Tenas Project

Project Description

November 2018

FINAL VERSION

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Pursuant to:	British Columbia *Environmental Assessment Act* (S.B.C. 2002, c.43)	*Canadian Environmental Assessment Act, 2012* (S.C. 2012, c.19. s.52)
Submitted by:	Telkwa Coal Limited Suite 1410 – 409 Granville Street Vancouver, BC V6C 1T2	

EXECUTIVE SUMMARY

Introduction

Telkwa Coal Limited (TCL) is proposing to develop the Tenas Project (the Project), a surface coal mine designed to produce approximately 15.0 million tonnes of washed metallurgical coal product, at about 0.750 million saleable tonnes per year, to be used in the manufacture of steel. The mine life of the Project will be around 25 years, including the construction, operation and reclamation phases.

The proposed Project is about 25 kilometres south of Smithers and 7 kilometres southwest of the village of Telkwa in northwestern British Columbia (BC). The Project is located on provincial Crown Land, three freehold land parcels owned by TCL, and nine coal licences held by TCL and Bulkley Valley Collieries Ltd. (who have agreed to allow TCL to access their licenses for mine infrastructure).

The Project is unique. Its proximity to existing infrastructure such as power, rail and port results in an extremely low initial capital expenditure of projected to be CDN$82.4 million and production cost of CDN$73.33 per tonne, allowing the Project to withstand global market pressures. Both the rail and powerlines are less than 10 km from the minesite while the port is approximately 375 km away. This compares with coal mines in the northeast and southeast BC which are well over 1,000 km from tidewater. The specific coal quality is in low supply globally, and therefore expected to be in high demand.

The Project will deliver approximately CDN$250 million in government tax revenues, plus employment and other economic opportunities to Indigenous groups, the Bulkley Valley and the surrounding region. TCL will continue to provide sponsorships and donations in the community and develop training opportunities. TCL is a wholly-owned subsidiary of Allegiance Coal Limited (ACL), a publicly listed company on the Australia stock exchange (ASX: AHQ) with headquarters in Sydney, Australia.

TCL acknowledges the unceded rights of the Wet'suwet'en to 22,000 square kms of traditional territory within which the Project sits. The Wet'suwet'en territory includes much of the Bulkley River drainage. TCL have and will continue to engage with the Office of the Wet'suwet'en (OW) in respect of all Project activities. The OW is the central office for the Wet'suwet'en focusing on the management of their lands and resources, fisheries and wildlife, human and social services, and treaty negotiations. The OW is governed by the Wet'suwet'en Hereditary Chiefs residing throughout their traditional territories. In April 2017, a Communication and Engagement Agreement was signed between TCL and the OW. The Project minesite area is within the traditional territory of the Cas'Yex (Grizzly House) of the Gitdumden clan of the Wet'suwet'en. TCL also recognizes that the Project rail loadout is located within Laksilyu territory of the Wet'suwet'en. This Project Description is inclusive of the considerations of the OW.

TCL is committed to developing the Project in a sustainable manner that respects natural, heritage, social and environmental values, while providing economic benefits for the region.

This Project Description has been prepared in accordance with the BC Environmental Assessment Office (EAO) *Guidelines for Preparing Project Descriptions* (EAO 2016) and the Canadian Environmental Assessment Agency *Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015).

Project Overview

GEOLOGY

Coal was discovered in the Telkwa area around 1900. The Geological Society of Canada's (GSC) Report No. 988 entitled *The Telkwa River and Vicinity, BC* (Leach 1907) included the first geological map of the area and documented the geology and coal occurrences in the area. Small-scale underground and surface mining began in the Telkwa area in 1918 and continued into 1985, resulting in the recovery of over 400,000 tonnes of coal, which was used to heat industrial, public and private buildings in the region.

Skeena Group sediments overlie Jurassic Hazelton volcanics within the Project area. Marine and non-marine sandstones and siltstones, with lesser amounts of mudstone, conglomerate, and coal dominate the stratigraphic sequence. Two main coal sequences dominate the succession over the entire property, with coal units commonly occurring as multiple seams in each zone. The Project's coal resources are contained within 13 distinct coal seams within Coal Zone 1, of which three are mineable due to their thickness and low rock content.

