e.g., grizzly bear, woodland caribou, and other listed species) and a single rating for each species. Where necessary, proposed mitigation(s) will be generated and reported.

9.4 AIR EMISSIONS AND NOISE

Various coal mining activities, such as conveyance, loading and unloading of material, have the potential to generate fugitive coal dust which can affect ambient particulate matter (PM) concentrations. There is also potential for emissions of nitrogen oxides (NO_x), sulphur oxides (SO_x), carbon monoxide (CO) and greenhouse gases (GHG) from mine-related activities. Best available technology and management practices will be incorporated into the Project design to minimize potential effects.

Noise effects will be considered for workers on-site during construction and operations. Construction- and operations-related noise in proximity to important wildlife habitat will also be considered as increased noise can result in decreased use and quality of the habitat. There are no human settlements located in close proximity to the Property.

9.5 VEGETATION

The construction of the Project facilities will permanently remove or change vegetation within the area, especially at the plant, surface mine targets and waste rock stockpile areas. At this stage, there is insufficient data available to determine if the Project footprint will affect plant communities and plant species of conservation concern.

9.6 SOILS AND TERRAIN

Soils, terrain, geological and geohazards information will be collected for the proposed footprint of the facilities including the location of the main coal deposits and the possible linear infrastructure associated with the Project. The potential effects of related geological and environmental conditions (i.e., soil erosion, terrain instability, avalanche, seismic events, rockslides etc.) on the Project will be investigated.

9.7 HYDROLOGY

The construction and operation of the Project facilities will likely temporarily or permanently affect the drainage patterns of a number of water bodies in the watershed (e.g., potential subsidence due to underground mining). Mine dewatering activities may affect stream flow as it is anticipated that some of the baseflow in the streams is derived from groundwater systems. The presence of waste rock dumps can potentially reduce water flow to the streams on the site, spreading peaks out over a longer period and therefore reducing the peak flow events. The effects of this on fish and fish habitats will be investigated, though a more stable flow would be beneficial to fish if water quality is maintained. Details of these alterations and their effects will be assessed in the EAC application.

9.8 HYDROGEOLOGY

The assessment will identify potential impacts of the development on the quantity and quality of the groundwater resource and any interrelated surface water resources, including specific details on the types and characteristics of potential contaminants and their sources. This will include the potential effects from open-pit development, de-watering, CCR/tailings management, waste rock stockpiles, coal stockpiles, and settling ponds.

The Project, especially underground mining activities to be conducted during the operational phase, has the potential to impact regional aquifers and, subsequently, hydrogeological processes in the area. Baseline studies and subsequent computation and modelling of relevant data will provide engineers and hydrogeologists with a better understanding of how best to manage these aspects and limit their impact.

9.9 ARCHAEOLOGY AND HERITAGE RESOURCES

Archaeological sites are non-renewable, very susceptible to disturbance, and are finite in number. They are important resources protected for their historical, cultural, scientific, and educational value to the general public, local communities, and First Nations. Should any archaeological or heritage sites be identified in the Project Area, the type of impact the Project might have on them will be disturbance or disruption. Under the *Heritage Conservation Act*, such impacts must be avoided or managed by the proponents.

9.10 HUMAN HEALTH

The human health section will provide a description of the potential effects of relevant environmental factors of the project in terms of human health. The focus of this section will be on collating and evaluating work already completed by the range of environmental and social disciplines and presenting this information in the context of human health. This human health section will consider if the project is likely to result in changes in exposures and if these changes are significant enough to cause potential adverse effects. Aspects such as noise, air quality, drinking water and country foods are those likely to be impacted by the Project, especially during the construction and operational phases.

9.11 VISUAL RESOURCES

Construction and operation of the Project will involve vegetation removal; transmission line and road construction; changes to hill profiles as a result of contour mining and increased traffic. These activities have the potential to affect visual quality and short term and long term effects will be assessed and evaluated using a viewshed model, a line of sight model and 3D renderings for key locations.

9.12 SOCIAL AND ECONOMIC CONDITIONS

The effects assessment will describe and analyze a number of potential socio-economic effects of the Project over the life of the Project, as well as decommissioning and closure. The effects assessment will identify potential effects on:

- community demographics and infrastructure;
- education, skills development, and training;
- employment and income opportunities;
- business opportunities and economic development; and
- community well-being.

Where necessary, quantitative methods will be used in the effects assessment, including economic modelling, use of multipliers, and cause-and-effects matrices. Indirect and induced employment, income, revenue generation, and gross domestic product effects will be predicted and measured using the BC Stats Input-Output Model.

Public and First Nations consultation findings, as they pertain to social issues, will be reviewed and considered in the socio-economic effects assessment.

