

HD Mining International Ltd.

# MURRAY RIVER COAL PROJECT Project Description



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# MURRAY RIVER COAL PROJECT PROJECT DESCRIPTION

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Prepared for:



HD Mining International Ltd.

Prepared by:



Engineers and Scientists

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# Executive Summary

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## General Information and Contacts

HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a six million tonnes per annum (6 Mtpa) underground metallurgical coal mine, with an estimated mine life of 31 years.

HD Mining is a private mineral exploration company with the head office located in Vancouver, BC. The company has two main partners: Huiyong Holdings (BC) Ltd. (55%) and Canadian Dehua International Mines Group Inc. (40%). As the majority investor, Huiyong Holdings (BC) Ltd. is responsible for project investment and guides mine development and operation.

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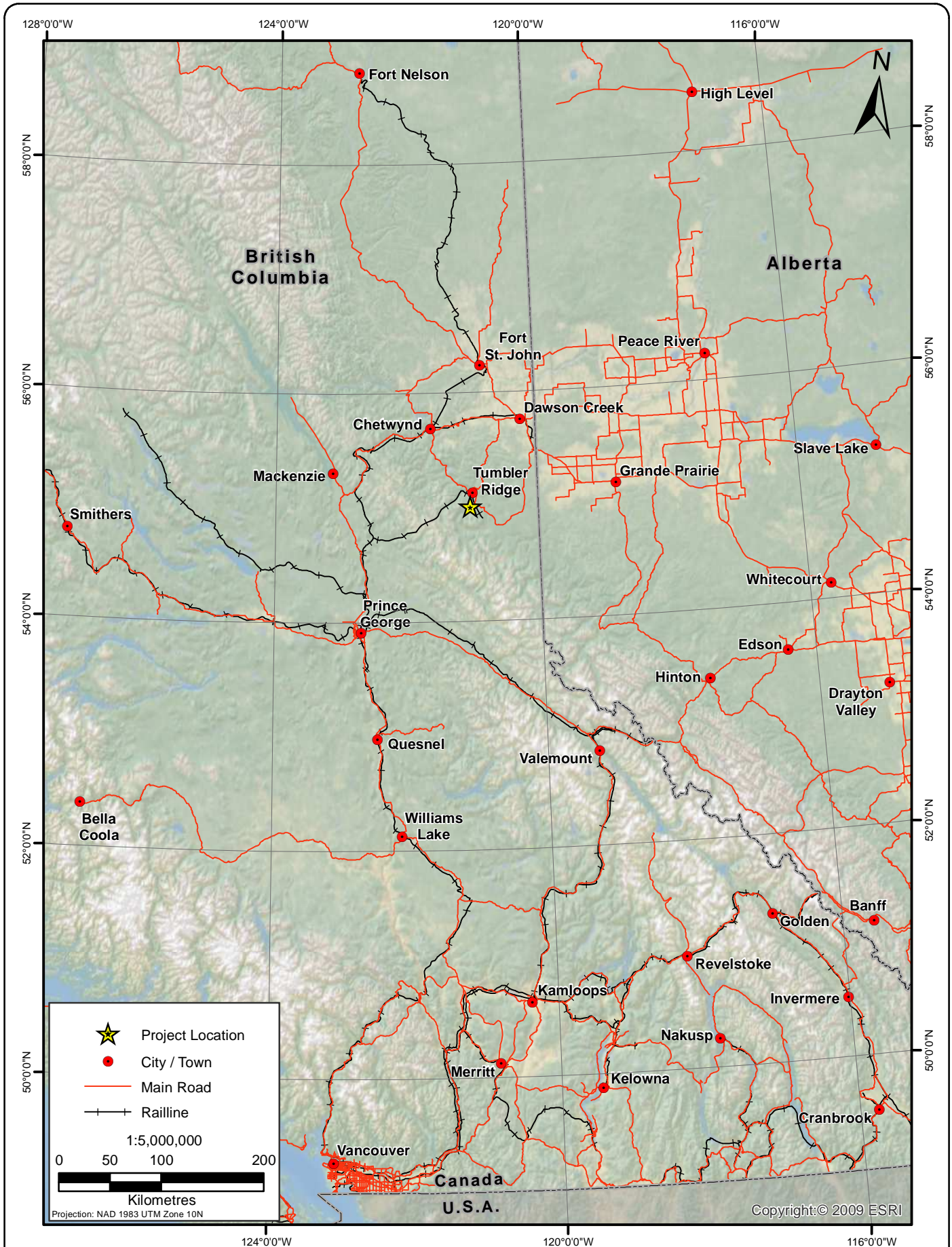
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## Project Location

The Murray River property is located 12.5 km south of Tumbler Ridge, British Columbia (Figure 1). The property consists of 57 coal licences covering an area of 16,024 hectares and is situated on Crown Land within the Peace River Regional District.





**MURRAY RIVER COAL PROJECT**

**Project Location**

**Figure 1**



The coordinates are E 112°54'03"-121°18'07", N 54°56'59'-55°09'59". The Project is accessed from Highway 52 (Heritage Highway), and the existing Quintette Mine and Murray River Forest Service Road. Dawson Creek is the closest city to the Project.

### Project Overview

The Project will be an underground metallurgical coal mine. At a production rate of 6 million tonnes per annum (Mtpa), the deposit will support a 31-year mine life. The Project is expected to provide approximately 18,600 person-years of employment and has an estimated capital cost of \$300 million Canadian dollars.

The purpose of the Project is to develop HD Mining's core Canadian asset to help meet world metallurgical coal demand in a manner that benefits First Nations, local communities, individuals, and local, provincial, and federal governments without compromising the ability of future generations to meet their own needs.

This document outlines HD Mining's conceptual plan for the responsible resource development of an underground metallurgical coal project to enable the Canadian Environmental Assessment Agency (CEA Agency) to determine whether a federal environmental assessment is required.

As part of exploration of the property, HD Mining has received approvals from the BC Ministry of Energy, Mines and Natural Gas (MENG) to mine a 100,000 tonne bulk sample to test the coal for use as a coking coal and to perform coal washability testing. HD Mining is currently preparing the site to mine the bulk sample in the fall of 2013. Permitted infrastructure associated with the bulk sample is divided between two areas: a shaft area and a decline area.

### Provincial and Federal Environmental Assessment Legislative Requirements

Pursuant to section 3(1) of the *Reviewable Projects Regulation* (B.C. Reg. 370/2002), the proposed production capacity for the Project exceeds the criteria of 250,000 tpa of metallurgical coal for a new coal mine and will require a provincial environmental assessment under the *British Columbia Environmental Assessment Act* (BC EAA; 2002a). On June 29, 2012 the British Columbia Environmental Assessment Office (BC EAO) issued a Section 10 order requiring an environmental assessment (EA) for the Project.

Federally, the Project is listed as a "designated project" under section 15(d) of the *Regulations Designating Physical Activities* (RDPA; SOR/2012-147) as the production rate will exceed the threshold for a coal mine of 3,000 tonnes per day (tpd). Additionally, section 8 of the RDPA may apply due to the construction of a facility that results in the extraction of more than 200,000 m<sup>3</sup>/a of groundwater. Up to 182,500 m<sup>3</sup>/a (500 m<sup>3</sup>/day) of this water would be sourced from a groundwater extraction well for sanitary purposes; the remaining water (up to 8,760 m<sup>3</sup>/d or 3,197,400 m<sup>3</sup>/a) would consist of collecting seepage water from the underground mine workings.

### Mineral Resources and Claims

The Murray River property is located within the Peace River Coalfield (PRC), an area with a long history of metallurgical grade coal open pit mining. Previous exploration in the area was conducted by various major oil and gas companies in the 1970s, Quintette Coal Limited (Quintette) and more recently in 2006 and 2007 by Kennecott Coal Exploration Inc. (Kennecott). The exploration programs in the 1970s were generally regional in nature, comprising widely spaced seismic lines and drilling of a small number of primarily oil and gas wells. These programs helped Quintette and Kennecott identify target areas for

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more detailed coal exploration and eventual mining. The target seams for the Murray River Project are part of the Gates Formation (Fort Saint John Group).

In 2009, Canadian Dehua International Mines Group Inc. (Canadian Dehua) obtained the Murray River property, which consists of 57 coal licences covering an area of 16,024 hectares. Detailed exploration consisting of 12 drill holes was carried out in 2009 and 2010 focusing on the central part of the property (about 37.45 km<sup>2</sup>). On July 17, 2010, Huiyong Holdings Group Ltd. signed a cooperation agreement with Canadian Dehua. From August 2010, additional exploration was performed on the property with a total of 20 holes drilled. On June 9, 2011, HD Mining International Ltd. was registered for incorporation in Canada.

### Production Process and Project Components

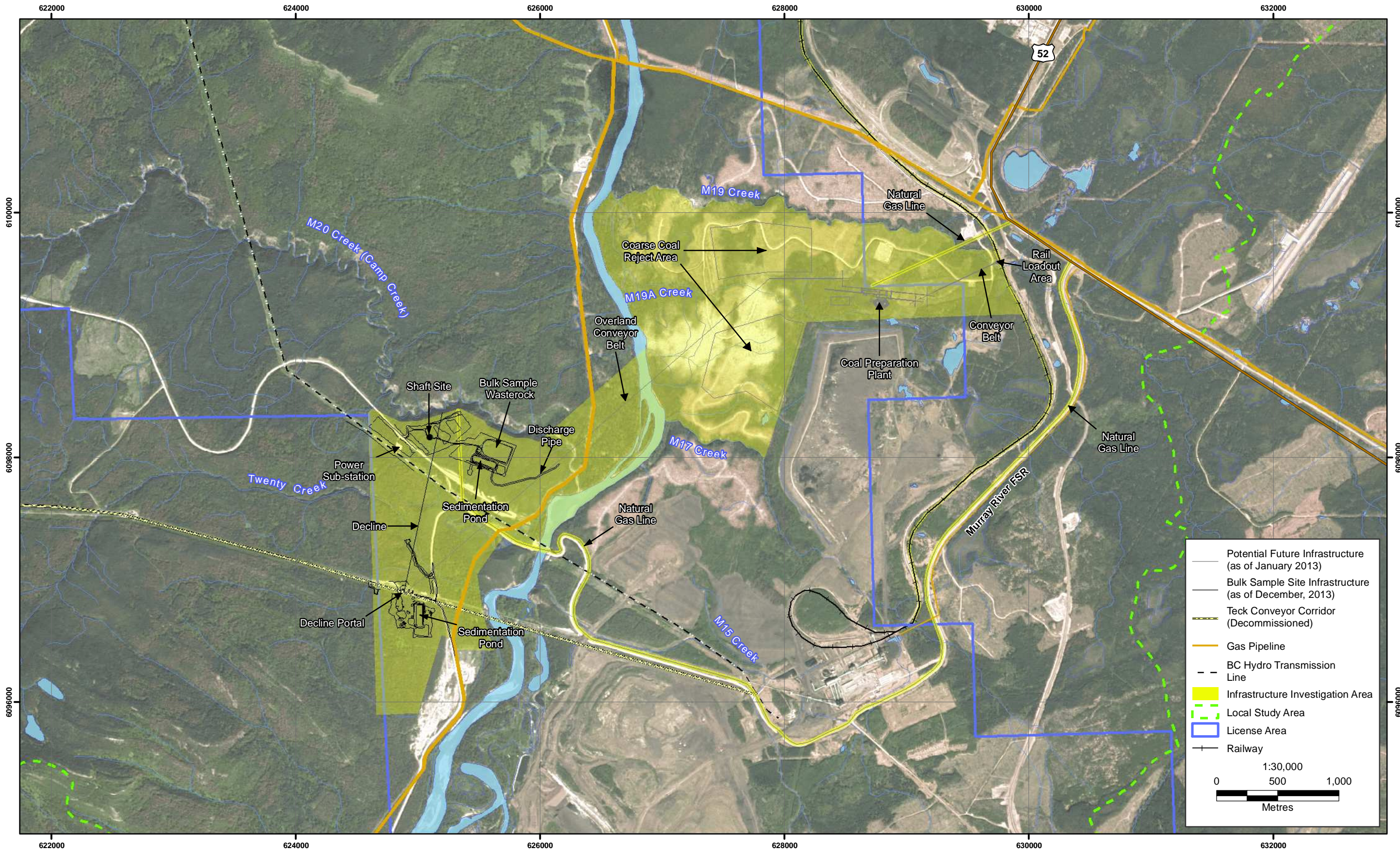
The Project is an underground metallurgical coal mine. Coal will be mined using longwall mining, a form of underground coal mining where coal is mined in large panels (typically 1 to 3 km long and 200 to 400 m wide). Longwall mining is designed to maximize extraction rates while maintaining worker safety. This contemporary method has been used for many years at mines around the world. Based on current mine planning, the underground workings will roughly correspond to an aboveground footprint of 37 km<sup>2</sup>.

Over an estimated 31-year mine life, the mine will produce approximately 185 Mt of metallurgical coal at a rate of up to 6 Mtpa (16,438 tonnes per day (tpd)).

The proposed surface layout for the mine is shown in Figure 2. The Project consists of the following on-site and off-site components:

- underground mine and associated works (e.g., main access shaft, ventilation shaft for return air, ramps, portals, tunnels);
- waste rock storage facilities;
- overburden and soil storage areas;
- explosive and storage facilities;
- coal rejects storage area;
- equipment and fuel storage areas and facilities;
- maintenance, administration and warehouse facilities;
- coal handling and preparation facilities (e.g., washing plant);
- coal conveyor;
- coal stockpiles;
- rail load-out;
- contact water collection ditches, sedimentation pond(s) and water management structures, including a discharge pipeline;
- non-contact water diversion ditch network and sedimentation pond(s);
- water supply facilities (e.g. groundwater extraction well);
- sewage treatment and disposal facilities;
- electric transmission line connecting to the existing BC Hydro grid and related infrastructure; and
- a natural gas pipeline connecting to existing infrastructure and related sub-station infrastructure.







The above listed Project components will be permanent throughout the life of the Project. Accommodation for mine employees (i.e. worker camps at the mine site during all Project phases) will not be required as all employees will live off-site in Tumbler Ridge. Transportation of workers to and from the site, and potential socio-economic effects (e.g., employment, pressure on community infrastructure) will be included in the scope of the EA. No Project components or physical activities related to the development of mine site access roads, including upgrades, is required as the roads currently on site are able to support mine development activities.

### Physical Activities

#### *Construction Phase*

Activities associated with the construction of Project components is anticipated to occur over a 1 to 2 year period, which are scheduled to commence in June 2015.

Initial site preparation activities will include, but are not limited to:

- the establishment of water management structures (e.g., embankments, sedimentation ponds, water treatment facilities, groundwater wells), and site drainage, including a system of diversion channels to divert contact and non-contact water;
- clearing and grubbing, including soil salvage as appropriate; and
- excavation and foundation preparation.

The installation of infrastructure (e.g., conveyors, coal preparation plant and other buildings, gas pipeline, transmission line, discharge pipeline etc.) will also occur during the construction phase, and construction activities will be timed to avoid sensitive fish and bird breeding periods. In particular, seasonal timing requirements will be adhered to for construction activities associated with the mainline conveyor crossing of the Murray River, and for the construction of any water management infrastructure in or near Murray River. The construction schedule will be optimized to achieve initial coal shipping targets.

BC Hydro has an existing 230 kV power line that runs immediately adjacent to the north (shaft) site. HD Mining is proposing to tie into this system (Figure 2). A surface substation/distribution hub will direct power around the Project site and to an underground substation, where it will be distributed to each working area along roadways/gateways. Power to the coal handling and preparation facilities on the east side of the Murray River would be distributed along the conveyor corridor. The total annual power requirement is estimated to be 31.5 MW.

HD Mining also intends to draw natural gas from the existing Pacific Northern Gas (PNG) network. Two pipelines are being considered: one short line (approximately 800 m) to supply the coal preparation plant; and one approximately 9.5 km line that parallels the Murray FSR to the shaft site in order to supply the underground mine (Figure 2). An option to truck the gas to a storage tank at the shaft site is also being investigated.

The total annual gas requirement is estimated to be 1.5 Mm<sup>3</sup>/yr.

Transportation activities during the construction phase will focus on bringing in equipment, materials, supplies, and personnel to facilitate construction activities at the mine site. Materials and equipment will be locally sourced to the extent possible, and travel to the mine site will be routed along Highway 52 and the existing Murray River Forest Service Road (Figure 2). It is estimated that up to 30 vehicles will each make a return trip per day at the peak of the construction phase to support the

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delivery of equipment, material, and supplies. Approximately 3 shuttle trips per day will be required to transport personnel to and from the mine site and Tumbler Ridge during construction.

### Operations Phase

#### *Underground Mine*

As part of the Bulk Sample work currently underway, two accesses will be developed from surface to underground: one decline for coal haulage; and one shaft for transportation of personnel, materials and equipment, and ventilation. These two accesses will also form the main access and secondary egress for the full mine development. In addition, a second shaft for return air only will be constructed for the full mine.

Coal will be mined using longwall mining, a form of underground coal mining where coal is mined in large panels (typically 1 to 3 km long and 200 to 400 m wide). Longwall mining is designed to maximize extraction rates while maintaining worker safety.

Three key pieces of mining equipment that will be used include road headers, shearers and hydraulic shields. Road headers will be used to establish the main tunnel systems and gate roads. The shearer operates at the longwall face and extracts the coal from the seam. Hydraulic shields provide a safe work environment for personnel along the face.

A system of conveyors will be used to transport the run of mine (ROM) coal from the longwall face to the decline and up to the surface. From the mining face, raw coal will be transported via conveyors through the underground workings to the decline, up the decline to the surface on the west side of Murray River, then on an overland conveyor across Murray River to a coal preparation plant located on the east side of the river. Clean coal produced in the plant will be conveyed to a rail loadout facility and then transported by rail to the port at Prince Rupert, BC.

#### *Surface Facilities*

The mine portals will consist of a conveyor decline, a man and materials shaft, and a ventilation shaft.

The main conveyor line that will connect the decline portal with the coal handling and preparation plant will cross a fish bearing wetland, M20 Creek, and the Murray River. Specifics of crossing designs are still under consideration; however, the intent is that clear-span crossings will be used with support structures located outside the riparian zones.

ROM coal will enter the coal preparation plant, where it will be crushed, and then transferred through a series of sizing processes, including: vibrating screens, heavy media cyclones, floatation cells, and centrifuges. Three streams are produced through the preparation plant: clean coal, middlings, and rejects. The clean coal and middlings are directed to the rail loadout, while the rejects are directed to the coarse coal rejects pile. The rejects are a co-mingled combination of over-sized material from the screening process and thickened and dewatered underflow from the floatation cells. HD Mining is currently considering the configuration of coal storage options (e.g., piles or covered silos) at the rail loadout.

HD Mining has held initial discussions with CN Rail regarding development of a rail loadout. Unlike the existing looped loadouts, the loadout is planned as a 5,800 m parallel track within the CN Rail right-of-way.

Each train (120 cars) has the capacity to carry 12,000 tonnes of coal. At 6 Mtpa production, this equates to approximately one train per day. The coal will be shipped to the port at Prince Rupert for shipment overseas.

Transportation activities during the operations phase will focus on bringing in equipment, materials, supplies, and personnel to facilitate ongoing operational activity at the mine site. Materials and equipment will be locally sourced to the extent possible, and travel to the mine site will be routed along Highway 52 and the existing Murray River Forest Service Road (Figure 2). It is estimated that up to 20 vehicles will each make a return trip per day at the peak of the operations phase to support the delivery of equipment, material, and supplies. Approximately 6 shuttle trips per day will be required to transport personnel to and from the mine site and Tumbler Ridge during operations.

#### *Waste Management*

The rejects from the coal preparation plant will be directed to a Coarse Coal Rejects (CCR) pile. Material will be transported to the pile on an extensible conveyor, and then re-worked by dozers. In general, it is expected that the resulting pile will look similar to the existing Teck tailings pile that is located immediately upslope. Although not labelled, the dimensions of the Teck tailings pile (roughly 500 m x 1,750 m) can be seen on Figure 2 immediately south of the Coal Preparation plant, bounded to the north and west by a mine site road.

Geotechnical planning and investigations are underway to assess the suitability of foundation materials for the CCR pile. Design and analysis will be completed consistent with the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008) to ensure the long-term stability of waste material.

Geochemical investigations are also underway to assess the Metal Leaching/Acid Rock Drainage (ML/ARD) characteristics of the reject material. This information will inform the design of the pile in relation to water management, treatment requirements and closure.

A small waste rock pile has been permitted for the bulk sample work. At this time, no additional storage of waste rock on-surface is planned for the full mine development. Only small volumes of inter-burden waste rock are expected to be generated during Project activities due to the efficiency of the longwall mining process. Any small amounts of waste rock that may be generated when mining between coal seams will be stored underground.

Air emissions will include particulate matter (PM), nitrous oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>), and greenhouse gas emissions from fuel combustion by surface and underground vehicles and equipment, and operation of the coal preparation plant. Fugitive dust emissions will occur due to vehicle traffic along the access roads; however, total traffic to/from site on a daily basis will be relatively low. Point source, mobile, and fugitive air emissions during the construction and operation phases of the Project will be inventoried and assessed using air dispersion modeling techniques.

Non-hazardous and hazardous waste materials, such as spoiled processing reagents and used batteries, will be generated throughout the life of the Project. These materials will be anticipated in advance; they will be segregated, inventoried, and, where necessary, tracked in accordance with federal and provincial legislation and regulations. Secure storage areas will be established with appropriate controls to manage spillages. Wastes will be labeled and stored in appropriate containers for shipment to approved off-site disposal facilities.

#### *Water Management*

Underground seepage rates have initially been estimated at up to 8,760 m<sup>3</sup>/d. This water will be collected, and used for dust control and fire suppression systems within the mine. Excess water will be pumped to sedimentation ponds at the surface.



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The Coal Preparation plant for the Project will require approximately 1,800 m<sup>3</sup>/d or 75 m<sup>3</sup>/h of water. The majority of water will be provided by collecting excess underground seepage.

Fresh water diversion channels will discharge into small tributaries of Murray River. Any potential changes in annual, peak and low flow periods related to diversion activities will be included in the scope of the effects assessment.

A groundwater well will be established to provide water for sanitary use (up to 500 m<sup>3</sup>/d). A small sewage treatment system will be on-site to process sanitary water.

A water treatment system will be required to treat on-site contact water prior to release to the environment. It is anticipated that the water treatment and discharge will follow a similar set-up to what is currently being established for the Bulk Sample work. This includes water treatment with coagulant and flocculent, followed by settling in sedimentation pond(s) prior to release. For the Bulk Sample, the approved discharge points are through infiltration galleries, with infiltration directed to Murray River (south site) and M20 Creek (north site) (the existing discharge pipeline is shown on Figure 2). It is anticipated that for the larger flow rates expected during full mine operation, following treatment, effluent will be discharged to the Murray River via a pipeline. Siting options are currently being evaluated and include a location near the south site where the Teck conveyor right-of-way crosses the Murray River, and near the M20 Creek confluence.

Detailed water balance and water quality models will be completed to support the water management design. The potential for significant adverse environmental effects resulting from discharge to the receiving environment will be analyzed for surface and ground water, fish and aquatic habitat, wildlife, and vegetation.

### Access

The Project is accessed from Highway 52 (Heritage Highway), the existing Quintette Mine road and the Murray River Forest Service Road. The roads will be used year-round to mobilize personnel, equipment and supplies to the mine site.

HD Mining is considering coal transportation options, including a rail loadout location (Figure 2). Discussions have been initiated with CN Rail regarding development of this loadout, which is planned as a 5.8 km parallel track within the CN Rail right-of-way.

Each train (approximately 120 cars) has the capacity to carry approximately 12,000 tonnes of coal. At a 6 Mtpa production rate, this equates to approximately one train per day during operations. The coal will be transported to the port at Prince Rupert for shipment overseas.

### Closure and Reclamation Phase

HD Mining recognizes that the Project must be planned with closure in mind. Consistent with the requirements of the BC *Mines Act* (1996d) and the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008), a closure plan will be developed for the Project. The objective of a closure plan is to detail the transition of the site from mining to its post-mine productive land use. This includes a requirement for financial assurance from the proponent. The closure plan will be regularly reviewed and updated throughout the mine life to reflect Project development. At this time, a preliminary conceptual closure plan is presented. This will be further developed as new information becomes available through the EA and permitting processes.

*Underground Mine*

At closure, all mining equipment and materials will be removed from the underground mine and re-purposed, sold or disposed of off-site. Once entry to the mine workings is no longer required, bulkheads will be constructed to seal the workings. It is anticipated that over time, the mine workings will flood with groundwater seepage, and that the groundwater table will return to near pre-mining levels. As part of the EA, estimates will be made of the time required to flood the workings, of water quality within the flooded mine based on geochemical characterization, and of the potential for contaminant transport from the flooded mine workings. It is anticipated that due to the depth of mining and the low hydraulic conductivity of the surrounding rocks, flow paths to any potential receiving environment would be very long and contaminant transport very slow.

A long-term monitoring program would be required to inspect the integrity of the bulkheads.

*Surface Facilities*

The conveyors, buildings, coal preparation plant equipment, and utilities will be dismantled or demolished as appropriate. Reusable components will be sold along with scrap metal. Waste materials will be disposed of in appropriately permitted facilities. The sites will then be scarified, reclaimed with salvaged topsoil material and re-vegetated.

*Coarse Coal Rejects Pile*

The CCR pile will be assessed and re-contoured as necessary to ensure long-term stability. The surface will be reclaimed with salvaged topsoil material and re-vegetated. If necessary, based on geochemical characterization, a CCR cover will be designed to minimize groundwater flow paths through the pile.

A long-term monitoring program would be required to inspect the integrity of the pile and reclamation cover and to monitor the groundwater conditions down slope of the pile.

Project Schedule

HD Mining's schedule for the proposed Project is targeting June 2015 for coal production.

The Project will have four defined development phases as summarized below:

- **Construction phase** - approximately one year in length (June 2014 to June 2015);
- **Operations phase** - 31 years in length, approximately from 2015 to 2046;
- **Reclamation and closure phase** - two years in length, approximately 2047 to 2048; and
- **Post-closure phase** - until long-term environmental objectives are achieved.

Regional Setting

Northeastern BC is populated by a number of small, predominantly First Nations' communities and larger centres of Tumbler Ridge, Chetwynd, Dawson Creek, and Fort St. John which provide services and supplies to much of the region. The communities are connected through Highways 97, 29, 2 and 52 (Figure 1).

The regional economic base is supported primarily by resource extraction industries including mining and forestry. Mineral exploration and oil and gas activities have increased in recent years, providing significant employment opportunities which are anticipated to continue while overseas commodity spot prices remain high. Forestry and tourism have fluctuated significantly in response to prevailing economic conditions.

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HD Mining is committed to satisfying regional land use objectives within the vicinity of the Project. The Project area is located within the boundaries of the Dawson Creek Land and Resource Management Plan (DC LRMP; Ministry of Forests Lands and Natural Resources Operations 1999). The DC LRMP encompasses 2.9 million hectares of land between Fort St. John and Prince George. The DC 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).

Two provincial parks and a protected area are located in the general vicinity of the Project area; Bearhole Lake Provincial Park and Protected Area is located approximately 17 km east of the Project, and Monkman Provincial Park is located approximately 27 km south of the Project. Neither of these areas is expected to be affected by the Project.

With respect to temporary and permanent residences, the nearest trapline cabin is 1.7 km from the Project, the nearest campground is 9.5 km from the Project, the nearest hunt camp is 26 km from the Project, and the nearest residential area (Tumbler Ridge) is 12.4 km from the Project.

### Regional Environmental Studies

HD Mining is not aware of any regional environmental studies within the Project area as described under section 74(1) of the *Canadian Environmental Assessment Act* (2012).

The BC Ministry of Environment (MOE) Omineca-Peace Region is leading a study to determine selenium uptake and general metals content in Murray River Slimy Sculpin (*Cottus cognatus*) and fine bottom sediments tissue (Carmichael and Chapman 2006). The sampling program includes three sample sites upstream of the coal development projects on the Murray River, and three sample sites downstream. HD Mining has not been asked to participate in this study.

To the south of the Project, the BC MOE is leading a Mountain Caribou Recovery Implementation Plan. This plan is described “as a collaborative approach with conservation organizations, First Nations, the forest industry and outdoor recreation groups in restoring the mountain caribou population to pre-1995 levels of more than 2,500 animals throughout their existing range” (ILMB 2007).

Numerous environmental studies have been undertaken in the regional area to satisfy EA information requirements. Table 1 provides a summary of past, existing, and potential future projects that occur within the region that have been, are, or may be subject to the EA process. Some aspects of these projects may have a spatial or temporal linkage with the Project.

### Federal Lands, Funding, and Transboundary Effects

There are no federal lands that would be affected by the Project. The nearest federal lands to the Project are the East Moberly Lake Indian Reserve 169 and West Moberly Lake Indian Reserve 168A, which are both located approximately 100 km northwest of the Project.

No federal funding is being sought or provided for the Project. No Project-related effects to federal lands are anticipated.

The Project is not expected to result in any transboundary effects to areas outside of British Columbia, including Alberta and the United States.

**Table 1. Current Status of Mine and Energy EA Projects in the Region**

Past Projects	Existing Projects	Potential Future Projects
Quintette Coal Mine	Mount Spieker	Mount Reesor
Quintette (Frame)	Bullmoose (Chamberlain)	Perry Creek Coal
Quintette (Shikano)	Monkman	Wolverine Coal Mine
Quintette (Babcock)	Quality Creek Wind	Trend Coal Project
Bullmoose		Tumbler Ridge Wind
Sukunka (Bullmoose)		Roman Coal Project
		Hermann Mine Project
		Horizon Coal Project
		Albright Ridge Wind
		Burnt River Wind
		Bullmoose Creek Wind
		Mt. Bennett Wind
		Mesa Creek Wind
		Mount Collier Wind
		Redwillow River Wind
		Sukunka River Wind
		Thunder Mountain Wind
		Wolverine River Wind

### Existing Environment

The Project is located within the Hart Foothills Ecoregion of the Sub-Boreal Interior Ecoprovince. It is comprised of low, rounded mountains and wide valleys on the east side of the Rocky Mountains. The area was glaciated by the Cordilleran Ice Sheet that flowed east from the Rocky Mountains in the Late Wisconsinian, producing rounded ridge mountain tops, and depositing thick layers of morainal deposits (often referred to as glacial till). The Murray River valley bottom contains isolated areas of glaciolacustrine sediments from Glacial Lake Peace. A series of glaciofluvial terraces, created during the drainage of Glacial Lake Peace, is evident in the valley cross section. The majority of the area is generally characterized by gentle to moderate slopes, and the area is considered relatively stable. Areas of instability are often associated with small hillslope channels, which exhibit strong gullying and downcutting, resulting from water erosion and other mass movement processes (e.g., debris slides, debris flows, snow avalanches). This has created relatively deep (e.g., 5 to 10 m), canyonized drainage patterns.

The region is characterized by a continental climate with little precipitation, moderately warm summers and cold winters. Vegetation in lowland areas consists of moist grasslands and trembling aspens (*Populus tremuloides*). Upland areas are dominated by white spruce (*Picea glauca*), black spruce (*Picea mariana*) and lodgepole pine (*Pinus contorta*).

The climate of the region is characterized by long cold winters and relatively warm summers. The region is frequently influenced by moist air from the Pacific as well as dryer continental air, as it is very close to the leeward side of the Rocky Mountains' Hart Ranges. The mean daily maximum summer temperatures are above 15°C and the mean daily minimum winter air temperature fall well below -10°C. Maximum air temperatures can reach the high 20s°C and minimum air temperatures can reach below -20°C.

The Project is located within the Murray River watershed. Project infrastructure also are located within portions of the M20 Creek and Twenty Creek sub-watersheds on the west side of the river, and within the M17 and M19 creek sub-watersheds on the east side of the river.

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Water and sediment quality sampling data were summarized for the 2010 field season. The Murray River drainage basin naturally experiences high levels of suspended solids and turbidity in May and June during spring freshet as a result of snow melt (both total suspended solids (TSS) and turbidity are > 100 mg/L or NTU) and consequently exceed BC guidelines for the protection of aquatic life. Outside the period of freshet, TSS and turbidity were generally low (below detection limits and < 10 NTU, respectively), although levels at M20 Creek were consistently higher year-round and frequently exceeded turbidity guidelines.

Ammonia, nitrate, and sulphate concentrations were generally low, below BC guidelines; however concentrations at M20 Creek were consistently higher than other sites and the 30-day maximum guideline values (50 mg/L). Baseline concentrations of aluminum (dissolved), cadmium (total), chromium (total), and iron often exceeded maximum BC guidelines in Murray River and M20 Creek.

For sediment quality, cadmium and nickel concentrations exceeded guidelines at all sites, arsenic guidelines were exceeded at M20 Creek and the remaining parameters were well below guideline values.

Fifty two wetlands have been identified within the Project area; all five wetland classes (i.e., bog, fen, marsh, swamp, and shallow open water) were observed. Shallow open water communities were not encountered as a simple wetland community but were observed numerous times as a component of larger wetland complexes.

The primary functions for each observed wetland class were identified following Hanson et.al. (2008); they include:

- groundwater recharge and water storage (hydrological);
- nutrient and organic export, carbon storage, and water quality improvements (biochemical);
- listed or sensitive ecosystems and wetland complexes (ecological); and
- habitat for wetland-dependant species.

Two provincially blue-listed wetlands (Wb09 and Wb06) were identified at 6 sites: black spruce - common horsetail - peat-moss bog, mapped over 5.4 ha; and tamarack - water sedge - fen moss bog, mapped over 13.0 ha.

The most significant feature defining fish distribution within the Murray River is Kinuseo Falls, located 38 km upstream of the Project. This 60 m high waterfall represents the upper limit of distribution for most fish species. Native species present downstream of the falls include:

- Mountain Whitefish (*Prosopium williamsoni*);
- Arctic Grayling (*Thymallus arcticus*);
- Bull Trout (*Salvelinus confluentus*);
- Northern Pike (*Esox lucius*);
- Burbot (*Lota lota*);
- Longnose Sucker (*Catostomus catostomus*);
- Slimy Sculpin (*Cottus cognatus*);
- Longnose Dace (*Rhinichthys cataractae*);
- Finescale Dace (*Phoxinus neogaeus*); and
- Lake Chub (*Couesius plumbeus*).

Bull Trout is BC blue-listed and is listed as a “Candidate” species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC; i.e., currently short-listed for upcoming assessment).

Three non-native sport-fish species have been introduced to the Murray River system in recent decades, including Rainbow Trout (*Oncorhynchus mykiss*), Brook Trout (*Salvelinus fontinalis*), and Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*). Although Rainbow Trout are potentially present at very low densities, sampling records indicate the species has failed to establish significant self-sustaining populations in the Murray River or its tributaries. Westslope Cutthroat Trout were stocked in Upper Blue Lake, at the headwaters of the Murray River, in 1983. This species is now abundant in the Upper and Lower Blue lakes complex and its tributaries, but have not been found below Kinuseo falls. Westslope Cutthroat Trout are protected as a Schedule 1 (Special Concern) species under the *Species at Risk Act* (SARA; 2002b), considered a species of “Special Concern” under COSEWIC, and are provincially blue-listed. Brook Trout are now commonly found in several Murray River tributaries in the vicinity of the Project and have established a significant spawning run in Barbour Creek, located approximately 10 km upstream.

Wildlife resources in region are recognized for their ecological, social, economic, and cultural value. Provincial databases and references were consulted to identify wildlife species that may occur near the Project. A total of four amphibian, 112 bird, and 11 mammal species were identified during baseline studies within the region. The most common wetland migratory birds, as defined under the *Migratory Birds Act* (1994), identified include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), ring-necked duck (*Aythya collaris*), green-winged teal (*Anas crecca*), Barrow’s goldeneye (*Bucephala islandica*), and lesser scaup (*Aythya affinis*). The most common breeding migratory birds identified were cliff swallow (*Petrochelidon pyrrhonota*), yellow-rumped warbler (*Dendroica coronata*), Swainson’s thrush (*Catharus ustulatus*), warbling vireo (*Vireo gilvus*), Wilson’s warbler (*Wilsonia pusilla*), and white-throated sparrow (*Zonotrichia albicollis*).

The presence of 11 species of conservation concern, including migratory birds, were confirmed during baseline studies, including species listed under SARA (2002b), COSEWIC, and the BC Conservation Data Centre (BC CDC; Table 2). Species listed by SARA identified during baseline studies were western toad (*Anaxyrus boreas*), olive-sided flycatcher (*Contopus cooperi*), and peregrine falcon, anatum subspecies (*Falco peregrinus anatum*).

Based on criterion such as conservation status, ecological sensitivity, importance to First Nations and local, social, or economic reasons, key species for the region include: moose (*Alces alces*), mountain caribou (*Rangifer tarandus*), mountain goat (*Oreamnos americanus*), grizzly bear (*Ursus arctos*), western toad, furbearers, waterfowl, raptors, and songbirds, including migratory birds.

### Potential Environmental Effects

Environmental baseline studies, including a comprehensive ML/ARD characterization study, are currently being undertaken in support of the Project. Potential environmental effects from the Project that are likely to be of concern include the degradation of surface and ground water quality (during the operations and closure phases of the Project) and sensory disturbance to wildlife during the construction and operations phases.

Other environmental effects that may occur include effects on air quality from fugitive dust emissions during construction and operations, and particulate matter and greenhouse gas emissions from fuel combustion by processing equipment, vehicles and generators.