PROJECT COMPONENTS

The Project will be a conventional shovel and truck operation, like other rock quarry and surface mine operations in the region. To develop the mine pit, TCL will salvage topsoil, excavate overburden, and drill and blast the rock in horizontal layers (or benches). Coal will be extracted using heavy machinery and trucked to an on-site coal processing plant north of the pit.

The proposed coal processing plant will be like other coal plants operating in BC. The processing plant will include a crushing station and two circuits: heavy media cyclones for coal larger than 0.5 millimetres and froth flotation for smaller coal. The coal will then be dewatered using centrifuges and belt filter presses and stockpiled, ready for shipping.

In addition to the mine pit and the coal processing plant, the Project will include the following major components:

- rock, overburden, plant rock, and topsoil storage piles;
- materials handling systems for raw coal, coarse and fine rock, and washed product coal (including plant conveyors, storage bins and stockpiles);
- administration, first aid, maintenance, bath house, coal and rock laboratory, and warehouse buildings;
- surface water management features (including ditches, sedimentation and storage ponds);
- propane storage facilities;
- water supply wells, storage, and distribution system;
- fuel and lube storage facilities;
- an explosives magazine, storage silos, and vehicle wash facilities;
- mine haul roads and access roads within the mine site;
- a 3.5 km long 25 kV power line and a 25 kV to 600V substation adjacent to the processing plant;
- a rail loadout facility and an approximately 2.5 km rail loop connecting to the existing main Canadian National Railway line;
- a steel girder bridge over Goathorn Creek; and
- an 11 km dedicated coal haul road and improvements to approximately 6.5 km of existing roads.

PROJECT ACTIVITIES, PHASES, AND SCHEDULE

Planning for construction will begin in 2019. Once the required authorizations, permits, and licenses have been obtained, TCL anticipates that the Project's construction phase will begin in the third quarter of 2020, and will continue for approximately one year. Major activities during construction include site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services.

The operation phase (coal production) will begin in the third quarter of 2021 and continue until 2041. In the early stage of operations, the pit and material storage piles will be developed. Topsoil and other material suitable for reclamation or construction uses will be stockpiled in designated areas. Coal processing, and the temporary stockpiling of raw coal prior to processing, and washed product coal prior to shipping, will occur. Aquatic effects monitoring, wildlife studies, and reclamation studies will also be ongoing during the operations period to monitor changes to the environment and develop or improve upon the approved mitigation measures provided during the regulatory process.

The timing and duration of closure and reclamation phase activities will be determined in more detail when a reclamation plan is submitted in the permitting process and updated in advance of projected mine closure. Post-closure reclamation activities are anticipated to require two to three years, with continued monitoring ongoing beyond this time frame to ensure successful reclamation.

Regulatory Context

Under Part 3, Section 8 of the Reviewable Projects Regulation for the BC *Environmental Assessment Act* (2002), the proposed Project will trigger an environmental assessment (EA), as its production capacity of 750,000 tonnes of clean metallurgical coal per year is above the 250,000-tonne threshold. However, the Project's daily production rate of 2,050 tonnes per day is below the threshold for a new coal mine under the *Canadian Environmental Assessment Act,* 2012, which is 3,000 tonnes per day. Therefore, TCL is seeking a determination from the CEA Agency on whether the Project is a designated project (i.e., requires a federal EA).

The Project may require additional federal, provincial, or municipal licenses, permits, and authorizations, including (but not limited to) those issued under Canada's *Explosives Act*, *Fisheries Act*, *Species at Risk Act*, and *Navigation Protection Act*; BC's *Mines Act*, Health, Safety and Reclamation Code for Mines in British Columbia, *Coal Act*, *Environmental Management Act*, *Water Sustainability Act*, *Heritage Conservation Act*, *Forest and Range Practices Act*, and *Land Act.*

TCL is planning to apply for concurrent review of permits under the BC *Mines Act* and *Environmental Management Act*) pursuant to the BC *Environmental Assessment Act* Concurrent Approvals Regulation (BC Reg. 371/2002). Under this Regulation, permits will be reviewed at the same time as TCL's Application for an EA Certificate. No decisions on permits can be made until an EA Certificate is issued by the Minister of Energy, Mines and Petroleum Resources and the Minister of Environment and Climate Change Strategy.