9.13 EFFECTS ON ABORIGINAL PEOPLES

Based on the current plans, the Project should not result in direct effects to Aboriginal reserve lands, but could potentially alter or result in changes to traditional use areas, as well as changes to the environment that may in turn result in effects on Aboriginal peoples and their established rights. First Nations consultation is underway and traditional use studies (TUS) are planned, which will contribute to a greater understanding of Project effects on First Nations, and all mitigations for these effects. Listed below are potential effects, with examples of what causes may elicit these effects:

9.13.1 Health and Socio-economic

- Potential health effects – There are no human settlements located in close (less than 40 km) proximity to the proposed Project mine site. Nevertheless, adverse health effects to workers at the site could arise from inhalation of coal dust (air quality), exposure to high decibel levels (noise), and changes to drinking water quality from operational activities. Local improvements to health care delivery, as a result of Project infrastructure could result in improved local Aboriginal community access to health care services and facilities.

- Potential socio-economic effects - The Project will likely result in potential employment opportunities for Aboriginal people, as well as business opportunities associated with construction, operations and decommissioning of different aspects of the Project. Employment and business opportunities have the

potential to enhance social well-being. Many members of First Nation communities may be attracted back to their local communities as a result of better work opportunities. This in turn could result in population growth, which may have adverse effects as community infrastructure and services may be overwhelmed due to an increase in demand, ultimately compromising the existing population's ability to access resources or maintain their lifestyle.

9.13.2 Physical and Cultural Heritage

- Potential effects on access to traditional and cultural activity sites – There may be beneficial or adverse effects related to access roads to traditional and cultural activity sites, such as culture camps (e.g., SFN and WMFN have two culture camps along the JCFSR). Improved access to traditional and cultural activity sites for First Nations communities may also result in undesired access to, and increased awareness of, these sites by non-aboriginal people.

- Potential effects on the aesthetics of traditional sites – there may be effects on visual landscapes near aboriginal heritage and cultural sites, including the *Twin Sisters* sacred site (Beattie Peaks).

9.13.3 Current Use of Lands and Resources for Traditional Purposes

- Potential effects on fisheries and wildlife resources - The project area provides habitat for a wide range of wildlife, including: grizzly bear, black bear, northern caribou, mountain goats, stone sheep, moose, elk, coyote, avian species (e.g., birds of prey, migratory songbirds, and waterfowl) and amphibian species (e.g. Western toad). Hunting, trapping, fishing and guiding are important cultural and economic activities to First Nations and any significant effects on fish or wildlife populations could have an effect on these activities. Impacts may include land clearing required at construction phase, increased noise and dust levels during operational phase, exposure of fish habitat to potential leachate/contaminants from waste rock stockpiles etc.

- Potential effects on berry picking and other country foods – There may be effects of coal and road dust on berries and other plants. Also, there may be effects on berry and plant harvesting activities from increased traffic volumes on FSRs including the JCFSR.

10. Permitting and Approvals

10.1 PRIOR APPROVALS

Cardero Coal has obtained approvals to conduct exploration and engineering evaluation work on the Project.

10.2 EXISTING PERMITS, LICENCES, AND AUTHORIZATIONS

The following permits and authorizations are in good standing for the Project:

- Coal Lease Option Agreement dated as of June 15, 2010 between the PRP and Cardero Coal, which gives Cardero Coal the right to enter upon the CGDL for the purpose of carrying out exploration and development work during the term of the agreement;
- Master Road Usage Agreement, effective October 13, 2010, and Forest Road Use and Maintenance Agreement made as of October 5, 2011, each made between Canadian Forest Products Ltd. (Canfor) and Cardero Coal respecting use of the JCFSR, the Burns Road and associated side and spur roads;
- Province of BC *Water Act* Section 8(1) Short Term Use of Water authorization (No. A703585): for diversion of water for exploration purposes from Seven Mile Creek, Nine Mile Creek, Ten Mile Creek, and Eleven Mile Creek;
- Notice of work for 2011 Drilling Program (Mines Act Permit CX-9-046. Approval Number 11-1640957-0812)
- Notice of work for 2012 Drilling Program (Mines Act Permit CX-9-046. Approval Number 12-1640957-0718)

10.3 ANTICIPATED PERMITS, LICENCES, AND AUTHORIZATIONS

Mining projects in BC are subject to regulation under federal and provincial legislation to protect workers and the environment. This section discusses the principal licences and permits required for the Project.

10.3.1 *British Columbia Environmental Assessment Act* Process

The BC*EAA* (2002) requires that certain project proposals undergo an environmental assessment and obtain an EAC before they can proceed. Proposed mining developments that exceed a threshold criterion of 75,000 tpa, as specified in the Reviewable Project Regulation (BC Reg. 370/2002), are required under the BC*EAA* to obtain an EAC from the Ministers of Environment and Energy and Mines before the issuance of any permits to construct or operate. The Project will thus require an EAC, because its proposed production rate exceeds the specified threshold.

10.3.2 British Columbia Licences and Permits

Provincial permitting, licensing, and approval processes (statutory permit processes) may proceed concurrently with the EAC application or follow after the issuing of the EAC. Cardero Coal may seek coordinated authorization with the BC EA process. However, no statutory permit approvals may be issued before an EAC is obtained. Statutory permit approval processes are normally more specific than the environmental assessment and may require more detailed design information, e.g., water management plan.

Table 10-1 details a preliminary list of the anticipated Provincial permits and authorizations required for the Project. Permit and authorization requirements will be reviewed and updated as the Project advances through the EA and permitting process.