Table 2. Wildlife Species of Conservation Concern, Including Migratory Birds, Likely or Probable to Occur in Project Area

Scientific Name	English Name	Likelihood of Occurring in RSA <sup>1</sup>	Identified During Baseline Studies <sup>2</sup>	BC List	Identified Wildlife	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Migratory <sup>5</sup>
<i>Aechmophorus clarkii</i>	Clark's grebe	L	P	Red				Y
<i>Aegolius funereus</i>	boreal owl	L		Yellow		NAR (1995)		
<i>Anaxyrus boreas</i>	western toad	L	Y	Blue		SC (2012)	1-SC (2005)	
<i>Asio flammeus</i>	short-eared owl	L		Blue	Y	SC (2008)	1-SC (2012)	
<i>Botaurus lentiginosus</i>	American bittern	L		Blue				Y
<i>Buteo platypterus</i>	broad-winged hawk	P		Blue				
<i>Canis lupus</i>	grey wolf	L		Yellow		NAR (1999)		
<i>Cardellina canadensis</i>	Canada warbler	P		Blue		T (2008)	1-T (2010)	Y
<i>Chlidonias niger</i>	black tern	L		Yellow		NAR (1996)		Y
<i>Chordeiles minor</i>	common nighthawk	L		Yellow		T (2007)	1-T (2010)	Y
<i>Circus cyaneus</i>	northern harrier	L		Yellow		NAR (1993)		
<i>Contopus cooperi</i>	olive-sided flycatcher	L	Y	Blue		T (2007)	1-T (2010)	Y
<i>Euphagus carolinus</i>	rusty blackbird	L		Blue		SC (2006)	1-SC (2009)	Y
<i>Falco peregrinus anatum</i>	Peregrine falcon, <i>anatum</i> subspecies	L	Y	Red		SC (2007)	1-SC (2012)	
<i>Grus canadensis</i>	sandhill crane	L		Yellow	Y	NAR (1979)		Y
<i>Gulo gulo</i>	wolverine	L		No Status		SC (2003)		
<i>Gulo gulo luscus</i>	wolverine, <i>luscus</i> subspecies	L		Blue	Y	SC (2003)		
<i>Hirundo rustica</i>	barn swallow	L	Y	Blue		T (2011)		Y
<i>Limnodromus griseus</i>	short-billed dowitcher	P		Blue				Y
<i>Martes pennanti</i>	fisher	L	Y	Blue	Y			
<i>Melanitta perspicillata</i>	surf scoter	L	Y	Blue				Y
<i>Myotis lucifugus</i>	little brown myotis	P		Yellow		E (2012)		
<i>Myotis septentrionalis</i>	northern myotis	P		Blue		E (2012)		
<i>Oporornis agilis</i>	Connecticut warbler	P		Red	Y			Y
<i>Phalaropus lobatus</i>	red-necked phalarope	L	Y	Blue		C (2011)		Y
<i>Podiceps auritus</i>	horned grebe	L	Y	Yellow		SC (2009)		Y
<i>Rana luteiventris</i>	Columbia spotted frog	L		Yellow		NAR (2000)		
<i>Rangifer tarandus</i>	caribou	L	Y	No Status	Y			

(continued)



**Table 2. Wildlife Species of Conservation Concern, Including Migratory Birds, Likely or Probable to Occur in Project Area (completed)**

Scientific Name	English Name	Likelihood of Occurring in RSA <sup>1</sup>	Identified During Baseline Studies <sup>2</sup>	BC List	Identified Wildlife	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Migratory <sup>5</sup>
<i>Rangifer tarandus</i> pop. 1	caribou (southern mountain population)	P		Red	Y	T (2000)	1-T (2003)	
<i>Rangifer tarandus</i> pop. 15	caribou (northern mountain population)	L		Blue	Y	T/SC (2002)	1-SC (2005)	
<i>Setophaga castanea</i>	bay-breasted warbler	P		Red	Y			Y
<i>Setophaga tigrina</i>	Cape May warbler	L		Red	Y			Y
<i>Setophaga virens</i>	black-throated green warbler	L	Y	Blue	Y			Y
<i>Ursus arctos</i>	grizzly bear	L	Y	Blue	Y	SC (2002)		

<sup>1</sup> P - probable to occur in RSA; L - likely to occur in RSA

<sup>2</sup> P - possible observation during baseline studies; Y - definite observation during baseline studies

<sup>3</sup> E - Endangered; SC - Special Concern; T - Threatened; NAR - Not At Risk; C - Candidate

<sup>4</sup> 1 - Schedule 1

<sup>5</sup> As per the Migratory Birds Convention Act, 1994

## PROJECT DESCRIPTION

Fish species and fish habitat, as defined by the *Fisheries Act* (1985b), may be affected by the harmful alteration, disruption and destruction of fish habitat (HADD) associated with the construction of the conveyer crossing of the Murray River and adjacent waterbodies. The construction of the conveyer crossing and discharge pipeline may also affect fish and aquatic habitat through the degradation of stream banks, increased erosion and sedimentation, and altered riparian areas. Fish and fish habitat may also be affected by the quality of the effluent discharge from the use of seepage groundwater as a dust and fire suppressant during construction, operation and closure, and from the sedimentation pond(s). A particular contaminant of concern, selenium, is known to bioaccumulate through the aquatic food web, with elevated levels related to mining activity commonly observed in sediment, periphyton, benthos, fish tissue, and aquatic bird tissue. A long-term aquatic effects monitoring program will be implemented to adaptively manage for any potential effects related to selenium. The Project also has the potential to adversely affect fish and fish habitat through direct mortality caused by potential spills associated with the transportation of materials such as fuel and processed coal during construction and operations, and from increased fishing pressure due to enhanced area access, during construction and operations. Increased noise and vibrations from mine activities during construction and operations may also adversely affect fish and fish habitat. These potential effects may also affect aquatic species of conservation concern, including Bull Trout, and western toad.

The Project is located in a relatively unpopulated area, therefore limited noise effects are anticipated for human receptors. Local wildlife species may experience intermittent sensory disturbance due to exposure to increased noise levels in the immediate vicinity of the Project during construction and operations. However, due to the primarily underground operations, surface noise levels are expected to be of minor magnitude.

The construction of the Project facilities will result in removal of soil and vegetation within the footprint of the mine infrastructure; as well, potential subsidence from the underground mine workings may further disturb soil and vegetation, or facilitate increased geohazard risk. Land clearing activities may affect species at risk and their habitat. Any potential effects on species at risk and their habitat, and on unique ecosystems will be minimized through appropriate site selection, and further mitigated to the extent possible. Reclamation activities throughout the mine life, and particularly during the closure phase of the Project will work towards re-establishing pre-disturbance conditions and ensure the productive use of land.

Wildlife-vehicle collisions (including with rail cars) and hunting pressure due to increased access near the Project may result in wildlife mortality, primarily during construction and operations when transportation and staffing requirements are at their greatest. The species most vulnerable to road-kill mortality are small, slow-moving species which are difficult for drivers to see, and large ungulates who utilize roads (e.g., moose). A species of particular concern is the western toad due to its conservation status.

The uptake of contaminants and heavy metals by wildlife may result in effects to the particular population and may result in food chain effects. Wildlife may be exposed to contaminants and metals through deposition of fugitive dust on vegetation and in waterbodies.

The potential for wildlife to become habituated to human presence and food sources exists due to the presence of mining facilities. Animals may be injured, or may cause damage to property or injure humans as a result of long-term exposure to human activity. Animals most at risk include black and grizzly bears, and small carnivores. Some waterfowl species may also be attracted to surface water with poor water quality (e.g., sedimentation ponds) or to lights on towers, and become injured as a result.

Other potential effects to migratory birds may include direct mortality from collisions with transmission lines, buildings, or vehicles, removal or disruption of nests, loss of habitat due to

vegetation clearing for construction and maintenance of right-of-ways and mine site components. Effects on migratory birds may also include interference from Project lighting and noise, and effects to health from the potential degradation of air and water quality related to air emissions from generators and other mining equipment, and from increased fugitive dust. Finally, discharge of treated water into the Murray River may affect migratory water bird habitat through an increased risk of bioaccumulation of metals/metalloids in sediments or lentic environments (e.g., selenium).

#### Potential Socio-Economic and Land-use Effects

The Project falls within the Peace River Regional District (PRRD) and the closest communities to the Project are the District of Tumbler Ridge and Town of Dawson Creek, which is a service centre for PRRD southern communities. These communities are expected to be a source of labour, goods and services for the Project. Chetwynd is located at the junction of Highway 97 (Alaska Highway) and Highway 29 and the CN Rail mainline. Fort St. John is the largest city in the north-east region and is the main government services, logistical and supply centre for the PRRD. Given its central role in the region, Fort St. John is also expected to be a source of labour, supplies and service contracts for the Project. These four communities will be included in the scope of the effects assessment because of their proximity to the Project site and their reliance on resource-based industries.

The construction and operation of the Project is likely to have direct and indirect social and economic effects on local and regional communities. It will provide approximately 18,600 person-years of direct employment. HD Mining expects to require the use of Temporary Foreign Workers (TFWs) who are experienced in underground longwall mining to mine the Bulk Sample and to help start the mine. HD Mining is working with the District of Tumbler Ridge to develop appropriate housing for workers, and with Northern Lights College to develop a training program so that, over time, the underground mining jobs could be transferred from TFWs to local workers.

Increased economic development opportunities will result through the provision of locally sourced materials, supplies, and equipment. The Project will provide local, provincial and federal tax revenues annually throughout construction and operations. Increased pressure on community infrastructure and emergency services will result from housing TFW in Tumbler Ridge. The Project may affect land and resource use for both Aboriginal and non-Aboriginal users through Project-related restricted or altered access and land modification. Guide outfitter territories and registered trap lines exist locally, and recreational hunting and fishing activities are common land uses that could be adversely affected by mining activities.

HD Mining is committed to developing the Project in a manner that minimizes potential effects, while maximizing benefits for Aboriginal and non-Aboriginal communities in the region, as well as the company.

#### Potential Human Health Effects

Due to the lack of industrial emission sources and low level of mobile emission sources in the Project area, ambient air quality in the area is good, and ambient noise levels are low.

There are no known users who draw drinking water from within the immediate area around the Project. Downstream of the Project, the District of Tumbler Ridge holds a water licence for the Murray River; however, this is not currently active - the town's water supply is drawn from groundwater.

The Project is located approximately 12 km south of the nearest permanent residence at Tumbler Ridge, and 1.7 km from the nearest temporary residence (a trapline cabin). Regional air quality and noise effects are expected to be minimal due to the majority of the mining activities occurring underground.

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Effects on downstream water quality may affect human health through the consumption of country foods where there is the potential for bioaccumulation of contaminants of concern in the food chain (e.g., fish, birds and wildlife) and through effects on drinking water quality. Changes to soil quality and vegetation in the vicinity of Project components also have the potential to affect human health through the harvesting and consumption of traditional plants for nutritional and medicinal purposes.

### Potential Heritage Effects

A review of available archaeological information identified multiple previously recorded archaeological sites within 5 km of the proposed Project infrastructure. All of the sites are pre-contact lithic scatters.

Archaeological Impact Assessments (AIA) for the Project have been conducted under Heritage Inspection Permits 2010-0279 and 2012-0099, issued by the Archaeology Branch, Ministry of Forests, Lands and Natural Resource Operations. The AIAs focused on areas of proposed infrastructure. No archaeological sites or other heritage resources were identified in conflict with proposed infrastructure on the west side of Murray River. However, archaeological site GgRg-9 (lithic scatter and trail) was identified along the proposed Conveyor Belt alignment east of the Murray River.

Site GgRg-9 is protected under the BC *Heritage Conservation Act* (1996h). However, as it is located immediately underneath the proposed conveyer belt, HD Mining is currently reviewing options related to conveyor alignment and design. If the trail cannot be avoided, then appropriate mitigation measures will be identified and implemented, and a Section 12 Site Alteration Permit issued by the Archaeology Branch will be acquired if necessary.

### Aboriginal Groups

The Project is located within the boundaries of Treaty 8. The federal Crown negotiated Treaty 8 in 1899 with Cree, Beaver, Chipewyan and other Indians, for an area that encompasses northeast British Columbia, northern Alberta, the northwest corner of Saskatchewan, and part of the Northwest Territories. Seven of the original 40 Treaty 8 First Nation communities are located in British Columbia. The McLeod Lake Indian Band adhered to Treaty 8 in 2000, in accordance with the McLeod Lake Indian Band Treaty 8 Adhesion and Settlement Agreement (British Columbia Environmental Assessment Office 2012).

The elements of Treaty 8 included provisions to maintain a livelihood for the native populations in this 840,000 km<sup>2</sup> (84,000,000 ha) region, such as entitlements to land, ongoing financial support, annual shipments of hunting supplies, and hunting rights on ceded lands unless those ceded lands were used for forestry, mining, settlement, or other purposes (Madill 1986).

In exchange for surrendering their lands, signatory First Nations would receive Indian Reserves based on 640 acres for each family of five; families or individuals who wished to live off reserve would receive “land in severalty to the extent of 160 acres to each Indian”. Treaty 8 also included provisions for education, farm stock, farm implements, ammunition, twine, and clothing (Madill 1986). Treaty 8 promises its signatories the right to “pursue their usual vocations of hunting, trapping, and fishing throughout the tract surrendered heretofore described, subject to such regulations as may from time to time be made by the Government of the country, acting under the authority of Her Majesty, and saving and excepting such tracts as may be required or taken up from time to time for settlement, mining, lumbering, trading, or other purposes”.

BC Treaty 8 First Nations include the Sauteau First Nations, West Moberly First Nations, McLeod Lake Indian Band (Tsek'he First Nation), Blueberry River First Nations, Doig River First Nation, Halfway River First Nation, Prophet River First Nation and Fort Nelson First Nation. The Project lies in the vicinity of the West Moberley First Nations (WMFN), Sauteau First Nations (SFN) and McLeod Lake Indian Band (MLIB) which is concordant with the terms of the Section 11 Order issued by the BC EAO.

The Kelly Lake Cree/Métis community is located 65 km northeast of the Project.

HD Mining is currently working to engage WMFN, SFN and MLIB to better understand their individual traditional use/knowledge as well as their current use of the local and regional area. The following summary information has been derived from available public sources.

#### *West Moberly First Nations*

West Moberley First Nations is a historic signatory to Treaty 8 and a member of the Treaty 8 Tribal Association (T8TA). The community of West Moberly Lake is approximately 30 km north of the town of Chetwynd and approximately 105 km northwest of the Project. Their 2,033.6 ha reserve is at the west end of Moberly Lake. As early treaty signatories, the WMFN have not defined a distinct traditional territory within Treaty 8 lands.

Hunting, trapping and fishing remain culturally and economically significant activities for the WMFN (PMT SRMP 2006). The traditional hunting and trapping territories of the WMFN are the foothills and mountains of the Rockies. Hunting and trapping occurred as far westward as the Ospika River, located on the western slope of the Rockies in the Rocky Mountain Trench. Ice-fishing was traditionally done at Moberly Lake in the winter, and in the late spring, goose eggs were collected and muskrats were trapped along the shore (Mokakioyis 2008).

The area lying between Moberly Lake and the Peace River comprises approximately 1,090 km<sup>2</sup> of land and is known as the Peace Moberly Tract (PMT; BC, SFN, and WMFN 2006; MNRO 2012). The PMT is a key supply area for traditional foods for the WMFN. The area provides medicinal plants, as well as products used in cultural ceremonies, crafts, and the fabrication of items such as canoes, drums and snowshoes (PMT SRMP 2006).

Indigenous burning was common in the PMT prior to the arrival of settlers and promoted the maintenance and improvement of berry producing areas, the production of horse pasture, and for fuel management. Blueberries and huckleberries (*Vaccinium* spp.), raspberries (*Rubus* spp.), highbush cranberry (*Viburnum edule*), saskatoon berries (*Amelanchier alnifolia*), soapollalie (*Shepherdia canadensis*) and other commonly used berry species show a strong affinity for young forests, and some ecosystems within the PMT are considered fire dependent (PMT SRMP 2006).

#### *Saulteau First Nations*

SFN is a historic signatory to Treaty 8 and a member of the T8TA. The Saulteau community at East Moberly Lake is approximately 25 km north of the town of Chetwynd and approximately 105 km northwest of the Project. Their 3,025.8 ha reserve is located at the east end of Moberly Lake. As early treaty signatories, the SFN have not defined a distinct traditional territory within Treaty 8 lands.

Hunting, trapping and fishing remain culturally and economically significant activities for the SFN (PMT SRMP 2006). A vigorous hunting economy currently exists within the Saulteau community (PMT SRMP 2006; Finavera 2011). Moose is the mainstay of the hunting economy, although deer, mountain goat and caribou are also hunted. The SFN have historically hunted and trapped the lands south of the Peace River, and east of the Rocky Mountains since their arrival in the region in the late 19<sup>th</sup> century (Leonard 1995). This area includes lands within the Murray and Sukunka River watersheds, as well as northward within the Kiskatinaw River watershed to the Peace River (TMW 2009). Presently, the core of SFN hunting territory is located north of the present-day reserve, centered around the Moberly and Pine rivers, as well as Cameron and Boucher Lakes.

Moberly Lake has populations of whitefish, pike, lake trout, greyling, burbot, and suckers that the SFN have harvested in a net fishery, although this technology has declined in recent times (Weinstein 1979). Many places around the Moberly River were highly used berry-picking areas (PMT SRMP 2006).

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A number of traplines are registered to SFN families. Trapping played a very significant role in the Saulteau economy, but due to declines in fur bearing animals in recent years, as well as a general decline in the prices for furs, the importance of trapping has significantly declined.

Sundance Lake, located approximately 20 km east of Chetwynd, was a place used by Cree and Saulteau groups for the annual sun dance. Sundance Lake was also used for trapping (Mokakioyis 2008).

### *McLeod Lake Indian Band*

The main community of MLIB is at McLeod Lake, BC, 145 km north of Prince George and approximately 125 km west of the Project. In contrast to other Treaty 8 First Nations, the MLIB only recently adhered to Treaty 8, in April 2000, giving the band provisions to expand its operations in forestry, mining, oil and gas, construction, and pipelines (Golder Associates 2009).

The MLIB continue to hunt and trap along the rivers and lakes that drain to the east into the Parsnip River, including Carp Lake and the Nation River and Lakes (Ridington 2008). Nation Lakes and Carp Lake are noted as productive hunting areas, and were the location of numerous MLIB traplines, while Carp Lake is also a well-known berry-picking area. Elk are harvested around Summit Lake and north of Hoglund Lake (Terrane 2008).

Fish are harvested in the spring and summer at a number of locales, but primarily at the head of the Parsnip River and at Tabor Lake, Philip Lakes, Nation Lakes, Summit Lake, and McLeod Lake. Birds were harvested along the Crooked and Pack rivers (Terrane 2008).

MLIB Elders indicate that saskatoon berries are found north and west along McLeod Lake and Pack River areas. In summer, MLIB Elders often travel along logging roads to pick berries (Terrane 2008).

### *Métis*

The Kelly Lake Métis are descendants of the unions of Cree speaking women and French Canadian fur traders who resided in the Red River settlements of Manitoba and moved west with the fur trade in the early 1800's. They have unresolved land claims filed with the Supreme Court of BC. The community of Kelly Lake currently consists of 109 people who claim Cree, Saulteau or Métis ancestry. The Métis of Kelly Lake are represented by the Kelly Lake Métis Settlement Society. At a provincial level, the Kelly Lake Métis are represented by the British Columbia Métis Federation. The community is occupied year-round and continues to be an important hub for residents to access their traplines, hunting and fishing sites, trails, camps, and sacred sites.

### Potential Effects to Aboriginal Groups

The current use of lands and resources by Aboriginal groups for traditional purposes in the region includes fishing within the Murray River, trapping and hunting, and harvesting of country foods. HD Mining is working to engage the Aboriginal groups to gather traditional knowledge and traditional land use information to inform the EA process and to minimize the potential for impacts on Treaty Nations and Métis. During construction and operations, the Project may adversely affect Aboriginal groups through direct and indirect effects on lands and resources, including: direct loss or degradation of wildlife habitat and movement corridors; direct mortality of wildlife from vehicle collisions; sensory disturbances created by Project activities including roads; and Project-induced changes to hydrology and water quality that may have the potential to adversely affect fish and fish habitat due to uptake of contaminants of concern (e.g., selenium). Dust deposition from Project activities, particularly during construction on soil and vegetation may also affect traditional harvesting activities of plants, berries, and mushrooms. The Project may also affect traditional land and resource use through Project related restricted or altered access and land modification.

The Project may also have adverse social, economic, and cultural effects on Aboriginal groups. Economic growth can lead to a number of potential negative outcomes due to increased income disparity, potential for greater access to drugs in communities, and domestic issues arising from family members partaking in mine employment that takes them away from traditional family and community roles and responsibilities.

#### Aboriginal Engagement and Consultation

HD Mining initiated engagement activities with Aboriginal groups in 2009 (described in detail in Section 9 of the Project Description) related to exploration drilling activities; engagement continued through the Bulk Sample application process, and will continue throughout the Project's planning and regulatory review, construction, and operations phases. Specific to the EA process, Aboriginal consultation activities will follow the requirements in the Project's Section 11 Order issued by the BC EAO, and First Nations Consultation Plan (also required by the Section 11 Order).

The Section 11 Order identifies consultation requirements for the WMFN, MLIB, and SFN. HD Mining has initiated consultation activities with these three groups, and HD Mining's draft First Nations Consultation Plan is based on engagement with these groups. The objectives of the consultation efforts is to provide information about the Project, to facilitate participation during the scoping phase of the EA process, to identify and document potential concerns and issues, and to adequately respond to issues raised by these groups.

The primary issues identified through First Nations consultation efforts to date include the following:

- EA capacity funding;
- early input into Project design and planning;
- lack of confidence in the EA process;
- notice for meetings;
- employment during baseline studies;
- potential impacts to caribou and other wildlife;
- water use and water quality;
- hunting, trapping and fishing;
- human health;
- safety;
- selecting Valued Components;
- cumulative effects;
- opportunities for employment, training, and apprenticeships;
- confidentiality; and
- revenue sharing.

#### Government Agency, and Local Government Consultations

A key mechanism for consulting government agencies and local governments about the Project during the EA process is the BC EAO and CEA Agency EA working group meetings. Issues raised during EA working group meetings, public comment periods, and throughout the EA review process will be documented and responded to by HD Mining.



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HD Mining will engage with federal, provincial, regional, and local governments, the public, tenure holders near the Project, economic development organizations; businesses and contractors (e.g., suppliers and service providers); and special interest groups (e.g., environmental, labour, social, health, and recreation groups). Communities to be consulted about the Project include:

- Tumbler Ridge;
- Chetwynd;
- Dawson Creek; and
- Fort St. John.

### Public Consultation

The objectives of HD Mining's public consultation program is to inform the public about the Project, to identify any potential concerns or issues, and to adequately address concerns, if appropriate.

A public consultation plan has been developed and approved by the BC EAO, and is available on the BC EAO's Project Information Centre (e-PIC; [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_home.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html)). This plan identifies:

- the different target regions and organizations for effective engagement;
- informational and consultation tools and actions during the various phases of the EA process and the key responsibilities, and summarizes what HD Mining has heard to date; and
- HD Mining's public consultation principles and information sharing objectives to achieve a broader understanding of the proposed Project, and describes the technology that will be utilized for underground long wall mining.

The public consultation audience includes:

- local and regional government and community leaders (e.g., District of Tumbler Ridge, City of Chetwynd, City of Dawson Creek, and Peace River Regional District);
- crown tenure holders (commercial recreation, guide outfitters, trappers, forestry, mining and gas, agriculture, wind power);
- energy and resource industry (e.g., Teck, Peace River Coal, Tumbler Ridge Wind Energy);
- non-government organizations (e.g., United Steelworkers Association, Industry Training Authority); and
- interest groups or citizens associations (e.g., Tumbler Ridge Museum Foundation, Tumbler Ridge Chamber of Commerce) .

The primary issues identified by the public and stakeholders through consultation efforts to date (listed in detail in Section 9 of the Project Description) include the following:

- maximize local infrastructure benefits to the Tumbler Ridge community;
- maximize local contractual service opportunities;
- provide opportunities for employment, training, and apprenticeships;
- concern over the potential for adverse effects on wildlife, water quality, air quality, or other environmental effects;

- o safety within the underground environment and at the surface;
- o human health; and
- o English language capability of staff.

### Authorizations, Permits, and Licenses

Provincial permitting, licensing, and approval processes (statutory permit processes) may proceed concurrently with an Environmental Assessment Certificate (EAC) application or follow after an EAC decision. However, no statutory permit approvals may be issued before an EAC is obtained. Multiple provincial permits, licenses and authorizations are anticipated, including permits, certificates, and approvals under the *BC Environmental Assessment Act (2002a)*, *BC Environmental Management Act (2003)*, *BC Drinking Water Protection Act (2001)*, *BC Transportation Act (2004b)*, the *BC Public Health Act (2008)*, *BC Mines Act (1996d)*, and *BC Land Act (1996c)*.

Like the provincial EA process, no federal approvals may be issued until an EA Decision Statement is issued.

Table 3 presents a list of federal authorizations, licences, and permits that may be required to develop the Project. Other federal legislation (e.g., *Species at Risk Act (2002b)*, *Migratory Birds Convention Act (1994)*), may be relevant in terms of evaluating potential effects of the Project, but specific permit requirements under those acts are not anticipated to be required. There are potential requirements for permits under Section 35(2) of the *Fisheries Act (1985b)*<sup>1</sup> and section 5 of the *Navigable Waters Protection Act (1985c)*<sup>2</sup> associated with the conveyer crossing of the Murray River and the installation of treated water discharge infrastructure (e.g., pipeline, outfall) in Murray River.

**Table 3. Federal Authorizations, Licenses, and Permits that May Be Required for the Project**

Federal Government Approvals and Licenses	Enabling Legislation
CEAA Decision Statement	<i>Canadian Environmental Assessment Act (2012)</i>
Section 35(2) authorization for the harmful alteration, disruption or destruction of fish habitat <sup>1</sup>	<i>Fisheries Act (1985b)</i>
Section 5 approval of works in a navigable water	<i>Navigable Waters Protection Act (1985c)</i>
Explosives Magazine License	<i>Explosives Act (1985a)</i>
Ammonium Nitrate Storage Facilities	<i>Canada Transportation Act (1996g)</i>
Radio Licenses	<i>Radiocommunications Act (1985d)</i>

<sup>1</sup> Amendments to the *Fisheries Act* that were tabled in the *Jobs, Growth, and Long-term Prosperity Act (Bill C-38)*, and further revised in *Bill C-45* received Royal Assent but have not yet been brought into force. It is anticipated that the amendments will come into force during the EA review process for the Murray River project and that the current legislative requirements under the 1985 *Fisheries Act* will no longer apply. Further, it is acknowledged that the proposed expansion of the Metal Mining Effluents Regulation to include coal mines may also affect the Murray River Project with respect to the need to obtain an amendment to Schedule 2 of the MMER. The information presented in this Project Description reflects the statutory requirements as currently prescribed under the 1985 *Fisheries Act*.

<sup>2</sup> Amendments to the *Navigable Waters Protection Act* that were tabled in the *Jobs, Growth, and Long-term Prosperity Act (Bill C-38)*, and further revised in *Bill C-45* received Royal Assent but have not yet been brought into force. It is anticipated that the amendments will come into force during the EA review process for the Murray River project and that the current legislative requirements under the 1985 *Navigable Waters Protection Act* will no longer apply. The information presented in this Project Description reflects the statutory requirements as currently prescribed under the 1985 *Navigable Waters Protection Act*.

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# MURRAY RIVER COAL PROJECT PROJECT DESCRIPTION

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# Glossary and Abbreviations

## Glossary and Abbreviations

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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.

<b>3D</b>	Three-dimensional
<b>μ</b>	Micro (10 <sup>-6</sup> )
<b>AANDC</b>	Aboriginal Affairs and Northern Development Canada
<b>AIA</b>	Archaeological Impact Assessment
<b>BC</b>	British Columbia
<b>BC CDC</b>	British Columbia Conservation Data Centre
<b>BC EAO</b>	British Columbia Environmental Assessment Office
<b>BC EAA</b>	British Columbia <i>Environmental Assessment Act</i> (2002)
<b>BC ILMB</b>	British Columbia Integrated Land Management Bureau
<b>BC MENG</b>	British Columbia Ministry of Mines, Energy and Natural Gas
<b>BC MOE</b>	British Columbia Ministry of Environment
<b>BEC</b>	Biogeoclimatic Ecosystem Classification
<b>CEAA 2012</b>	<i>Canadian Environmental Assessment Act, 2012</i>
<b>CEA Agency</b>	Canadian Environmental Assessment Agency
<b>CCME</b>	Canadian Council of Ministers of the Environment
<b>CCR</b>	Coarse Coal Rejects
<b>CN Rail</b>	Canadian National Railway
<b>CNSC</b>	Canadian Nuclear Safety Commission
<b>COSEWIC</b>	Committee on the Status of Endangered Wildlife in Canada
<b>DFO</b>	Department of Fisheries and Oceans
<b>EA</b>	Environmental Assessment
<b>EAC</b>	Environmental Assessment Certificate
<b>EADS</b>	Environmental Assessment Decision Statement
<b>EC</b>	Environment Canada
<b>EIS</b>	Environmental Impact Statement
<b>EPCM</b>	Engineering, procurement, construction, and maintenance
<b>e-PIC</b>	BC EAO's Project Information Centre; <a href="http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html">http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html</a>
<b>EPT</b>	Ephemeroptera, Trichoptera, and Plecoptera (benthos communities)

## PROJECT DESCRIPTION

<b>FN</b>	First Nation
<b>GHG</b>	Greenhouse Gas
<b>GJ</b>	Gigajoule
<b>ha</b>	hectare
<b>HD Mining</b>	HD Mining International Inc.
<b>Hwy</b>	Highway
<b>ISQG</b>	Interim Sediment Quality Guidelines
<b>k</b>	Kilo ( $10^3$ )
<b>Kennecott</b>	Kennecott Coal Exploration Inc.
<b>LOM</b>	Life of Mine
<b>LRMP</b>	Land and Resource Management Plan
<b>LSA</b>	Local Study Area
<b>m</b>	milli ( $10^{-3}$ ) or metre
<b>m<sup>3</sup>/a</b>	Cubic metres per annum
<b>m<sup>3</sup>/d</b>	Cubic metres per day
<b>m<sup>3</sup>/h</b>	Cubic metres per hour
<b>M</b>	Million or Mega ( $10^6$ )
<b>masl</b>	Metres above sea level
<b>mbgs</b>	Metres below ground surface
<b>MSC</b>	Meteorological Service of Canada
<b>MSDA</b>	Mine Site Development Area
<b>MFLNRO</b>	Ministry of Forests, Land and Natural Resource Operations
<b>ML/ARD</b>	Metal leaching/acid rock drainage
<b>MLIB</b>	McLeod Lake Indian Band
<b>MMER</b>	Metal Mining Effluent Regulations
<b>MNBC</b>	Métis Nation of British Columbia
<b>MOTI</b>	Ministry of Transportation and Infrastructure
<b>MPMO</b>	Major Projects Management Office
<b>Mt</b>	Million tonnes
<b>NLG</b>	Nisga'a Lisims Government
<b>NRCan</b>	Natural Resources Canada
<b>NTU</b>	Nephelometric turbidity units
<b>PMT</b>	Peace Moberly Tract
<b>PNG</b>	Pacific Northern Gas

<b>PRC</b>	Peace River Coalfield
<b>Quintette</b>	Quintette Coal Limited
<b>RDPA</b>	<i>Regulations Designating Physical Activities</i>
<b>RIC</b>	Resource Inventory Committee (currently known as the Resource Information Standards Committee)
<b>RISC</b>	Resource Information Standards Committee (previously known as the Resource Inventory Committee)
<b>ROM</b>	Run-of-mine
<b>RSA</b>	Regional Study Area
<b>SARA</b>	<i>Species at Risk Act (2002)</i>
<b>SFN</b>	Saulteau First Nation
<b>T8</b>	Treaty 8
<b>TFW</b>	Temporary Foreign Worker
<b>the Project</b>	The Murray River Coal Project
<b>tpa</b>	Tonnes per annum
<b>tpd</b>	Tonnes per day
<b>TC</b>	Transport Canada
<b>TEM</b>	Terrestrial Ecosystem Mapping
<b>TSS</b>	Total suspended solids
<b>WMFN</b>	West Moberly First Nation

# 1. Introduction

# 1. Introduction

---

## 1.1 OVERVIEW

The main objective of the proposed Murray River Coal Project (the Project) is the safe and economic extraction of metallurgical coal resources from the Murray River deposit, located near Tumbler Ridge, British Columbia (BC; Figure 1.1-1; Figure 1.1-2). HD Mining International's (HD Mining) proposed underground coal mine will produce metallurgical coal at a rate of up to 6 M tonnes per annum (tpa). The Project is expected to provide about 600 direct jobs and 700 indirect jobs. The Project's estimated capital cost is CDN \$300 million.

This document describes the proposed Project in order to allow the Canadian Environmental Assessment Agency (CEA Agency) to determine whether an environmental assessment (EA) is required. The contents of this document are intended to fulfill information requirements outlined in the *Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012 (CEAA 2012)*, and as regulated under the *Prescribed Information for the Description of a Designated Project (SOR/2012-148)*.

The Project is considered a "designated project" under Section 15(d) of the *Regulations Designating Physical Activities (RDPA; SOR/2012-147)* as the production rate will exceed the coal mine threshold of 3,000 tonnes per day (tpd). Additionally, Section 8 of the RDPA may apply due to the construction of a facility that results in the extraction of more than 200,000 m<sup>3</sup>/a of groundwater. Up to 182,500 m<sup>3</sup>/a (500 m<sup>3</sup>/day) of this water would be sourced from a groundwater extraction well for sanitary purposes; the remaining water (up to 8,760 m<sup>3</sup>/d or 3,197,400 m<sup>3</sup>/a) would consist of seepage water from the underground mine workings.

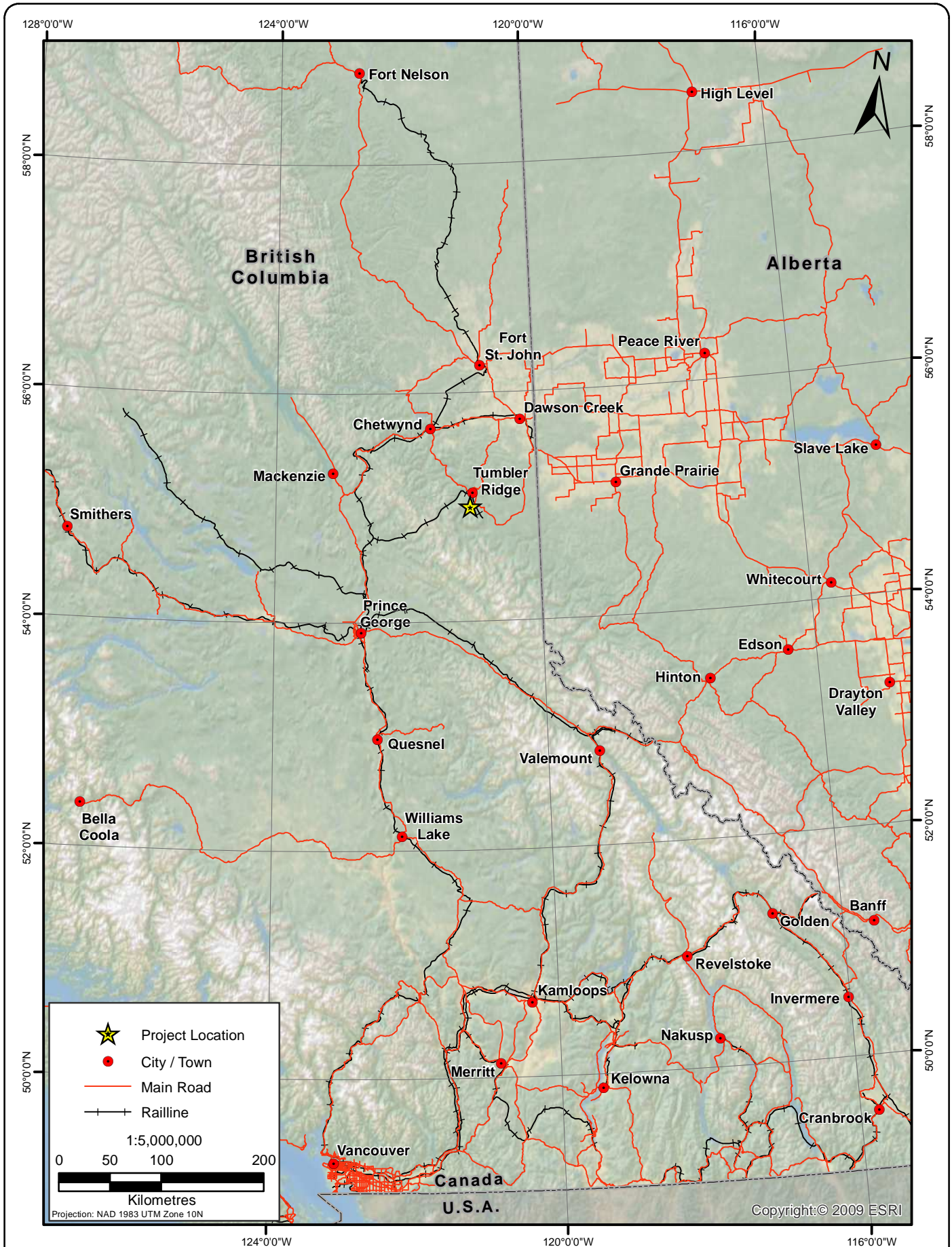
Provincially, pursuant to section 3(1) of BC's *Reviewable Projects Regulation*, the proposed production capacity for the Project exceeds the criteria of 250,000 tonnes per annum (tpa) of metallurgical coal for a new coal mine and will require a provincial EA under the British Columbia *Environmental Assessment Act (BC EAA)*. The BC Environmental Assessment Office (BCEAO) has confirmed this by issuing Section 10 (June 29, 2012) and Section 11 (December 14, 2012) orders pursuant to the BC EAA. These documents are available on the BCEAO website via the electronic Project Information Center (e-PIC; [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_home.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html)).

To support Project planning and development, environmental and socio-economic baseline studies were initiated in 2010. Engineering and scoping studies have been completed by HD Mining and Norwest Corporation. Further engineering work is being undertaken by HD Mining.

As part of exploration of the property, HD Mining received approvals from the BC Ministry of Energy, Mines and Natural Gas (BCMENG) in February 2012 and March 2012 to mine a 100,000 tonne bulk sample to test the coal for use as a coking coal and to perform coal washability testing. HD Mining is currently preparing the site to mine the bulk sample in the fall of 2013. Permitted infrastructure associated with the bulk sample is divided between two areas: the shaft area and the decline area.

HD Mining's schedule for development of the full-scale mine includes submitting an Environmental Impact Statement (EIS) in 2013 and targets coal production beginning in June 2015.