Existing Environment

The Project is centered on a remnant land terrace that rises above Goathorn Creek and Tenas Creek and south of the Telkwa River and west of the Bulkley River. Six kilometres east of the Project lies the Bulkley River Valley. Adjacent to the east side of the Project, Goathorn Creek is a moderately wide, extensively braided creek. Four Creek, a tributary of Goathorn Creek, flows along the eastern edge of the minesite, before meeting Goathorn Creek near the proposed bridge crossing. On the north and west sides of the Project, lies a smaller watercourse, Tenas Creek.

The Project is situated in proximity to places of cultural importance to the Wet'suwet'en. *Yinta* is a Wet'suwet'en concept in which everything is connected to the land. This world view embodies within it the responsibility of stewardship over the territories that sustain Wet'suwet'en lifeways. The Wet'suwet'en continue to practice deliberate resource management strategies that are designed to ensure generational succession of territorial resources. The OW, as governed by the hereditary Chiefs, continue to collectively manage lands and resources, fisheries and wildlife, human and social services, and treaty negotiations on behalf of the Wet'suwet'en (Office of the Wet'suwet'en 2018).

Baseline research on the existing environment was initiated by the former owners of the Project property, Crowsnest Resources and Manalta Coal Ltd., between 1983 and 1998. TCL has been expanding on these studies since 2016, after acquiring the property in 2014. Studies include meteorology and climate, noise and dustfall, surficial geology, soils and terrain, geochemistry, surface water and groundwater quality and quantity, fisheries and aquatic habitat and biota, terrestrial ecosystems, vegetation and wildlife, traditional land use and traditional knowledge, land use, land status and land capability, heritage resources, and socioeconomics.

Climate, Air Quality, and Noise

The climate in the Project area and Bulkley Valley is characterized by four prominent seasons typical of northern interior BC. The Project is located within the Bulkley Valley Airshed. Airborne particulate matter has been identified as having the largest impact on the existing air quality in the Bulkley Valley region. Some examples of existing air emission activities of concern for the airshed include residential wood burning (for heating), forestry-related open burning (e.g., slash piles), wood processing facility emissions, fugitive dust from paved and unpaved roads, and natural forest fires. Noise sources in the Project area are typical of a small rural community with nearby forestry operations. Specific common anthropogenic noise sources include aircraft, vehicles, transport trucks and mobile equipment, trains, farming activities, and outdoor recreational activities (noises associated with all-terrain vehicles, snowmobiles, and hunting). Natural noise sources include wind, rain, rivers, and wildlife.

Soils and Terrain

The Project area is underlain by thick, fine-textured morainal deposits that form gently undulating and sloping terrain in the lower Telkwa River valley. To a lesser extent, morainal deposits form a thin mantle over irregularly hummocky bedrock. Glaciofluvial and glaciolacustrine deposits occur scattered throughout the morainal landscape, as low ridges and in depressions, respectively. The soils of the Project area are organized into eight principal map units based on soil parent material and drainage. Well to moderately drained morainal tills, characterized by fine-textured compact Grey Luvisols to coarse loamy Eutric and Dystric Brunisols make up the most widespread map unit.

Surface Water and Groundwater

The Project is in the transition zone between the wetter Coast Mountains and the drier Interior Plateau. The majority of runoff occurs in the spring and early summer due to the melting winter snowpack. Following the snowmelt-driven high flow, a period of low flow typically occurs throughout the late summer and early fall. Throughout the fall, high intensity rain may produce substantial peak events. Annual low flows occur during the winter, when air temperatures remain below freezing and snowfalls are stored in the snowpack until spring. During the winter low flow period, most streamflow is dominated by baseflow from groundwater discharge. Some streams in the region have glacial inputs, but this is less prominent in the regional streamflow regime, as most of the substantial glacier coverage lies to the west of the Project.

Water in Goathorn Creek, Bulkley River, Telkwa River, Tenas Creek, and Four Creek has an alkaline pH, and moderately high conductivity. Tenas and Goathorn Creeks have soft to moderately hard water, Four Creek has moderately hard to hard water, and the Telkwa and Bulkley Rivers have soft water.