Table 10-1: BC Authorizations, Licenses and Permits Anticipated for the Carbon Creek Project

BC Government Permits and Licenses	Enabling Legislation
Environmental Assessment Certificate	BC *Environmental Assessment Act*
Permit Approving Work System & Reclamation Program (mine site – initial development)	*Mines Act*
Amendment to Permit Approving Work System and Reclamation Program (Pre-production)	*Mines Act*
Amendment to Permit Approving Work System and Reclamation Program (Bonding)	*Mines Act*
Amendment to Permit Approving Work System and Reclamation Program (Mine plan –production)	*Mines Act*
Permit Approving Work System and Reclamation Program (Gravel pit/wash plant/rock borrow pit)	*Mines Act*
Coal Lease	*Coal Act*
Water License – Notice of Intention (application)	*Water Act*
Water License – storage and diversion	*Water Act*
Water License – Use	*Water Act*
Water License – Construction of fences, screens and fish or game guards across streams to conserve fish or wildlife	*Water Act*
Water License – Alteration of stream or channel	*Water Act*
Authority to Make a Change in and about a Stream – notification	*Water Act/Water Regulation*
Authority to Make a Change in and About a Stream – approval to make a change	*Water Act/Water Regulation*
Authority to Make a Change in and About a Stream – terms and conditions of habitat officer	*Water Act/Water Regulation*
Occupant License to Cut – Access road, borrow pits	*Forest Act*
Road Use Permit (existing FSR)	*Forest Act*
Special Use Permit – Construct new access road of mineral tenure on crown land	*Forest Act*
License of Occupation – Crown land outside of tenure area	*Land Act*
License of Occupation – Borrow/gravel pits for crown land outside tenure area	*Land Act*
Waste Management Permit – Effluent (sediment, CCR/tailings, and sewage)	*Environmental Management Act*
Waste Management Permit – Air Emissions (crushers, ventilation, dust)	*Environmental Management Act*
Waste Management Permit – Refuse (if burial on site)	*Environmental Management Act*
Special Waste Generator Permit (waste oil)	*Environmental Management Act (Special Waste Regulations)*
Waterworks Permit	*Drinking Water Protection Act*
Fuel Storage Approval	*Fire Services Act*
Food Service Permits	*Health Act*
Highway Access Permit	*Highway Act*
Heritage Inspection Permit (to conduct archaeological site investigations)	*Heritage Act*
Wildlife Permit (to handle wildlife)	*Wildlife Act*

10.4 PROVINCIAL ENVIRONMENTAL ASSESSMENT REVIEW

Major mining projects in British Columbia are subject to an environmental assessment and review prior to certification and issuance of permits to authorize construction and operations. The environmental assessment is a means of ensuring the potential for adverse environmental, social, economic, health, and heritage effects or the potential adverse effects on Aboriginal interests or rights are addressed prior to project approval. There are generally two stages in the EA: pre-application phase when studies and consultations are undertaken, and application review phase, during which the project details and effects on the environment and communities are reviewed along with further consultations. Generally, the scope, procedures, and methods of each assessment are flexible and tailored specifically to the project circumstances. These are defined in approved Application Information Requirements (formerly referred to as "Terms of Reference"). Depending on the scope of the project, assessment and permitting of major mines in BC may proceed through either:

a) BC EA Process pursuant to the BC*EAA*; or

b) Major Mine Review Process pursuant to the *Mines Act*.

In general, each EA contains four common main elements:

1. Opportunities for all interested parties, including First Nations and neighbouring jurisdictions, to identify issues and provide input;
2. Technical studies of the relevant environmental, social, economic, heritage, and health effects of the proposed project;
3. Identification of ways to prevent or minimize undesirable effects and enhance desirable effects; and
4. Consideration of the input of all interested parties in compiling the assessment findings and making recommendations about project acceptability.

An EAC and a *Mines Act* Permit, issued by ministers at the conclusion of the environmental assessment Process, represents government approval in principle and will allow Cardero Coal to seek any other statutory authorization needed to construct and operate the Project.

Cardero Coal will seek a decision from the EAO on an assessment of the Project relative to the *Reviewable Projects Regulation*, in effect, determining whether the Project can be considered as a non-reviewable project in relation to the BC*EAA*. It is assumed, based on current estimates, that the Project is reviewable, due to exceeding the production threshold of 75,000 tpa (see above and below).

10.5 FEDERAL ENVIRONMENTAL ASSESSMENT REVIEW

Federal government review under the *Canadian Environmental Assessment Act* (*CEAA*) is independent of provincial review as the federal agencies, deemed responsible authorities (RA), will ascertain if there are federal "triggers" invoked by the Project, thereby resulting in an applicable level of federal review (e.g., none – screening level assessment – comprehensive review). Concurrent reviews required under the BC*EAA* and *CEAA* are carried out co-operatively under the Canada-British Columbia Agreement for Environmental Assessment Cooperation in order to expedite such reviews.