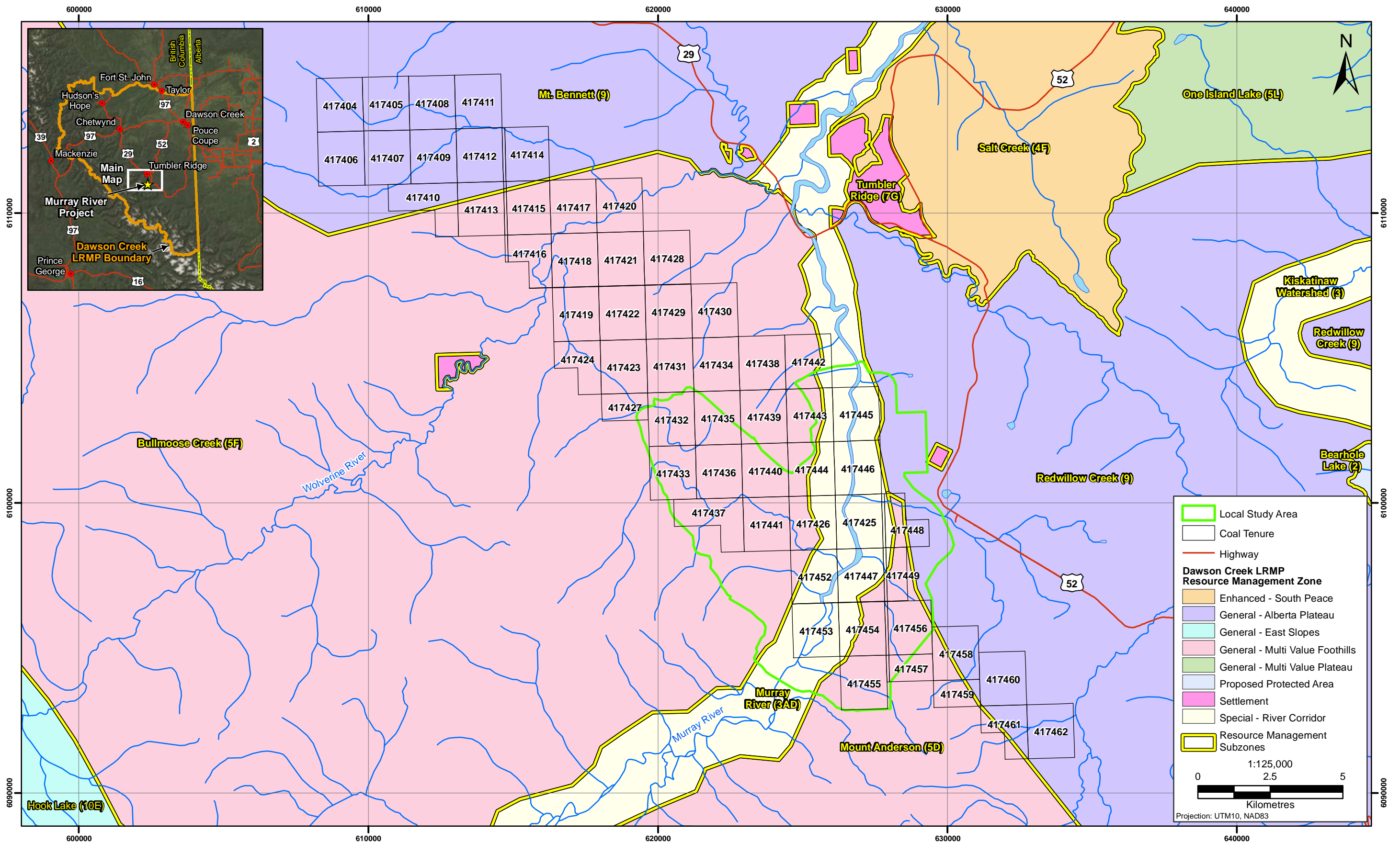


**MURRAY RIVER COAL PROJECT**

**Project Location**

**Figure 1.1-1**







## 1.2 PROPONENT

HD Mining International Ltd. holds 57 coal licences that comprise the Murray River property. Incorporated in BC in 2011, HD Mining International Ltd. is a private corporation formed by two majority partners, Huiyong Holdings (BC) Ltd. (55%) and Canadian Dehua International Mines Group Inc. (40%), with five percent held by another party. As the majority investor, Huiyong Holdings (BC) Ltd. is responsible for project investment and guides mine development and operation.

The Board of Directors of HD Mining International Ltd. is comprised of representatives of the partner companies. Mr. Penggui Yan, Chairman of Huiyong Holdings Group, the parent company of Huiyong Holdings (BC) Ltd., serves as Chairman.

Huiyong Holding Group (HHG), the parent company of Huiyong Holdings (BC) Ltd., is a private company based in China and a respected leader in underground coal mining. Currently HHG operates 9 mines throughout China. Through strong training initiatives, rigorous engineering and collaboration with local communities, HHG has developed a national reputation for excellence in mine safety, environmental protection and operational efficiency.

HD Mining contact information is provided below.

HD Mining International Ltd.  
Suite 433 - 595 Burrard Street  
P.O. Box 49161  
Vancouver, BC V7X 1J1  
Tel: 604-689-8669  
Fax: 604-689-0969  
Website: [www.hdminingintl.com](http://www.hdminingintl.com)

Contact: Jody Shimkus, VP, Environmental & Regulatory Affairs  
Email: [jody.shimkus@hdminintl.com](mailto:jody.shimkus@hdminintl.com)

## 1.3 CONSULTANTS

Rescan Environmental Services Ltd. has been retained to undertake environmental and social baseline studies and to prepare documents for the EA process. Rescan offers a wide range of science, engineering, and socio-economic services to the resource development industry. Rescan contact information is provided below.

Rescan Environmental Services Ltd.  
Sixth Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3  
Tel: 604-689-9460  
Fax: 604-687-4277  
Website: [www.rescan.com](http://www.rescan.com)

Jason Rempel, Project Manager  
Email: [jrempel@rescan.com](mailto:jrempel@rescan.com)

Anne Currie, Project Director  
email: [acurrie@rescan.com](mailto:acurrie@rescan.com)

## 2. Regional Overview

## 2. Regional Overview

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### 2.1 LOCATION AND ACCESS

The Project is located 12.5 km southwest of the town of Tumbler Ridge, BC. The coordinates are E 112°54'03"-121°18'07", N 54°56'59'-55°09'59". The Project is accessed from Highway 52 (Heritage Highway), and the existing Quintette / Murray River Forest Service Road.

### 2.2 REGIONAL INFRASTRUCTURE

The Project falls within the Peace River Regional District (PRRD) and the closest communities to the Project are the District of Tumbler Ridge and Town of Dawson Creek, which is a service centre for PRRD southern communities (Table 2.2-1, Figure 2.2-1). These communities are expected to be a source of labour, goods and services for the Project. Chetwynd is located at the junction of Highway 97 (Alaska Highway) and Highway 29 and the CN Rail mainline. Fort St. John is the largest city in the north-east region and is the main government services, logistical and supply centre for the PRRD. Given its central role in the region, Fort St. John is also expected to be a source of labour, supplies and service contracts for the Project. These four communities will be included in the scope of the effects assessment because of their proximity to the Project site and their reliance on resource-based industries.

**Table 2.2-1. Summary of Communities and Proximity to the Murray River Coal Project**

Community	Population <sup>1</sup>	Distance (km)
Tumbler Ridge	2,710	13
Chetwynd	2,635	85
Pouce Coupe	738	98
Dawson Creek	11,583	98
Hudson Hope	970	128
Taylor	1,373	130
Fort St. John	26,380	137
West Moberly Lake #168A	95	99
McLeod Lake #1	73	130
East Moberly Lake #169 (SFN)	324	103

<sup>1</sup> Statistics Canada (2012)

### 2.3 REGIONAL LAND USE

The regional economic base is supported primarily by resource extraction industries including mining, oil and gas, power, and forestry. Mineral exploration activity has increased in recent years, providing significant employment opportunities which are anticipated to continue while overseas commodity spot prices remain high. Forestry and tourism have fluctuated significantly in response to prevailing economic conditions.

HD Mining is committed to developing the Project in a manner that satisfies regional land use objectives. The Project is located in the Dawson Creek Land and Resource Management Plan (DC LRMP; Ministry of Forests Lands and Natural Resources Operations 1999). The Dawson Creek LRMP encompasses 2.9 million hectares of land between Fort St. John and Prince George (Figure 1.1-2). The Dawson Creek LRMP's objectives with respect to coal and minerals are to:

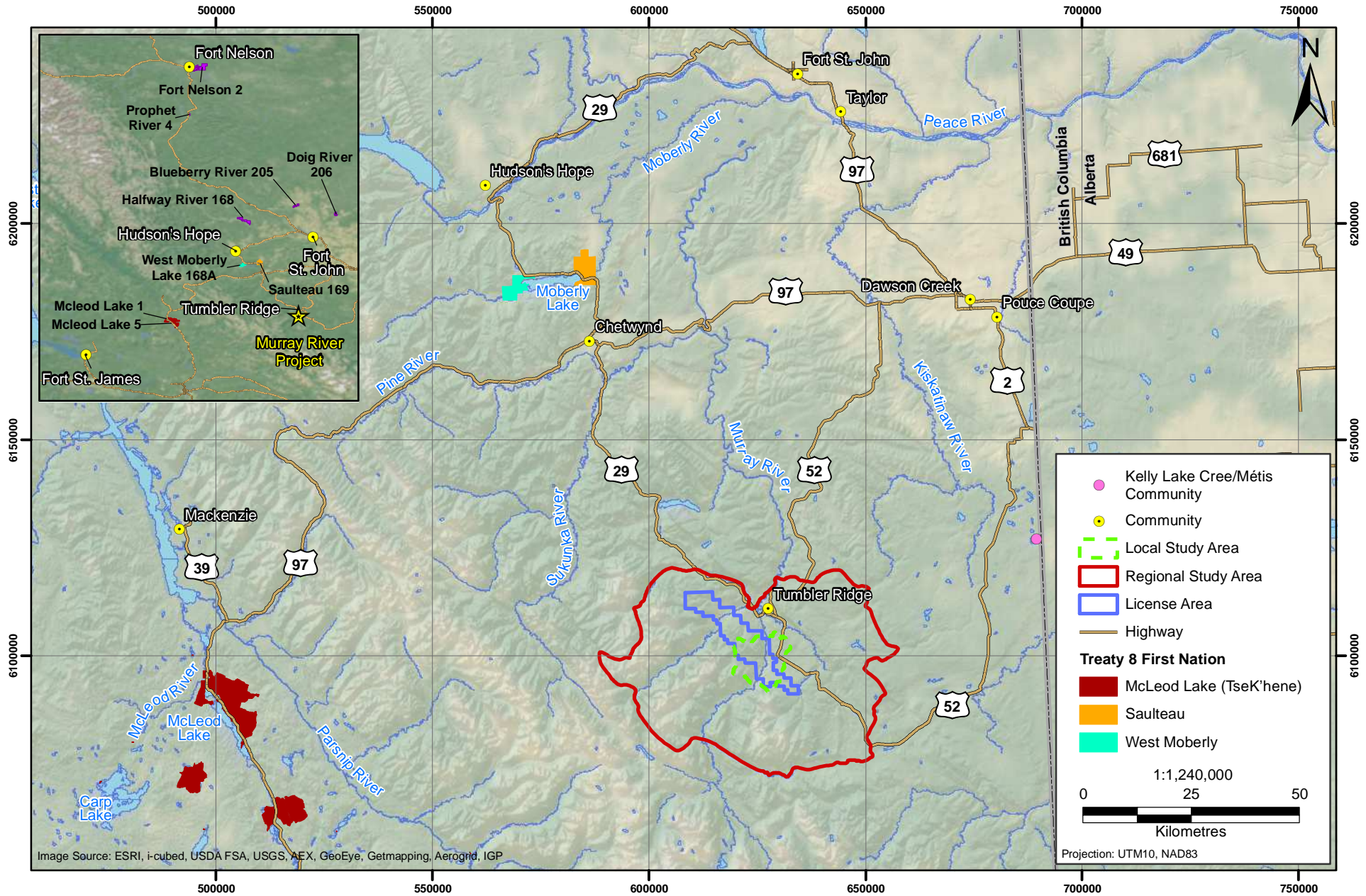


Figure 2.2-1



**MURRAY RIVER COAL PROJECT**

### Communities and Treaty 8 First Nations Located Near the Project

Figure 2.2-1



- 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 (*Ursus arctos*)).

The Project is located near two provincial parks and protected areas. Bearhole Lake Provincial Park and Protected Area is located approximately 17 km east of the Project, and Monkman Provincial Park is located approximately 27 km south of the Project (Figure 2.3-1).

## 2.4 TREATY 8 FIRST NATIONS AND MÉTIS

The Project is located within Treaty 8 (Figure 2.4-1). The federal Crown negotiated Treaty 8 in 1899 with Cree, Beaver, Chipewyan and other Indians, for an area that encompasses northeast British Columbia, northern Alberta, the northwest corner of Saskatchewan, and part of the Northwest Territories. Seven of the original 40 Treaty 8 First Nation communities are located in British Columbia. The McLeod Lake Indian Band adhered to Treaty 8 in 2000, in accordance with the McLeod Lake Indian Band Treaty 8 Adhesion and Settlement Agreement (British Columbia Environmental Assessment Office 2012).

BC Treaty 8 First Nations include the Saulteau First Nations, West Moberly First Nations, McLeod Lake Indian Band (TseK'hene First Nation), Blueberry River First Nations, Doig River First Nation, Halfway River First Nation, Prophet River First Nation and Fort Nelson First Nation.

The West Moberley First Nations (WMFN), Saulteau First Nations (SFN) and McLeod Lake Indian Band (MLIB) are the nearest Treaty 8 First Nations to the Project (Figure 2.2-1), and have been identified as First Nations under the Project's Section 11 Order issued by the BC EAO. The Kelly Lake Cree/Métis community is located 65 km northeast of the Project (Figure 2.2-1).

The elements of Treaty 8 included provisions to maintain a livelihood for the native populations in this 840,000 km<sup>2</sup> (84,000,000 ha) region, such as entitlements to land, ongoing financial support, annual shipments of hunting supplies, and hunting rights on ceded lands unless those ceded lands were used for forestry, mining, settlement, or other purposes (Madill 1986).

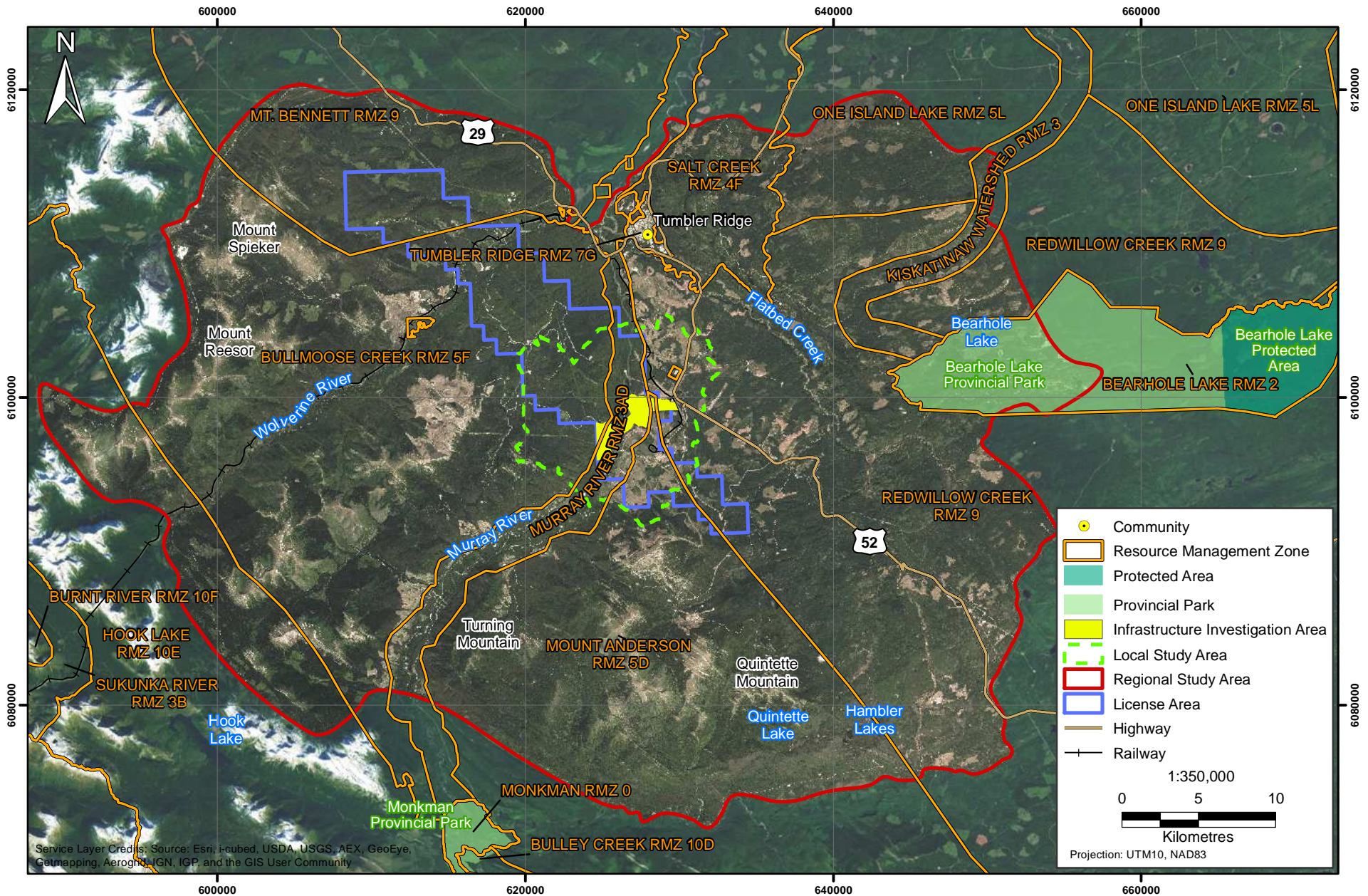
In exchange for surrendering their lands, signatory First Nations would receive Indian Reserves based on 640 acres for each family of five; families or individuals who wished to live off reserve would receive "land in severalty to the extent of 160 acres to each Indian". Treaty 8 also included provisions for education, farm stock, farm implements, ammunition, twine, and clothing (Madill 1986). Treaty 8 promises its signatories the right to "pursue their usual vocations of hunting, trapping, and fishing throughout the tract surrendered heretofore described, subject to such regulations as may from time to time be made by the Government of the country, acting under the authority of Her Majesty, and saving and excepting such tracts as may be required or taken up from time to time for settlement, mining, lumbering, trading, or other purposes".

### 2.4.1 West Moberly First Nations

West Moberley First Nations is a historic signatory to Treaty 8 and a member of the Treaty 8 Tribal Association (T8TA). The community of West Moberly Lake is approximately 30 km north of the town of Chetwynd and approximately 105 km northwest of the Project. Their 2033.6 ha reserve is at the west end of Moberly Lake (Figure 2.2-1). Aboriginal Affairs and Northern Development Canada (AANDC) states that there are 238 members of the WMFN, with 85 people living on the West Moberly Reserve #168A, and 150 people living off-reserve (AANDC 2012a). Comparatively, according to the 2011 Census, there were 95 people living on reserve (#168A), an 86.3% increase from 2006, when there were only 51 people living on the reserve (AANDC 2012b; Statistics Canada 2012c).

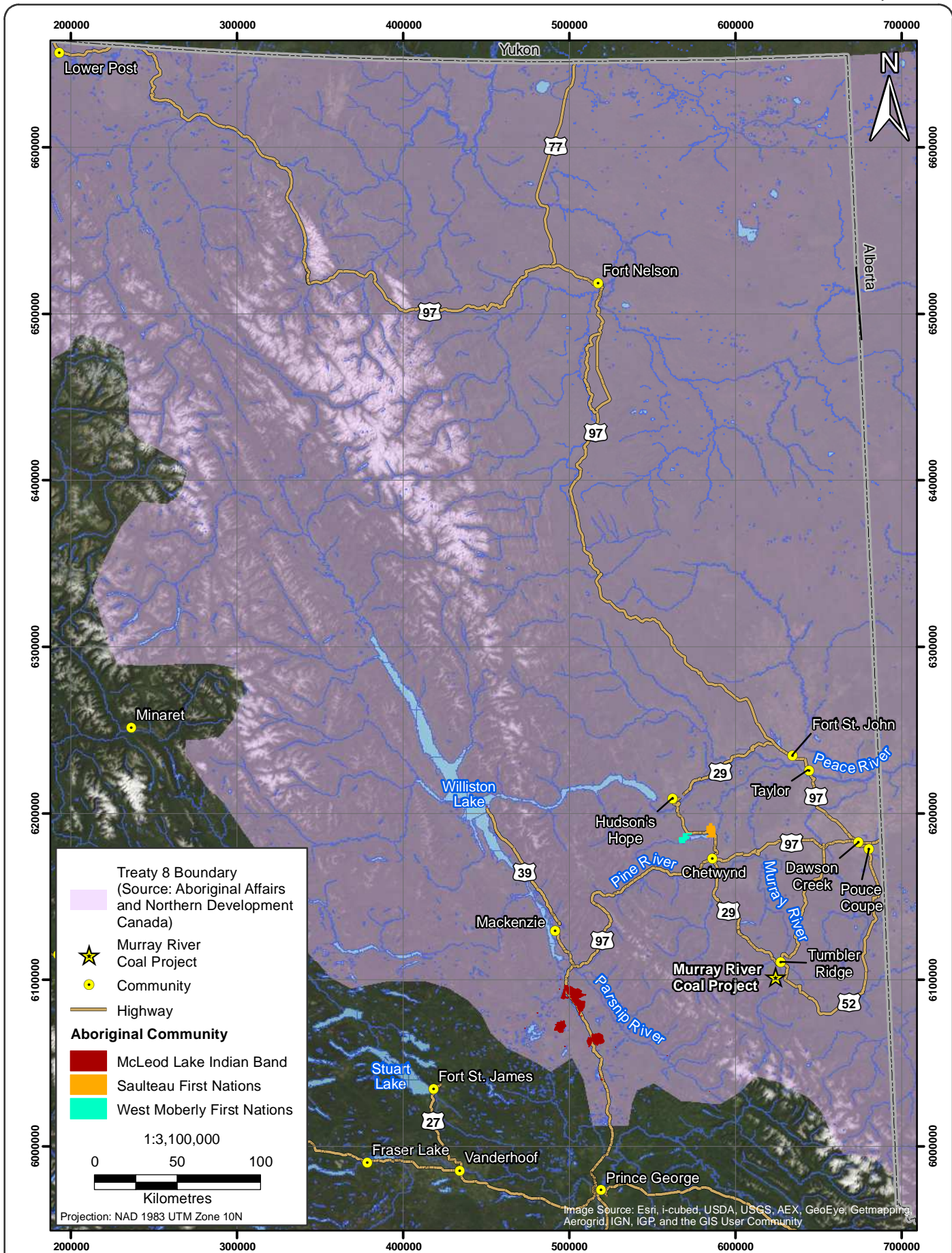
As early treaty signatories, the WMFN have not defined a distinct traditional territory within Treaty 8 lands.





Service Layer Credits: Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community





## PROJECT DESCRIPTION

### 2.4.2 Saulteau First Nations

SFN is a historic signatory to Treaty 8 and a member of the T8TA. The Saulteau community at East Moberly Lake is approximately 25 km north of the town of Chetwynd and approximately 105 km northwest of the Project (Figure 2.2-1). Their 3025.8 ha reserve is located at the east end of Moberly Lake. AANDC does not list their on and off-reserve population, however the T8TA lists the population of the SFN at 840 (T8TA 2012). According to the 2011 Census, there were 325 people living on the East Moberly Lake Reserve (#169,), a 17.8% increase from 2006, when 275 people lived on reserve (AANDC 2012c; Statistics Canada 2012a).

Similarly to the WMFN, the SFN have not defined a distinct traditional territory within Treaty 8 lands.

### 2.4.3 McLeod Lake Indian Band (TseK'hene First Nation)

The main community of MLIB is at McLeod Lake, BC, 145 km north of Prince George and approximately 125 km west of the Project (Figure 2.2-1). The AANDC does not list their on and off-reserve populations, however the BC Ministry of Aboriginal Relations and Reconciliation (MARR) lists the population of MLIB at 491 as of 2010 (MARR 2012). According to the 2011 Census, there were 73 people living on McLeod Lake IR 1, a 22.3% decrease from 2006, when 94 people lived on the reserve. McLeod Lake IR 5 is aggregated as part of Electoral Area 'G' of the Fraser-Fort George Regional District; therefore, data on reserve population cannot be distinguished from the larger area (Statistics Canada 2012b).

In contrast to other Treaty 8 First Nations, the MLIB only recently adhered to Treaty 8, in April 2000, giving the band provisions to expand its operations in forestry, mining, oil and gas, construction, and pipelines (Golder Associates 2009). New Indian Reserves were established in Mackenzie and Bear Lake as provisions of the Treaty 8 Adhesion Agreement (Table 2.4-1). In total, the MLIB have 21 reserves totalling 15,957.2 ha.

**Table 2.4-1. McLeod Lake Indian Band Reserves**

Reserves	Res. #	Hectares	Notes
Arctic Lake	10	2.0	
Blue Lake	24	1.1	
Carp Lake	3	4.9	
Davie Lake	28	1.0	
Finlay Bay	21	1.0	
Hominka	11	2.0	
Kerry Lake East	9	3323.0	
Kerry Lake West	8	898.0	
Mackenzie	19	8.1	
McIntyre Lake	23	4.0	
McLeod Lake	1	815.2	Primary Reserve for community members together with IR 5.
McLeod Lake	5	8061.3	Primary Reserve for community members together with IR 1.
Pack River	2	111.7	
Quaw Island	25	1.5	
Sas Mighe Indian	32	26.0	
Tacheeda Lake	14	2.1	
Tom Cook	26	12.0	
War Lake	4	3.3	
Weedon Carp	6	2674.0	
Weedon Lake	27	4.0	
Weston Bay	20	1.0	

Source: Aboriginal Canada Portal (2012); AANDC (2012b)

MLIB traditional territory is approximately 108,000 square kilometres (km<sup>2</sup>; Figure 2.4-2) and is bounded as follows (MLIB, n.d., cited in Golder Associates 2009):

- to the south, the height of land separating the Arctic and Pacific watersheds near Summit Lake;
- to the east, following that height of land to the border of BC and Alberta;
- to the north, following the border to the Peace River, west, following the southern bank of the Peace River to Williston Lake, south, following the western bank of Williston Lake to the western bank of Manson Arm, south, along the west bank of Manson Arm, southwest and west, along the height of land between Manson River and Eklund Creek and Jackfish Creek, southwest; and
- to the west, along the height of land between the Nation River watershed and the Omineca River watershed, south and east along the height of land separating the Arctic and Pacific watersheds to the commencement point.

#### 2.4.4 Métis

Current federal approach acknowledges potential Aboriginal rights for Métis communities in BC. Most Métis communities in BC are chartered through the Métis Nation BC (MNBC).

The Kelly Lake Métis are descendants of the unions of Cree speaking women and French Canadian fur traders who resided in the Red River settlements of Manitoba and moved west with the fur trade in the early 1800's. They were overlooked both by the Treaty 8 and Scrip Commissions and have unresolved land claims which they have filed with the Supreme Court of BC. The community of Kelly Lake currently consists of 109 people who claim Cree, Saulteau or Métis ancestry. The Métis of Kelly Lake are represented by the Kelly Lake Métis Settlement Society. Together the three Aboriginal groups claim northeast British Columbia and west-central Alberta as their traditional territory. Kelly Lake is located within BC, 1.6 km inside the British Columbia-Alberta border, 56 km south of Dawson Creek, and 65 km northeast of the Project (Figure 2.2-1). The community is occupied year-round and continues to be an important hub for residents to access their traplines, hunting and fishing sites, trails, camps, and sacred sites. At a provincial level, the Kelly Lake Métis are represented by the British Columbia Métis Federation.

## 2.5 SOCIO-ECONOMIC SETTING

The closest community to the Project is Tumbler Ridge and is the most likely community to be affected by the Project. Dawson Creek is the closest city to the Project and is a service centre for the Peace River Regional District (PRRD) southern communities; therefore, is expected to be a source of labour, goods and services for the Project.

The community of Chetwynd is located at the junction of Highway 97 (Alaska Highway) and Highway 29 and the Canadian National Rail mainline. Pouce Coupe, Hudson's Hope and Taylor are smaller regional communities. They are considered because of their proximity to the Project site and their reliance on resource-based industries.

Fort St. John is the largest city in the north-east region and is the main government services, logistical and supply centre for the PRRD. Given its central role in the region, Fort St. John is also expected to be involved in the provision of labour force, supplies and service contracts for the Project.

The mining and oil and gas industries supplied more than 9% of employment in the region in 2011. Expansion of the oil and gas industry has also stimulated construction activity (SPEDC 2012). The Peace River Region also produces 90% of BC's grain, and 40% of the province's hydroelectric power. In addition, the region has a relatively healthy timber supply areas and several large lumber and pulp and paper mills and remanufacturing facilities (NPEDC 2012).



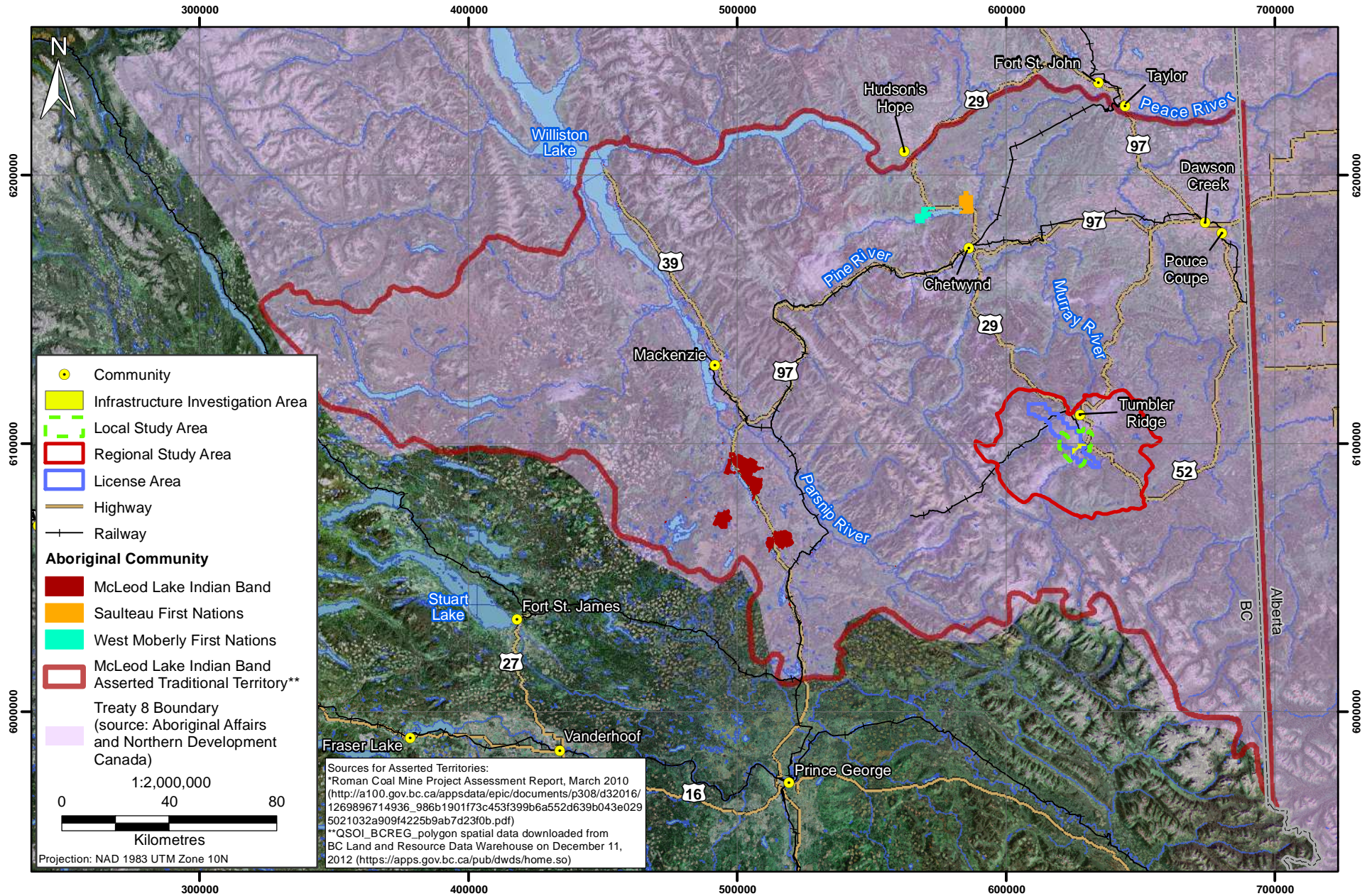


Figure 2.4-2



**MURRAY RIVER COAL PROJECT**

### McLeod Lake Indian Band Asserted Traditional Territory

Figure 2.4-2



The construction and operation of the Project is likely to have direct and indirect social and economic effects on local and regional communities. It will provide approximately 18,600 person-years of direct employment. HD Mining expects to require the use of Temporary Foreign Workers (TFWs) who are experienced in underground longwall mining to mine the Bulk Sample and to help start the mine. HD Mining is working with the District of Tumbler Ridge to develop appropriate housing for workers, and with Northern Lights College to develop a training program so that, over time, the underground mining jobs could be transferred from TFWs to local workers.

Increased economic development opportunities will result through the provision of locally sourced materials, supplies, and equipment. The Project will provide local, provincial and federal tax revenues annually throughout construction and operations. Increased pressure on community infrastructure and emergency services will result from housing TFW in Tumbler Ridge. The Project may affect land and resource use for both Aboriginal and non-Aboriginal users through Project-related restricted or altered access and land modification. Guide outfitter territories and registered trap lines exist locally, and recreational hunting and fishing activities are common land uses that could be adversely affected by mining activities.

## 2.6 REGIONAL ENVIRONMENTAL STUDIES

HD Mining is not aware of any regional environmental studies within the local or regional Project areas as described under section 74(1) of the *Canadian Environmental Assessment Act* (2012).

The BC MOE is leading a study to determine selenium uptake and general metals content in Murray River Slimy Sculpin (*Cottus cognatus*) and fine bottom sediments tissue (Carmichael and Chapman 2006). The sampling program includes 3 sample sites upstream of the coal development projects on the Murray River, and 3 sample sites downstream. HD Mining has not been asked to participate in this study.

To the south of the Project, the BC MOE is leading a Mountain Caribou Recovery Implementation Plan. This plan is described “as a collaborative approach with conservation organizations, First Nations, the forest industry and outdoor recreation groups in restoring the mountain caribou population to pre-1995 levels of more than 2,500 animals throughout their existing range” (ILMB 2007).

Numerous baseline environmental studies have been undertaken in the regional area to satisfy EA information requirements (Figure 2.6-1). Table 2.6-1 provides a summary of past, existing, and potential future projects that occur within the region that have been, are, or may be subject to the EA process. Some aspects of these projects may have a spatial or temporal linkage with the Project.

## 2.7 FEDERAL LANDS, FUNDING, AND TRANSBOUNDARY EFFECTS

There are no federal lands that would be affected by the Project. The nearest federal lands to the Project are the East Moberly Lake Indian Reserve 169 and West Moberly Lake Indian Reserve 168A, which are both located approximately 100 km northwest of the Project.

No federal funding is being sought or provided for the Project. No Project-related effects to federal lands are anticipated.

The Project is not expected to result in any transboundary effects to areas outside of British Columbia, including Alberta and the United States.



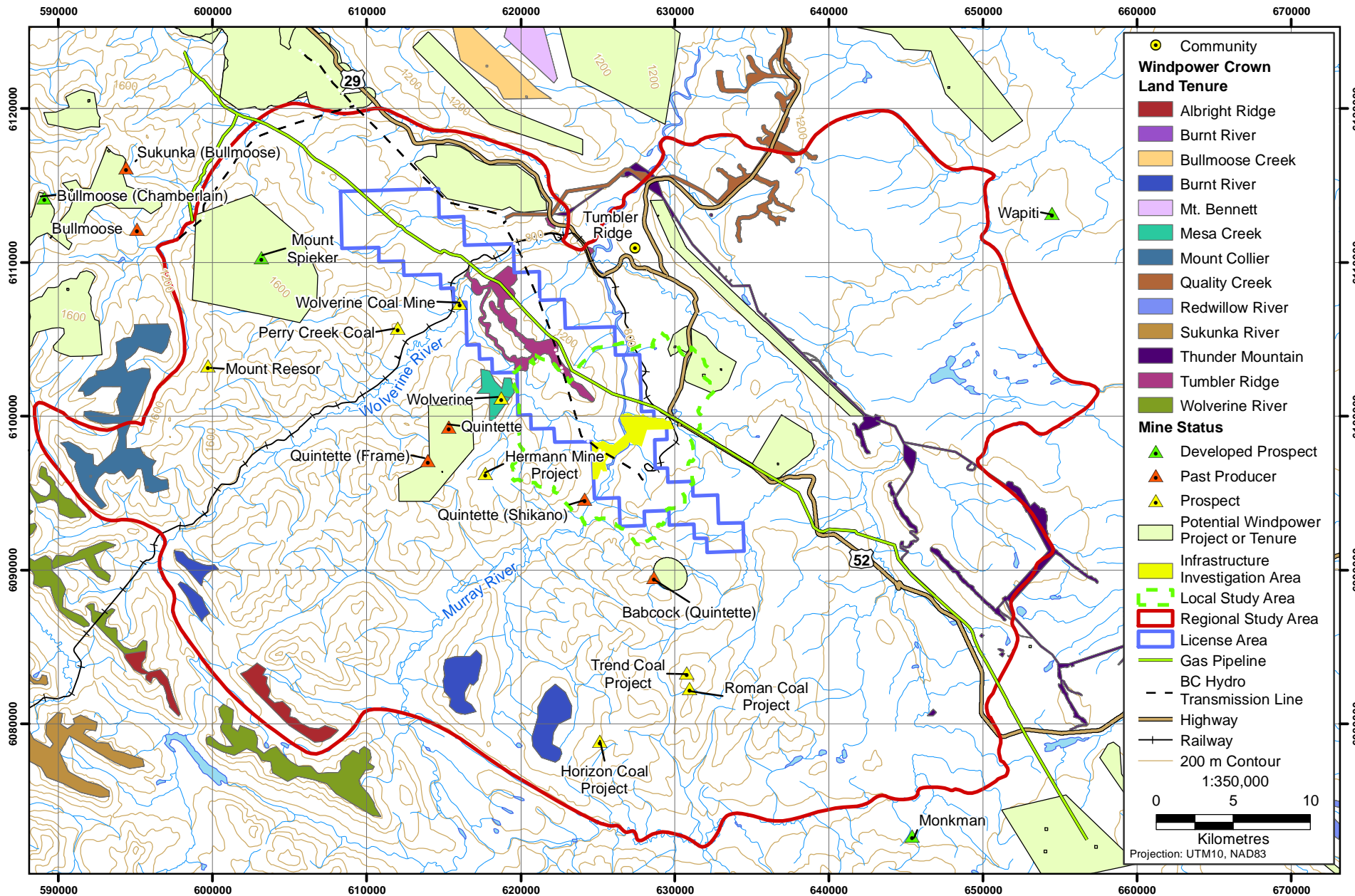


Figure 2.6-1



**MURRAY RIVER COAL PROJECT**

**Mine and Energy Developments in the Region**

Figure 2.6-1



**Table 2.6-1. Current Status of Regional Mine and Energy Development Projects**

Past Projects	Existing Projects	Potential Future Projects
Quintette Coal Mine	Mount Spieker	Mount Reesor
Quintette (Frame)	Bullmoose (Chamberlain)	Perry Creek Coal
Quintette (Shikano)	Monkman	Wolverine River Wind
Quintette (Babcock)	Quality Creek Wind	Wildmare Wind
Bullmoose	Wolverine Coal Mine	Tumbler Ridge Wind
Sukunka (Bullmoose)	Trend Coal Project	Roman Coal Project
		Hermann Mine Project
		Horizon Coal Project
		Albright Ridge Wind
		Burnt River Wind
		Bullmoose Creek Wind
		Mt. Bennett Wind
		Mesa Creek Wind
		Mount Collier Wind
		Redwillow River Wind
		Sukunka River Wind
		Thunder Mountain Wind

### 3. Mineral Tenure, Exploration and Permitting History



### 3. Mineral Tenure, Exploration and Permitting History

#### 3.1 MINERAL TENURE

The Murray River property consists of 57 coal licences covering an area of 16,024 hectares (Table 3.1-1; Figure 1.1-2).