The groundwater flow system is divided into two sub-systems: a deep bedrock flow system, and a shallow overburden flow system. The deep system encompasses the bedrock units. Groundwater flows from the upland areas in a northerly direction towards the major drainage features of the area, namely the Telkwa River and its tributaries, the Tenas Creek and the Goathorn Creek. This system has a large lateral extent and is characterized by relatively long residence times in the subsurface, with associated higher levels of dissolved solids in groundwater. The shallow system includes potentially high-yielding local aquifers composed of glaciofluvial or fluvial materials deposited in topographic lows and stream valleys, and to a lesser extent along Tenas, Four, and Goathorn Creek valleys. Occurrences of sand and gravel outwash deposits in bedrock depressions may also form local water bearing units, potentially connected with the overburden deposits located in stream valleys. The shallow system is characterized by groundwater flows from topographic highs to adjacent topographic lows, and by relatively short residence times and lower levels of dissolved solids in groundwater.

Long-term historical baseline information exists from local Water Survey of Canada (WSC) gauges and Environment and Climate Change Canada (ECCC) climate stations for hydrology and meteorology. As well, historical baseline information exists from various project-specific campaigns, as well as campaigns near the project for hydrogeology and surface water and groundwater quality. Historical baseline information has been augmented, updated, and refined with the information collected during ongoing baseline programs.

FISH

Several fish-bearing streams surround the Project area, including Tenas Creek, Goathorn Creek, Four Creek, the Telkwa River and the Bulkley River. Known species in these streams include:

- brassy minnow;
- bull trout;
- burbot;
- Chinook salmon;
- chum salmon;
- coastrange sculpin;
- coho salmon;
- cutthroat trout;
- Dolly Varden;
- lake chub;
- lake trout;
- lake whitefish;
- lamprey;
- largescale sucker;
- longnose dace;
- longnose sucker;
- mountain whitefish;
- peamouth chub;
- pink salmon;
- prickly sculpin;
- rainbow trout/Steelhead;
- redside shiner;
- slimy sculpin;
- sockeye salmon;
- threespine stickleback; and
- white sucker.

Aquatic Resources

Periphyton biomass, as chlorophyll *a*, is higher in the Project area's larger rivers than the smaller tributary creeks and is well below both the BC guideline and the Bulkley River provisional objective. Benthic invertebrate abundance is highest in Tenas Creek and lowest in upper Goathorn Creek.

Benthic invertebrate communities are dominated by the pollution-sensitive taxa Ephemeroptera (mayflies) and Plecoptera (stoneflies). A third pollution-sensitive taxon, Trichoptera (caddisflies), was abundant in the lower Bulkley River. These three taxa comprise the bulk of the community at most sites, except lower Tenas Creek, upper Goathorn Creek, and the Telkwa River, where Diptera (true flies) and particularly Chironomidae (non-biting midges), was more abundant.

Terrestrial Resources

Three biogeoclimatic subzones/variants within two biogeoclimatic zones are present within the immediate Project area: Sub-Boreal Spruce dry cool subzone (comprising the bulk of the Project area), Sub-Boreal Spruce moist cold subzone (comprising a lesser portion of the Project area), and Englemann Spruce - Subalpine Fir moist cold subzone (comprising a very minor portion of the Project area). Timber harvesting has occurred over much of the Project area, with large areas harvested approximately 40 years ago, and the most recent harvesting occurring approximately 10 years ago.

Wildlife

The Project area supports a wide range of wildlife species typical for northcentral BC, with many species of interest to regulatory agencies, Indigenous groups and the public. These include:

- woodland caribou, also referred to as northern caribou;
- moose;
- elk;
- white-tailed deer;
- mule deer;
- grizzly bear;
- black bear;
- furbearers (including American marten, coyote, ermine, fisher, grey wolf, lynx, red squirrel and wolverine);
- bats (including silver-haired bat, western small-footed myotis, western long-eared myotis, and long-legged myotis);
- breeding birds (including passerines, hummingbirds, swifts, woodpeckers, grouse, and ptarmigan);
- waterbirds (including ducks, geese, swans, loons, and grebes);
- raptors (including osprey, eagles and hawks, owls, and falcons);
- coastal tailed frog;
- western toad; and
- terrestrial invertebrates (including butterflies, ants, and dragonflies, as well as spiders and terrestrial snails and slugs).