With a projected annual average production rate of 4.1 million metric tonnes of clean coal per annum over the 20 year mine life the Project is deemed a designated project as set out in Section 15(d), Schedule (*Section 2 to 4*) of the new *Regulations Designating Physical Activity, 2012*. Therefore the Project will be screened to ascertain whether a federal environmental assessment is required. The Project is subsequently also expected to qualify as a Major Resource Project under the MPMO Initiative. The MPMO aims to provide overarching project management and accountability, and works collaboratively with federal departments and agencies.

Federal permits may be required for the Project. Three federal triggers with potential applicability to the Project include: impacts on fisheries habitat or resources, obstruction or modification of navigable waters, and the storage of explosives on site.

Impacts on fisheries will be driven by water quality management on the site (e.g., the location of effluent discharge, assessment, and mitigation of risk to fish-bearing waterways). The Carbon Creek watershed and tributary creeks within the Project Lands support populations of rainbow trout, bull trout, kokanee, Arctic grayling, and possibly other fish species, which will be elucidated further upon completion of baseline environmental monitoring programmes currently underway. The presence or absence of a fisheries' trigger, as decided by Fisheries and Ocean Canada (DFO), will determine the requirement for a fish habitat compensation plan. Provincial and federal fisheries agencies will likely have specific interest in understanding the potential for Se redistribution and accumulation in the aquatic environment resulting from mining and waste rock management.

Environmental Canada's Canadian Wildlife Service may be engaged if water quality management protocols affect waters frequented by migratory birds. Harlequin duck breeding sites have been documented along Eleven Mile Creek and Carbon Creek and other migratory species, such as Canada geese and Common Mergansers, have been observed in the lower section of Carbon Creek. It is not believed that the Project footprint will disturb or destroy these specific migratory species breeding grounds or habitats. Potential impacts of the Project will be assessed upon completion of the wildlife baseline studies and throughout the EA process. All potentially-navigable waters, as defined by Transport Canada, will require assessment at proposed crossing locations for the Project's potential effect on navigability, and if required, obtain necessary authorization from Transport Canada. The current Project proposal envisages only repair and maintenance to existing crossings.

Use of explosives for mining on site will be compared to the threshold limits (i.e., Explosives User Magazine Licence (Type U); any quantity stored is for commercial use; or the quantity stored for private use exceeds 75 kilograms or 100 detonators; or the period of storage of any quantity exceeds 90 days) established by Natural Resources Canada (NRCAN). The underground mine specifically will require the provision of explosives to the site for blasting. Explosives, prior to use, will be stored in a secured magazine on-site. An Explosives User Magazine Licence (Type U) issued by NRCAN (Explosives Regulatory Division), may be required to store these explosives on-site, depending on amount required and storage time.

The MPMO may coordinate federal permitting activities should a number of federal authorizations apply to the Project.

Table 10-2 details a preliminary list of the anticipated Federal permits and authorizations required for the Project. Specific permitting requirements will be further refined during the review process and through discussions with federal agencies.

Table 10-2: Federal Authorizations, Licenses, and Permits that May Be Required for the Project

Federal Government Approvals and Licenses	Enabling Legislation
CEAA Approval	*Canadian Environmental Assessment Act*
Fish Habitat Compensation Agreement[1]	*Fisheries Act*
Section 35(2) Authorization for harmful alteration, disruption or destruction of fish habitat[1] (may not be an issue, subject to mine plan and DFO screening)	*Fisheries Act*
Navigable Water: Stream Crossings Authorization[2]	*Navigable Waters Protection Act*
Explosives Factory License	*Explosives Act*
Explosives Magazine License	*Explosives Act*
Ammonium Nitrate Storage Facilities	*Canada Transportation Act*
Vessel Registration	*Canada Shipping Act*
Radio Licenses	*Radio Communications Act*

[1] *Required if a Fisheries Act Harmful Alteration, Disruption, or Destruction (HADD) occurs.*
[2] *Required if Transport Canada determines navigable waters involved in project.*

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1985. *Navigable Waters Protection Act,* R.S.C., 1985, c. N-22.

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1996. *Canada Transportation Act*, S.C. 1996, c. 10.

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1996. *Mines Act*, SBC c 293.

1996. *Weed Control Act*, SBC, c 487.

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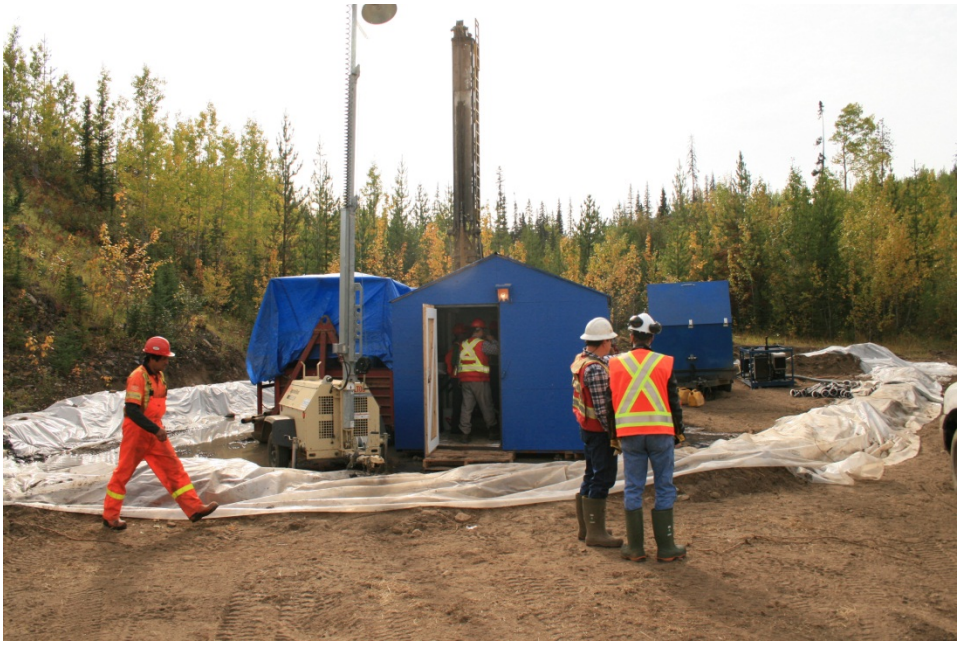
Appendix 1: Photographs of the Carbon Creek Project Area