**Table 3.1-1. Murray River Property Coal Licences**

Tenure Number	Map Number	Status	Area
417404	093P014	Good Standing 2013.05.08	296 ha
417405	093P014	Good Standing 2013.05.08	296 ha
417406	093P014	Good Standing 2013.05.08	296 ha
417407	093P014	Good Standing 2013.05.08	296 ha
417408	093P014	Good Standing 2013.05.08	296 ha
417409	093P014	Good Standing 2013.05.08	296 ha
417410	093P014	Good Standing 2013.05.08	296 ha
417411	093P014	Good Standing 2013.05.08	296 ha
417412	093P014	Good Standing 2013.05.08	296 ha
417413	093P014	Good Standing 2013.05.08	296 ha
417414	093P014	Good Standing 2013.05.08	296 ha
417415	093P014	Good Standing 2013.05.08	296 ha
417416	093P005	Good Standing 2013.05.08	222 ha
417417	093P015	Good Standing 2013.05.08	296 ha
417418	093P005	Good Standing 2013.05.08	296 ha
417419	093P005	Good Standing 2013.05.08	297 ha
417420	093P015	Good Standing 2013.05.08	296 ha
417421	093P005	Good Standing 2013.05.08	296 ha
417422	093P005	Good Standing 2013.05.08	297 ha
417423	093P005	Good Standing 2013.05.08	297 ha
417424	093P005	Good Standing 2013.05.08	223 ha
417425	093P005	Good Standing 2013.05.08	297 ha
417426	093P005	Good Standing 2013.05.08	297 ha
417427	093P005	Good Standing 2013.05.08	149 ha
417428	093P005	Good Standing 2013.05.08	296 ha
417429	093P005	Good Standing 2013.05.08	297 ha
417430	093P005	Good Standing 2013.05.08	297 ha
417431	093P005	Good Standing 2013.05.08	297 ha
417432	093P005	Good Standing 2013.05.08	297 ha
417433	093P005	Good Standing 2013.05.08	297 ha
417434	093P005	Good Standing 2013.05.08	297 ha
417435	093P005	Good Standing 2013.05.08	297 ha
417436	093P005	Good Standing 2013.05.08	297 ha
417437	093P005	Good Standing 2013.05.08	297 ha
417438	093P005	Good Standing 2013.05.08	297 ha

(continued)

Table 3.1-1. Murray River Property Coal Licences (completed)

Tenure Number	Map Number	Status	Area
417439	093P005	Good Standing 2013.05.08	297 ha
417440	093P005	Good Standing 2013.05.08	297 ha
417441	093P005	Good Standing 2013.05.08	297 ha
417442	093P005	Good Standing 2013.05.08	297 ha
417443	093P005	Good Standing 2013.05.08	297 ha
417444	093P005	Good Standing 2013.05.08	297 ha
417445	093P005	Good Standing 2013.05.08	297 ha
417446	093P005	Good Standing 2013.05.08	297 ha
417447	093I095	Good Standing 2013.05.08	297 ha
417448	093P005	Good Standing 2013.05.08	223 ha
417449	093I095	Good Standing 2013.05.08	149 ha
417452	093I095	Good Standing 2013.05.08	297 ha
417453	093I095	Good Standing 2013.05.08	297 ha
417454	093I095	Good Standing 2013.05.08	297 ha
417455	093I095	Good Standing 2013.05.08	297 ha
417456	093I095	Good Standing 2013.05.08	297 ha
417457	093I095	Good Standing 2013.05.08	149 ha
417458	093I096	Good Standing 2013.05.08	297 ha
417459	093I096	Good Standing 2013.05.08	149 ha
417460	093I096	Good Standing 2013.05.08	297 ha
417461	093I096	Good Standing 2013.05.08	223 ha
417462	093I096	Good Standing 2013.05.08	298 ha

### 3.2 EXPLORATION HISTORY

Previous exploration in the area was conducted by various major oil and gas companies in the 1970s (Lortie 2010), Quintette Coal Limited and more recently in 2006 and 2007 by Kennecott. The exploration programs in the 1970s were generally regional in nature, comprised of widely spaced seismic lines and drilling of a small number of primarily oil and gas wells. These programs helped Quintette and Kennecott identify target areas for more detailed coal exploration and eventual mining. The target seams for the Project are part of the Gates Formation (Fort Saint John Group).

Kennecott's exploration program is the only known coal specific exploration program conducted within the Murray River licence area. It consisted of one rotary (Lane 2006) and three core holes (BC MEMNG 2006) two others were abandoned, surface mapping and interpretation of two seismic lines. Because of difficulties encountered during drilling, only one core hole was completed through the Gates Formation.

Du Pont completed two holes in 1979 west of the Murray River property as a preliminary investigation of the Gates Formation coal seams. One hole did not penetrate into the zone on contact between upper Gates and Hulcross due to the interception of a postulated fault zone (Du Pont of Canada Exploration Ltd. 1980). The property has undergone numerous geological investigations, primarily from 1971 through 1980, when there was interest in western Canadian metallurgical coal properties. These investigations were performed before computerized geologic models were employed for coal property evaluation. A preliminary geologic model has been developed for the property.

In 2009, Canadian Dehua International Mines Group Inc. obtained the Murray River coal property. Detailed exploration consisting of 12 drill holes was carried out in 2009 and 2010 focusing on the central part of the property (about 37.45 km<sup>2</sup>). On July 17, 2010, Huiyong Holdings Group Ltd. signed a “Cooperation Agreement on Canada Murray River Coalfield” with Canada Dehua International Mines Group Inc. From August 2010, additional exploration was performed on the property with a total of 20 holes (17,850 m) drilled; two of the holes were tested for hydrogeologic properties.

### 3.3 PERMITTING HISTORY

As part of exploration of the coal deposit, HD Mining has received the following approvals from the BC Government to mine a 100,000 tonne bulk sample:

- Coal Exploration Permit CX-9-44 (BC Ministry of Energy, Mines, and Petroleum Resources);
  - initially issued in December 2010;
  - amended in March 2012 to approve the Bulk Sample program;
- Approval AE105825 under the *BC Environmental Management Act* (BC MOE);
  - issued in February 2012, authorizes temporary discharge of effluent from the Murray River Bulk Sample initial surface preparation construction activity;
- Approval AE105878 under the *BC Environmental Management Act* (BC Ministry of Environment);
  - issued in March 2012, authorizes discharge of effluents from the Murray River Bulk Sample construction and operation activities.

The purpose of the Bulk Sample program is to test the coal for use as a coking coal and to perform coal washability testing. The raw coal mined for the bulk sample will be shipped by truck or train directly to the port in Prince Rupert for testing to be completed overseas.

HD Mining is currently preparing the site to mine the bulk sample in the fall of 2013. Permitted infrastructure associated with the Bulk Sample is divided between two areas: the shaft area and the decline area.

The shaft area includes:

- a shaft;
- topsoil storage;
- a waste rock pile; and
- water treatment facilities, including a sediment pond and discharge structure to M20 creek.

The decline area includes:

- a decline portal;
- a decline conveyor;
- a truck load-out;
- topsoil storage; and
- water treatment facilities, including a sedimentation pond and discharge infiltration galleries.

## 4. Geology

## 4. Geology

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### 4.1 REGIONAL SETTING

The Murray River property is located within the Peace River Coalfield (PRC) in the eastern foothills of the Canadian Rocky Mountains of northeastern BC. The western margin of the Foothills belt is classified as the easternmost major thrust fault that emplaced Paleozoic strata over Mesozoic strata. The eastern margin is a series of echelon thrust faults that separate the Foothills from the gently dipping strata of the Alberta Plateau (Holland 1976). The Foothills belt is characterized by folded and faulted Mesozoic sediments. The deformation within the Foothills belt is variable - mostly decreasing in complexity toward the eastern margin. Deformation within the Rocky Mountains involves complicated folding and faulting. Regional axes for folding and faulting trends northwest, dipping to the southeast. In the Foothills belt, dips tend to be 20° or less with local folds and undulations significantly modifying this value.

In the PRC there are two main coal-bearing units: the Gates Formation and the Gething Formation (British Columbia Geological Survey n.d.). Both Lower Cretaceous units were subjected to varying degrees of burial prior to the Laramide deformation and mountain-building episodes that took place approximately 40 to 70 million years ago when the Pacific and North American plates collided. The Laramide Orogeny increased the overall maturity of the coal seams. Based on drill core information from the neighbouring Quintette mine (immediately adjacent north of the Murray River Forest Service Road on Figure 6.2-1), coal seams of the Gates Formation can be comprised of up to 10 separate seams and the average cumulative thickness of the coal seams is as high as 17 metres.

### 4.2 STRATIGRAPHY

The regional geology and stratigraphy of the PRC is provided in Figures 4.2-1 and 4.2-2. Descriptions of the formations are provided below. The information is sourced primarily from Johnson (1985).

#### 4.2.1 Moosebar Formation

The basal sequence of the Moosebar Formation is a dark grey to black marine shale with sideritic concretions, bentonite, and siltstone. The upper parts comprise banded or fissile sandy shale, very fine-grained sandstone, and sandstone intercalated shale. This transition is a pro-deltaic (highstand systems tract) transition from marine sediments to the massive continental sandstones that mark the overlying Gates Formation. The Bluesky Member is a chert pebble conglomerate that is found locally at the base of the Moosebar Formation.

#### 4.2.2 Gates Formation (Fort St. John Group)

The Gates Formation conformably overlies the Moosebar Formation. The lower portion of the formation is termed the Quintette or Torrens member and consists of massive, light gray, medium-grained sandstone, with minor carbonaceous and conglomeratic horizons.

The Quintette member is overlain by several cyclical sequences of coal deposition that occur over a stratigraphic interval of approximately 80 m collectively referred to as the Middle Gates. Each cycle normally begins with laminated, medium- to fine-grained sandstone at the base, transitioning to carbonaceous shale and coal. Coal seams are thickest and more continuous in the lowermost cycle: the D through K seams are economical to mine. Individual coal seams within the higher cycles may coalesce to form a single seam, e.g., the G and I seams are typically referred to as the G/I seam.

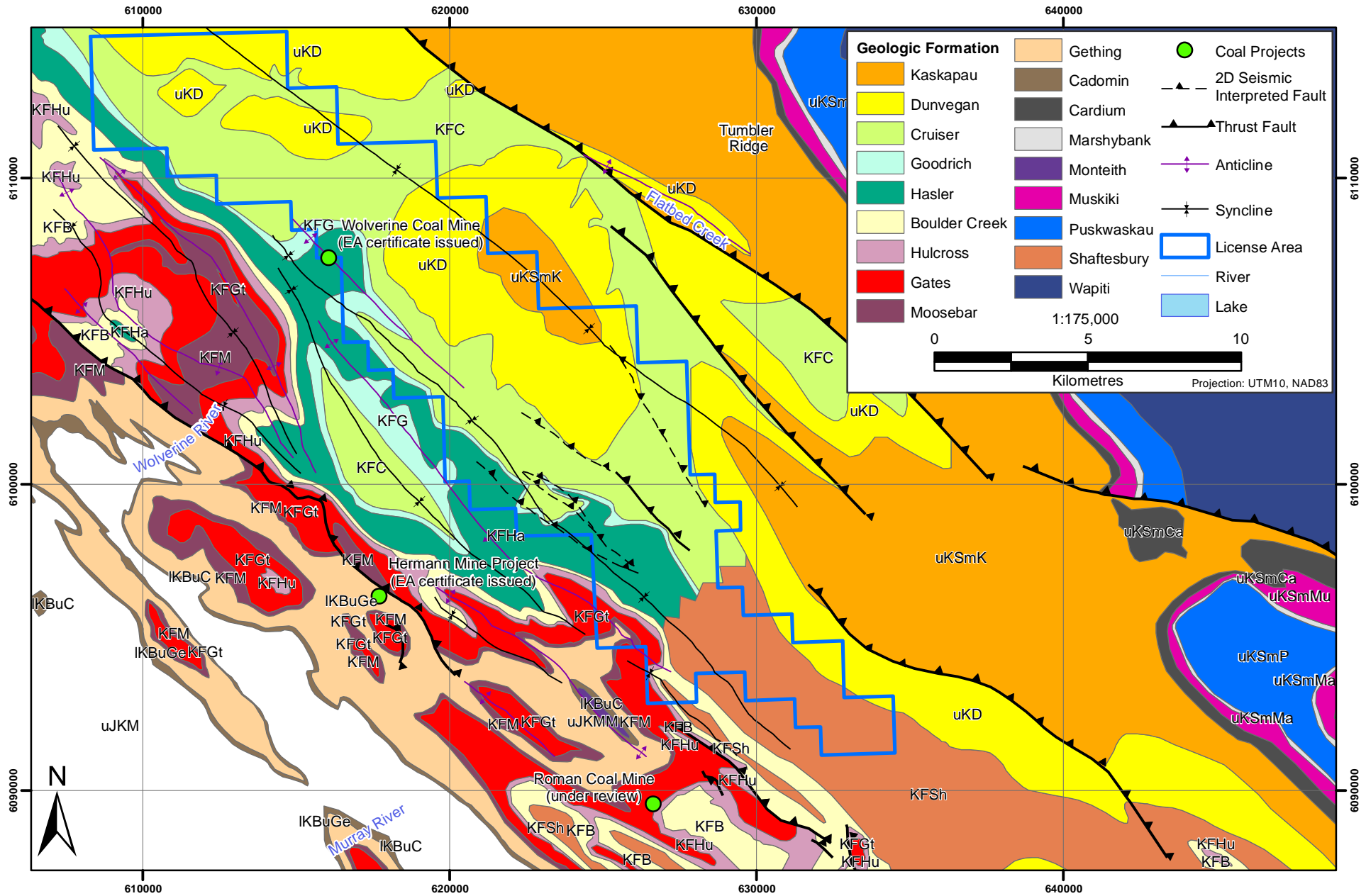


Figure 4.2-1

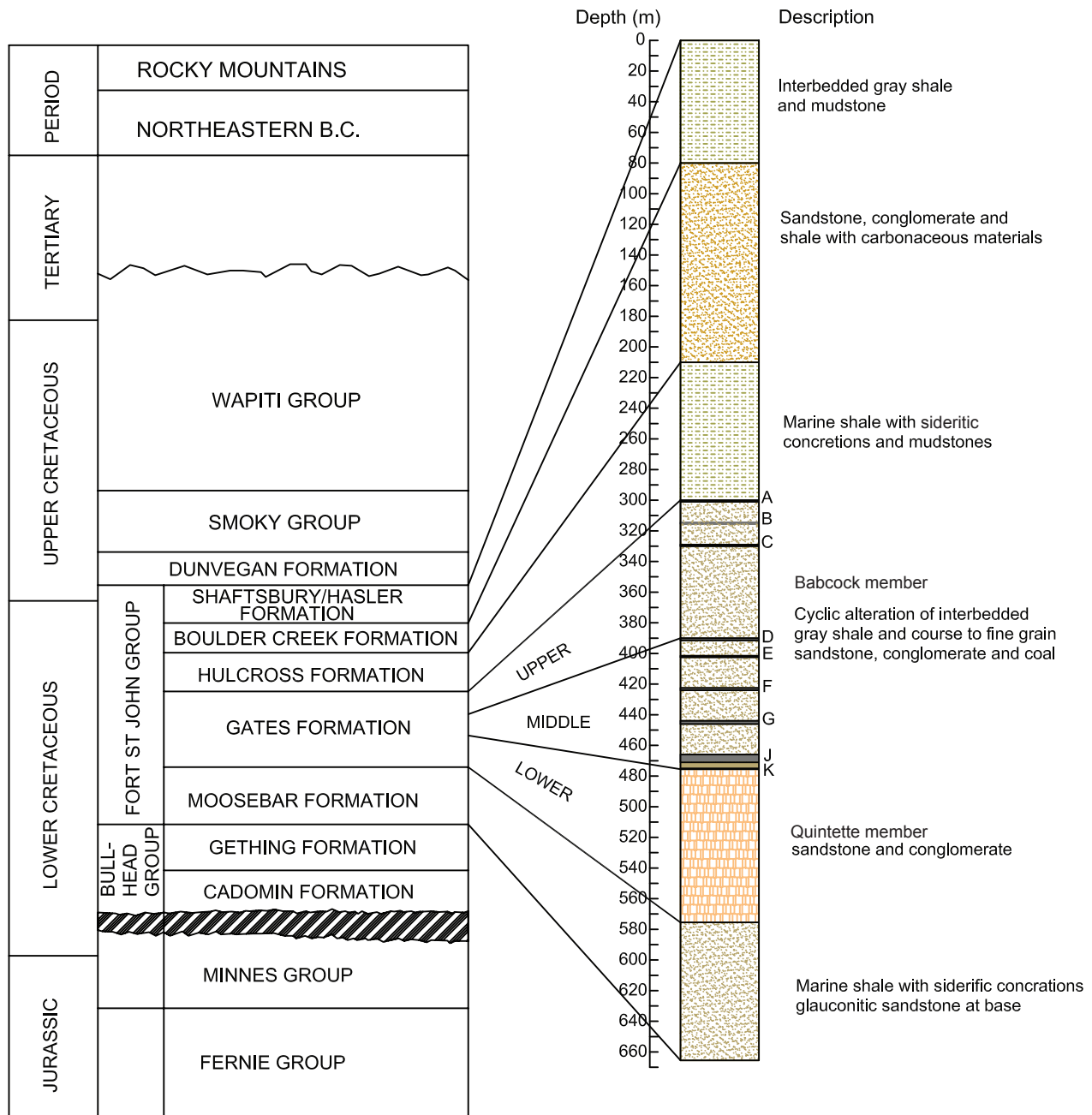


**MURRAY RIVER COAL PROJECT**

### Regional Geology of NE British Columbia

Figure 4.2-1





Source: Smith, G.G., 1989, Coal Resources of Canada; Geological Survey of Canada, Paper 89-4, pages 29-68.

**LEGEND**

- Shale / Mudstone
- Sandstone
- Shale / Sandstone
- Coal
- Sandstone / Conglomerate

## PROJECT DESCRIPTION

The lower portion of the Upper Gates is massive, medium- to coarse-grained sandstone and overlain by a predominantly shale sequence containing two to three poorly developed coal seams (A - C) intercalated with sandy shale and very fine sandstone. A very thin bed of chert pebbles with ferruginous cement marks the contact of the Upper Gates with the overlying marine sediments of the Hulcross Formation.

### 4.2.3 Hulcross Formation

The Hulcross Formation is comprised predominantly of dark grey marine shale approximately 100 metres thick. The base of the Formation is more homogeneous, arenaceous and can contain sideritic concretions. The upper portion of the Formation is dominated by thinly laminated interbeds of siltstone and very fine-grained sandstone. A few kaolinitic beds have also been observed. The Hulcross Formation is usually distinguished from the Moosebar Formation by the absence of glauconitic sandstones at the base of the Hulcross.

### 4.2.4 Boulder Creek Formation

The Boulder Creek Formation is a 130 to 200 metre thick sequence of shale, greywacke, and conglomerate that conformably overlies the Hulcross Formation. The Boulder Creek is a coarsening upward sequence with massive conglomerate and conglomeratic sandstone in the upper portions of the Formation and alternating medium- to fine-grained sandstones and shale in the middle of the Formation (Du Pont of Canada Exploration Ltd. 1980).

### 4.2.5 Hasler Formation

The Hasler Formation is predominantly dark grey marine shale with sideritic concretions and a minor sandstone and pebble conglomerate component; the basal layer is frequently pebbly (British Columbia Ministry of Energy and Mines and Responsible for Housing 2011).

Above the Hasler Formation, the Goodrich and Cruiser Formations form the uppermost units in the Fort St. John Group. According to regional geology maps, the Hasler, Goodrich, and Dunvegan formations comprise the majority of bedrock outcrop on the property.

The Hasler, Hulcross, and Boulder Creek formations are predicted to be Potentially Acid Generating (PAG) and the Upper Gates formation is predicted to be predominantly not-PAG. The majority of the minable stratigraphic units are predicted to be not-PAG, with the potential exception of the J coal seam. Shake flask extractions and kinetic tests indicate some potential for leaching of aluminum, cadmium, and selenium. Geological information will be used to inform geochemical analyses and water quality predictions related to the potential for Metal Leaching/Acid Rock Drainage (ML/ARD).



## 5. Mineral Resources

## 5. Mineral Resources

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HD Mining has undertaken a strict and methodological assessment of the resource to plan their development of the Project. A team of coal mining experts was brought together to review the exploration data collected and to develop a resource estimate. The results of this analysis were compiled by No.173 Prospecting Party of China National Administration of Coal Geology (July 2011). The following resource information has been extracted from their report.

In general, the coal seams within the proposed mining area have simple structural conditions. The seams lean to the northeast and dip more than 30° in the wing of the fold in the west of the region. The coal seams with mining value occur in the Gates Formation and the Gething Formation. There are nine coal seams developed in the Gates Formation, which are labeled alphabetically from top to bottom (A to K). There are also seven coal seams developed in the Gething Formation (from top to the bottom: Superior, Trojan, Lower Trojan, Titan, Falls, Little Mogul, and Mogul). The F and J seams are the major workable coal seams of this area, with other seams providing locally mineable sources.

Five coal seams were included in the estimation of resources: D, E, F, G/ I and J. The estimate was based on the following criteria:

- minimum mineable thickness: 0.7 m;
- maximum ash content: 40%; and
- maximum sulfur content: 3%.

The resulting resource estimate for the property includes:

- an intrinsic economic coal resource of 68,813 billion tons;
- proven intrinsic economic resources of 19,332 billion tons;
- a controlled intrinsic economic resource of 12,088 billion tons; and
- an inferred intrinsic economic resource of 37,393 billion tons.

The portion of the property currently targeted for mine development includes:

- an intrinsic economic resource of 12,156 billion tons;
- a proven intrinsic economic resource of 47.84 million tons;
- a controlled intrinsic economic resource of 18.07 million tons; and
- an inferred intrinsic economic resource of 55.65 million tons.

## 6. Project Components and Physical Activities

## 6. Project Components and Physical Activities

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### 6.1 OVERVIEW

The Project is anticipated to produce 6 million tonnes of metallurgical coal per year over 31 years. This production rate is in excess of the 3,000 tpd required to trigger a federal assessment pursuant to section 15(d) of the RDPA, CEAA (2012) and the 250,000 tpa of metallurgical coal for a new coal mine required to trigger a provincial assessment pursuant to section 3(1) of the *Reviewable Projects Regulation*, BC EAA (2002a).

### 6.2 MINE SITE

The proposed surface layout for the mine is shown in Figure 6.2-1. The Project consists of the following on-site and off-site components:

- underground mine and associated works (e.g., main access shaft, ventilation shaft for return air, ramps, portals, tunnels);
- waste rock storage facilities;
- overburden and soil storage areas;
- explosive and storage facilities;
- coal rejects storage area;
- equipment and fuel storage areas and facilities;
- maintenance, administration and warehouse facilities;
- coal handling and preparation facilities (e.g., washing plant);
- coal conveyor;
- rail load-out;
- contact water collection ditches, sedimentation pond(s) and water management structures, including a discharge pipeline;
- non-contact water diversion ditch network and sedimentation pond(s);
- water supply facilities (e.g. groundwater extraction well);
- sewage treatment and disposal facilities;
- electric transmission line connecting to the existing BC Hydro grid and related infrastructure; and
- a natural gas pipeline connecting to existing infrastructure and related sub-station infrastructure.

The above listed Project components will be permanent throughout the life of the Project. Accommodation for mine employees (i.e. worker camps at the mine site during all Project phases) will not be required as all employees will live off-site in Tumbler Ridge. Transportation of workers to and from the site, and socio-economic effects (e.g., employment, pressure on community infrastructure) will be included in the scope of the EA. No Project components or physical activities related to the development of mine site access roads, including upgrades, is required as the roads currently on site are able to support mine development activities.

## PROJECT DESCRIPTION

Bulk Sample components include:

- shaft area:
  - a shaft;
  - topsoil storage;
  - a waste rock pile; and
  - water management facilities, including a sedimentation pond and discharge structure to M20 creek.
- decline area:
  - a decline portal;
  - a decline conveyor;
  - a truck load-out;
  - topsoil storage; and
  - water treatment facilities, including a sedimentation pond and discharge infiltration galleries.

### 6.3 CONSTRUCTION PHASE

Construction activities will be focused at the Project mine site and along the transmission and natural gas pipeline corridors.

Construction activities will include:

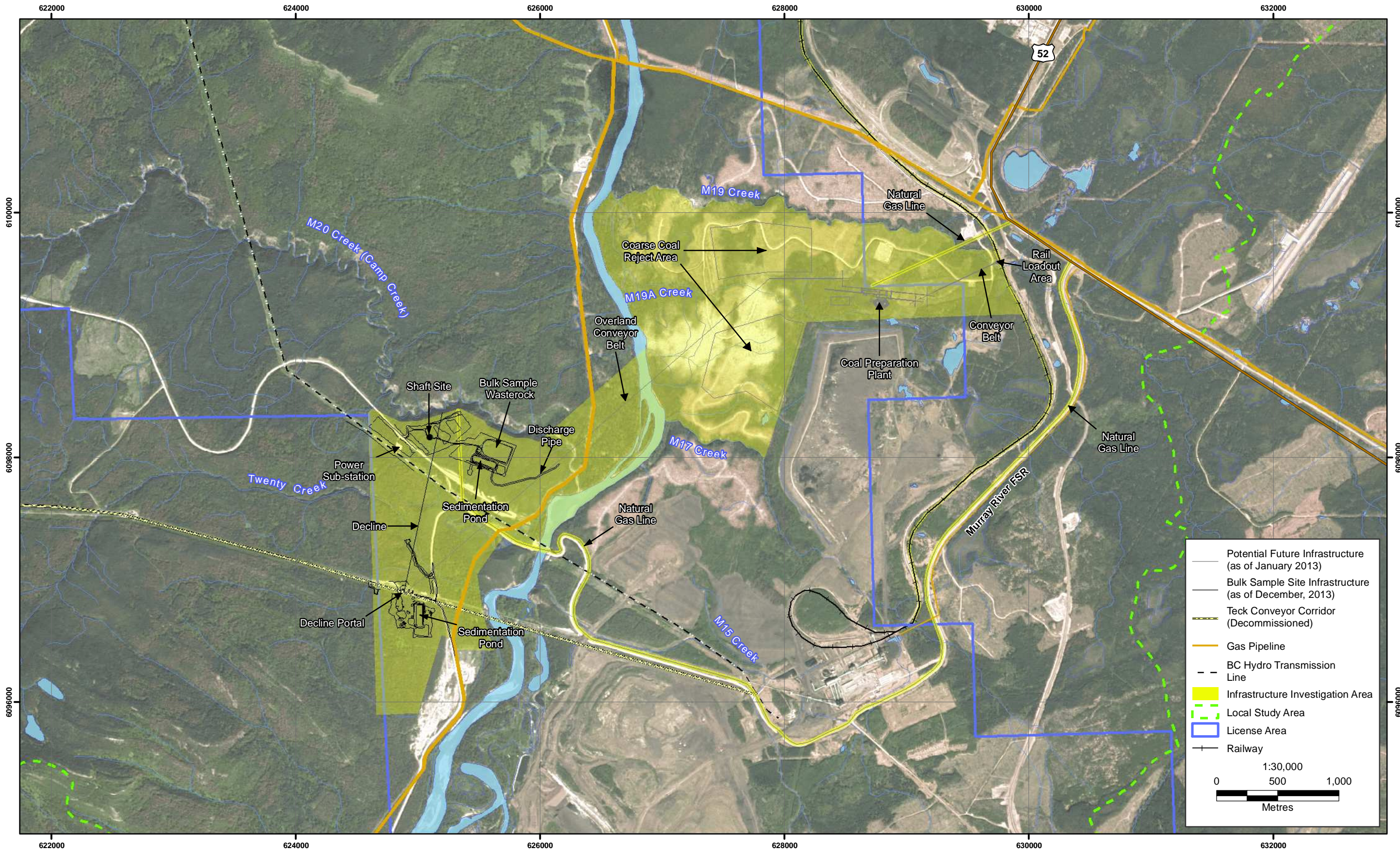
- construction of the rail load-out;
- construction of the coal preparation plant;
- construction of the conveyer belts;
- construction and/or expansion of the water treatment infrastructure including sedimentation ponds, sewage treatment plant, and diversion infrastructure;
- preparation of storage areas for coarse coal rejects, waste rock and soil and overburden;
- development and expansion of underground facilities;
- construction and/or expansion of equipment and fuel storage areas and facilities, and maintenance, administration and warehouse facilities; and
- grading of the mine site area.

Construction activities related to the transmission and natural gas lines include:

- vegetation clearing;
- installation of towers, transmission line, and power sub-station; and
- installation of the natural gas pipeline.

Transportation activities during the construction phase will focus on bringing in equipment, materials, supplies, and personnel to facilitate construction activities at the mine site. Materials and equipment will be locally sourced to the extent possible, and travel to the mine site will be routed along Highway 52 and the existing Quintette/Murray River Forest Service Road (Figure 6.2-1). It is estimated that up to 30 vehicles will each make a return trip per day at the peak of the construction phase to support the delivery of equipment, material, and supplies. Approximately 3 shuttle trips per day will be required to transport personnel to and from the mine site and Tumbler Ridge during construction.







## 6.4 MINE DEVELOPMENT AND OPERATIONS PHASE

### 6.4.1 Underground Mine

#### Coal Seams

The main workable coal seams of the mine are seams D, E, F, G/I, and J. Seams D and E are thin or moderately-thick, F and J are moderately thick, whereas G and I are very thin, and therefore not targeted. The distance between the coal seams is 80 to 120 metres. In order to achieve the mine's production capacity, seams F and J are the main mining seams, and seams D and E are the auxiliary mining seams.

#### Mine Access and Design

As part of the Bulk Sample work currently underway, two accesses will be developed from surface to underground: one decline for coal haulage; and one shaft for transportation of personnel, materials and equipment and the air intake. These two accesses will also form the main access and secondary egress for the full mine development. In addition, a second shaft for return air only will be constructed for the full mine (Figure 6.4-1).

Coal will be mined using longwall mining, a form of underground coal mining where coal is mined in large panels (typically 1 to 3 km long and 200 to 400 m wide). Longwall mining is designed to maximize extraction rates while maintaining worker safety. This contemporary method has been used for many years at mines around the world. The typical layout planned for the Project is illustrated in Figure 6.4-2.

A three tunnel system will be established to provide access to the main mining headings: one for personnel and materials, one to convey coal, and one for air return. Gate roads are then driven off the main tunnel system to the back of each panel before longwall mining begins. The longwall face is mined back toward the main tunnel in retreat fashion. The cavity that is created behind the longwall face is called the gob (also called goaf or goff). For safety reasons, personnel and equipment do not access the gob.

In tunnels where long-term access is required, roof bolting is anticipated to be the predominant type of roof support. Based on geotechnical assessment, additional methods such as steel arches may be used in areas where additional support is required. At the longwall face, where relatively short-term access is required, hydraulic shield supports will be used.

#### Mine Equipment

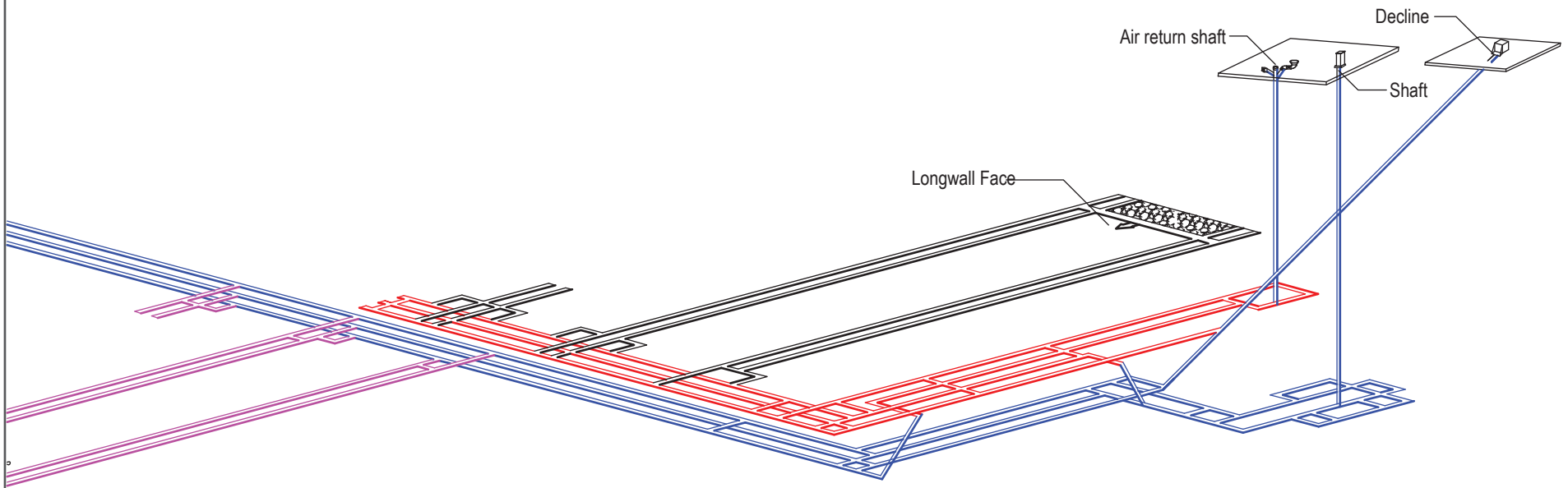
Three key pieces of mining equipment that will be used include road headers, shearers and hydraulic shields. Road headers will be used to establish the main tunnel system and gate roads. The shearer operates at the longwall face and extracts the coal from the seam. Hydraulic shields provide a safe work environment for personnel along the face.

A system of conveyors is used to transport the run of mine (ROM) coal from the longwall face to the decline and up to the surface. The road headers, shearers and conveyors are electrically powered; the longwall shields will be hydraulically powered.

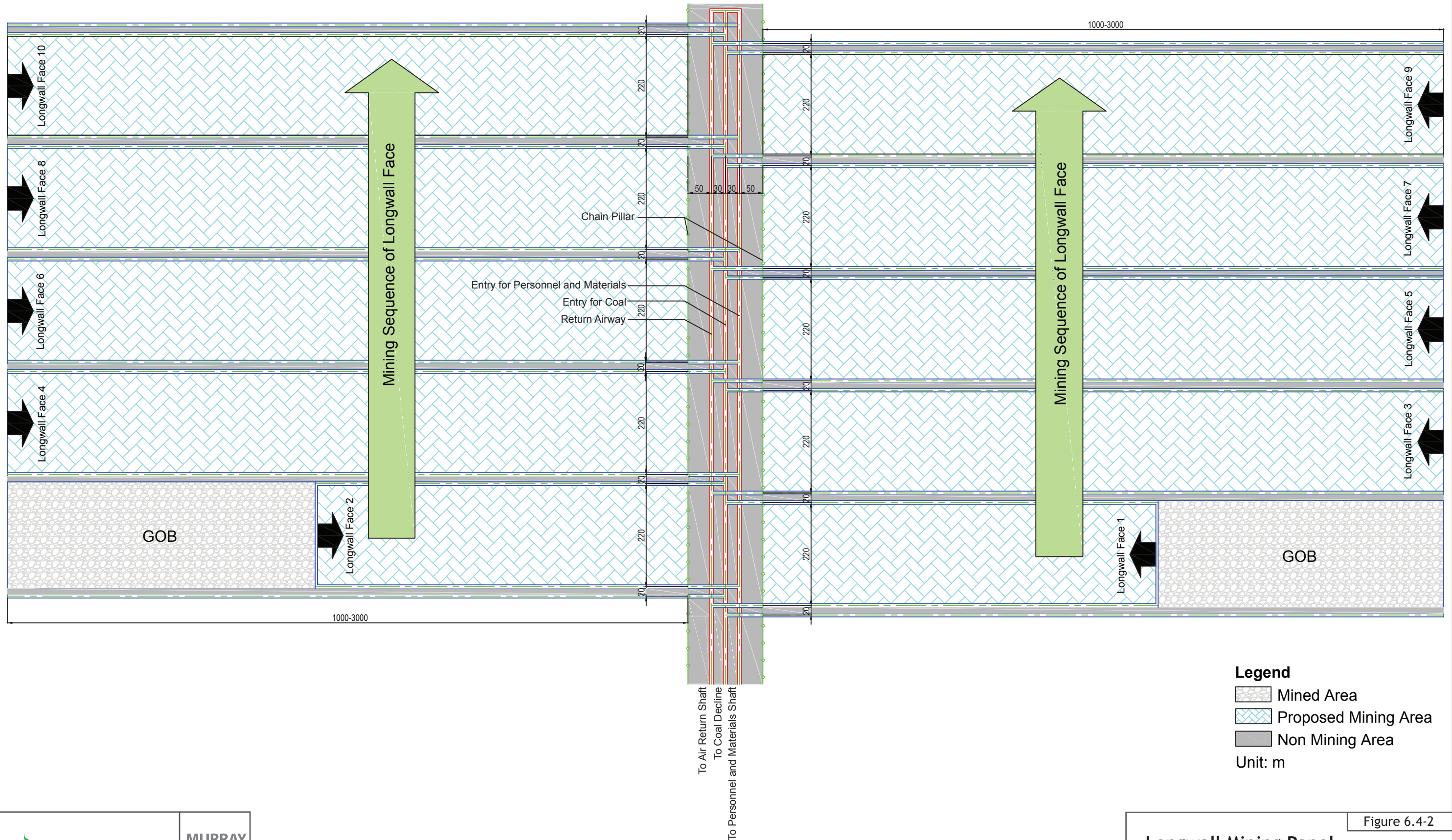
The main underground transportation for personnel, materials and equipment will be by explosion-proof diesel vehicles.

All equipment will comply with Canadian and BC equipment safety standards for underground coal mining.








Perspective View of Longwall Mining Area



**Legend**

-  Mined Area
  -  Proposed Mining Area
  -  Non Mining Area
- Unit: m

### Explosives

Most of the mining, including the main tunnel systems will be within the coal seams, where use of explosives is not required. Small amounts of explosives may be required when mining between coal seams. Any explosives required will be stored in surface magazines that are located through consultation with the mines inspector and Natural Resources Canada (NRCan) to ensure the safety of mine staff. Strict safety procedures will be in place to ensure that areas are clear before any blasting occurs.