Rare and Endangered Species

Some species that are found in or near the Project area are listed either federally or provincially as belonging to specific categories of conservation risk. These include plants (e.g., whitebark pine), invertebrates (e.g., gypsy cuckoo bumble bee), birds (e.g., short-eared owl), and mammals (caribou and grizzly bear).

Environmentally Sensitive Areas

No ecological reserves, protected areas, or parks are found in the Project area. The Project is located within Wildlife Habitat Area WHA 6-333 for northern caribou (Telkwa herd). A mountain goat ungulate winter range (U-6-003) is located approximately 10 km south of the Project.

Cultural Resources

The Project is situated within the Gitdumden and Laksilyu territories of the Wet'suwet'en. These territories were and are still frequently harvested for resources. Wet'suwet'en oral histories indicate that these territories were utilized for generations. The importance of obtaining traditional use and oral information cannot be over-emphasized within this assessment process. Wet'suwet'en cultural knowledge regarding environmental resource values such as fish, water and wildlife will be incorporated into the research.

Potential Project Effects and Mitigation

Potential Project Effects

An overview of key potential environmental, social, economic, heritage and health effects, and effects on Indigenous interests as they are currently understood, that may arise from construction, operation, closure, and reclamation phases of the Project may be found in Table 10 (in the main body of this report). Measures to mitigate effects are also provided. These issues, and others that are identified through further study and engagement, will be addressed in the EA.

Potential Trans-boundary and Cumulative Effects

The Project is located approximately 200 km from the BC-Alaska border and no trans-boundary effects are expected. The potential for the Project to contribute to cumulative effects will be considered in the EA, and will be informed by approved land use plans, baseline studies and historical data, and the predicted effects of both present development in and around the Project area, and of future developments that are sufficiently certain to proceed.

Engagement and Consultation

Prior to and during the preparation of the Project Description, TCL has engaged with the following Indigenous groups and stakeholders through formal and informal in-person meetings, teleconferences, and e-mails, as well as through print and social media:

- the Wet'suwet'en via the Office of the Wet'suwet'en;
- EAO;
- CEA Agency;
- BC Ministry of Energy, Mines and Petroleum Resources;
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development;
- BC Ministry of Transportation and Infrastructure;
- BC Ministry of Environment and Climate Strategy;
- Ministry of Indigenous Relations and Reconciliation;
- Regional District of Bulkley-Nechako;
- Town of Smithers;
- Village of Telkwa; and
- the public.

The ongoing engagement plan for the Project will meet provincial requirements and guidance established by the EAO, including the Section 11 order, pursuant to the BC *Environmental Assessment Act*. The BC EAO will also invite Indigenous groups to participate in a Working Group established as part of the EA review of the Project. A Public Consultation Plan and Indigenous Consultation Plan (provided to Indigenous groups for review and comment prior to finalization) will be developed and deferred to throughout the EA process. The Section 11 order will require that reports on Indigenous and public consultation activities be submitted during the EA review.

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List of Acronyms and Abbreviations

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

ACL	Allegiance Coal Limited
ALR	Agricultural Land Reserve
AMD	Acid Mine Drainage
AP	Acidity potential
ASX	Australian stock exchange
ATV	All-terrain vehicle
BC	British Columbia
BCEAA	British Columbia *Environmental Assessment Act*
BC CDC	British Columbia Conservation Data Centre
BMPs	Best Management Practices
BTEX	Benzene, toluene, ethylbenzene, and xylene
BVCL	Bulkley Valley Collieries Ltd.
CDN$	Canadian dollars
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CEA Agency	Canadian Environmental Assessment Agency
CN	Canadian National Railway
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EA	Environmental Assessment
EAO	British Columbia Environmental Assessment Office
EMA PA	*Environmental Management Act* Permit Application
EMPR	British Columbia Ministry of Energy, Mines, and Petroleum Resources
ENV	British Columbia Ministry of Environment and Climate Strategy
ESSF	Engelmann spruce subalpine fir
FEL	Front-end loader
FLNRORD	British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development