Photograph 1: Aerial photograph of Carbon Creek watercourse

Photograph 2: Aerial view of the bridge on Johnson Creek Forest Service Road

Photograph 3: Carbon Creek Temporary Camp Facilities



Photograph 4: Example of Exploratory Drill Site

Photograph 5: Excavated Seam

Appendix 2: Consultation/Engagement Partners

Partners Consulted/Engaged During the Preparation of the Carbon Creek Project Description	
Saulteau First Nation	Chief Harley Davis
McLeod Lake Indian Band	Chief Derek Orr
West Moberly First Nation	Chief Roland Willson
Blueberry River First Nations	Chief Joe Apsassin
Halfway River First Nation	Chief Ed Whitford
Tsay Keh Dene First Nations	Chief Dennis Izony
Takla Lake First Nations	David Radies
CEAA	Robyn McLean
Major Resources Management Office	Stefan Skocylas
EAO	Gerry Hamblin
EAO	Yasmeen Qureshi
Ministry of Energy and Mines	Kim Bellefontaine
Ministry of Energy and Mines	Diane Howe
Ministry of Energy and Mines	Kim Stone
Ministry of Forests, Lands and Natural Resource Operations	Marianne Novotny
Ministry of Forests, Lands and Natural Resource Operations	Todd Bondaroff
Ministry of Forests, Lands and Natural Resource Operations	Jennifer Stuart
Ministry of Environment	James Jacklin
Ministry of Environment	Julie Orban
District of Hudson's Hope	CAO John Locher
Town of Chetwynd	Mayor Merwin Nichols
District of Mackenzie	Mayor Stephanie Killam

Appendix 3: Tables of Concordance

Canadian Environmental Assessment Agency Requirements

CEAA Requirements	*PD Section*
1. General Information and Contacts	
1.1 Describe the nature of the designated project, and proposed location (2–3 paragraphs; note that additional location details are to be provided in section 3).	1.1, 1.4.1
1.2. Proponent contact information	
1.2.1 Name of the designated project	1
1.2.2 Name of the proponent	1
1.2.3 Address of the proponent	2.1
1.2.4 Chief Executive Officer or equivalent	2.1
1.2.5 Principal contact person for purposes of the project description (include name, official title, email address and telephone number).	2.1
1.3 Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the project description. (A description of the result of any consultations undertaken is to be provided in sections 7 and 8).	Appendix 2
1.4 Other relevant information:	
1.4.1 Provide information on whether the designated project is subject to the environmental assessment and regulatory requirements of another jurisdiction(s).	1.2
1.4.2 Provide information on whether the designated project will be taking place in a region that has been the subject of a regional environmental study. Proponents are advised to contact the Agency during the preparation of the project description for information regarding any regional environmental studies that may be relevant.	1
2. Project information *Provide the following information to the extent that it is available or applicable.*	
2.1 Provide a general description, including the context and objectives of the project	1.2
2.2 Indicate the provisions in the *Regulations Designating Physical Activities* setting out the designated activities that describe the project in whole or in part.	1
2.3 Components and activities *Provide a description of the components associated with the proposed project, including*:	
2.3.1 Physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	4.3, 4.4, 4.5, 4.6
2.3.2 Anticipated size or production capacity of the designated project, with reference to thresholds set out in the *Regulations Designating Physical Activities*, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures.	1, 4.3
2.3.3 If the designated project or one component of the designated project is	4.4