### Ventilation System

A main ventilation system will be designed to ventilate the entire mine and maintain indoor air quality standards set by the provincial government for worker safety.

Intake (fresh) and return airways will be separated. Longwall mining faces adopt U-shape ventilation, with intake airways and return airways located at each end of the working faces. The development working faces will use auxiliary fans for ventilation.

Due to the depth of mining, and geothermal gradients, air temperatures in the underground mine will be consistent year-round. However, during the winter months, the ventilation air will be heated to avoid freezing of water and utility lines within the intake shaft.

### Subsidence

The potential for surface subsidence as a result of underground mining has been identified and will be investigated as part of the EA. BC MENG has requested HD Mining to prepare a subsidence monitoring plan for the Bulk Sample.

## **6.4.2 Surface Facilities**

### Mine Portals

The mine portals will consist of a conveyor decline, a man and materials shaft, and a ventilation shaft. The portal locations are outlined in Figure 6.2-1.

### Conveyor System

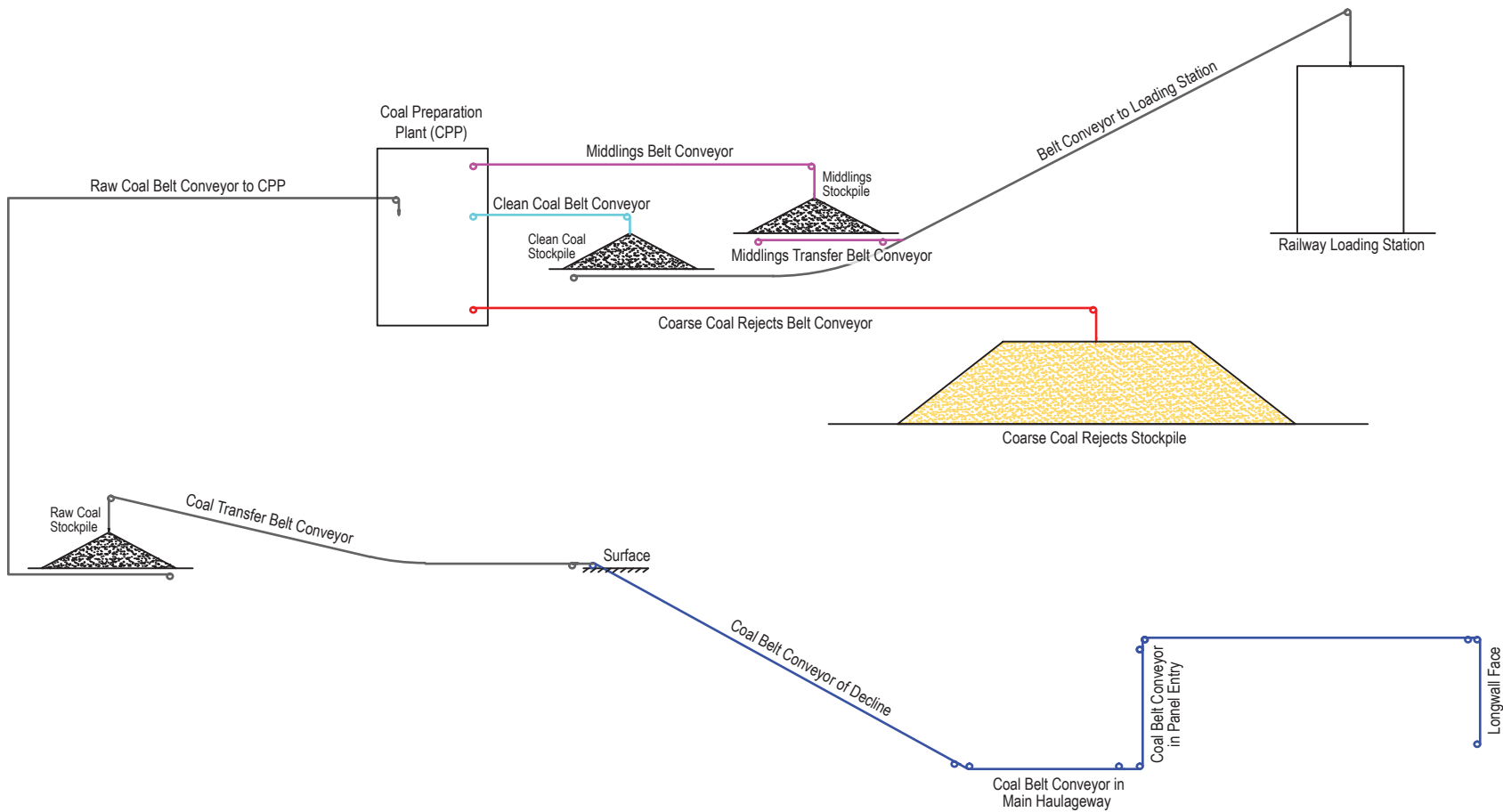
Figure 6.4-3 outlines the series of conveyors and stockpiles that will be used to transport material around the site.

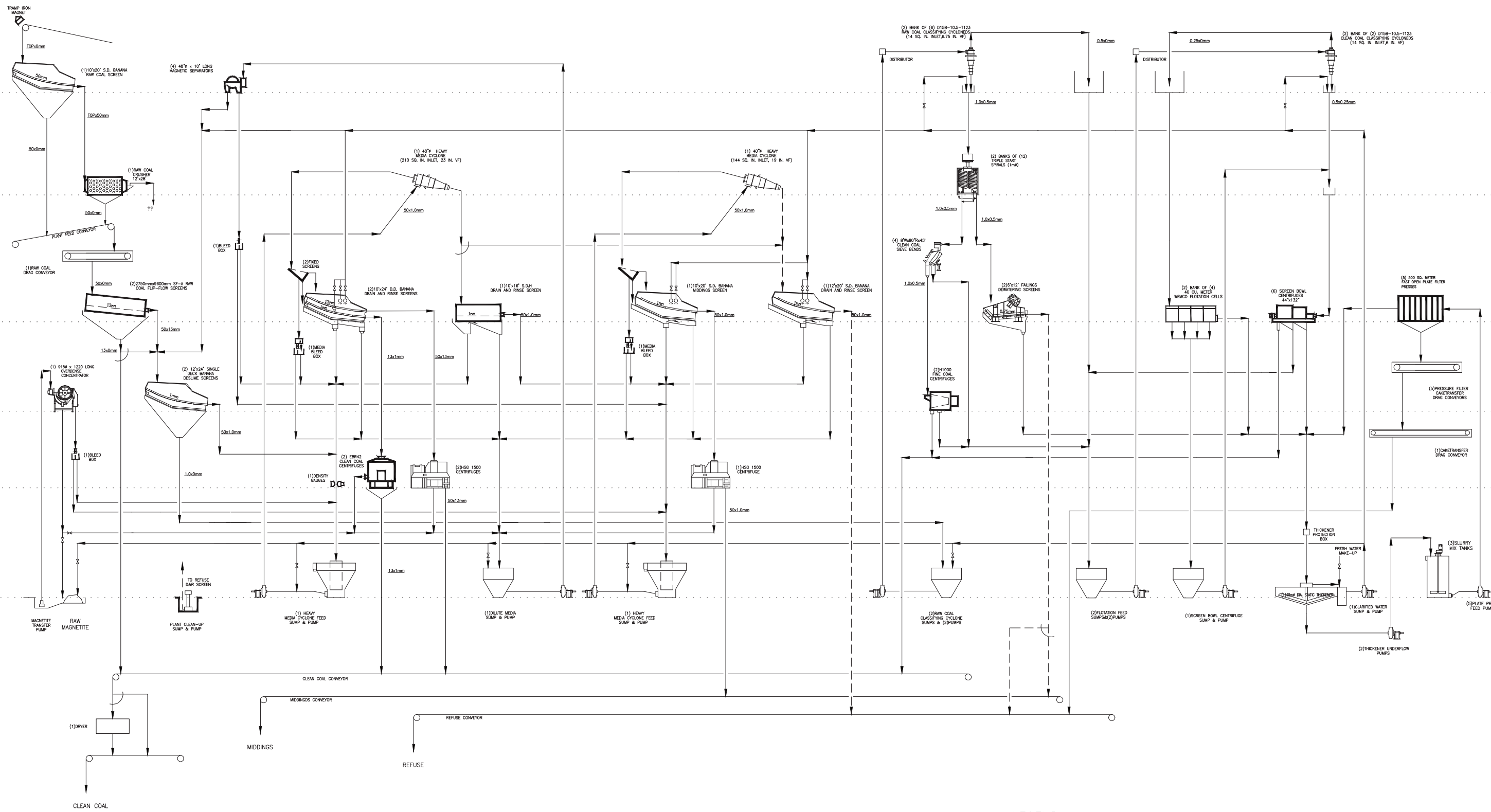
The main conveyor line that will connect the decline portal with the coal handling and preparation plant will cross a fish bearing wetland, M20 Creek, and the Murray River. Specifics of crossing designs are still under consideration; however, the intent is that clear-span crossings will be used with support structures located outside the riparian zone. HD Mining is also investigating the potential to construct a decline from near the coal preparation plant to the shaft location in lieu of the surface conveyor line.

### Coal Preparation Plant

Figure 6.4-4 outlines the process-flow diagram for the coal preparation plant. Run-of-mine (ROM) coal enters the plant, is crushed, and then flows through a series of sizing processes, including: vibrating screens, heavy media cyclones, floatation cells, and centrifuges.

Three streams are produced through the preparation plant: clean coal, middlings, and rejects (also referred to as 'refuse' in Figure 6.4-4). The clean coal and middlings are directed to the rail loadout, while the rejects are directed to the coarse coal reject area (Figure 6.2-1).





LEGEND

- PROCESS EQUIPMENT
- FLOW LINE
- REFUSE FLOW LINE
- CONTROL VALVE
- POSSIBLE FLOW LINE

The rejects are a co-mingled combination of over-sized material from the screening process and thickened and dewatered underflow from the floatation cells.

No water discharge is planned from the coal preparation plant. All water contained in the coal fines will be clarified and recycled within the system. Water will be released via steam from the clean coal drying system. Make-up water requirements to the system (up to 1,818 m<sup>3</sup>/d) will either be supplied from excess underground seepage using a heat-traced pipeline attached to the conveyor, or from a groundwater well.

#### Rail Loadout

HD Mining has held initial discussions with CN Rail regarding the development of a rail loadout. Unlike the existing looped loadouts, the loadout is planned as a 5,800 m parallel track within the CN Rail right-of-way.

Each train (120 cars) has the capacity to carry 12,000 tonnes of coal. At 6 Mtpa production, this equates to approximately one train per day, which CN Rail has indicated fits within their operational parameters. The coal will be shipped to the port at Prince Rupert for shipment overseas.

#### Buildings and Other Facilities

Other buildings include facilities such as the change house, offices, maintenance shop, and warehouse. Facilities to support fuel storage, water supply, sewage treatment, parking lots, and other activities will also be required.

#### **6.4.3 Transmission Line**

BC Hydro has an existing 230 kV power line that runs immediately adjacent to the north (shaft) site (see Figure 6.2-1). HD Mining is proposing to tie into this system. A surface substation/distribution hub will direct power around site and to an underground substation, where it will be distributed to each working area along roadways/gateways. Power to the coal handling and preparation facilities on the east side of the Murray River would be distributed along the conveyor corridor.

The total annual power requirement is estimated to be 31.5 MW.

#### **6.4.4 Natural Gas**

HD Mining intends to draw natural gas from the existing Pacific Northern Gas (PNG) network. Two pipelines are being considered (see Figure 6.2-1): one short line (approximately 800 m) to supply the coal preparation plant; and one approximately 9.5 km line that parallels the Murray FSR to the shaft site in order to supply the underground mine. An option to truck the gas to a storage tank at the shaft site is also being investigated.

The total annual gas requirement is estimated to be 1.5 Mm<sup>3</sup>/yr.

#### **6.4.5 Waste Management**

##### *6.4.5.1 Coarse Coal Rejects*

The rejects from the coal preparation plant will be directed to a Coarse Coal Reject area (CCR). Material will be transported to the CCR on an extensible conveyor, and then re-worked by dozers. Two piles within the CCR are currently planned, with the toe of the piles set back from riparian areas of M19, M19A and M17 creeks. In general, it is expected that the resulting pile will look very similar to the existing Teck tailings pile that is located immediately upslope (located immediately south of the coal preparation plant and bounded to the north and west by an existing mine site road; Figure 6.2-1).



## PROJECT DESCRIPTION

Geotechnical planning and investigations are underway to assess the suitability of foundation materials. Design and analysis will be completed consistent with the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008) to ensure the long term stability of waste material.

Geochemical investigations are also underway to assess the ML/ARD characteristics of the reject material. This information will inform the design of the pile in relation to water management and closure.

### 6.4.5.2 Waste Rock

A small waste rock pile has been permitted for the Bulk Sample work. No additional storage of waste rock on-surface is planned for the full mine development. Only small volumes of waste rock are expected to be generated during Project activities due to the efficiency of the longwall mining process. Any small amounts of waste rock that may be generated when mining between coal seams will be stored underground.

### 6.4.5.3 Air Emissions

Air emissions will include particulate matter (PM), nitrous oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>), and greenhouse gas emissions from fuel combustion by surface and underground vehicles and equipment, and operation of the coal preparation plant. Fugitive dust emissions will occur due to vehicle traffic along the access roads; however, total traffic to/from site on a daily basis will be relatively low. There is also the potential for fugitive emissions from the coal stockpiles; mitigation options to minimize the fugitive emissions are currently being explored. Point source, mobile, and fugitive air emissions during the construction and operation phases of the Project will be inventoried and assessed using air dispersion modeling techniques.

### 6.4.5.4 Hazardous Waste

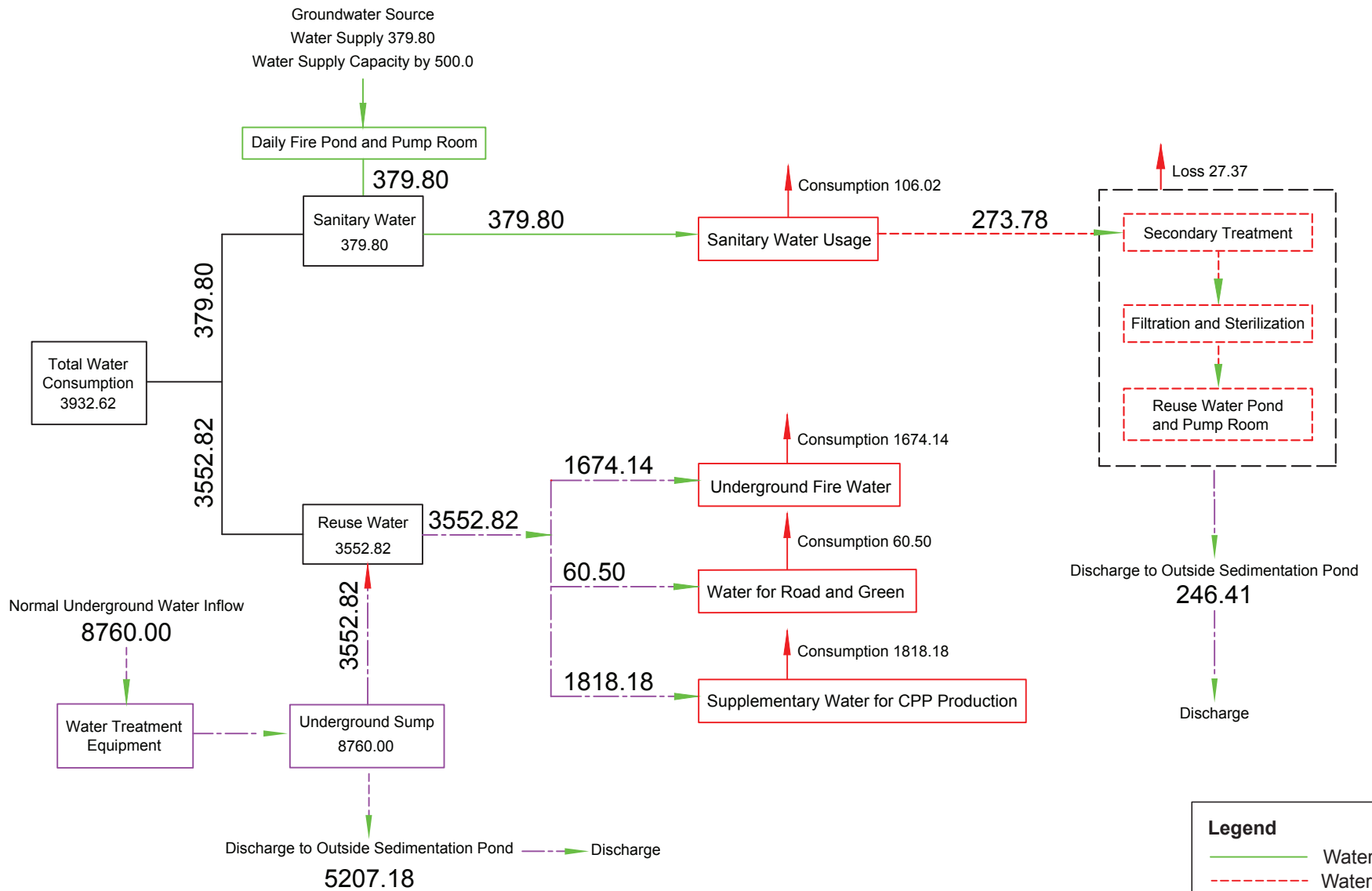
Hazardous waste materials, such as spoiled processing reagents and used batteries, will be generated throughout the life of the Project, from construction to decommissioning. These materials will be anticipated in advance; they will be segregated, inventoried, and tracked in accordance with federal and provincial legislation and regulations such as the federal *Transportation of Dangerous Goods Act (1992)*. A separate secure storage area will be established with appropriate controls to manage spillages. Hazardous waste will be labeled and stored in appropriate containers for shipment to approved off-site disposal facilities.

### 6.4.5.5 Non-Hazardous Waste Management

Waste management will involve the segregation of waste into appropriate management channels. Project waste collection and disposal facilities will include specific areas for recyclable materials, general wastes, and sewage. Waste materials will be transported off-site for disposal at existing licensed facilities.

## 6.4.6 Water Management

Figure 6.4-5 illustrates the preliminary water balance for the site. It is anticipated that the major water source will be seepage to the underground workings (up to 8,760 m<sup>3</sup>/d). A groundwater well will be established to provide water for sanitary use (up to 500 m<sup>3</sup>/d). A small sewage treatment system will be on-site to handle sanitary water. It is currently unclear whether collection of the underground seepage constitutes 'extraction' of groundwater as described under section 15(c) of the RDPA.



**Legend**

- Water Supply (Solid Green Line)
- Water Drainage (Dashed Red Line)
- Reuse Water (Dashed Purple Line)

Unit: m<sup>3</sup>/d

## PROJECT DESCRIPTION

Underground, seepage water will be collected, and used for dust control and fire suppression systems within the mine. Excess water will be pumped to sedimentation pond(s) at the surface. Some of this water may be used as make-up for the coal processing plant, the rest will be released to the environment following appropriate treatment.

At this time, it is anticipated that the water treatment and discharge will follow a very similar set-up to what is currently being established for the Bulk Sample work. This includes water treatment with coagulant and flocculent, followed by settling in a sedimentation pond(s) prior to release. The current discharge points are through infiltration galleries, with infiltration directed to Murray River (south site) and M20 Creek (north site). It is anticipated that for the larger flow rates expected during full mine operation, following treatment, Project discharge will be to the Murray River via a pipeline (final location to be determined based on input from BC MOE and MENG).

Detailed water balance and water quality modelling that is coupled with ML/ARD predictions will be completed to support the ultimate water management design for contact and non-contact water, and the effects assessment of discharge to the receiving environment.

## 6.5 CLOSURE AND RECLAMATION

HD Mining recognizes that the Project must be planned with closure in mind. Consistent with requirements of the BC *Mines Act* (1996d) and the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008), a closure plan will be developed for the Project. The objective of a closure plan is to detail transition of the site from mining to its post-mine land use. This includes a requirement for financial assurance from the proponent. The plan will be regularly reviewed and updated throughout the mine life to reflect Project development. At this time, a preliminary conceptual closure plan is presented. This will be further developed as new information (particularly related to ML/ARD) becomes available through the EA and permitting process.

### 6.5.1 Underground Mine

At closure, all mining equipment and materials will be removed from the underground mine and re-purposed, sold or disposed of off-site. Once entry to the mine workings is no longer required, bulkheads will be constructed to seal the workings. It is anticipated that over time, the mine workings will flood with groundwater seepage, and that the groundwater table would return to near pre-mining levels. As part of the EA, estimates will be made of the time required to flood the workings, of water quality within the flooded mine based on ML/ARD characterization, and of the potential for contaminant transport from the flooded mine workings. It is anticipated that due to the depth of mining and the low hydraulic conductivity of the surrounding rocks, flow paths to any potential receiving environment would be very long and contaminant transport very slow.

A long-term monitoring program would be required to inspect the integrity of the bulkheads.

### 6.5.2 Surface Facilities

The conveyors, buildings, coal preparation plant equipment and utilities will be dismantled or demolished as appropriate. Reusable components will be sold along with scrap metal. Waste materials will be disposed of in appropriately permitted facilities. The sites will then be scarified, reclaimed with salvaged topsoil material and re-vegetated.

### 6.5.3 Coarse Coal Reject Area

The CCRA will be assessed and re-contoured as necessary to ensure long-term stability. The surface will be reclaimed with salvaged topsoil material and re-vegetated. If necessary, based on ML/ARD

characterization, the CCR cover will be designed to minimize infiltration of precipitation and groundwater flow paths through the pile.

A long-term monitoring program would be required to inspect the integrity of the pile and reclamation cover and to monitor the groundwater conditions down slope of the pile.

## 6.6 EMPLOYMENT

It is anticipated that the Project will provide approximately 18,600 person-years of direct employment.

### 6.6.1 Underground Mine

The mine is planned to operate year round. It is anticipated that the mine will employ approximately 400 underground workers. Examples of typical underground operating and maintenance positions include:

- Shift boss;
- Fire boss;
- Equipment Operators;
  - Shearers;
  - Chain conveyors;
  - Crushers;
  - Hydraulic shields;
  - Pumps;
  - Road headers;
  - Bolters;
  - Belt conveyors;
  - Hoists;
- Electricians;
- Mechanics and maintenance workers;
- Blasters;
- Drillers; and
- Labourers.

Mine operating and maintenance personnel will work a schedule that meets applicable provincial laws and regulations. The maximum scheduled shift underground will be eight hours.

### 6.6.2 Other Positions

Other typical positions that will require to be filled include:

- Mine managers;
- Geologists;
- Engineers;
- Water treatment operators;
- Coal Preparation Plant operators;
- Rail loaders;

## PROJECT DESCRIPTION

- Equipment operators;
- Surface maintenance staff;
- Electricians;
- Mechanics;
- Welders; and
- Administrative support.

### 6.6.3 Employment Strategy

There is currently a shortage of skilled underground mine workers in the Canadian mining sector (Government of Canada 2013). In particular, there is a shortage of workers trained and experienced to safely undertake longwall coal mining. For its Bulk Sample program, HD Mining has received an approved labour market opinion (LMO) from Human Resources and Skills Development Canada (HRSDC) for the use of 201 Temporary Foreign Workers (TFWs) for a two-year period.

It is anticipated that TFWs would also be required to fill a portion of the positions during full mine operation. These workers will typically come from China, and will have experience working with the specific pieces of longwall mining equipment that will be utilized at the site. It is the goal of HD Mining that over time, the skills of the TFWs will be transferred to local Canadians; however this will take time. As part of the application to HRSDC, HD Mining committed to a multi-year training arrangement under which local Canadian workers may be trained up to replace the TFWs.

HD Mining is currently working with the District of Tumbler Ridge on a housing solution for Temporary Foreign Workers.

## 7. Environmental Setting and Potential Effects



## 7. Environmental Setting and Potential Effects

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### 7.1 OVERVIEW

The Project is in the Southern Alberta Upland Ecosystem which is part of the Boreal Plains Ecoprovince. The region is characterized by a continental climate with little precipitation, moderately warm summers and cold winters. Vegetation in lowland areas consists of moist grasslands and trembling aspens. Upland areas are dominated by white spruce, black spruce and lodgepole pine.

The Project is located within the Murray River watershed; Project infrastructure may fall within portions of the M20 Creek and Twenty Creek sub-watersheds on the west side of the river, and within the M17 and M19 creek sub-watersheds on the east side of the river

Plates 7.1-1 and 7.1-2 illustrate the existing environment surrounding the proposed Project components.



*Plate 7.1-1. Aerial view of the Project on the west side of Murray River.*

To define the scope of environmental baseline studies, regional and local study areas (RSA and LSA, respectively) were developed (Figure 7.1-1). The RSA is a broader area where there is a potential for direct, indirect, or cumulative environmental or socio-economic effects and includes lands, waters and potentially affected communities in the Peace River Regional District. It is also intended to be ecologically relevant based on the home range of key wildlife species known to inhabit the region. The LSA is the area where there is a reasonable expectation of immediate impacts from Project activities on valued environmental and socio-economic components. The LSA includes the Project footprint, and portions of the access and mine site roads. Its boundary has also been developed following natural terrain and drainage boundaries in order to be ecologically relevant. For consistency, the same RSA and LSA are used for all baseline environmental studies. The spatial boundaries used for the effects assessment may be the same or slightly different than those used for the baseline studies.



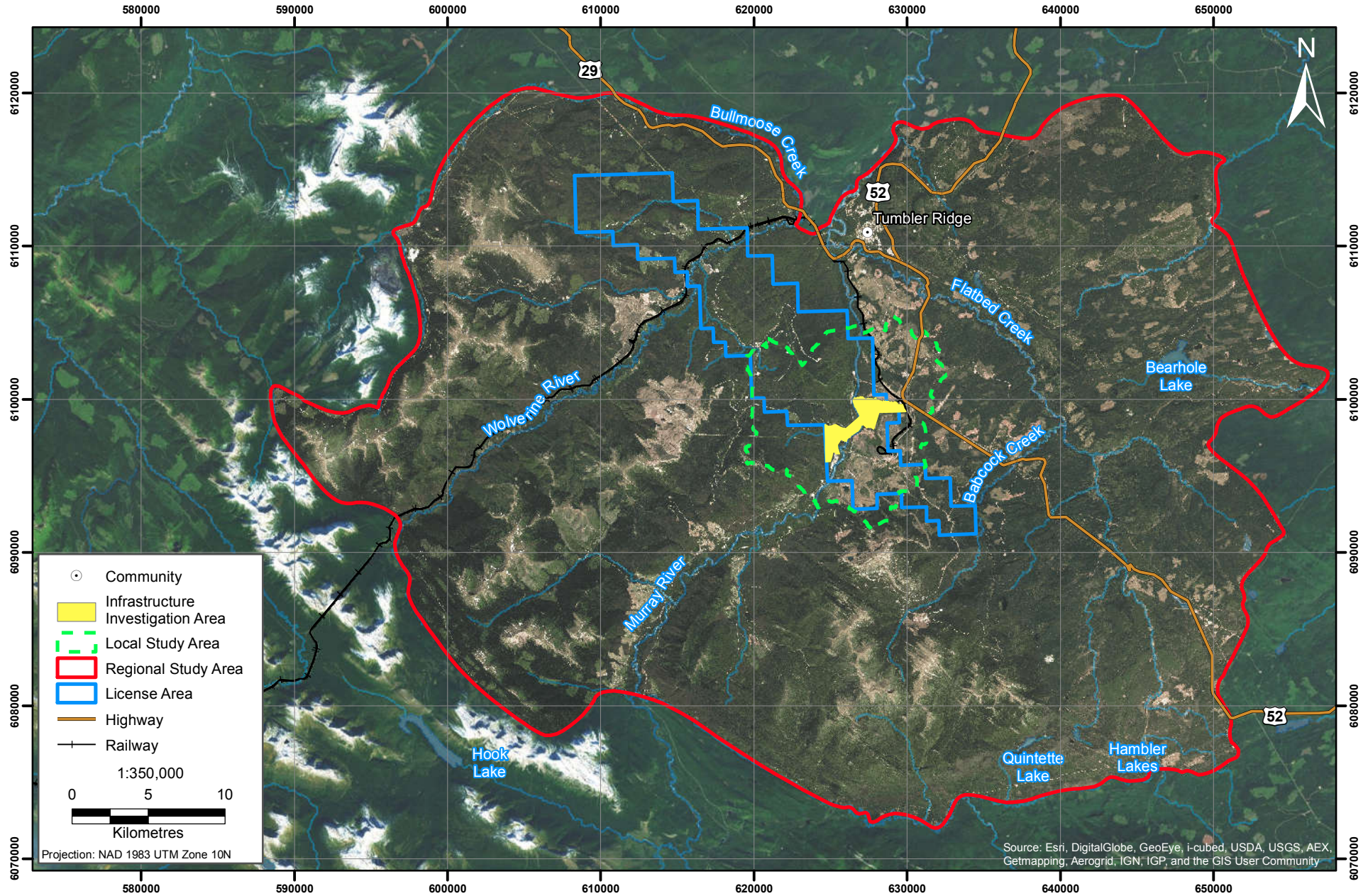


Figure 7.1-1



**MURRAY RIVER COAL PROJECT**

### Environmental Baseline Study Areas for the Project

Figure 7.1-1







*Plate 7.1-2. Murray River.*

A similar RSA/LSA approach has been used to guide socio-economic studies; however a different set of boundaries was applied (Figure 7.1-2), where the RSA extent is based on the Peace River Regional District, and the LSA focuses on local communities, including:

- District of Tumbler Ridge;
- City of Dawson Creek;
- District of Chetwynd;
- City of Fort St. John;
- West Moberly First Nation;
- Saulneau First Nation; and
- McLeod Lake Indian Band.

## 7.2 CLIMATE

### 7.2.1 Setting

A meteorology baseline program was initiated for the Project in 2011 with the installation of a site-specific meteorology station. In addition, the general climate of the region has been characterized using available climate normals from four Meteorological Service of Canada (MSC) weather stations (Table 7.2-1).

The region is frequently influenced by moist air from the Pacific as well as dryer continental air, as it is very close to the leeward side of the Rocky Mountains' Hart Ranges. The topography of the region plays a large role in the Project's climate as precipitation, air temperature, snow depth, and wind speed and direction are highly variable within the area itself.



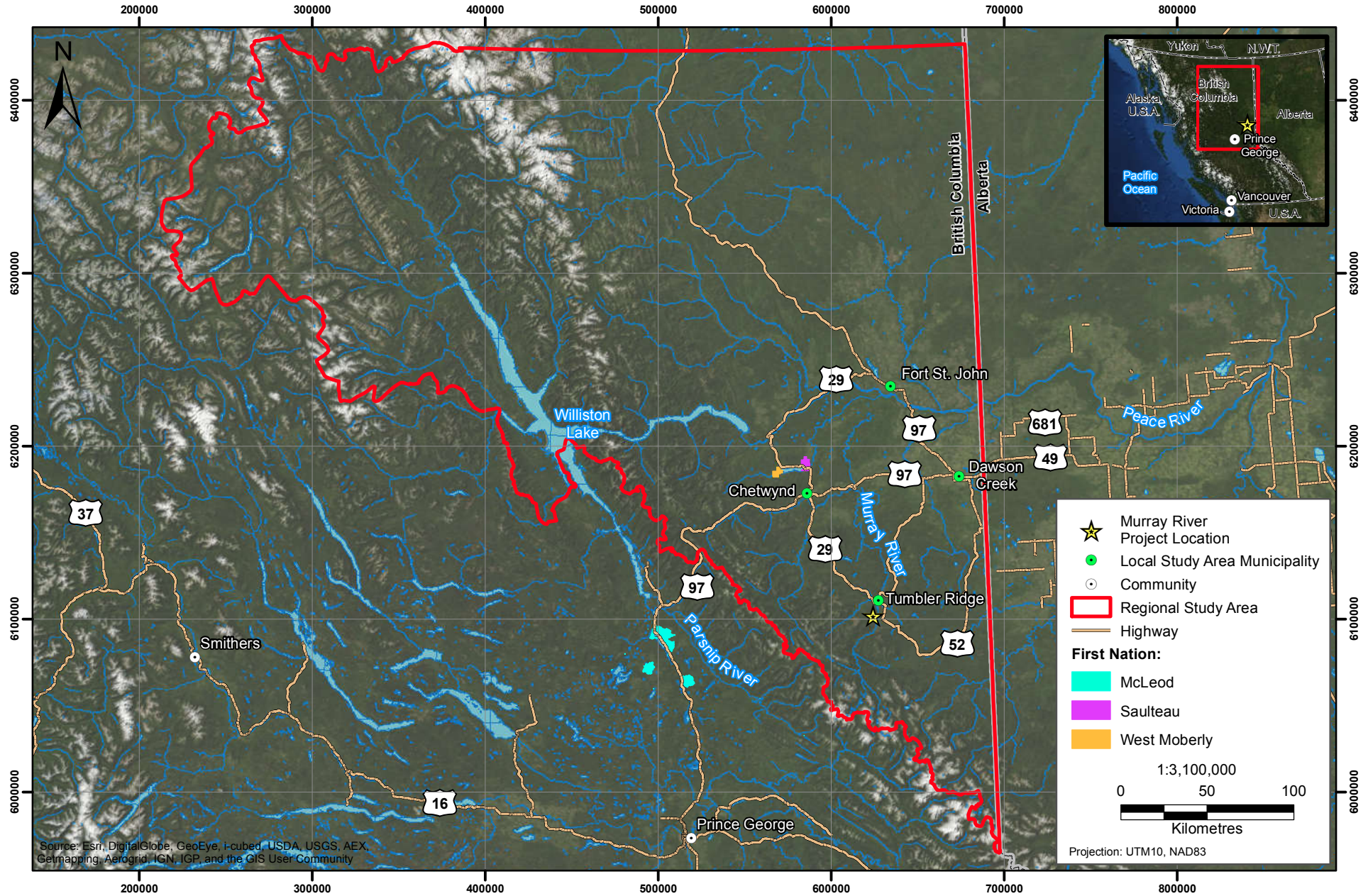


Figure 7.1-2



**MURRAY RIVER COAL PROJECT**

### Socio-Economic Baseline Study Areas for the Project

Figure 7.1-2



Table 7.2-1. Meteorological Stations in the Regional Area

Station Name	Location			Time Period Used	Meteorological Parameters Used	Status
	Climate ID	(Lat., Long., Elevation)	Distance from Murray River Station			
Murray River	n/a	55.02158° N 121.08100° W 1055 m	n/a	3/9/11 to 10/16/11	Air Temperature Precipitation Snow Depth Wind Speed and Direction Solar Radiation Barometric Pressure Relative Humidity	Active
Denison Plant Site	1182427	55° N 121.03° W 854 m	3.8 km southeast	7/1/82 to 5/31/98	Air Temperature Precipitation Snow Depth	Inactive
Tumbler Ridge	1188297	55.13° N <sup>a</sup> 121.01° W <sup>a</sup> 824 m	13.2 km north northeast	3/1/85 to 3/31/03	Air Temperature Precipitation Snow Depth	Inactive
Bullmoose	1181120	55.13° N 121.48° W 1102 m	25.8 km northwest	1/1/82 to 12/31/00	Air Temperature Precipitation Snow Depth	Inactive
Chetwynd A	1181508	55.69° N 121.63° W 610 m	81.9 km north west	1/1/82 to 12/31/00	Air Temperature Precipitation Snow Depth Wind Speed and Direction	Active

<sup>a</sup> The MSC's reported position of Tumbler Ridge station is incorrect. The listed position is an estimate of the correct location based on the location of the town of Tumbler Ridge and its topography.

The mean daily maximum summer temperatures are above 15°C and the mean daily minimum winter air temperature fall well below -10°C. Based on the approximately 7 month reporting period (March 9 to October 16 2011), the extreme maximum air temperature was 26.2°C (September 8) and the extreme minimum air temperature was -22.4°C (March 11), recorded at the Project specific meteorological station (1,055 m).

The orographic influence due to mountains within the RSA, as well as the inflow of moist air from the Pacific meeting with dryer continental air masses means that precipitation is highly variable over the region. Average annual precipitation for the Murray River site is estimated at 578 mm with approximately 36% of this volume falling as snow between late September and early May. Maximum precipitation falls during the summer, especially in June and July, when convective weather systems, such as thunderstorms, are more active.

Snow depth data from regional stations typically ranged from 5 to 43 cm between November and March, and is highly dependent on elevation. On average, February has the largest snow depth at 24 cm at elevations around 825 m.

Strong winds occur in all seasons at high elevations in the region, with a prevailing wind direction predominantly from the south. Winds at low elevations are funnelled through the valleys with a light to moderate wind speed, predominantly from the south. Solar radiation, barometric pressure and relative humidity data were also recorded at the Murray River meteorological station. Generally, there is an energy deficit during winter months and an energy surplus during summer months.

### **7.2.2 Potential Project Effects and Environmental Management**

Potential effects of the Project with respect to climate relate to emission of greenhouse gases (GHGs) from mobile vehicular sources (e.g. light duty and heavy duty gas and diesel vehicles) and consumption of natural gas, with a subsequent contribution to global climate change. Project-related climate change impacts are expected to be minimal due to the largely clean energy sources utilized (e.g., hydro, natural gas), although Project GHG emissions will be included in the scope of the effects assessment. The assessment will follow federal guidelines as outlined in the 'Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003).

## **7.3 TERRAIN, SOILS, GEOLOGY**

### **7.3.1 Setting**

The Project is located within the Hart Foothills Ecosection of the Sub-Boreal Interior Ecoprovince. It is comprised of low, rounded mountains and wide valleys on the east side of the Rocky Mountains. This area was glaciated by the Cordilleran Ice Sheet that flowed east from the Rocky Mountains in the Late Wisconsinian, producing rounded ridge mountain tops, and depositing thick layers of morainal deposits (often referred to as glacial till). The Murray River valley bottom contains isolated areas of glaciolacustrine sediments from Glacial Lake Peace. A series of glaciofluvial terraces, created during the drainage of Glacial Lake Peace, is evident in the valley cross section. The majority of the area is generally characterized by gentle to moderate slopes, and the area is considered relatively stable. Areas of instability are often associated with small hillslope channels, which exhibit strong gullying and downcutting, resulting from water erosion and other mass movement processes (e.g, debris slides, debris flows, snow avalanches) which have created relatively deep (e.g., 5 to 10 m), canyonized drainage patterns.

Soil formation in the LSA is limited by the cold climate and in some cases by periodic deposition of new mineral material by gravity or water. In the LSA, upland soils developed predominantly on loamy morainal material (till), sandy glaciofluvial deposits, variable (but mostly sandy) colluvial material, and coarse to medium-textured fluvial sediments.