FSR	Forest service road
GHG	Greenhouse gases
ha	Hectare
kg	Kilograms
km	Kilometre
kV	Kilovolt
LRMP	Land and Resource Management Plan
m	Metre
MAPA	*Mines Act* Permit Application
mid-vol or MV	Medium-volatile
MIRR	British Columbia Ministry of Indigenous Relations and Reconciliation
MS	Montane spruce
Mt	Million tonnes
NPAG	Non-acid generating or non-PAG
NP	Neutralization potential
NPR	Neutralization potential ratio
NOx	Nitrogen oxides
NRCan	Natural Resources Canada
OW	Office of the Wet'suwet'en
PAG	Potentially acid generating
PAH	Polycyclic aromatic hydrocarbon
PCI	Pulverized coal injection
PID	Property identification number
PM	Particulate matter
Project	Tenas Project
RDBN	Regional District of Bulkley-Nechako
RMZ	Resource management zones
ROM	Run of mine
SFE	Shake flask extraction

SSCC	Semi-soft coking coal
t	Tonnes
TCL	Telkwa Coal Limited
TSP	Total suspended particulate
UTM	Universal transverse Mercator
UWR	Ungulate Winter Range
VC	Valued Component
WSC	Water Survey of Canada

1. General Information and Contacts

Telkwa Coal Limited (TCL) is proposing to develop the Tenas Project (the Project), a proposed surface coal mine in northwestern British Columbia (BC), approximately 25 km south of Smithers and seven km southwest of Telkwa (Figure 1). The Project is within Wet'suwet'en traditional territory, specifically the Gitdumden and Laksilyu clans (Figure 2).

The proposed Project will produce metallurgical coal at a planned annual maximum production rate of 0.750 million clean tonnes, equivalent to approximately 2,050 tonnes of washed product coal per day. The mine life of the Project will be approximately 25 years, including construction, operations and reclamation phases. The metallurgical coal produced from the mine will be exported to the Asian marketplace. Chapter 3 provides additional details on the proposed Project.

The Project's estimated capital cost is CDN$82.4 million. The Project is anticipated to generate 100 person-years of direct employment during construction, and 2,000 person-years of employment (between 90 and 110 full-time employees) during the operations phase.

This Project Description has been prepared in accordance with the BC Environmental Assessment Office (EAO) *Guidelines for Preparing Project Descriptions* (EAO 2016) and the Canadian Environmental Assessment Agency *Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015).

Prior to and during the preparation of the Project Description, the Office of the Wet'suwet'en (OW) and the following government ministries and local governments were engaged and consulted: EAO, CEA Agency, BC Ministry of Energy, Mines and Petroleum Resources (EMPR), BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), BC Ministry of Transportation and Infrastructure, BC Ministry of Environment and Climate Strategy (ENV), Ministry of Indigenous Relations and Reconciliation, Regional District of Bulkley-Nechako, Town of Smithers, and Village of Telkwa. The public were also consulted. Chapter 8 describes engagements and consultations with Indigenous groups, government agencies, local governments, and the public, and presents the results of consultations.

1.1 Project Location

The Project is located in the Regional District of Bulkley-Nechako (RDBN), approximately 25 km south of Smithers and 7 km southwest of the village of Telkwa (Figure 1 and Figure 3). The coordinates of the proposed Project site (centre of the plant site) are approximately 54°36'48" North latitude and 127°09'32" West longitude. The coordinates for the pit area are approximately 54°35'55.67" North latitude and 127°10'43.25" West longitude.

1.2 Proponent Information and Key Contacts

TCL is a wholly-owned subsidiary of Allegiance Coal Limited (ACL), a publicly-listed company on the Australia stock exchange (ASX: AHQ) with headquarters in Sydney, Australia. In addition to the Project, ACL owns two other projects located in central Queensland, Australia: the Kilmain and Back Creek projects. The Tenas Project is the company's flagship project. ACL does not own or operate any other projects in BC.

TCL has offices in Telkwa and Vancouver, BC. The company was registered in BC on September 10, 2014 (BC1013154). The ACL website is: *http://www.allegiancecoal.com.au*.