an expansion, the percent of increase in size or capacity from the existing project (relative to the thresholds set out in the *Regulations Designating Physical Activities*).	
2.3.4 A description of all activities to be performed in relation to the designated project.	4.2, 4.3
2.4 *Emissions, discharges and waste* Provide a description of any solid, liquid, gaseous or hazardous wastes likely to be generated during any phase of the designated project and of plans to manage those wastes, including the following:	4.2.1 , 4.7, 4.8, 4.9
2.4.1 Sources of atmospheric contaminant emissions during the designated project phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions.	4.8, 4.9.4
2.4.2 Sources and location of liquid discharges.	4.7.5, 4.7
2.4.3 Types of wastes and plans for their disposal	4.2.1, 4.7.5, 4.7, 4.8, 4.9
2.5 *Construction, operation, and decommissioning and abandonment phases and scheduling.* *Provide a description of the timeframe in which the development is to occur and the key project phases, including the following:*	
2.5.1 Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, and decommissioning and abandonment.	1.3, 4.2, 4.3.1, 4.3, 4.10.2.1, 4.11, 5,
2.5.2 Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g. activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sentiments, infilling, and installing structures).	4.2, 4.2.1, 4.3, 4.4, 4.7, 4.9, 4.10,4.11, 5
3. Project Location	
3.1 *Provide a description of the designated project's location including:*	
3.1.1 Coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, if for a linear project, provide the beginning and end points.	3.1
3.1.2 Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.	Figure 4-1 & Figure 4-10
3.1.3 Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to: • watercourses and waterbodies with names where they are known; • linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines); • other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures); • location of Aboriginal groups, settlement land (under a land claim	 • Figure 1-3 & Figure 1-5 • Figure 1-2 & Figure 1-1 & Figure 4-12 • Figure 6-2 • Figure 1-5

agreement) and, if available, traditional territory; • federal land including, but not limited to National parks, National historic sites, and reserve lands; • nearby communities; • permanent, seasonal or temporary residences; • fisheries and fishing areas (i.e., Aboriginal, commercial and recreational); • environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, National Wildlife areas, and priority ecosystems as defined by Environment Canada); and, • provincial and international boundaries.	 • Figure 6-2 • Figure 1-1 & Figure 1-5 • Figure 1-1 & Figure 1-5 • Figure 9-1 • Figure 6-2 & Figure 1-4 • Figure 1-1
3.1.4 Photographs of work locations to the extent possible.	Appendix 1
3.1.5 Legal description of land to be used for the designated project, including the title, deed or document and any authorization relating to a water lot.	3.2
3.1.6 Proximity of the designated project to: • any permanent, seasonal or temporary residences; • traditional territories, settlement land (under a land claim agreement) as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and, • any federal lands.	3.1 • Figure 1-1 & Figure 1-5 • Figure 1-5 • Figure 6-2
3.2 Land and Water Use *To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following:*	
3.2.1 Zoning designations.	3.1
3.2.2 Current land ownership, including sub-surface rights.	3.2
3.2.3 Any applicable land use, water use (including ground water), resource management or conservation plans within and near the project site.	1.4.2
3.2.4 For the proposed construction, operation, decommission and abandonment of a marine terminal, state whether or not the lands are routinely, and have been historically, used as a marine terminal, or are designated for such use in a land use plan that has been the subject of public consultation.	1.4.2
3.2.5 If the project is to take place within the waters or lands administered by a Canada Port Authority under the *Canada Marine Act* and its regulations. Describe applicable land status and zoning under the Port Land Use Plan.	1.4.2
3.2.6 If the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples.	1.4.2
4 Federal Involvement *Financial Support, Lands and Legislative Requirements*	
4.1 Describe if there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to the designated project.	1.5
4.2 Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership).	3.1

4.3 Detail any federal legislative or regulatory requirements that may be applicable, including a list of permits, licenses or other authorizations that may be required to carry out the designated project.	10 10.5
5. Environmental Effects *The information to be provided in this section is meant to be a brief assessment of the environmental interactions of the project. A detailed examination of the potential environmental effects of the project does not need to be included in the project description.* *Using existing knowledge and available information provide an overview of the following:*	
5.1 A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	6.1, 9
5.2 A description of any changes that may be caused as a result of carrying out the designated project to: (a) fish and fish habitat, as defined in the *Fisheries Act*; (b) aquatic species, as defined in the *Species at Risk Act*; and, (c) migratory birds, as defined in the *Migratory Birds Convention Act, 1994*.	9, 10.5, PD-ES (a) 9.1 & 9.2 (b) 9.1 & 9.2 (c) 9.3
5.3 A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada.	9
5.4 A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	9.13 & PD-ES
6. Proponent Engagement and Consultation with Aboriginal Groups *Experience has shown that engagement by proponents with Aboriginal groups early in the planning and design phases of a proposed project can benefit all concerned. By learning about Aboriginal interests and concerns and identifying ways to avoid or mitigate potential impacts, proponents can build these considerations into their project design, reducing the potential for future project delays and increased costs.* *Provide the following information to the extent that it is available or applicable:*	
6.1 A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project, including contact information (location, name, mailing address, email address, and fax and telephone numbers).	Table 7-1, 7.6
6.2 A description of the engagement or consultation activities carried out to date with Aboriginal groups, including: • names of Aboriginal groups engaged or consulted to date with regard to the project; • date(s) each Aboriginal group was engaged or consulted; and, • means of engagement or consultation (e.g., community meetings, mail or telephone).	7.6
6.3 An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these	7.6