### **7.3.2 Potential Project Effects**

Potential effects to terrain include effects related to surface subsidence from the underground mine as well as effects on the stability of terrain features leading to increased geohazard risks. Potential effects to soil include adverse effects on soil quantity and soil quality. The removal of soil will be required to facilitate the construction of Project infrastructure in the immediate Project footprint. Soil quality may be degraded through accidental spills or the release of chemicals or hydrocarbons during re-fueling activities or at transfer points. Direct loss of soil is expected to be minimal due to the primarily underground nature of the Project. Project components and activities will also be susceptible to potential effects of the environment (e.g., terrain instability such as landslides, earthquakes etc.) which will be addressed by undertaking a comprehensive risk assessment for the Project.

Geological information will also be collected and used to inform geochemical analyses to support an assessment of the potential for ML/ARD to affect surface and groundwater quality, which is further detailed in Sections 7.4 and 7.5.

Environmental management plans and mitigation measures to minimize the potential for adverse effects on terrain, soils and geology will be implemented.



## 7.4 SURFACE WATER, SEDIMENT AND AQUATIC RESOURCES

### 7.4.1 Setting

#### 7.4.1.1 Surface Water Hydrology

The Murray River (Plate 7.1-2) has a total drainage area of 5,550 km<sup>2</sup> and is within the greater Peace River drainage system (293,000 km<sup>2</sup>). Since 1977, the Water Survey of Canada (WSC) has operated two monitoring stations on Murray River - one near Tumbler Ridge, above Wolverine River, and one near the mouth, where it enters the Pine River. Data from these stations are particularly useful for the Project, and, along with other regional data, have been compiled to inform Project design and planning.

During 2011 and 2012, site-specific baseline hydrometric data has been collected at the following seven stations:

- Murray River;
- Mast Creek;
- Twenty Creek;
- M20 Creek (2 stations):
- M19 Creek; and
- M17 Creek.

Consistent with what would be expected for snow melt dominated systems, the majority of observed flow is concentrated in the freshet period, with approximately 90% of the annual runoff occurring between May and July. In particular, 2011 represented a very wet year with flow statistics well above the long-term average from the two WSC stations on Murray River, and peak flows near 1-in-100-year estimates.

#### 7.4.1.2 Surface Water Quality, Sediment and Aquatic Resources

Water quality sampling for the Project was initiated in May 2010 and continued through 2011 and 2012. Water sampling was conducted weekly in May and June during the spring freshet and monthly for the remainder of each year. Water quality samples were collected from watercourses within the Project footprint, including Camp (M20) Creek, Twenty Creek, and Murray River, as well as at a reference site located upstream from the Project.

Table 7.4-1 lists the water quality parameters that were measured. This table includes relevant water quality parameters to coal mining activity such as total suspended solids (TSS) and turbidity, nutrients (e.g., ammonia, nitrate, and sulphate), metals (e.g., aluminum, cadmium) and metalloids (e.g., selenium). Baseline data from the Project's 2010 sampling season is generally discussed below and parameters of importance to the coal mining industry are discussed in the context of Canadian Council of Ministers of the Environment (CCME) water quality guidelines, and provincial guidelines for the protection of freshwater aquatic life. Although data has been collected through 2011 and 2012, analysis of these data is on-going, and is not presented here.

The Murray River drainage basin naturally experiences high TSS and turbidity levels in May and June during spring freshet as a result of snow melt (e.g., both TSS and turbidity are > 100 mg/L or NTU) and exceed BC guidelines. Outside the period of freshet, TSS and turbidity were generally low (below detection limits and < 10 NTU, respectively), although levels at M20 Creek were consistently higher year-round and frequently exceeded turbidity guidelines.

**Table 7.4-1. Water Quality Parameters, Detection Limits and Guidelines**

Parameter	Units	Realized Detection Limit	CCME Guidelines		BC Water Quality Guideline	
			Short term	Long term	30-Day	Max
<b>Physical Tests</b>						
Colour, True		5	-	-	-	-
Conductivity	µs/cm	2			-	-
Hardness (as CaCO <sub>3</sub> )	mg/L	0.5 - 2.5			-	-
pH	pH	0.01 - 0.1		6.5 - 9.0	-	6.5 - 8.5
Total Suspended Solids	mg/L	1 - 3			5	25
Turbidity	NTU	0.1			2	8
<b>Anions</b>						
Acidity (as CaCO <sub>3</sub> )	mg/L	1 - 2				
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	1 - 2			-	10
Bromide (Br)	mg/L	0.05 - 0.1				
Chloride (Cl)	mg/L	0.1 - 0.5	640	120	150	600
Fluoride (F)	mg/L	0.02 - 0.1		0.12		
Sulphate (SO <sub>4</sub> )	mg/L	0.5 - 1			50	100
<b>Nutrients</b>						
Ammonia (as N)	mg/L	0.005 - 0.02		1.54 <sup>1</sup>	1.23 <sup>1</sup>	12.4 <sup>1</sup>
Nitrate (as N)	mg/L	0.005 - 0.01	550	13	3	32.8
Nitrite (as N)	mg/L	0.001 - 0.01		60 NO <sub>2</sub> -N	0.02	0.06
Total Kjeldahl Nitrogen	mg/L	0.005 - 0.05				
Orthophosphate-Dissolved (as P)	mg/L	0.001				
Phosphorus-Total Dissolved (P)	mg/L	0.002				
Total Phosphate (as P)	mg/L	0.002 - 0.02				
<b>Cyanides</b>						
Cyanides, Weak Acid Diss	mg/L	0.001 - 0.002				
Cyanide, Total	mg/L	0.001 - 0.01		0.005		
<b>Organic Carbon</b>						
Total Organic Carbon	mg/L	0.5				
<b>Total and Dissolved Metals</b>						
Aluminium (Al)	mg/L	0.001 - 0.05		0.1 <sup>5</sup>	D=0.05	D=0.1
Antimony (Sb)	mg/L	0.0001 - 0.001		0.005		0.02 <sup>2</sup>
Arsenic (As)	mg/L	0.0001 - 0.005				0.005
Barium (Ba)	mg/L	0.00005 - 0.05			1	5 <sup>3</sup>
Beryllium (Be)	mg/L	0.0001 - 0.001				0.0053 <sup>3</sup>
Bismuth (Bi)	mg/L	0.0005 - 0.001				
Boron (B)	mg/L	0.004 - 0.04	29	1.5		1.2
Cadmium (Cd)	mg/L	0.00001 - 0.0001		0.000026 <sup>4</sup>		0.00002 <sup>2,4</sup>
Calcium (Ca)	mg/L	0.02 - 5				
Chromium (Cr)	mg/L	0.0001 - 0.005	-	-		0.001 <sup>2</sup>
Cobalt (Co)	mg/L	0.00005 - 0.0005			0.004	0.11
Copper (Cu)	mg/L	0.0001 - 0.002		0.002 <sup>4</sup>	0.003	0.009
Iron (Fe)	mg/L	0.01 - 0.1		0.3		T=1; D=0.35
Lead (Pb)	mg/L	0.00005 - 0.001		0.0022 <sup>4</sup>	0.006	0.06
Lithium (Li)	mg/L	0.0001 - 0.002				0.87 <sup>1</sup>
Magnesium (Mg)	mg/L	0.005 - 0.1				

(continued)

**Table 7.4-1. Water Quality Parameters, Detection Limits and Guidelines (completed)**

Parameter	Units	Realized Detection Limit	CCME Guidelines		BC Water Quality Guideline	
			Short term	Long term	30-Day	Max
<i>Total and Dissolved Metals (cont'd)</i>						
Manganese (Mn)	mg/L	0.00005 - 0.002			0.9	1.4 <sup>4</sup>
Mercury (Hg)	mg/L	0.00001 - 0.0005		0.00002	0.00002	0.0001
Molybdenum (Mo)	mg/L	0.00005 - 0.001		0.073	1	2
Nickel (Ni)	mg/L	0.0002 - 0.002		0.078 <sup>4</sup>		0.065 <sup>2,4</sup>
Phosphorus (P)	mg/L	0.2 - 0.3				
Potassium (K)	mg/L	0.05 - 0.2				
Selenium (Se)	mg/L	0.0001 - 0.005		0.001	0.002	
Silicon (Si)	mg/L	0.05 - 5				
Silver (Ag)	mg/L	0.00001 - 0.0005		0.0001	0.00005	0.0001
Sodium (Na)	mg/L	0.01 - 2				
Strontium (Sr)	mg/L	0.0001 - 0.005				
Thallium (Tl)	mg/L	0.00002 - 0.0002		0.0008		
Tin (Sn)	mg/L	0.0001 - 0.002				0.008 <sup>2</sup>
Titanium (Ti)	mg/L	0.005 - 0.05				
Uranium (U)	mg/L	0.00001 - 0.0002	0.033	0.015		0.3 <sup>2</sup>
Vanadium (V)	mg/L	0.001 - 0.01				0.006 <sup>2</sup>
Zinc (Zn)	mg/L	0.001 - 0.04		0.03	0.008	0.023 <sup>4</sup>

**Notes:**

<sup>1</sup> Conservative estimate at pH 7.5 and temperature 20°C

<sup>2</sup> BC Ministry of Environment Working Guideline

<sup>3</sup> BC Ministry of Environment Working Guideline which is under review

<sup>4</sup> Parameter is hardness dependant, guideline value based on minimum hardness detected at 76.5 mg/L

<sup>5</sup> pH ≥ 6.5

## PROJECT DESCRIPTION

Ammonia, nitrate, and sulphate concentrations were generally below CCME and BC guidelines (where guideline exists); however concentrations at M20 Creek were consistently higher than other sites and the 30-day maximum guideline values (50 mg/L). Concentrations of aluminum (dissolved), cadmium (total), chromium (total), and iron often exceeded CCME and maximum BC guidelines (where guidelines exist) in Murray River and M20 Creek.

Sediment quality was sampled annually in August from 2010 to 2012 at sites in M20 creek and Murray River. Similar to water quality, only 2010 data will be generally discussed. Table 7.4-2 shows the sediment quality variables analyzed and the parameters with associated CCME and BC guidelines. Cadmium and nickel concentrations exceeded guidelines at all sites, arsenic guidelines were exceeded at M20 Creek and the remaining parameters were well below guideline values.

Changes in surface water and sediment quality can affect local aquatic resources, such as periphyton and benthic invertebrates. Monitoring of periphyton and benthos occurred in August from 2010 to 2012 at sites in M20 Creek, Murray River, and the reference Club Creek. The results of the August 2010 sampling are discussed here. Periphyton biomass and density is variable at sites within the LSA. Biomass and density varied across sites from 0.23 to 1.14  $\mu\text{g}$  chlorophyll *a*/cm<sup>2</sup> and from 13,036 to 121,464 cells/cm<sup>2</sup>, respectively. Genus richness of the periphyton communities varied between 15 and 25 taxa per site, with greater richness in the Murray River. Periphyton diversity measured using Simpson's Index was between 0.4 and 0.8 with both the lowest and highest indices occurring in the Murray River (upstream and downstream from Project respectively).

Benthic invertebrate density ranged from 361 to 3364 invertebrates/m<sup>2</sup>, with the greatest density occurring at Club Creek and the lowest at a reference site on the Murray River. Taxa belonging to the Ephemeroptera, Trichoptera, and Plecoptera (EPT) groups dominated the benthos communities, making up between 54 and 67% of the taxa. Benthos diversity (Simpson's Index) was highest in M20 Creek (0.85) and lowest in Murray River (downstream of M20 confluence).

### 7.4.2 Potential Project Effects

Potential adverse effects of the Project on surface water hydrology relate to changes in flow volume (e.g., annual, peak, and low flow conditions) and pathways resulting from diverting non-contact and contact water, withdrawing water for Project freshwater make-up requirements, or releasing water into the receiving environment from the Project. The majority of water for the Project will be sourced from groundwater seepage in the underground workings and recycled in the coal preparation plant before release into the receiving environment. Release of water from the Project may augment flow in Murray River and M20 Creek, particularly during low flow periods; however, the rate of release is expected to be relatively small, particularly when compared to flow in the Murray River. Mitigation measures (e.g. staged release of discharge to mimic the natural hydrograph) to minimize flow related changes in the affected watershed will be implemented if required.

The Project has the potential to negatively affect surface water and sediment quality at and downstream of the Project site through: release of effluent to the receiving environment, erosion and sedimentation processes associated with Project development and disturbance; release of nitrate and ammonia from blasting activities, and deposition of contaminants (dust and air emissions) in surface waterways. Elevated concentrations of sulphate, selenium, aluminum, cadmium, chromium, nitrate, ammonia, TSS and turbidity are of particular concern in water and sediments in the receiving watercourses.

The potential effects of the Project on water quality and sediment quality may also influence periphyton and benthos by affecting productivity and community composition through chronic toxicity.

**Table 7.4-2. Sediment Quality Parameters, Detection Limits and Guidelines**

Parameter	Units	Realized Detection Limit	CCME Guidelines		BC Guideline
			Short term	Long term	
<b>Physical Tests</b>					
Moisture	%	0.1			
Particle Size	%	0.1			-
<b>Nutrients</b>					
Available Phosphate	mg/kg	2			
Available Sulphate	mg/kg	2			
Total Nitrogen	%	0.02			
Total Sulphur	%	0.02			
<b>Organic Carbon</b>					
Total Organic Carbon	mg/kg	0.1			
<b>Total and Dissolved Metals</b>					
Aluminium (Al)	mg/kg	100	-		
Antimony (Sb)	mg/kg	0.1			
Arsenic (As)	mg/kg	0.2	5.9	17	5.9
Barium (Ba)	mg/kg	1			
Beryllium (Be)	mg/kg	0.1			
Bismuth (Bi)	mg/kg	0.1			
Cadmium (Cd)	mg/kg	0.05	0.6	3.5	0.6
Calcium (Ca)	mg/kg	100			
Chromium (Cr)	mg/kg	1	37.3	90	37
Cobalt (Co)	mg/kg	0.3			
Copper (Cu)	mg/kg	0.5	35.7	197	36
Iron (Fe)	mg/kg	100			
Lead (Pb)	mg/kg	0.1	35	91.3	35
Magnesium (Mg)	mg/kg	10			
Manganese (Mn)	mg/kg	0.2			
Mercury (Hg)	mg/kg	0.005	0.17	0.485	0.174
Molybdenum (Mo)	mg/kg	0.1			
Nickel (Ni)	mg/kg	0.8			16
Phosphorus (P)	mg/kg	10			
Potassium (K)	mg/kg	100			
Selenium (Se)	mg/kg	0.1			5
Silver (Ag)	mg/kg	0.05			0.5
Sodium (Na)	mg/kg	100			
Strontium (Sr)	mg/kg	0.1			
Thallium (Tl)	mg/kg	0.1			
Tin (Sn)	mg/kg	0.2			
Titanium (Ti)	mg/kg	1			
Uranium (U)	mg/kg	0.05			
Vanadium (V)	mg/kg	2			
Zinc (Zn)	mg/kg	2	123	315	123

**Notes:**

<sup>1</sup> Conservative estimate at pH 7.5 and temperature 20 °C

<sup>2</sup> BC Ministry of Environment Working Guideline

<sup>3</sup> BC Ministry of Environment Working Guideline which is under review

<sup>4</sup> Parameter is hardness dependant, guideline value based on minimum hardness detected at 76.5 mg/L

## PROJECT DESCRIPTION

Geochemical characterization of coal and waste materials is underway to determine the potential for ML/ARD and will be used to inform surface and ground water quality predictions. ML/ARD predictions will be made following the Mine Environment Neutral Drainage (MEND) report 1.20.1 “Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials” Version 0 (December 2009). Appropriate mitigation strategies will be developed in accordance with federal and provincial guidelines to ensure that potential effects are avoided and/or minimized.

### 7.5 GROUNDWATER

#### 7.5.1 Setting

The groundwater/hydrogeology baseline sampling program was initiated in 2011. This program involved a series of groundwater monitoring installations, water level data collection, hydraulic conductivity tests, and groundwater sampling. Groundwater flow is generally aligned with major topographic features, the dominating flow direction being towards the Murray River. Current hydraulic conductivity data suggest moderate lateral heterogeneity spanning the monitoring network. Hydraulic conductivities range from  $10^{-6}$  m/s to  $10^{-8}$  m/s at depths less than 100 m below ground surface (mbgs), and  $10^{-7}$  m/s to  $10^{-10}$  m/s at depths exceeding 100 mbgs. Sample analysis was conducted for general chemistry and total and dissolved metal analytes. Results were screened against guidelines for the protection of fresh water aquatic life published by the British Columbia Ministry of Environment (BC MOE 2011) and Canadian Council of Ministers of the Environment (CCME 2012). Concentrations of total iron and aluminum in exceedance of guidelines were frequent due to high suspended solids concentrations in the samples. Regional occurrence of iron and aluminum-rich minerals also lead to occasional dissolved concentration exceedances. Total concentrations of certain trace metals exceeded guidelines (arsenic, selenium, chromium, copper, lead, and zinc). These exceedances coincided with high total aluminum and iron concentrations, and have been interpreted to be adsorbed onto clay particle surfaces.

#### 7.5.2 Potential Project Effects

Potential Project effects related to groundwater include dewatering of deep aquifers through seepage to underground workings. There are no known water users in the region; excess seepage will be brought to surface, treated and released. Another potential effect is related to seepage through the CCRA, which over time would naturally migrate toward Murray River. Development of a 3-dimensional groundwater flow and transport model is planned to evaluate this potential, including sensitivity analyses.

Following mine closure, the underground workings will flood with water, and after the water table re-equilibrates, there is potential for contaminant transport from the flooded workings. It is anticipated that due to the depth of mining and the low hydraulic conductivity of the surrounding rocks, flow paths to any potential receiving environment would be very long and slow.

### 7.6 FISH AND FISH HABITAT

#### 7.6.1 Setting

Fish and fish habitat fieldwork was conducted for the Project between 2010 and 2012. Fish information that was collected between 2004 and 2006 for Western Coal Corp. and reported in the WCC Herman Mine Application is applicable to the currently proposed Project. Those data are included here with the co-operation of Walter Energy Western Coal.

The Murray River is a low-turbidity, moderate-gradient system stretching 200 km from its origin at Upper Blue Lake, in the Hart Ranges of the Rocky Mountains, to its confluence with the Pine River on the Peace Lowlands to the northeast. The proposed Project is located approximately 120 km upstream



of the confluence of the Murray and Pine rivers. The proposed Project infrastructure is in close proximity to the Murray River mainstem and several small tributaries, including M17 Creek, M19 Creek, M20 Creek, and Twenty Creek (see Figure 6.2-1).

The Murray River contains relatively high fisheries values and supports several regionally important sport-fish populations. The most significant feature defining fish distribution within the Murray mainstem is Kinuseo Falls, located 38 km upstream of the proposed Project. This 60 m high waterfall represents the upper limit of distribution for most fish species. Native species present downstream of the falls include:

- Mountain Whitefish (*Prosopium williamsoni*);
- Arctic Grayling (*Thymallus arcticus*);
- Bull Trout (*Salvelinus confluentus*);
- Northern Pike (*Esox lucius*);
- Burbot (*Lota lota*);
- Longnose Sucker (*Catostomus catostomus*);
- Slimy Sculpin (*Cottus cognatus*);
- Longnose Dace (*Rhinichthys cataractae*);
- Finescale Dace (*Phoxinus neogaeus*); and
- Lake Chub (*Couesius plumbeus*).

Bull Trout is BC blue-listed and is a “Candidate” species under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC; i.e., currently short-listed for upcoming assessment).

Three non-native sport-fish species have been introduced to the Murray River system in recent decades, including Rainbow Trout (*Oncorhynchus mykiss*), Brook Trout (*Salvelinus fontinalis*), and Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*). Although Rainbow Trout are potentially present at very low densities, sampling records indicate the species has failed to establish significant self-sustaining populations in the Murray River or its tributaries. Westslope cutthroat trout were stocked in Upper Blue Lake, tributaries to Murray River, in 1983. This species is now abundant in the Upper and Lower Blue lakes complex and its tributaries, but have not been found in portions of the Murray River drainage nearest the Project. Westslope cutthroat trout are protected as a Schedule 1 (Special Concern) species under the *Species at Risk Act* (SARA; 2002b), considered of “Special Concern” under COSEWIC, and are provincially blue-listed. Brook Trout are now commonly found in several Murray River tributaries in the vicinity of the Project and have established a significant spawning run in Barbour Creek, located approximately 10 km upstream.

M19 Creek was found to contain juvenile Arctic Grayling, as well as Slimy Sculpin, Longnose Dace, and juvenile Brook Trout. This creek appears to be one of the relatively few small tributaries near the Project where Arctic Grayling spawning occurs. M20 Creek was found to contain Bull Trout, juvenile Mountain Whitefish, juvenile Longnose Sucker, Slimy Sculpin, Brook Trout, and Rainbow Trout. Twenty Creek is an ephemeral stream; however, during high-flow conditions it provides habitat for juvenile Mountain Whitefish, juvenile Rainbow Trout, and Brook Trout. One wetland complex was found to contain adult and young-of-year Lake Chub.

### 7.6.2 Potential Project Effects

Fish species and fish habitat, as defined by the *Fisheries Act* (1985b), may be affected by the harmful alteration, disruption and destruction of fish habitat (HADD) associated with the construction of the conveyer crossing of the Murray River and adjacent waterbodies. Fish and fish habitat may also be affected from the installation of treated water discharge infrastructure (e.g., pipeline, outfall) in Murray River. These activities may affect fish and aquatic habitat through degradation of stream banks, increased erosion and sedimentation, and altered riparian areas. The Project also has the potential to adversely affect fish and fish habitat through direct mortality caused by potential spills associated with the transportation of materials to/from site during construction and operations, and from increased fishing pressure due to enhanced area access. These potential effects may also affect aquatic species of conservation concern, including Bull Trout.

Mitigation measures to minimize potential adverse effects on fish and fish habitat will be implemented, including the application of DFO best practice guidelines, for example the Canadian Technical Report of Fisheries and Aquatic Sciences 2107 *Guidelines for the use of Explosives In or Near Canadian Fisheries Waters* (DFO 1998). If required by DFO, a Fish Habitat Compensation Plan will be developed to offset potential effects on fish and fish habitat.

## 7.7 TERRESTRIAL ECOSYSTEMS AND VEGETATION

### 7.7.1 Setting

Terrestrial ecosystems and vegetation fieldwork was conducted for the Project between 2010 and 2012. The objective of the baseline studies was to document current ecosystem and vegetation conditions within the RSA and the LSA, including information regarding rare and sensitive ecosystems, and rare plants and rare plant habitat.

The RSA overlaps nine Biogeoclimatic Ecosystem Classification (BEC) units, six of which are forested, two are parkland (transition to alpine), and one is alpine. The two most extensive ecosystems are the lower elevation Boreal White and Black Spruce (BWBS) zone and the higher elevation Engelmann Spruce - Subalpine Fir Moist Very Cold (ESSFmv2) Bullmoose variant subzone. The RSA is characterized predominantly by mesic forests. Mature forests are the most extensive structural stage of the RSA, followed by shrub. This includes much of the re-forested extent within the RSA.

The LSA is located within four BEC units, the majority of which is the BWBS -Moist Warm (BWBSmw), with lesser amounts of BWBS - Murray Wet Cool (BWBSwk1), ESSFmv2, and Sub-Boreal Spruce - Finlay Peace Wet Cool (SBSwk2). The LSA is characterized predominantly by mesic moderately dry forests. Anthropogenically modified areas, including existing mines, seismic lines, roads, transmission lines, oil, gas and hydro power developments, are interspersed throughout the LSA and are particularly common in the southeastern section. History of natural disturbances such as wildfires, windthrow, insect epidemics, notably mountain pine beetle (*Dendroctonus ponderosae*), and disease are widespread.

Surveys for rare and invasive plants resulted in the identification of one blue-listed species, *Botrychium crenulatum* (dainty moonwort; Plate 7.7-1) and 14 exotic species, of which three are regulated by the *BC Weed Control Act* (1996e) and five are tracked by the North East Invasive Plant Committee (North East Invasive Plant Committee 2006).

Ten provincially listed ecological communities were identified during field baseline studies. Of these ecosystems, one is red-listed (extirpated, endangered or threatened) and nine are blue-listed (of special concern; Table 7.7-1). Both blue- and red-listed ecosystems were identified during mapping and field studies within the LSA. The majority of these ecosystems were located along the Murray River corridor.



Plate 7.7-1. Sample of *Botrychium crenulatum* and its typical site conditions in forested areas.

Table 7.7-1. BC CDC Listed Ecosystems Identified During Field Baseline Studies

Ecosystem (Site Series/ Site Association)	Scientific Name	English Name	BC CDC List
ESSFmv2/06: Ws08	<i>Abies lasiocarpa</i> - <i>Alnus</i> spp. - <i>Equisetum</i> spp.	Subalpine fir - Alders - Horsetails	Blue
BWBSwk1/103	<i>Picea glauca</i> - <i>Pinus contorta</i> - <i>Shepherdia canadensis</i> - <i>Aster conspicuus</i>	White spruce - Lodgepole pine - Soopolallie - Showy aster	Blue
BWBSmw/112	<i>Populus balsamifera</i> - <i>Picea glauca</i> - <i>Alnus incana</i> - <i>Cornus stolonifera</i>	Balsam poplar - White spruce - Mountain alder - Dogwood	Red
BWBSmw/111; BWBSwk1/110	<i>Picea glauca</i> - <i>Ribes triste</i> - <i>Equisetum</i> spp.	White spruce - Currant - Horsetail	Blue
BWBSmw/110	<i>Picea glauca</i> - <i>Gymnocarpium</i> <i>dryopteris</i> - <i>Aralia nudicaulis</i>	White spruce - Oak fern - Sasparilla	Blue
SBSwk2/02	<i>Pinus contorta</i> / <i>Vaccinium</i> <i>membranaceum</i> / <i>Cladina</i> spp.	lodgepole pine / black huckleberry / reindeer lichens	Blue
Wm02	<i>Equisetum fluviatile</i> - <i>Carex utriculata</i>	swamp horsetail - beaked sedge	Blue
Wb09	<i>Picea mariana</i> - <i>Equisetum arvense</i> - <i>Sphagnum</i> spp.	Black spruce - Common horsetail - Peat-mosses	Blue
Wb06	<i>Larix laricina</i> - <i>Aulacomnium palustre</i>	Tamarack - Glow moss	Blue
Wb03	<i>Picea mariana</i> - <i>Vaccinium vitis-idaea</i> - <i>Sphagnum</i> spp.	black spruce - lingonberry - peat- mosses	Blue

### 7.7.2 Potential Project Effects

The construction of the Project facilities will permanently remove or change vegetation within the footprint. Construction of linear structures (e.g., conveyer belt and natural gas pipeline) may also affect sensitive ecosystems or ecosystems of conservation concern. Project activities, including vegetation clearing and use of transportation and other linear corridors, may introduce invasive species into the area or exacerbate the spread of existing invasive species. Mitigation measures and environmental management plans to minimize adverse effects will be implemented.

## 7.8 WETLANDS

### 7.8.1 Setting

Wetlands fieldwork was conducted for the Project between 2010 and 2012. These surveys resulted in the classification and mapping of 27 wetlands; GIS analysis identified a further 24 wetland features within the study area. All five wetland classes (i.e., bog, fen, marsh, swamp, and shallow open water) were observed in the wetland study area (see Table 7.8-1). Shallow open water communities were not encountered as a simple wetland community but were observed numerous times as a component of larger wetland complexes. Eight wetland associations were identified including three bog, one fen, one marsh, and three swamp associations. Marshes and swamps account for the majority of all wetland observations.

**Table 7.8-1. Wetland Associations Observed in the Murray River Wetland Study Area**

Wetland Associations	Wetland Class				
	Bog	Fen	Marsh	Swamp	Total
Salix				1	1
Salix/Carex				1	1
Wb05	1				1
Wb08	2				2
Wb09	2				2
Wf04		1			1
Wb06	4				4
Wm01			8		8
Ws07				7	7
TRIM Swamp				16	16
TRIM Marsh			8		8
Total	9	1	16	21	51

The primary functions for each observed wetland class were identified following Hanson et.al. (2008), they include:

- groundwater recharge and water storage (hydrological);
- nutrient and organic export, carbon storage, and water quality improvements (biochemical);
- listed or sensitive ecosystems and wetland complexes (ecological); and
- habitat for wetland-dependant species.

Two provincially blue-listed wetlands (Wb09 and Wb06) were identified at 6 sites (Table 7.8-1). Wetland site association Wb09 (Plate 7.8-1) is a black spruce - common horsetail - peat-moss bog, and was mapped over 5.4 ha. Wetland site association Wb06 (Plate 7.8-2) is the tamarack - water sedge - fen moss bog, and was mapped over 13.0 ha.

### 7.8.2 Potential Project Effects

The construction of the Project facilities may permanently remove or degrade (e.g., hydrological regime changes, sedimentation, dust deposition) other wetlands and may potentially affect key plant communities and wildlife that rely on wetlands. Avoidance of wetland areas will be incorporated through siting and design to the extent possible.





*Plate 7.8-1. Wb09 black spruce - common horsetail - peat-moss bog identified in the LSA during baseline studies.*



*Plate 7.8-2. Wb06 tamarack - water sedge - fen moss bog identified in the LSA during baseline studies.*

## 7.9 WILDLIFE INCLUDING MIGRATORY BIRDS AND SPECIES AT RISK

### 7.9.1 Setting

Wildlife resources in the RSA and LSA are recognized for their ecological, social, economic, and cultural value. Baseline studies for wildlife were conducted between 2010 and 2012; these studies focused on ungulates, bats, raptors, wetland birds, terrestrial breeding birds, and amphibians, and associated important habitat features.

A total of four amphibian, 112 bird, and 11 mammal species were identified during baseline studies within the RSA. The most commonly occurring wetland migratory birds, as defined in the *Migratory Birds Act* (1994), include:

- Canada goose (*Branta canadensis*);
- mallard (*Anas platyrhynchos*);
- ring-necked duck (*Aythya collaris*);
- green-winged teal (*Anas crecca*);
- Barrow's goldeneye (*Bucephala islandica*); and
- lesser scaup (*Aythya affinis*).

The most commonly occurring passerine migratory birds include:

- cliff swallow (*Petrochelidon pyrrhonota*);
- yellow-rumped warbler (*Dendroica coronata*);
- Swainson's thrush (*Catharus ustulatus*);
- warbling vireo (*Vireo gilvus*);
- Wilson's warbler (*Wilsonia pusilla*); and
- white-throated sparrow (*Zonotrichia albicollis*).

The presence of 11 species of conservation concern, including migratory birds, were confirmed during baseline studies, including species listed under SARA (2002b), COSEWIC, and the BC Conservation Data Centre (BC CDC; Table 7.9-1).

Habitat suitability modeling identified core summer and winter caribou habitat within the RSA, but not within the LSA. Five caribou were observed and two caribou antler sheds were observed within the RSA (outside the LSA) during baseline studies.

Habitat suitability modelling for grizzly bears (*Ursus arctos*) identified high quality spring and moderately high quality summer and fall habitat. Two grizzly bear sightings were incidentally observed within the RSA (outside of the LSA) during baseline studies.

High quality fisher (*Martes pennanti*) habitat (all seasons) and natal habitat were identified within the LSA during habitat suitability modeling. Fisher were not observed during baseline studies.

In addition to caribou, moose (*Alces americanus*), mountain goat (*Oreamnos americanus*), mule deer (*Odocoileus hemionus hemionus*), Rocky Mountain elk (*Cervus canadensis nelsoni*), and white-tailed deer (*Odocoileus virginianus*) were observed in the RSA during baseline studies. A mineral lick/wallow, an important habitat feature for ungulates, was found along the Murray River within the LSA. The Project RSA overlaps one approved ungulate winter range (UWR U-9-002) for mountain goats and caribou.



Table 7.9-1. Wildlife Species of Conservation Concern, Including Migratory Birds, Likely or Probable to Occur in Project Area

Scientific Name	English Name	Likelihood of Occurring in RSA <sup>1</sup>	Identified During Baseline Studies <sup>2</sup>	BC List	Identified Wildlife	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Migratory <sup>5</sup>
<i>Aechmophorus clarkii</i>	Clark's grebe	L	P	Red				Y
<i>Aegolius funereus</i>	boreal owl	L		Yellow		NAR (1995)		
<i>Anaxyrus boreas</i>	western toad	L	Y	Blue		SC (2012)	1-SC (2005)	
<i>Asio flammeus</i>	short-eared owl	L		Blue	Y	SC (2008)	1-SC (2012)	
<i>Botaurus lentiginosus</i>	American bittern	L		Blue				Y
<i>Buteo platypterus</i>	broad-winged hawk	P		Blue				
<i>Canis lupus</i>	grey wolf	L		Yellow		NAR (1999)		
<i>Cardellina canadensis</i>	Canada warbler	P		Blue		T (2008)	1-T (2010)	Y
<i>Chlidonias niger</i>	black tern	L		Yellow		NAR (1996)		Y
<i>Chordeiles minor</i>	common nighthawk	L		Yellow		T (2007)	1-T (2010)	Y
<i>Circus cyaneus</i>	northern harrier	L		Yellow		NAR (1993)		
<i>Contopus cooperi</i>	olive-sided flycatcher	L	Y	Blue		T (2007)	1-T (2010)	Y
<i>Euphagus carolinus</i>	rusty blackbird	L		Blue		SC (2006)	1-SC (2009)	Y
<i>Falco peregrinus anatum</i>	Peregrine falcon, <i>anatum</i> subspecies	L	Y	Red		SC (2007)	1-SC (2012)	
<i>Grus canadensis</i>	sandhill crane	L		Yellow	Y	NAR (1979)		Y
<i>Gulo gulo</i>	wolverine	L		No Status		SC (2003)		
<i>Gulo gulo luscus</i>	wolverine, <i>luscus</i> subspecies	L		Blue	Y	SC (2003)		
<i>Hirundo rustica</i>	barn swallow	L	Y	Blue		T (2011)		Y
<i>Limnodromus griseus</i>	short-billed dowitcher	P		Blue				Y
<i>Martes pennanti</i>	fisher	L	Y	Blue	Y			
<i>Melanitta perspicillata</i>	surf scoter	L	Y	Blue				Y
<i>Myotis lucifugus</i>	little brown myotis	P		Yellow		E (2012)		
<i>Myotis septentrionalis</i>	northern myotis	P		Blue		E (2012)		
<i>Oporornis agilis</i>	Connecticut warbler	P		Red	Y			Y
<i>Phalaropus lobatus</i>	red-necked phalarope	L	Y	Blue		C (2011)		Y
<i>Podiceps auritus</i>	horned grebe	L	Y	Yellow		SC (2009)		Y
<i>Rana luteiventris</i>	Columbia spotted frog	L		Yellow		NAR (2000)		
<i>Rangifer tarandus</i>	caribou	L	Y	No Status	Y			

(continued)

Table 7.9-1. Wildlife Species of Conservation Concern, Including Migratory Birds, Likely or Probable to Occur in Project Area (completed)

Scientific Name	English Name	Likelihood of Occurring in RSA <sup>1</sup>	Identified During Baseline Studies <sup>2</sup>	BC List	Identified Wildlife	COSEWIC <sup>3</sup>	SARA <sup>4</sup>	Migratory <sup>5</sup>
<i>Rangifer tarandus</i> pop. 1	caribou (southern mountain population)	P		Red	Y	T (2000)	1-T (2003)	
<i>Rangifer tarandus</i> pop. 15	caribou (northern mountain population)	L		Blue	Y	T/SC (2002)	1-SC (2005)	
<i>Setophaga castanea</i>	bay-breasted warbler	P		Red	Y			Y
<i>Setophaga tigrina</i>	Cape May warbler	L		Red	Y			Y
<i>Setophaga virens</i>	black-throated green warbler	L	Y	Blue	Y			Y
<i>Ursus arctos</i>	grizzly bear	L	Y	Blue	Y	SC (2002)		

<sup>1</sup> P - probable to occur in RSA; L - likely to occur in RSA

<sup>2</sup> P - possible observation during baseline studies; Y - definite observation during baseline studies

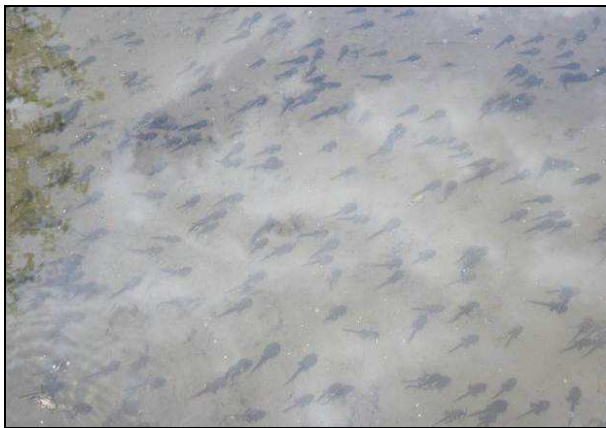
<sup>3</sup> E - Endangered; SC - Special Concern; T - Threatened; NAR - Not At Risk; C - Candidate

<sup>4</sup> 1 - Schedule 1

<sup>5</sup> As per the Migratory Birds Convention Act, 1994

Bats were detected at all of three survey sites within the RSA during baseline studies. At least two species of myotis were detected: one was most likely the little brown myotis (*Myotis lucifugus*), but the other could not be identified to species. The little brown myotis has recently been listed as endangered under COSEWIC, due to unprecedented mortality from *Geomyces destructans*, the pathogen responsible for White-nose Syndrome (COSEWIC 2012). In addition, either a hoary bat (*Lasiurus borealis*) or silver-haired bat (*Lasionycteris noctivagans*) was detected at a survey adjacent to Flatbed Creek.

Amphibian surveys were conducted in the summer of 2010. Four species of amphibians were detected: western toad (*Anaxyrus boreas*), Columbia spotted frog (*Rana luteiventris*), wood frog (*Lithobates sylvaticus*), and long-toed salamander (*Ambystoma macrodactylum*). Amphibians were recorded at 10 survey sites, eight of which were breeding sites (i.e., locations where amphibians at varying breeding stages were recorded). Four of these breeding sites are within the LSA. One additional breeding site was detected incidentally within the LSA during other wildlife baseline surveys in July. Western toad (listed as Special Concern in Schedule 1 of SARA) was the most commonly observed breeding amphibian. Six locations (including the one site recorded incidentally) contained western toad tadpoles and/or toadlets, including two sites where over 500 individuals were counted (Plate 7.9-1). Three western toad breeding sites are located within the LSA.



a) Western Toad tadpoles



b) Western Toad metamorphs (toadlet)



c) Western Toad toadlets



d) Western Toad toadlet

Plate 7.9-1. Large aggregation of western toad, toadlets and tadpoles observed within the LSA.