groups.	
6.4 An overview of information on current use of lands and resources for traditional purposes by Aboriginal groups or peoples (e.g., information provided verbally or in writing, and past or present studies).	7.6.3
6.5 A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be collected (or, alternatively, an indication of why such engagement or consultation is not required). The proponent is encouraged to provide background information on Aboriginal groups' potential or established Aboriginal or treaty rights. The proponent is also encouraged to provide information on the impact area of the designated project and how it overlaps with uses by Aboriginal groups that have potential or established Aboriginal or treaty rights. This information will be used to facilitate the Agency's understanding of the scope of Aboriginal interests in relation to the designated project, including the potential for impacts on Aboriginal rights and issues of concern.	7.6, 7.6.4 6.3, 6.3.1 Figure 1-5
7. Consultation with the Public and Other Parties (other than Aboriginal consultation included above) *Provide the following information to the extent that it is available or applicable:*	
7.1 A list of stakeholders that may be interested and potentially affected by the carrying out of the designated project. In addition, please describe consultation activities carried out to date with stakeholders, including: • names of stakeholders previously consulted; • date(s) each stakeholder was consulted; and, • means of consultation (e.g., community meetings, mail or telephone).	Figure 7-1 7.3, 7.4, 7.5,7.7, 7.8, 7.9 Appendix 2
7.2 An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	7.4.1, 7.5.1
7.3 An overview of any ongoing or proposed stakeholder consultation activities.	7
7.4 A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	7.9
8. Executive Summary *Proponents are to include as part of the project description an executive summary that summarizes the information identified in Sections 1 to 7 of this Guide*.	PD-ES

Environmental Assessment Office, British Columbia Requirements

EAO Requirements	*PD Section*
Proponent Information	
The proponents name and the representative managing of the project	2.1
Contact information, including a mailing address, phone and fax numbers, and email addresses	2.1
Corporate information, including a website address, particulars of company incorporation, and partners names	2.1
General Background Information	
The type and size of the project, with specific reference to the thresholds set out in the reviewable projects regulation	1.2
Project purpose and rationale	1.2
Estimated capital cost	8.2.1
Number of construction jobs and operating jobs	8.1
Location (latitude and longitude)	3.1
Project Overview	
A brief description of the major on-site and off-site project components, including options if the final site selections are not yet available	4.3, 4.4, 4.5, 4.11
A conceptual site plan and maps 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)	Figure 4-1 & Figure 4-10
The projects duration, including decommissioning if appropriate	5, 4.3.1
The projects potential environmental, economic, social, heritage, and health effects	1.5, 1.6, 6, 9
Land use setting	
A general description of existing land use in the vicinity of the project site	1.4.2
Whether the project and its components are situated on private Crown land	3.2
Information about First Nations interests where asserted claims to rights or title are known	1.4.3
Consultation Activities	
A summary of Consultation activities that have been carried out with First Nations, the public, and local governments	1.4.3, 7
Proposed development schedule	
A tentative schedule for submitting an application for an environmental assessment certificate and developing the project (should a certificate be issued)	5
Required Permits	
A list of required permits, if known	10.3, 10.5

Major Projects Management Office's Guide to Preparing a Project Description for a Major Resource Project (2008)

MPMO Requirements	*PD Section*
1. General Information and Contact(s)	
1.1 Provide a general description of the project (2-3 paragraphs)	1.2
1.2 Proponent contact information	
1.2.1 Name of Proponent	2.1
1.2.2 Address of proponent	2.1
1.2.3 Chief Executive Officer of equivalent (name/title/email/address/phone)	2.1
1.2.4 Principal contact person for purposes of the EA	2.1
2. Project Information	
2.1. Location	
2.1.1 Project coordinates (centre of facility or if linear project-beginning and end)	3.1
2.1.2 Site Map/plan location of main components and activities	Figure 4-1 & Figure 4-10
2.1.3 Map showing the location of the project components and activities relative to existing features, including but not limited to:	
Watercourses/waterbodies; names, width, depth	Figure 1-3 & Figure 1-5
Linear and other transportation components (e.g. airports, ports, railways, roads, electrical power transmission lines, pipelines	Figure 1-2 & Figure 1-1 & Figure 4-12
Other features of existing or past land use (e.g. archaeological sites, commercial developments, houses, industrial facilities, residential areas)	Figure 6-2
Location of Aboriginal groups, First Nation land, reserve land, and if available traditional territory	Figure 1-5
Federal land	Figure 6-2
National parks	Figure 6-2
National historic sites	Figure 6-2
Nearby communities	Figure 1-1 & Figure 1-5
Fishery and fish areas	Figure 9-1
Environmental sensitive areas	Figure 6-2
2.1.4 Provide photographs of work locations to extent possible	Appendix 1
2.2 Components and activities	
2.2.1 Major physical features of the project; large buildings, bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, roads, transmission lines, railways)	4.4
2.2.2 Area to be affected by the undertaking (i.e. project footprint and zone of influence)	Figure 3-6

2.2.3 Anticipated size or production capacity of the project with reference to thresholds from the Comprehensive Study List Regulations	1, 4.3
2.2.4 If the proposed project is an expansion, the % increase	4.4 (N/A)
2.2.5 State if the project will involve constructing a pipeline or international electrical transmission line greater than 40 km in length regulated by the National Energy Board (NEB)	4.5.1
2.3 Emissions, discharges and waste	
2.3.1 Sources of atmospheric contaminant emissions during the phases of the project (Criteria air contaminants and greenhouse gases or non-criteria contaminants of potential concern) and location of emissions	4.8, 4.9.4
2.3.2 Sources of liquid discharges and location of discharges	4.7, 4.7.5
2.3.3 Types of wastes and plans for their disposal (e.g. landfill, licensed waste management facility, marine waters, or tailings containment facility	4.2.1, 4.8, 4.7, 4.9
2.4. Site preparation, construction, commissioning, operation, and decommissioning and abandonment phases and scheduling	
2.4.1 Anticipated schedule/duration/staging of key project phases; prep of site, construction, commissioning, operation, decommissioning, abandonment	4.2, 4.3.1, 4.10.2.1, 4.11 5,
2.4.2 Main activities in each phase of the project that are expected to be required	4, 5
2.5 General physical and biological information requirements	
2.5.1 Physical and biological components in the area likely to be affected by the project (i.e., air, fish, terrain, vegetation, water, wildlife, migratory birds, and known habitats)	6.1
2.5.2 Potential of known plant and wildlife species in the project area, which are listed under the SARA or other provincial or territorial endangered species legislation, and critical habitat that are likely to be affected by the project.	6.1.6, 6.1.7, 6.1.8, 9
2.6 Alternatives	
2.6.1 Describe any alternatives (i.e. siting, arrangement, technology, etc.) under consideration	4.12
3. Land and Water Use	
3.1 Zoning designations	1.4.2, 6.2.3
3.2 Legal description of land and/or water lot	3.2
3.3 Current land ownership, including sub-surface rights	3.2
3.4 Describe any applicable land use, water use, resource management or conservation plans within or near the project site	1.4.2, 6.2.3
3.5 For the proposed construction, decommission or abandonment of a marine terminal, state whether or not the lands are routinely, and have been historically used as a marine terminal or that are designated for such use in a land-use in a land-use plan that has been the subject of public consultation	N/A
3.6 Describe if the project is to take place within the waters or lands administered by a Canada Port Authority under the Canadian Marine Act regulations	N/A

3.7 Provide information on any granting of interest in federal land, including reserve land that may be required for the project (i.e., easement, right of way, or transfer of ownership)	N/A
3.8 State if the project is going to require access to, use or occupation of, or the exploration, development and production of Aboriginal lands and/or resources.	1.4.2
4. Company Engagement/Consultation with Aboriginal Groups	
4.1 Provide a list of Aboriginal groups that may be interested in, and/or potentially affected by, the project including contact information (location, name, address, e-mail/fax and telephone numbers).	7.6, Table 7.1
4.2 Describe engagement/consultation activities carried out to date with Aboriginal groups, including:	
4.2.1 Names of Aboriginal groups consulted to date with regard to the project	7.6
4.2.2 Date(s) each Aboriginal group was engaged/consulted	7.6
4.2.3 Means of engagement/consultation (e.g., community meetings, mail or telephone)	7.6
4.3 Provide an overview of key comments and concerns expressed by Aboriginal groups identified/engaged to date, including any responses provided to these groups.	7.6
4.4 Where possible, provide an overview of information on traditional or heritage use by Aboriginal groups/peoples (e.g., information provided verbally or in writing, and/or past or present studies).	7.6.3
4.5 Provide an overview of any ongoing and/or proposed Aboriginal engagement/consultation activities and the general schedule for these activities (or, alternatively, an indication of why such engagement/consultation is not required).	7.6
5. Stakeholder Consultation (other than Aboriginal)	
5.1 Provide a list of stakeholders that may be interested and potentially affected by the project. In addition, please describe consultation activities carried out to date with stakeholders, including:	
5.1.1 Names of stakeholders previously engaged	7
5.1.2 Date(s) each stakeholder was engaged	7
5.1.3 Means of engagement/consultation (e.g., community meetings, mail or telephone)	7
5.2 Provide an overview of key comments and concerns expressed to date by stakeholders, and any response that have been provided	7
5.3 Provide an overview of any ongoing and/or proposed stakeholder consultation activities.	7
6. Federal Funding	
6.1 Describe if there is any proposed or anticipated federal funding associated with the project	N/A
7. Questions Relevant to Common Federal Triggers:	
Subsection 127(1) of the Canadian Environmental Protection Act,1999	N/A
Subsection 10(1) of the International River Improvements Regulations	N/A
Subsection 7(1) of the Explosives Act	10.5

Section 32 of the Fisheries Act	10.5
Subsection 35(2) of the Fisheries Act	10.5
Paragraph 36(5)(a) to (e) of the Fisheries Act	10.5
Paragraph 5(1)(a) and 6(4) of the Navigable Waters Protection Act	10.5
Section 108(4) of the National Energy Board Act	N/A
Information on:	
Environment Canada - Canadian Environmental Protection Act, International River Improvements Regulations	N/A
Fisheries and Oceans Canada - Fisheries Act	6.1.6, 10.5
Natural Resources Canada - Explosives Act	10.5
Transport Canada - Navigable Waters Protection Act	10.5, 4.4.3