Based on criteria such as conservation status, ecological sensitivity, importance to First Nations and local, social, or economic factors, key indicator species for the region include: moose, mountain caribou, mountain goat, grizzly bear, western toad, furbearers, and migratory raptors, waterfowl and songbirds.

### 7.9.2 Potential Project Effects

Any potential effects on species at risk and their habitat, and on unique ecosystems during any phases of the Project will be minimized through appropriate site selection, and further mitigated to the extent possible. Areas with good quality wildlife habitat, including those of species listed under SARA (2002b) and migratory birds as defined under the *Migratory Birds Convention Act* (1994), may be affected by Project development activities, and sensory disturbance due to Project related noise and movement. Moose, grizzly bears, and other species utilize the Murray River as a movement corridor, and this movement may be impeded by the location of the Project near the river, as well as from construction and operation of the conveyer crossing. Project infrastructure is located at a relatively low elevation, and outside of core Caribou habitat. However, caribou are known to swim across the Murray River and construction and operation of the Project may affect this movement, either via sensory disturbances or through loss of movement corridors due to the Project footprint. However, as an underground mine, the aboveground Project footprint is relatively small and is not expected to significantly contribute to wildlife habitat fragmentation.

The increased use of existing access roads and rail lines to the Project during construction and operations could expose wildlife to direct mortality due to vehicle collisions. The species most vulnerable to road-kill mortality are small, slow-moving species which are difficult for drivers to see, and large ungulates who utilize roads (e.g. moose). A species of particular concern is the western toad due to its conservation status.

The uptake of contaminants and heavy metals by wildlife may result in effects to the particular population and may result in food chain effects. Wildlife may be exposed to contaminants and metals in on-site water management facilities (e.g., sedimentation ponds, ditches), or through deposition of fugitive dust on vegetation and in waterbodies. Of particular concern regionally is the uptake of selenium by aquatic wildlife. Appropriate mitigation measures, potentially including water treatment, will be investigated if necessary based on the results of geochemical predictions.

The potential for wildlife to become habituated to human presence and food sources exists due to the presence of mining facilities. Animals may be injured, or may cause damage to property or injure humans as a result of long-term exposure to human activity. Animals most at risk include black and grizzly bears, and small carnivores. Some waterfowl species may also be attracted to surface water with poor water quality (e.g., sedimentation ponds) or to lights on towers, and become injured as a result.

Local wildlife species may experience intermittent sensory disturbance due to exposure to increased noise levels in the immediate vicinity of the Project during construction and operations. However, due to the primarily underground operations, surface noise levels are expected to be of minor magnitude.

Other potential effects to migratory birds may include direct mortality from collisions with transmission lines, buildings, or vehicles, removal or disruption of nests, loss of habitat due to vegetation clearing for construction and maintenance of right-of-ways and mine site components. Effects may also include interference from Project lighting and noise, and effects to health from potential degradation of air and water quality related to potentially harmful air emissions from generators and other mining equipment, and from increased fugitive dust. Finally, discharge of treated contact water into the receiving environment, may affect migratory water bird habitat. These effects will primarily occur during construction and operations. All baseline data and supporting analyses will be conducted following applicable federal guidelines, including the Canadian Wildlife Service's Technical Report No. 508 *A Framework for the Scientific Assessment of Potential Impacts on Birds* (Hanson et al 2009).

## 7.10 VISUAL AND AESTHETIC RESOURCES

### 7.10.1 Setting

The proposed Project is not in an area of heavy use, but it does have recreational value. Activities include hiking, fishing, rafting trips, and skiing. Given the emphasis placed on tourism by both the Dawson Creek LRMP and the District of Tumbler Ridge, it can be expected that the area will continue to be used for both summer and winter recreational purposes. Thus, the natural landscape is an important part of the area's recreational capacity.

The LSA is a busy area, with many overlapping interests. Existing industrial infrastructure/activity includes the Quintette Mine, gas pipelines, hydro transmission lines, forestry, and oil/gas/mineral exploration. An assessment of viewpoints from Tumbler Ridge and along the Highway 52 corridor, the areas of highest traffic for both locals and visitors to the area, indicated that at distances of 5 to 10 km, few details of these infrastructure/activities could be discerned. However, infrastructure is clearly visible to recreational users accessing the Murray River FSR.

### 7.10.2 Potential Project Effects

A visual quality assessment will be undertaken to assess the potential effects of mine infrastructure on the visual landscape as specified in the Dawson Creek LRMP and/or by BC Ministry of Forests, Lands and Natural Resource Operations (as applicable). In general, as mining will be underground, the Project's surface footprint will be relatively small, and the planned infrastructure will not be substantially different from what already exists on the landscape. The Project also has the potential to increase ambient light levels at the Project site. Potential light effects will be included in the scope of the effects assessment and night-time illumination levels will be assessed, if required. Mitigation measures to reduce adverse effects on visual quality, including light, will be implemented as appropriate.

## 7.11 ARCHAEOLOGY, AND PHYSICAL AND CULTURAL HERITAGE

### 7.11.1 Setting

A review of available archaeological information identified multiple previously recorded archaeological sites within 5 km of the proposed Project infrastructure. All of the sites are pre-contact lithic scatters.

Archaeological Impact Assessments (AIA) for the Project have been conducted under Heritage Inspection Permits 2010-0279 and 2012-0099, issued by the Archaeology Branch, Ministry of Forests, Lands and Natural Resource Operations. The AIAs focused on areas of proposed infrastructure. No archaeological sites or other heritage resources were identified in conflict with proposed infrastructure on the west side of Murray River. However, archaeological site GgRg-9 (lithic scatter and trail) was identified along the proposed Conveyor Belt alignment east of the Murray River.

### 7.11.2 Potential Project Effects

Site GgRg-9 is protected under the *BC Heritage Conservation Act* (1996h). However, as it is located immediately underneath the proposed conveyer belt, HD Mining is currently reviewing options related to conveyor alignment and design. If the trail cannot be avoided, then appropriate mitigation measures will be identified and implemented, and a Section 12 Site Alteration Permit issued by the Archaeology Branch will be acquired if necessary. No other physical and cultural heritage resources have been identified within the proposed Project footprint

## 7.12 LAND USE

### 7.12.1 Setting

The proposed Project infrastructure and underground mining area is located on Crown land and within the boundaries of the Dawson Creek Land and Resource Management Plan (LRMP; British Columbia Integrated Land Management Bureau 1999).

The Dawson Creek LRMP area is subdivided into 12 Resource Management Zones (RMZs) to reflect resource values, existing economic activity, environmentally important areas, and Agricultural Land Reserve boundaries (Figure 7.12-1). The management of the RMZs is guided by 17 General Management Directions that address conservation issues and provide direction related to coal and mineral development, fish and wildlife, air quality, First Nations, biodiversity, and energy. The LSA overlaps with three RMZs: the Foothills RMZ (including Bullmoose Creek and Mount Anderson subzones), the Alberta Plateau RMZ (including the Redwillow Creek subzone) and the Major River Corridor RMZ (including the Murray River subzone).

Subsistence activities, such as trapping, hunting and fishing are common land uses regionally. Three trapping tenures overlap the RSA (Figure 7.12-2); these tenure holders commonly harvest beaver (*Castor canadensis*), coyotes (*Canis latrans*), fisher, lynx (*Lynx canadensis*), American marten (*Martes americana*), otters (*Lontra canadensis*), squirrels (*Tamiasciurus* spp. and others), weasels (*Mustela* spp.), wolverine (*Gulo gulo*), and wolves (*Canis lupus*).

Common species hunted for both residents and non-residents in the region are Rocky Mountain elk, mule deer, white-tailed deer, moose, black bear and mountain sheep (*Ovis* spp.). Four guide-outfitting tenures overlap the RSA (Figure 7.12-3); these guide-outfitters target black bear, grizzly bear, Rocky Mountain elk, moose, mountain goats, mountain sheep, cougar (*Puma concolor*), and wolf.

Surveys have reported over 6,000 active anglers in the Peace region, fishing almost 70,000 angler-days. The primary species caught are walleye (pickerel; *Sander vitreus*), rainbow trout, northern pike, perch, whitefish, and Arctic grayling. No commercial angling guides or popular fishing spots are located within the RSA.

Recreational boaters can launch their boats at the Murray River FSR bridge, and use of the Murray River is common during the open water season, particularly to travel up river and visit Kinuseo Falls.

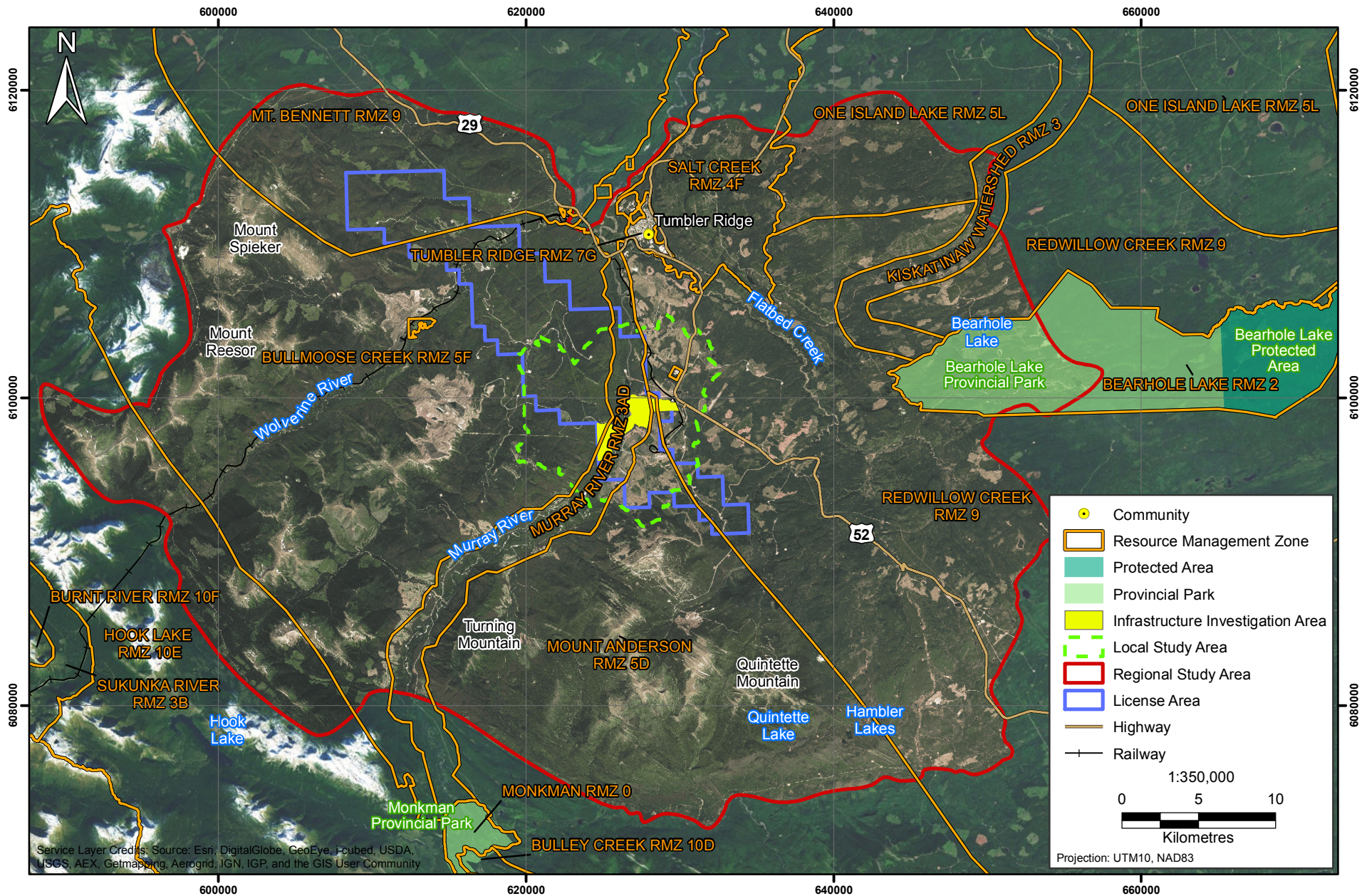
Twelve cutblock licenses exist within the LSA (Figure 7.12-4); three of these are held by the proponent. Large portions of the LSA have been recently harvested to remove pine-beetle affected timber.

Multiple recreation tenures, as well as temporary and permanent residences exist within the Project area (Figures 7.12-2 and 7.12-5). The nearest trapline cabin is 1.7 km from the Project, the nearest campground is 9.5 km from the Project, the nearest hunt camp is 26 km from the Project, and the nearest residential area (Tumbler Ridge) is 12.4 km from the Project.

### 7.12.2 Potential Project Effects

The development of the Project is consistent with the Dawson Creek LRMP (British Columbia Integrated Land Management Bureau 1999). Effects to land use may involve disturbances to subsistence activities, such as trapping, hunting and fishing, as well as the economic environment surrounding those activities (e.g., guide-outfitting). Disturbances to recreational opportunities may also occur. Wildlife populations for hunting, trapping and guide-outfitting would be affected through pathways identified in Section 7.9.2. Fish populations would for fishing would be affected through pathways identified in Section 7.6.2. As well, established use and enjoyment of these resources may be affected through an increased pressure on the resource from the influx of workers for the Project.





Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Fcoubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Figure 7.12-1



**MURRAY RIVER COAL PROJECT**

**Dawson Creek LRM Resource Management Zones (RMZs) and Provincial Parks Near the Project**

Figure 7.12-1





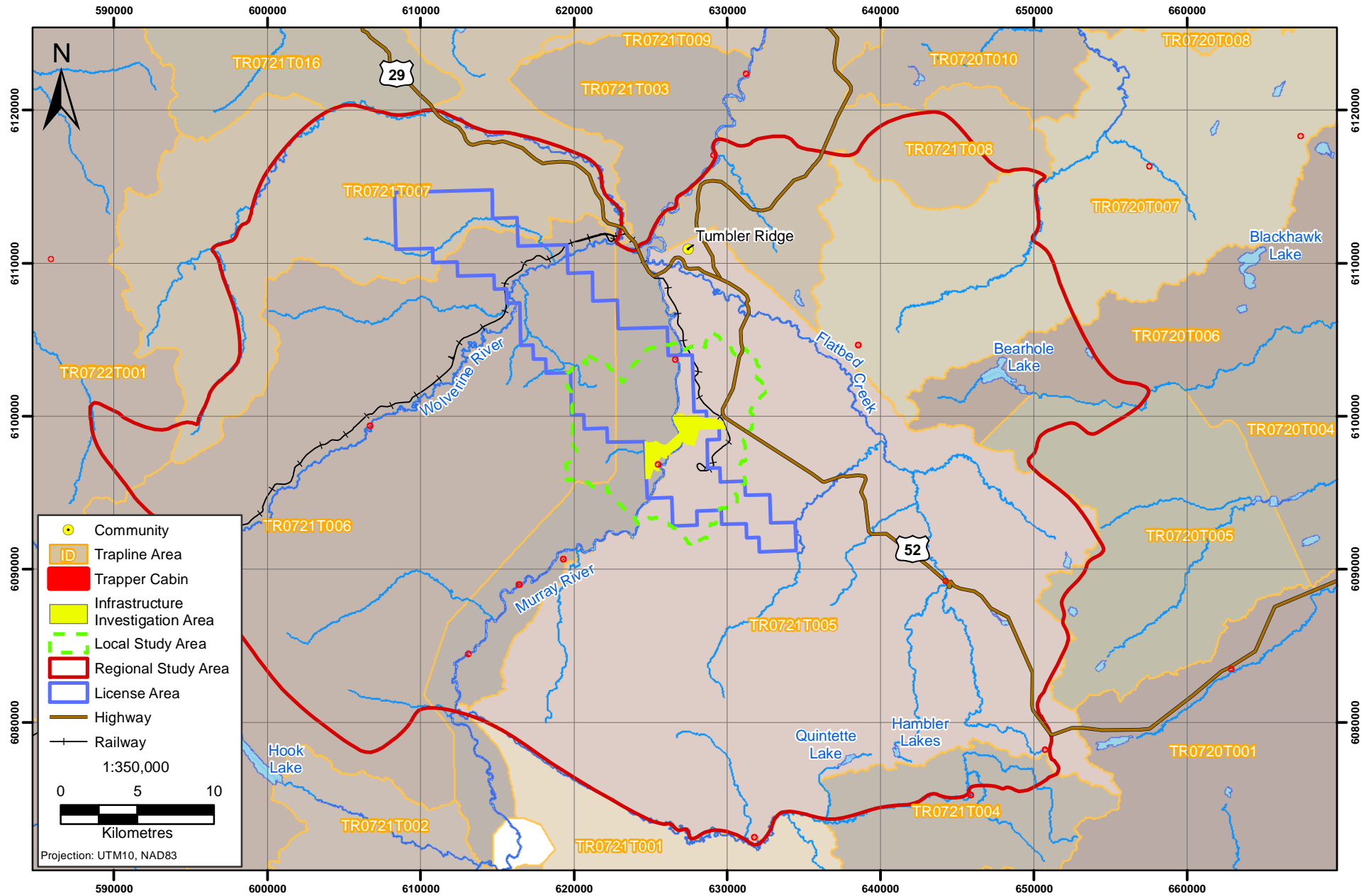


Figure 7.12-2



**MURRAY RIVER COAL PROJECT**

**Trapline Areas**

Figure 7.12-2



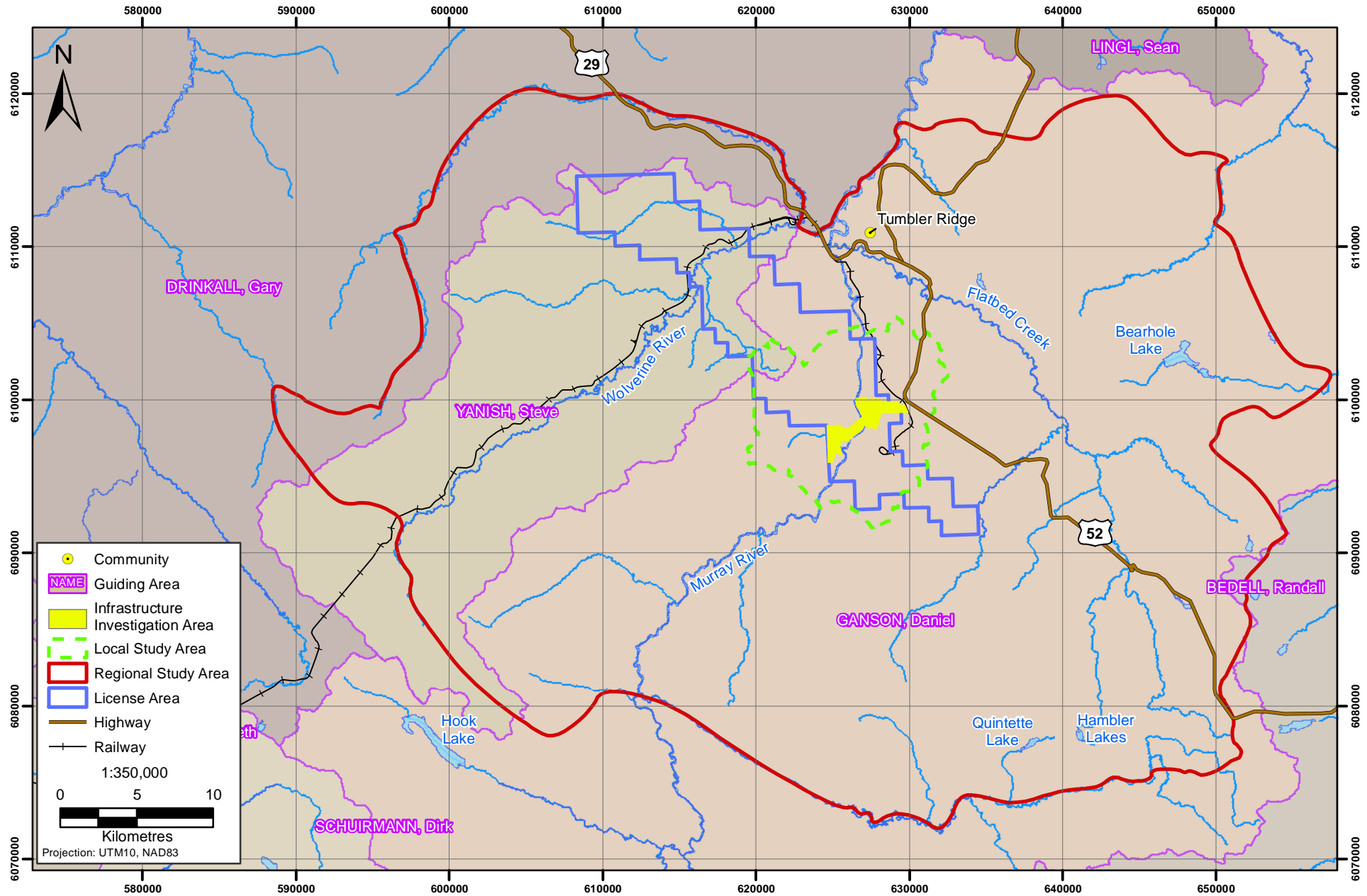


Figure 7.12-3



**MURRAY RIVER COAL PROJECT**

**Guide Outfitting Areas**

Figure 7.12-3





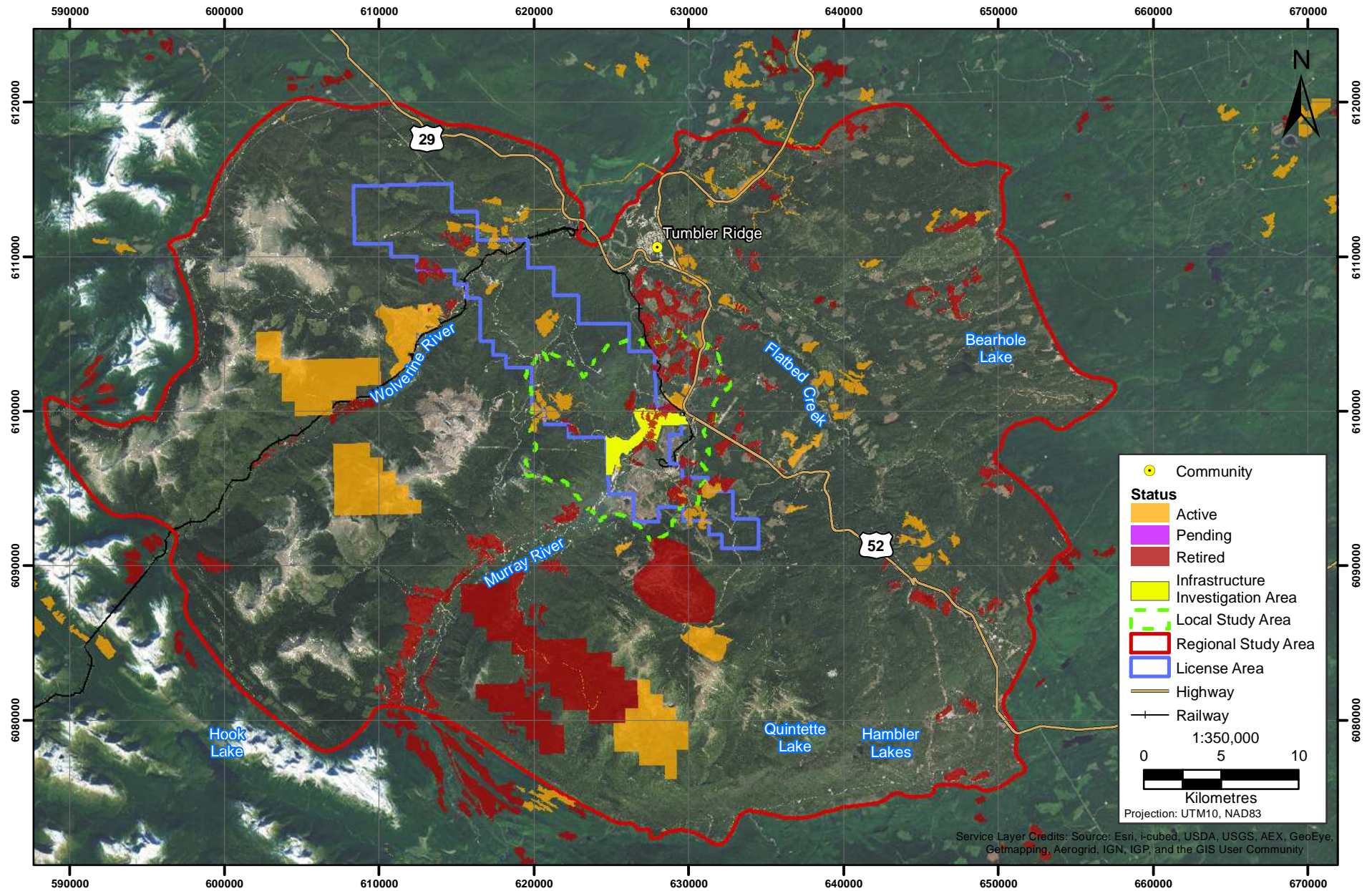


Figure 7.12-4



MURRAY RIVER COAL PROJECT

### Forest Tenure Cutblock Boundaries

Figure 7.12-4



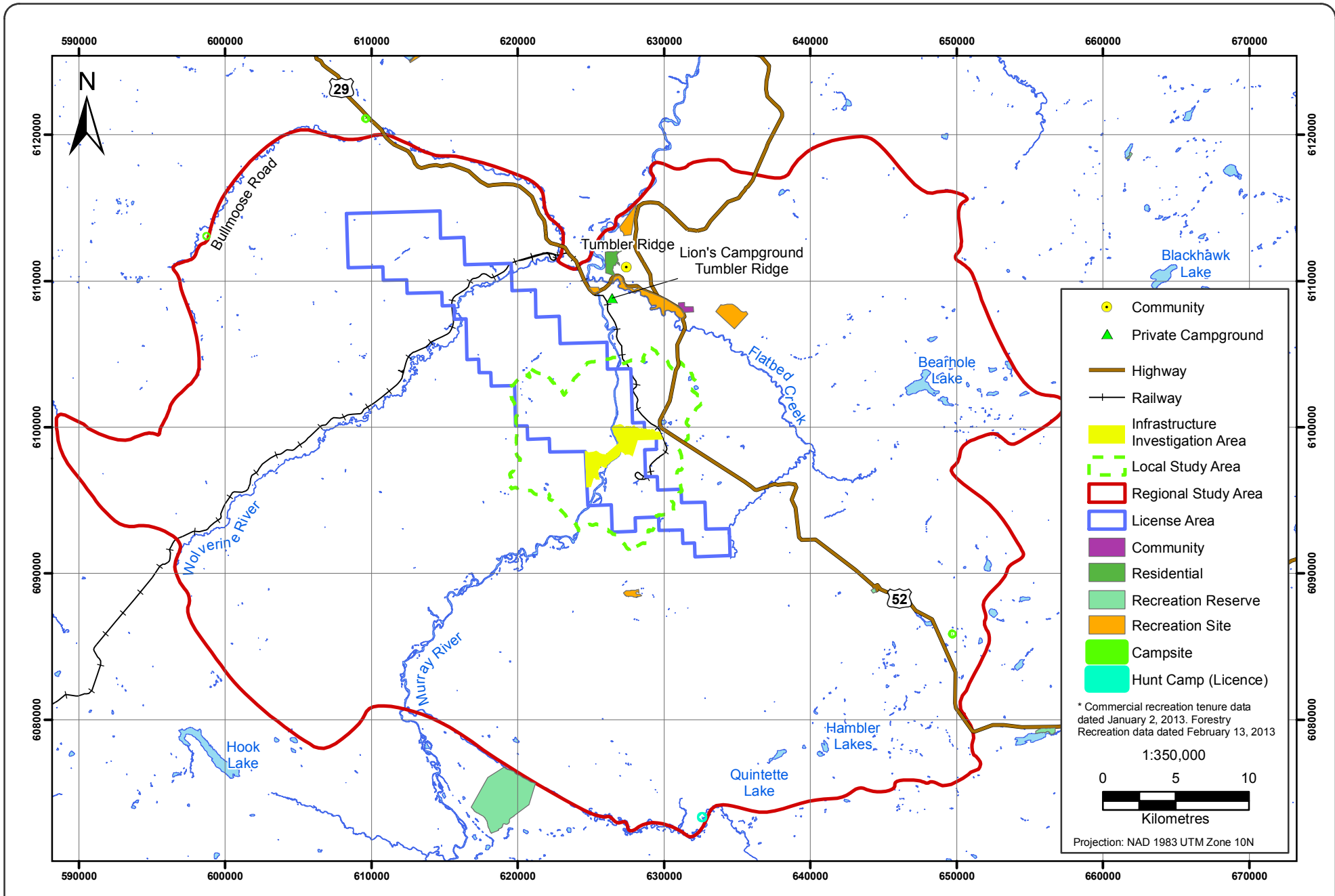


Figure 7.12-5



**MURRAY RIVER COAL PROJECT**

**Recreation Tenures, Seasonal, Temporary, and Permanent Residences**

Figure 7.12-5



## 7.13 AIR QUALITY AND NOISE

### 7.13.1 Setting

Existing air quality conditions have been characterized by measurements of particulate matter ( $PM_{10}$  and  $PM_{2.5}$ ), which are available from the Tumbler Ridge airport and Tumbler Ridge Industrial Park monitoring stations operated by personnel from the Trend Coal Mine. Site-specific measurements of dustfall have also been collected at a number of stations within the LSA. All measured air quality parameters fall within provincial ambient air quality guidelines and the Canada Wide Standards for air quality.

Baseline noise measurements have been collected for a number of locations within the LSA. Existing noise conditions are consistent with expectations for a forested area with relatively limited daily industrial presence.

### 7.13.2 Potential Project Effects

Potential effects on air quality include particulate matter and greenhouse gas emissions from fuel combustion by vehicles and coal preparation plant operation; fugitive emissions from the above ground coal stock piles may also occur. The Project site is not in close proximity to human settlements, and dust and noise are not expected to impact any communities in the region. Criteria air contaminants may become deposited on surrounding soils and vegetation.

Increased noise resulting from the Project has the potential to affect the experience of recreational users. Also, local wildlife species may be exposed to increased noise level in the immediate vicinity of the mine site. However due to the primarily underground operations, surface noise levels are not expected to be substantial. An assessment of noise will be included in the scope of the effects assessment if required and all federal guideline documents will be followed, in particular Health Canada's (2011) draft document entitled: *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise*.

## 7.14 HUMAN HEALTH AND COUNTRY FOODS

### 7.14.1 Setting

Human health assessments generally consider the potential for impacts to human health related to air quality, water quality, noise levels, and country foods. Information on existing conditions for these topics has been outlined in previous sections.

Due to the lack of industrial emission sources and low level of mobile emission sources in the Project area, ambient air quality in the area is good, and ambient noise levels are low.

There are no known users who draw drinking water from within the immediate area around the Project. Downstream of the Project, the District of Tumbler Ridge holds a water licence for the Murray River; however, this is not currently active - the town's water supply is drawn from groundwater.

The Project is located approximately 12 km south of the nearest permanent residence at Tumbler Ridge (Figure 7.12-5), and 1.7 km from the nearest temporary residence (a trapline cabin; Figure 7.12-2).

Many different plants and animals are hunted/collected from within the region. The most common country foods consumed in the region include: moose, grouse, and various types of berries.



### 7.14.2 Potential Project Effects and Environmental Management

Regional air quality and noise effects are expected to be minimal due to the majority of the mining activities occurring underground. Effects on downstream water quality may affect human health through the consumption of country foods where there is the potential for bioaccumulation of contaminants of concern in the food chain (e.g., fish, birds and wildlife) and through effects on drinking water quality. Changes to soil quality and vegetation in the vicinity of Project components also have the potential to affect human health through the harvesting and consumption of traditional plants for nutritional and medicinal purposes.

## 7.15 ABORIGINAL GROUPS

### 7.15.1 Setting

HD Mining is currently working to engage WMFN, SFN and MLIB to better understand their individual traditional use/knowledge as well as their current use of the LSA and the region. The following summary information has been derived from available public sources.

#### 7.15.1.1 West Moberly First Nation

Hunting, trapping and fishing remain culturally and economically significant activities for the WMFN (PMT SRMP 2006). The traditional hunting and trapping territories of the WMFN are the foothills and mountains of the Rockies. Hunting and trapping occurred as far westward as the Ospika River, located on the western slope of the Rockies in the Rocky Mountain Trench. Prior to 1961, the typical historical seasonal round would have included occupation along the Smoky River during the snow-free seasons, and dispersal to family trap-lines during the winter (Weinstein 1979; TMW 2009).

Moberly Lake was well known as a dependable food source by the Dane-zaa. Ice-fishing was done at Moberly Lake in the winter, and in the late spring, goose eggs were collected and muskrats were trapped along the shore (Mokakioyis 2008).

The area lying between Moberly Lake and the Peace River comprises approximately 1,090 km<sup>2</sup> of land and is known as the Peace Moberly Tract (PMT; PMT SRMP 2006). The PMT, partially located within the RSA and approximately 69 km north of the LSA, is a key supply area for traditional foods (also known as country foods) for both the WMFN and SFN. The SRMP for the PMT allows for the continued practice of traditional activities such as trapping, hunting and fishing that remain an essential component of life for these communities. The area provides medicinal plants, as well as products used in cultural ceremonies, crafts, and the fabrication of items such as canoes, drums and snowshoes (PMT SRMP 2006).

Indigenous burning was common in the PMT prior to the arrival of settlers for a variety of reasons including the maintenance and improvement of berry producing areas, fuel management, and to produce horse pasture. Patches are maintained mostly by low intensity burning at intervals of three to seven years. Blueberries and huckleberries (*Vaccinium* spp.), raspberries (*Rubus* spp.), highbush cranberry (*Viburnum edule*), Saskatoon (*Amelanchier alnifolia*), soopollalie (*Shepherdia canadensis*) and other commonly used berry species show a strong affinity for young forests, and some ecosystems within the PMT are considered fire dependent (PMT SRMP 2006).

#### 7.15.1.2 Saulteau First Nations

Hunting, trapping and fishing remain culturally and economically significant activities for the SFN (PMT SRMP 2006). The SFN have historically hunted and trapped the lands south of the Peace River, and east of the Rocky Mountains since their arrival in the region in the late 19<sup>th</sup> century (Leonard 1995). This area includes lands within the Murray and Sukunka River watersheds, as well as northward within

## PROJECT DESCRIPTION

the Kiskatinaw River watershed to the Peace River (TMW 2009). Presently, the core of SFN hunting territory is located north of the present-day reserve, centered around the Moberly and Pine rivers, as well as Cameron and Boucher Lakes (all within the RSA). There is still a vigorous hunting economy within the Saulteau community (PMT SRMP 2006; Finavera 2011).

There are strong parallels to the geographic extent of the WMFN hunting/trapping area. Again, SFN's hunting/trapping area is entirely within the bounds of the RSA, though only borders the northwest corner of the LSA in the Murray River drainage.

Sundance Lake, located approximately 20 km east of Chetwynd, was a place used by Cree and Saulteau groups for the annual sun dance. People would gather between there and Dancing Lake during the summer. Sundance Lake was also used for trapping (Mokakioyis 2008).

Moberly Lake has populations of whitefish, pike, lake trout, greyling, burbot, and suckers that the SFN have harvested in a net fishery, although this technology has declined in recent times (Weinstein 1979). Saulteau elders recall the people moving camp in September to go on hunting parties around Big Lake or Swan Lake (both within the RSA but outside of the LSA). They would pack horses and the people would make dry meat, pounded meat, and pemmican. Many places around the Moberly River were highly used berry-picking areas (PMT SRMP 2006). Moose is the mainstay of the hunting economy, although deer, mountain goat and caribou are also hunted.

The PMT is a key supply area for traditional foods for the SFN. The SRMP for the PMT allows for the continued practice of trapping, hunting and fishing and the area provides medicinal plants, as well as products used in cultural ceremonies and crafts (PMT SRMP 2006).

A number of traplines are registered to Saulteau First Nation families. Trapping played a very significant role in the Saulteau economy, but due to declines in fur bearing animals in recent years, as well as a general decline in the prices for furs, the importance of trapping has significantly declined.

### *7.15.1.3 McLeod Lake Indian Band*

Present-day hunting/fishing/trapping/guiding territory of the MLIB extends north of the village of Mackenzie to the confluence of the Nation and Parsnip Rivers, south to Summit Lake and the height of land separating the Fraser and Parsnip rivers (the Continental Divide), and east into the Pine River headwaters. The eastern half of this resource acquisition area may lie within the RSA boundary, while none of the area overlaps with the LSA. This, however, is contrasted with the traditional territory of the MLIB, which includes all of the LSA.

The McLeod Lake Tsek'ehne continue to hunt and trap along the rivers and lakes that drain to the east into the Parsnip River, including Carp Lake and the Nation River and Lakes (Ridington 2008). Nation Lakes and Carp Lake were noted as productive hunting areas, and were the location of numerous MLIB traplines, while Carp Lake was also a well-known berry-picking area. Mount Milligan was also identified as one of many places within their territory which people traditionally used on their seasonal rounds. Elk were harvested around Summit Lake and north of Hogleund Lake (Terrane 2008).

Fish are harvested in the spring and summer at a number of locales, but primarily at the head of the Parsnip River and at Tabor Lake, Philip Lakes, Nation Lakes, Summit Lake, and McLeod Lake. Birds were harvested along the Crooked and Pack rivers (Terrane 2008).

The McLeod Lake Indian Band Elders indicate that saskatoon berries are found north and west along McLeod Lake and Pack River areas. In summer, McLeod Lake Indian Band Elders often travel along logging roads to pick berries (Terrane 2008).

#### 7.15.1.4 *Métis*

The Métis people at Kelly Lake began arriving with the fur trade in the 1800's (Calverley 1980). Their culture is intertwined with Canada's fur trade history. The Métis people at Kelly Lake have traditionally been hunters and trappers, and continue to subsist on a traditional economy. The Kelly Lake Métis Settlement Society members hold traplines in the surrounding area. Hunting and trapping are important food and income sources to community members.

### 7.15.2 Potential Effects to Aboriginal Groups

Based on feedback received during engagement work completed to date (see Section 9), HD Mining recognizes that Aboriginal groups in the region have wide ranging interests on the Project. Key environmental interests include caribou habitat, water quality in the Murray River watershed, potential effects to native plants, and access to engage in traditional activities; socio-economic interests are related to job opportunities and training, and other economic opportunities. Details on the specific geographic locations of Aboriginal groups' activities are unavailable at this time; HD Mining is working with local Aboriginal groups to acquire this information.

The Project may have minimal impact on Aboriginal groups' rights and interests to caribou. The Project has a relatively small aboveground footprint, and will largely utilize existing infrastructure for transportation (CN Rail, existing Forest Service Roads) and power (BC Hydro). Project infrastructure is at relatively low elevation, and outside of core caribou habitat. The conveyer belt crossing the Murray River has the potential to affect wildlife movement; however it will be sufficiently elevated as to not impede wildlife movement. It will also be shielded at point of crossing to prevent accidental spillage into Murray River.

Due to the Project's proximity to the Murray River there is the potential to effect fish and aquatic habitat, and the Project may affect Aboriginal groups' rights and interests to fisheries. Selenium leaching and the potential for biological/ecological effects due to oxidation of coarse coal rejects (ML/ARD) may be a potential effect in the receiving environment. Water management and treatment facilities will be in place to minimize these potential effects. Dust control measures will also be implemented to prevent direct deposition of mine dust into the receiving environment.

Aboriginal groups' rights and interests to wildlife may be affected by an increase in both road and rail traffic may increase direct wildlife mortality from vehicle collisions, as well as create sensory disturbance for hunted and trapped wildlife species. The small Project footprint will limit potential incremental loss of habitat, and should not affect access to areas that could support hunting, trapping, and native plant harvesting.

Archaeological site GgRg-9 was identified on the eastern bank of the Murray River near the Project; if avoidance is not possible, appropriate measures will be implemented to mitigate any potential effects to this site.

## 8. Environmental Management and Monitoring Plans

## 8. Environmental Management and Monitoring Plans

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During the EA process, relevant environmental management and monitoring plans will be developed for implementation during all Project phases. These may include:

- air quality and dust control;
- noise and light;
- site preparation and soil salvage;
- erosion and sediment control;
- water;
- raw and processed coal stockpiling and handling;
- coarse and fine coal rejects;
- metal leaching and acid rock drainage;
- flocculent;
- explosives and nitrogen;
- selenium;
- fish habitat compensation;
- invasive plants;
- wildlife;
- waste management (including hazardous materials/waste, construction waste, sewage);
- archaeological resources;
- subsidence;
- recruitment, training and employment;
- site access;
- snow management;
- spill response;
- emergency response; and
- reclamation and closure.



## 9. Information Distribution and Consultations

## 9. Information Distribution and Consultations

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### 9.1 INTRODUCTION

A consultation program will be developed and implemented as part of the EA process. The program will be consistent with the *Canadian Environmental Assessment Act, 2012* and guidelines derived from the *BC Environmental Assessment Act (BCEAA; 2002)*, the BCEAA's *Public Consultation Policy Regulation* (B.C. Reg. 373/2002); and the *Provincial Policy for Consultation with First Nations* (2010). Aboriginal consultation and public participation are fundamental aspects of a comprehensive EA process. Consultations with Aboriginal groups, local communities, and the public in general, will be conducted throughout the EA review process. The Crown will be required to exercise its responsibility in discharging its consultation requirements during the assessment review period.

### 9.2 CONSULTATION PROGRAM

The BC EAO has issued an order under Section 11 of the BC *EAA* (2002a) that specifies the provincial Project-specific consultation and consultation reporting requirements.

Following BC EAO's the issuance of the Section 11 Order, HD Mining submitted a Public Consultation Plan to the BC EAO (January 2013). This plan was approved and posted to the BC EAO's Project Information Centre (ePIC; [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_home.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html)) on January 16, 2013. A draft First Nations Consultation Plan has also been developed and has been submitted to First Nation groups and the BC EAO for review and comment.

As part of the EA process, the BC EAO has established a formal EA working group with the following parties: potentially affected First Nations Groups, relevant provincial, federal, and local governments, the District of Tumbler Ridge, and the Peace River Regional District. The working group's goal is to provide guidance to HD Mining 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.

Engagement and consultation with provincial, federal, and First Nations' governments, the public, and stakeholders will be conducted throughout all stages of Project planning and regulatory review 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.

### 9.3 CONSULTATION ACTIVITIES

HD Mining is committed to open communication with all stakeholders or interested parties including Aboriginal groups, the public, and federal, provincial, regional and local governments. HD Mining has defined the following guiding principles for public consultation and engagement:

- open and honest communication;
- information is accessible, accurate and appropriate to the scope of the assessment for the proposed project;

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- inclusion: stakeholders and Aboriginal groups are engaged to the broadest and most appropriate degree;
- responsive: engagement is responsive to community interests. Engagement is a two-way dialogue whereby processes will be in place to demonstrate receipt of information and its consideration in project development, where possible; and
- long-term: a strong community present is anticipated over many years. Relationship building is about the long-term.

HD Mining and their consultants are currently in communication with local communities and governments, provincial and federal agencies, as well as Aboriginal groups. Working relationships with local Aboriginal groups are currently being developed. Engagement activities that have taken place to date include mail-outs to tenure holders in the Project study area, presentations to local municipal governments and Aboriginal groups, as well as community information sessions. HD Mining and their consultants will continue to engage all interested parties throughout the EA process.

### 9.3.1 Treaty 8 First Nations and Métis

HD Mining is committed to building constructive and positive relationships with Aboriginal communities. Its engagement with Aboriginal communities will be guided by the following principles:

- open and honest communication;
- respect for Aboriginal culture and values; and
- responsiveness to community interests.

Working in collaboration with Aboriginal groups, HD Mining will gather information about how First Nations' treaty rights, land, citizens and interests may be impacted by the proposed Project, as well as possible ways in which those impacts can be avoided or mitigated.

HD Mining is also interested in ensuring that Aboriginal groups have the capacity to participate effectively in the EA process.

Specific engagement objectives include:

- providing Aboriginal groups with sufficient information to allow meaningful evaluation of the proposed Project;
- identifying Aboriginal Treaty rights and interests that may be affected by the proposed Project;
- gathering information about how Aboriginal Treaty rights and interests may be affected by the proposed Project;
- involving Aboriginal groups in relevant studies and seeking comments from Aboriginal groups on proposed baseline studies, potential Project effects and mitigation measures;
- identifying and developing measures to prevent, mitigate, or otherwise address potential effects on Aboriginal Treaty rights and interests; and
- documenting and reporting the results of consultation and engagement with Aboriginal groups.

HD Mining acknowledges that circumstances may arise where specific information provided by Aboriginal groups must be kept confidential. HD Mining is interested in working with Aboriginal groups to address confidentiality issues where they arise.

All BC Treaty 8 First Nations have been invited by the BC EAO to participate in the Project’s EA working group. The Section 11 Order has defined consultation requirements for the WMFN, SFN, and MLIB. HD Mining has drafted and provided to First Nations a First Nations Consultation Plan based on engagement with these three groups. The remaining BC Treaty 8 Nations will be informed of key milestones reached in the EA process.

Contact information for the nearest Aboriginal groups is provided in Table 9.3-1.

**Table 9.3-1. Contact Information for Treaty 8 First Nations and Métis**

Treaty or First Nation	Address	Phone/Fax/Email	Contact Person
McLeod Lake Indian Band	4821 South Access Road, PO Box 87 Chetwynd, BC V0C 1J0	T: (250) 750-4415 F: (250) 750-4420 <a href="http://www.mlib.ca/?page_id=437">http://www.mlib.ca/?page_id=437</a>	Deborah Prince (Land Referral Manager) deprince@mlib.ca (250) 788-2227
Saulteau First Nations	PO Box 1020 Chetwynd, BC V0C 1J0	T: (250) 788-3955 F: (250) 788-1276 info@saulteau.com	Rick Publicover (Land Manager) rpublicover@saulteau.com (250) 788-7258
West Moberly First Nations	PO Box 90 Moberly Lake, BC V0C 1X0	T: (250) 788-3663 F: (250) 788-9792 landuseoffice@westmo.org	Lisa McArthur
Métis Nation BC	30691 Simpson Road Abbotsford, BC V2T 6C7	T: 1-800-940-1150 F: (604) 557-5851 <a href="http://mpcbc.bc.ca">http://mpcbc.bc.ca</a>	Dan Pope (Interim Regional Director for Northeast) (250) 261-4334
Treaty 8 Tribal Association	10233 100 <sup>th</sup> Avenue Fort St. John, BC V1J 1Y8	T: (250) 785-0612 F: (250) 785-2021 <a href="http://treaty8.bc.ca">http://treaty8.bc.ca</a> r.resener@treaty8.bc.ca	Shona Nelson (Treaty & Aboriginal Rights Research Director) ext. 244 snelson@treaty8.bc.ca

Table 9.3-2 summarizes Aboriginal engagement activities carried out to date.

**Table 9.3-2. Summary of Aboriginal Engagement by HD Mining**

Date	Method of Communication	To	Topic/Summary Discussion
22-Feb-2010	Meeting	WMFN Chief, Councillors, and LUM	Introduce Murray River Project
24-Mar-2010	E-mail	MLIB Coordinator	Discussion of MOU for the Murray River and Bullmoose projects Donation offer for community project EA capacity funding
24-Mar-2010	E-mail	WMFN Chief and Council	Project update
28-Apr-2010	E-mail	MLIB Coal Coordinator	Respond to CDIMG request for information regarding MLIB newsletter and provide details of MOU signing
19-May-2010	E-mail	WMFN LUM	Sent water fowl study map
20-May-2010	Meeting	MLIB Chief and Councillors	MOU signing for Murray River and Bullmoose projects Lunch with MLIB, Chetwynd Mayor, Chamber of Commerce Manager and Chetwynd EDO

(continued)

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Table 9.3-2. Summary of Aboriginal Engagement by HD Mining (continued)

Date	Method of Communication	To	Topic/Summary Discussion
9-Jul-2010	In person	WMFN Administration	Sponsorship for Westmo Days
13-Jul-2010	In person	MLIB CDIMG FNCCM	Tour of reclaimed Murray River drill sites
14-Jul-2010	E-mail	MLIB Coal Coordinator	Respond to questions regarding stakes and depths of drill sites based on July 13 visit
21-Jul-2010	E-mail	MLIB Coal Coordinator	Status of TK/TU studies for Murray River
25-Jul-2010	In person	WMFN Community	Attend Westmo Days
5-Aug-2010	E-mail	SFN Chief, Council	Request Community Consultation meeting on Sept 21
6-Aug-2010	Meeting	MLIB	Attend annual general meeting
10-Aug-2010	E-mail	MLIB Coal Coordinator	Draft Murray River Project description
23-Aug-2010	E-mail	MLIB Coal Coordinator	Employment opportunities with Canada Dehua Drilling
23-Aug-2010	E-mail	WMFN Administration	Employment opportunities with Canada Dehua Drilling
29-Aug-2010	Meeting	WMFN LUM	Murray River project update
27-Oct-2010	E-mail	MLIB LUM Coal Coordinator	Notice of application for bulk coal sample for Murray River
15-Nov-2010	E-mail	WMFN Chief, Councillors and LUM	Murray River and Bullmoose project updates, request support from WMFN Explain CKD to WMFN
23-Nov-2010	E-mail	WMFN	Request for Environmental Monitor to work with CDIMG Environmental Company
7-Jan-2011	Meeting	WMFN LUM	Wildlife baseline studies
18-Jan-2011	E-mail	MLIB Coal Coordinator	Offer to provide funding for Coal Coordinator to attend Minerals Roundup Conference in Vancouver
1-Feb-2011	E-mail	MLIB Coal Coordinator	Murray River baseline study update
1-Feb-2011	E-mail	SFN	Murray River baseline study update
1-Feb-2011	E-mail	WMFN LUM	Murray River baseline study update
2-Feb-2011	Phone	WMFN Councillor	Murray River project update, educational opportunities and community funding
7-Feb-2011	Meeting	WMFN Environmental Liaison	Introductions and project update
9-Feb-2011	E-mail	MLIB Coal Coordinator	Murray River bulk sample information
10-Feb-2011	Phone	WMFN Councillor	Murray River project update, educational opportunities and community funding
14-Feb-2011	phone	MLIB Coal Coordinator	Murray River bulk sample update
16-Feb-2011	Meeting	MLIB	Update on letter of support for Murray River
2-Mar-2011	E-mail	MLIB	Provide additional information on Murray River and copy of Murray River Surface Facility map
3-Mar-2011	E-mail	WMFN	Request TK/TU and land use information related to country foods (caught/fished/harvested within the MRP health study area and regionally)
4-Mar-2011	Meeting	WMFN Councillor	Project update
7-Mar-2011	Meeting	MLIB Oil/Gas Coordinator	Education and employment opportunities
8-Mar-2011	E-mail	Chief, Councillors	Provide Murray River Project Description and Surface Facility Plan

(continued)

Table 9.3-2. Summary of Aboriginal Engagement by HD Mining (continued)

Date	Method of Communication	To	Topic/Summary Discussion
9-Mar-2011	Meeting	SFN Councillors	Murray River project update
23-Mar-2011	E-mail	MLIB Oil/Gas Coordinator	Murray River Project Description and Surface Facility Plan
24-Mar-2011	E-mail	WMFN LUM	Murray River Project Description and Surface Facility Plan
29-Mar-2011	E-mail	WMFN Councillors	Protocol agreement
4-Apr-2011	E-mail	MLIB Oil/Gas Coordinator	Letter of support for Murray River bulk coal sample
8-Apr-2011	Phone	MLIB Band Manager	Community and educational opportunities
3-May-2011	Phone	WMFN Chief	Protocol agreement
6-May-2011	Phone	CDIMG FNCCM	Summer employment program and Dehua support
20-May-2011	Mail	SFN Pemmican Days Committee	Donation to Pemmican Days
24-May-2011	Phone	Land use Office	Community and Educational Opportunities
25-May-2011	In person	SFN Chief and Council	Project update
1-Jun-2011	Meeting	MLIB LUM, EDO	Murray River project update and introduction of Joint Venture HD Mines International
17-Jun-2011	E-mail	SFN	Letter of support for Murray River
28-Jul-2011	E-mail	MLIB LUM	Update on Murray River and Gething projects
30-Jul-2011	In person	WMFN Community	Attend Westmo Days
11-Aug-2011	E-mail	WMFN Councillor	Request list of Band/member and joint venture companies
11-Aug-2011	E-mail	MLIB LUM	Request list of Band/member and joint venture companies
11-Aug-2011	E-mail	MLIB LUM	Request list of Band/member and joint venture companies
11-Aug-2011	E-mail	SFN Chief and Council Admin	Request list of Band/member and joint venture companies
6-Oct-2011	Meeting	SFN	Murray River bulk sample permit
23-Nov-2011	Site Tour	WMFN Land Manager and Councillor	Murray River site visit
19-Jun-2012	In person	MLIB Band Manager; Land Referral Officer	Murray River project update, baseline studies
12-Jul-2012	Meeting	MLIB Referral Office, Chief and Council	Murray River project update, baseline studies
13-Jul-2012	Meeting	SFN Councillors lands resource technician	Murray River project update, baseline studies
20-Jul-2012	E-mail	SFN lands resource technician	Respond to questions raised at July 13 meeting
6-Sep-2012	Meeting	WMFN LUM, SFN LUM, MLIB LUM	Wildlife baseline study
1-Oct-2012	Meeting	MLIB	Community meeting
2-Oct-2012	In person	Government/Rescan/First Nations	Working Group Meeting

(continued)



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**Table 9.3-2. Summary of Aboriginal Engagement by HD Mining (completed)**

Date	Method of Communication	To	Topic/Summary Discussion
6-Nov-2012	E-mail	SFN	Comment on draft agreement
22-Nov-2012	Meeting	SFN	Employment, confidentiality agreement, third party review, data sharing, TK/TU studies, permitting, First Nations Consultation plan, TFW, training
3-Dec-2012	Meeting	MLIB	Project update, Human Environment Baseline Research Program
13-Dec-2012	E-mail	MLIB, SFN, WMFN	First Nations Consultation Plan
18-Dec-2012	E-mail	SFN	Comments on First Nations Consultation Plan
9-Jan-2013	E-mail	SFN	TK/TU scope of work and budget
10-Jan-2013	E-mail	MLIB	TK/TU research plan
14-Jan-2013	E-mail	SFN	TK/TU scope of work and budget
23-Jan-2013	E-mail	MLIB	Subsidies, training and transition program
30-Jan-2013	E-mail	MLIB	TK/TU research plan
2-Feb-2013	E-mail	MLIB	TK/TU research plan
15-Feb-2013	Telephone	WMFN	TK/TU research, socio-economic research report
13-Mar-2013	E-mail	SFN, WMFN	TK/TU scope of work and budget
14-Mar-2013	Telephone	MLIB	TK/TU research, socio-economic research report
18-Mar-2013	E-mail	WMFN	Socio-economic baseline study
26-Mar-2013	Meeting	SFN	Training

Issues raised to date by Aboriginal groups are included in Table 9.3-3.

**Table 9.3-3. Issues Raised to Date**

Issue Type	Issue	FN	Method	Date	
Engagement Process	Need for capacity funding to participate in baseline studies, negotiations, and third party review	MLIB	Meeting	June 19 2012	
		WMFN	Meeting	Sept 6 2012	
		SFN	Meeting	July 13, 2012	
	Desire to participate in the development of valued components	SFN	Meeting	Oct 11 2012	
		Engagement agreements (e.g. MOU, confidentiality agreement, participation agreement)	SFN	Meeting	July 12 2012
			SFN	Meeting	Nov 22 2012
		MLIB	Meeting	Dec 3 2012	
Potential impact of EA timelines on treaty rights	SFN	Email	Dec 18 2012		
Need for process to deal with environmental concerns brought forward by Aboriginal groups	SFN	Meeting	Nov 22 2012		
Potential Environmental and Human Impacts	Caribou and other wildlife (e.g. habitat effects)	MLIB	Meeting	June 19 2012	
		SFN	Meeting	July 13, 2012	

(continued)

**Table 9.3-3. Issues Raised to Date (completed)**

Issue Type	Issue	FN	Method	Date
Potential Environmental and Human Impacts ( <i>cont'd</i> )	Water use and water quality (e.g. Murray River, M20 Creek, dust control, settlement ponds)	MLIB	Meeting	June 19 2012
		SFN	Meeting	July 13, 2012
		SFN	Meeting	Nov 22 2012
	Trees and vegetation (e.g. timber harvesting, disturbance of native plants)	SFN	Meeting	July 13 2012
		SFN	Meeting	Nov 22 2012
	Human health and safety	MLIB	Meeting	June 19 2012
	Hunting, trapping and fishing	MLIB	Meeting	June 19 2012
	Potential impacts due to residue from explosives	MLIB	Meeting	June 19 2012
Potential impacts due to transportation	SFN	Document (comments on draft AIR)	Dec 18 2012	
Potential impacts due to importation of foreign temporary workers (e.g. impacts on local employment opportunities)	MLIB	Meeting	Oct 1 2012	
Cumulative effects (e.g. water discharge)	SFN	Meeting	July 13, 2012	
Potential Benefits for Aboriginal groups	Opportunities for employment, training, and apprenticeships (e.g. contracts, subsidies for certification)	MLIB	Meeting	June 19 2012
		WMFN	Email	Nov 23 2010
		WMFN	Letter	Jan 17 2011
		WMFN	Phone	Feb 25 2011
		WMFN	Email	July 11 2011
		SFN	Meeting	Feb 18 2011
		SFN	Email	June 23 2011
		SFN	Meeting	July 13, 2012
		SFN	Telephone	Aug 7 2012
		SFN	Meeting	Nov 22, 2012
	SFN	Meeting	Mar 26 2013	
	Opportunities for revenue sharing with Proponent	MLIB	Phone	July 12, 2012
		SFN	Meeting	Oct 1 2012
	Opportunities for community economic development	SFN	Meeting	Oct 1 2012
	Funding for capacity development and new infrastructure	SFN	Meeting	Oct 1 2012
SFN		Meeting	Nov 22 2012	
MLIB		Email	Jan 30 2013	
WMFN		Telephone	Feb 15 2013	

Engagement with Treaty 8 First Nations and Métis will continue through the EA review process. Additional planned engagement during the pre-application phase includes:

- address funding capacity needs, as appropriate;
- review comments on Project-related documents/submissions;
- conduct, review and/or support traditional knowledge and traditional land use studies, as appropriate for each Aboriginal group;

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- collect socio-economic and non-traditional land use information for Aboriginal groups in support of baseline studies;
- conduct further meetings with Aboriginal groups leadership, staff, and communities;
- identify, compile, and track issues raised by Aboriginal groups in baseline studies, meetings, comments and correspondence;
- prepare written responses to key issues identified by Aboriginal groups and develop a proposal for the resolution of outstanding issues; and
- implement additional measures for Aboriginal consultation and accommodations as required by the BC EAO and/or CEEA.

Additional planned engagement during the assessment review phase include:

- distribute copies of documents to Aboriginal group for information and consultation purposes;
- write to each Aboriginal group to identify the dates of the public comment period(s), and the dates, times and locations of technical working group meetings;
- respond to issues that are identified in comments submitted by Aboriginal groups during the review of the assessment;
- attend technical working group meetings organized by the BC EAO and CEA Agency to provide information related to the Application/EIS and respond to questions;
- by mutual agreement, arrange consultation meetings with Aboriginal groups to:
  - identify any specific Aboriginal interests which may be potentially affected by the Project, as identified in:
    - Aboriginal interest and use studies;
    - traditional use studies; or
    - other sources of information; and
  - measures to avoid or mitigate potential adverse effects and/or to otherwise address or mitigate Aboriginal concerns; and
- undertake further consultations with Aboriginal groups as directed by the CEA Agency and the BC EAO.

### 9.3.2 Stakeholders and the Public

HD Mining will contribute to a consultation and engagement program that is inclusive of the public. The objectives public consultation efforts will be to inform the public about the Project, and to identify any potential concerns.

A public consultation plan has been developed and is available on the BC EAO's Project Information Centre (e-PIC; [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_home.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html)). This plan identifies:

- the different target regions and organizations for effective engagement;
- informational and consultation tools and actions during the various phases of the EA process and the key responsibilities, and summarizes what HD Mining has heard to date; and
- HD Mining's public consultation principles and information sharing objectives to achieve a broader understanding of the proposed Project and the technology that will be utilized for underground long wall mining.

The objectives of the public consultation plan include:

- ensure that all affected and interested parties have the opportunity to learn about the proposed Project and provide input and comment into elements of the proposed Project, including consideration and potential effects; and
- build on previous activities by strengthening community relationships and enhancing the dialogue related to specific project elements.

The public consultation audience includes:

- local and regional government and community leaders (e.g., District of Tumbler Ridge, City of Chetwynd, City of Dawson Creek, and Peace River Regional District);
- crown tenure holders (commercial recreation, guide outfitters, trappers, forestry, mining and gas, agriculture, wind power);
- energy and resource industry (e.g., Teck, Peace River Coal, Tumbler Ridge Wind Energy);
- non-government organizations (e.g., United Steelworkers Association, Industry Training Authority); and
- interest groups or citizens associations (e.g., Tumbler Ridge Museum Foundation, Tumbler Ridge Chamber of Commerce) .

Consultation activities will include the following methods of communication:

- open houses, information sessions, and meeting to raise awareness about, and interest in, the Project, and identify and address any public issues and concerns;
- site tours;
- written correspondence (mail outs and email);
- meetings with key stakeholder groups;
- meetings with government leadership (local governments, and government agencies);
- website and printed material development;
- engagement with local media;
- issues tracking and response;
- public notification of events and meetings, status of the Project, including through newspaper advertisements;
- regular media interviews with the Tumbler Ridge news to provide project updates specific to the Tumbler Ridge community; and
- comprehensive reporting of the consultation process, including a consultation summary to support the EA.

Table 9.3-4 summarizes highlights of the public consultation activities carried out to date.

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Table 9.3-4. Public Consultation by HD Mining

Date	Method of Communication	Participant	Topic
2009	Presentation	Districts of Tumbler Ridge and Mackenzie	Overview of plans to develop the Project
16-May-2011	Meeting	Mayor and Council Tumbler Ridge	Project update
19-May-2011	E-mail	District of Chetwynd	Letter of support
25-May-2011	Letter	Mulvahill Hunting, Wolverine Valley Outfitters, Freeland Guide Services, Tracks BC and High Prairie Outfitters, Monkman Expeditions, West Fraser Mill Ltd., Interoute Construction Ltd., Finavera Renewables Inc., and other tenure holders in RSA.	Introduction to Project
1-Jun-2011	Meeting	Chetwynd Councillors	Update Murray River project
2-Jun-2011	Meeting	Mayor Tumbler Ridge, Councillors, EDO and Superintendent Public Works	Update Murray River Project
9-Jun-2011	Telephone	Hale Hilton, Trapper	Project update
17-Jun-2011	E-mail	Bone Mountain Outfitters	Project update
5-Jul-2012	Meeting	District of Tumbler Ridge	Photo opportunity and donation
24-Jul-21	In person	TR Car Club	Sponsored and attended TR Show and Shine
Aug-2011	Donation	TR Community Garden and Composting Society	Donation of \$5000 to support construction of garden gazebo
30-Aug-2011	Meeting	Bone Mountain Outfitters	Project update
30-Aug-2011	In person	Daniel Ganson, Trapper	Project update
5-Oct-2011	In person	2011 Northeast British Columbia Community Coal & Energy Forum	Participant
5-Oct-2011	Letter	Wolverine Valley Outfitters, Freeland Guide Services, Tracks BC and High Prairie Outfitters, Monkman Expeditions, West Fraser Mills Ltd., Interoute Construction Ltd., Finavera Renewables Inc., and other tenure holders in RSA.	Baseline studies update
14-Oct-2011	Letter	Bone Mountain Outfitters	Baseline studies update
14-Oct-2011	Letter	Muvahill Hunting	Baseline studies update
26-Oct-2011	Meeting	Hale Hilton, Trapper	To address concerns
26-Oct-2011	In person	Lawrence Reynen, Trapper	To address concerns
29-Oct-2011	In person	Bone Mountain Outfitters	Project update
2-Nov-2011	In person	Forum for councillor and Mayor election	Participant
15-Dec-2011	In person	Bone Mountain	Business opportunities
8-Feb-2012	Meeting	District of Tumbler Ridge - Mayor Wren	New Community Plan and proposed land development
16-Mar-2012	Meeting	District of Tumbler Ridge	Proposed residential development
10-May-2012	Meeting	Trapper (Hilton Hale)	Business opportunities
10-May-2012	Meeting	Guide Outfitter (Danniel Ganson)	Business opportunities

(continued)

**Table 9.3-4. Public Consultation by HD Mining (completed)**

<b>Date</b>	<b>Method of Communication</b>	<b>Participant</b>	<b>Topic</b>
14-Jun-2012	District Led Industry Open House	District Councillors	Participant
3-Jul-2012	Telephone	Chetwynd Forest Industries	Interview
2-Oct-2012	In person	Government/Rescan/First Nations	Working Group Meeting
14-Nov-2012	In person	Northern Lights College	Signing of Memorandum of Understanding for the provision of training services
24-Nov-2012	Community Open House	Key town officials, community leaders, public and stakeholders	Participant
12-Dec-2012	Meeting	Tumbler Ridge Forever Young Society	Luncheon speaker

The primary issues identified by stakeholders through consultation efforts to date include the following:

- maximize local infrastructure benefits to the Tumbler Ridge community;
- maximize local contractual service opportunities;
- provide opportunities for employment, training, and apprenticeships;
- potential adverse effects on wildlife, water quality, air quality, or other environmental effects;
- safety within the underground environment and at the surface;
- ensuring water and air quality;
- human health; and
- English language capability of staff.

### **9.3.3 Federal Government**

Federal government agencies that have participated as part of the BC EAO EA working group to date include:

- Canadian Environmental Assessment Agency;
- Environment Canada;
- Health Canada; and
- Transport Canada.

HD Mining engaged with these agencies at a preliminary technical working group meeting held October 2, 2012. Engagement with Federal Government Agencies to date is summarized in Table 9.3-5.



**Table 9.3-5. Engagement with Federal Government Agencies**

Date	Method of Communication	Participant	Topic
19-May-2011	E-mail	Health Canada	Request for information
5-Jul-2011	E-mail	Health Canada (Sr. Risk Communications & Public Involvement Officer)	Query
7-Jul-2011	Telephone	Health Canada (Sr. Risk Communications & Public Involvement Officer)	Query
2-Oct-2012	In person	Canadian Environmental Assessment Agency; Transport Canada; Environment Canada	EA Working Group meeting
28-Feb-2013	Meeting	CEA Agency	Project Description

### 9.3.4 Provincial Government

Provincial Government Agencies to be included in the environmental assessment process is determined through the technical working group, convened by the BC EAO. Provincial Government Ministries participating in the working group include:

- Ministry of Aboriginal Affairs and Reconciliation;
- Ministry of Energy, Mines and Natural Gas;
- Ministry of Environment;
- Ministry of Forests, Lands and Natural Resource Operations;
- Ministry of Jobs, Tourism and Skills Training; and
- Ministry of Transportation and Infrastructure.

Engagement with Provincial Government Agencies to date is summarized in Table 9.3-6.

**Table 9.3-6. Engagement with Provincial Government**

Date	Method of Communication	Participant	Topic
11-Apr-2011	Telephone	Ministry of Environment	Query
16-Feb-2012	Telephone	Ministry of Forests, Lands and Natural Resource Operations	Request for information
19-Apr-2012	E-mail	Ministry of Environment	Request for information
2-May-2012	In person	Ministry of Environment	Site visit
24-Aug-2012	Telephone	Ministry of Environment	Query
14-Dec-2012	E-mail	Ministry of Environment	dAIR, comment tracking table, First Nations Consultation Plan
28-Dec-2012	E-mail	Ministry of Forests, Lands and Natural Resource Operations Ministry of Energy, Mines and Natural Gas	Memo, permit conditions
4-Jan-2012	E-mail	Ministry of Environment	dAIR, comment tracking table

### 9.3.5 Regional and Local Government

HD Mining will contribute to a consultation and engagement program that is inclusive of the regional and local governments. The objectives consultation efforts will be to inform these governments about the Project, and to identify any potential concerns. Consultation efforts with respect to regional and local governments are considered in the Public Consultation Plan discussed in Section 9.3.2.

A public consultation plan has been developed and is available on the BC EAO's Project Information Centre (e-PIC; [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_home.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_home.html)).

## 10. Authorizations, Permits, and Licenses

# 10. Authorizations, Permits, and Licenses

## 10.1 PROVINCIAL AUTHORIZATIONS, PERMITS, AND LICENSES

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.

### 10.1.1 British Columbia Environmental Assessment Act Process

The BC EAA (2002a) requires that certain project proposals undergo an EA and obtain an Environmental Assessment Certificate (EAC) before they can proceed. Proposed mining developments that exceed a threshold criterion of 75,000 tpa, as specified in the *Reviewable Project Regulation* (B.C. Reg. 370/2002), are required under the BCEAA 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.

### 10.1.2 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. HD Mining may seek concurrent approvals 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., tailing storage facilities).

Tables 10.1-1 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 10.1-1. BC Authorizations, Licenses and Permits that May Be Required for the Murray River Project**

BC Government Permits and Licenses	Enabling Legislation
Environmental Assessment Certificate	<i>BC Environmental Assessment Act (2002a)</i>
Permit Approving Work System & Reclamation Program (mine site - initial development)	<i>BC Mines Act (1996d)</i>
Amendment to Permit Approving Work System and Reclamation Program (Pre-production)	<i>BC Mines Act (1996d)</i>
Amendment to Permit Approving Work System and Reclamation Program (Bonding)	<i>BC Mines Act (1996d)</i>
Amendment to Permit Approving Work System and Reclamation Program (Mine plan -production)	<i>BC Mines Act (1996d)</i>
Permit Approving Work System and Reclamation Program (Gravel pit/wash plant/ rock borrow pit)	<i>BC Mines Act (1996d)</i>
Coal Lease	<i>BC Coal Act (2004a)</i>
Water License - Notice of Intention (application)	<i>BC Water Act (2006)</i>
Water License - storage and diversion	<i>BC Water Act (2006)</i>
Water License - Use	<i>BC Water Act (2006)</i>

(continued)

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**Table 10.1-1. BC Authorizations, Licenses and Permits that May Be Required for the Murray River Project (completed)**

BC Government Permits and Licenses	Enabling Legislation
Water License - Construction of fences, screens and fish or game guards across streams to conserve fish or wildlife	<i>BC Water Act (2006)</i>
Water License - Alteration of stream or channel	<i>BC Water Act (2006)</i>
Authority to Make a Change in and about a Stream - notification	<i>BC Water Act/Water Regulation (B.C. Reg. 204/88)</i>
Authority to Make a Change in and About a Stream - approval to make a change	<i>BC Water Act/Water Regulation (B.C. Reg. 204/88)</i>
Authority to Make a Change in and About a Stream - terms and conditions of habitat officer	<i>BC Water Act/Water Regulation (B.C. Reg. 204/88)</i>
Occupant License to Cut - Access road, TSF, borrow pits	<i>BC Forest Act (1996b)</i>
Road Use Permit (existing FSR)	<i>BC Forest Act (1996b)</i>
Special Use Permit - Construct new access road of mineral tenure on crown land	<i>BC Forest Act (1996b)</i>
License of Occupation - Crown land outside of tenure area	<i>BC Land Act (1996c)</i>
License of Occupation - Borrow/gravel pits for crown land outside tenure area	<i>BC Land Act (1996c)</i>
Waste Management Permit - Effluent (sediment, tailings, and sewage)	<i>BC Environmental Management Act (2003)</i>
Waste Management Permit - Air Emissions (crushers, ventilation, dust)	<i>BC Environmental Management Act (2003)</i>
Waste Management Permit - Refuse (if burial on site)	<i>BC Environmental Management Act (2003)</i>
Special Waste Generator Permit (waste oil)	<i>BC Environmental Management Act/Hazardous Waste Regulation (B.C. Reg. 63/88)</i>
Waterworks Permit	<i>BC Drinking Water Protection Act (2001)</i>
Fuel Storage Approval	<i>BC Fire Services Act (1996a)</i>
Food Service Permits	<i>BC Public Health Act/Food Services Regulation (B.C. Reg. 210/99)</i>
Highway Access Permit	<i>BC Transportation Act (2004b)</i>
Heritage Inspection Permit (to conduct archaeological site investigations)	<i>BC Heritage Conservation Act (1996h)</i>
Wildlife Permit (to handle wildlife)	<i>BC Wildlife Act (1996f)</i>

*Note: subject to assessment under the BCEAA (2002a), pending reviewability determination.*

**10.2 FEDERAL AUTHORIZATIONS, PERMITS, AND LICENSES**

Like the provincial EA process, no federal approvals may be issued until an EA Decision Statement is issued. The federal Major Projects Management Office (MPMO) is responsible for overseeing both EA planning and the regulatory process.

Table 10.2-1 presents a list of federal authorizations, licences, and permits that may be required to develop the Project. Other federal legislation (e.g., *Species at Risk Act (2002b)*, *Migratory Birds Convention Act (1994)*), may be relevant in terms of evaluating potential effects of the Project, but

specific permit requirements under those acts are not anticipated to be required. There are potential requirements for permits under Section 35(2) of the *Fisheries Act* (1985b)<sup>3</sup> and *Navigable Waters Protection Act* (1985c)<sup>4</sup> associated with the conveyer crossing the Murray River, and the installation of treated water discharge infrastructure (e.g., pipeline, outfall) in Murray River.

**Table 10.2-1. Federal Authorizations, Licenses, and Permits that May Be Required for the Project**

Federal Government Approvals and Licenses	Enabling Legislation
CEAA Decision Statement	<i>Canadian Environmental Assessment Act</i> (2012)
Section 35(2) Authorization for harmful alteration, disruption or destruction of fish habitat <sup>1</sup>	<i>Fisheries Act</i> (1985b)
Section 5 Approval for works in a navigable water <sup>2</sup>	<i>Navigable Waters Protection Act</i> (1985c)
Explosives Magazine License	<i>Explosives Act</i> (1985a)
Ammonium Nitrate Storage Facilities	<i>Canada Transportation Act</i> (1996g)
Radio Licenses	<i>Radiocommunications Act</i> (1985d)

<sup>3</sup> Amendments to the *Fisheries Act* that were tabled in the *Jobs, Growth, and Long-term Prosperity Act* (Bill C-38), and further revised in Bill C-45 received Royal Assent but have not yet been brought into force. It is anticipated that the amendments will come into force during the EA review process for the Murray River project and that the current legislative requirements under the 1985 *Fisheries Act* will no longer apply. Further, it is acknowledged that the proposed expansion of the Metal Mining Effluents Regulation to include coal mines may also affect the Murray River Project with respect to the need to obtain an amendment to Schedule 2 of the MMR. The information presented in this Project Description reflects the statutory requirements as currently prescribed under the 1985 *Fisheries Act*.

<sup>4</sup> Amendments to the *Navigable Waters Protection Act* that were tabled in the *Jobs, Growth, and Long-term Prosperity Act* (Bill C-38), and further revised in Bill C-45 received Royal Assent but have not yet been brought into force. It is anticipated that the amendments will come into force during the EA review process for the Murray River project and that the current legislative requirements under the 1985 *Navigable Waters Protection Act* will no longer apply. The information presented in this Project Description reflects the statutory requirements as currently prescribed under the 1985 *Navigable Waters Protection Act*.



## 11. Project Schedule

# 11. Project Schedule

HD Mining's project schedule for the proposed Murray River Coal Project has coal being produced in June 2015. A schedule of key milestones is outlined in Table 11-1.

**Table 11-1. Anticipated Project Permitting and Construction Schedule**

Activity	2012		2013		2014		2015		2016	
	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
Consultation	■	■	■	■	■	■	■	■	■	■
Bulk Sample	■	■	■	■	■	■				
Baseline Environmental Studies	■	■	■							
AIR/EIS Guidelines <sup>1</sup>			■							
Application/EIS			■	■						
Provincial EAC Decision				■	■	■				
Federal EA Decision				■	■	■				
Permitting				■	■	■				
Construction							■	■		
Start Production								■	■	■

<sup>1</sup> AIR - Application Information Requirements; EIS - Environmental Impact Statement

The Project will have four defined development phases as summarized below:

- **Construction phase** - approximately one year in length; in 2015
- **Operations phase** - 31 years in length; approximately from 2015 to 2046
- **Reclamation and closure phase** - two years in length; approximately 2047 to 2048
- **Post-closure phase** - until long-term environmental objectives are achieved.

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- 1985b. *Fisheries Act*, RSC. C. F-14.
- 1985c. *Navigable Waters Protection Act*, RSC. C. N-22.
- 1985d. *Radiocommunication Act*, RSC. C. R-2.
1992. *Transportation of Dangerous Goods Act*, SC. C. 34.
1994. *Migratory Birds Convention Act*, SC. C. 22.
- 1996a. *BC Fire Services Act*, RSBC. C. 144.
- 1996b. *BC Forest Act*, RSBC. C. 157.
- 1996c. *BC Land Act*, RSBC. C. 245.
- 1996d. *BC Mines Act*, RSBC. C. 293.
- 1996e. *BC Weed Control Act*, RSBC. C. 487.
- 1996f. *BC Wildlife Act*, RSBC. C. 488.
- 1996g. *Canada Transportation Act*, SC. C. 10.
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