Figure 1: Project Location

Legend

- Proposed Rail Loop
- Major Roads
- Minor Roads
- Railway (CNR)
- Parks and Protected Areas
- Lake/River
- Electoral A

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Produced by Telkwa Coal Limited

Figure 2
Indigenous Traditional Territories

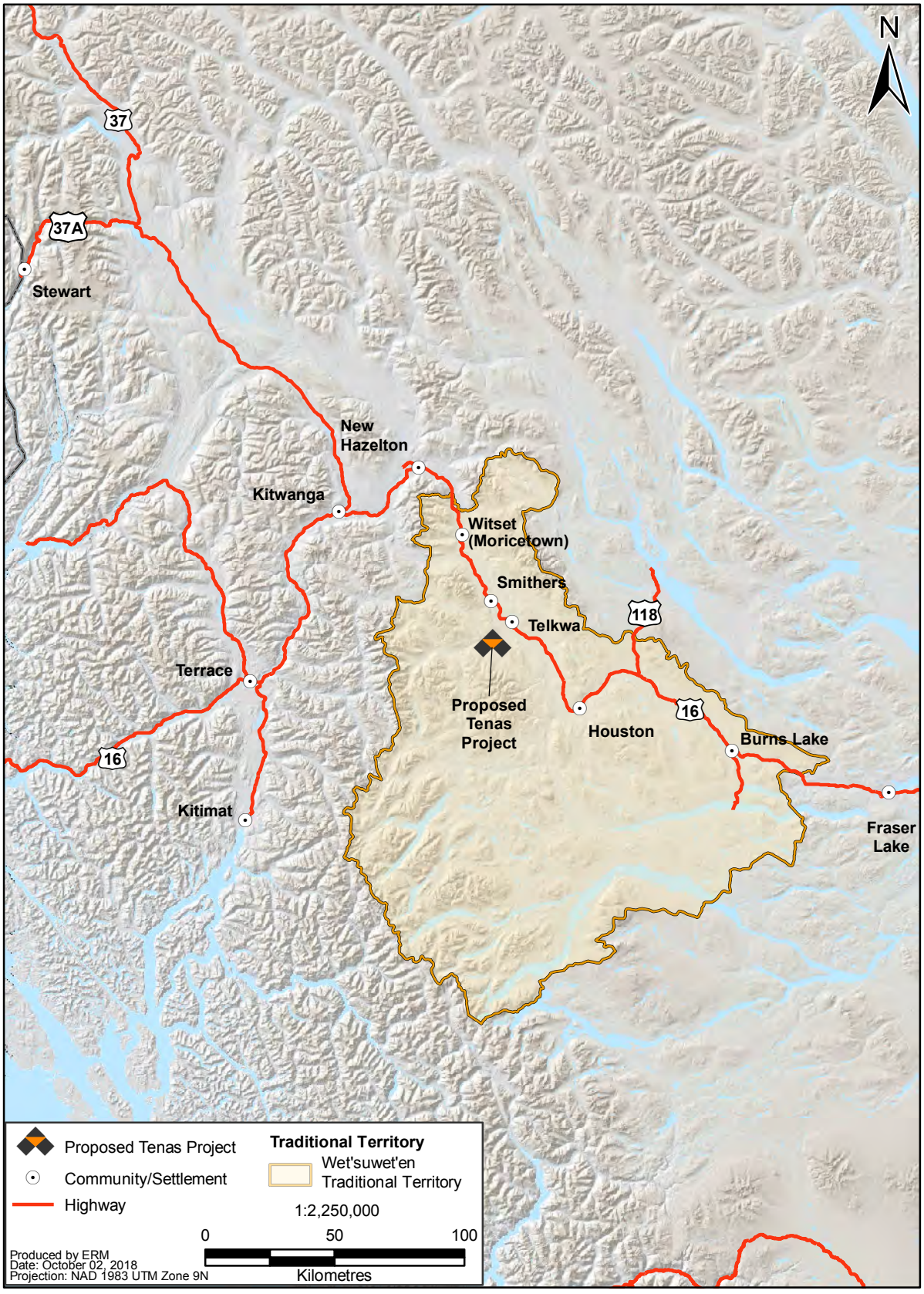
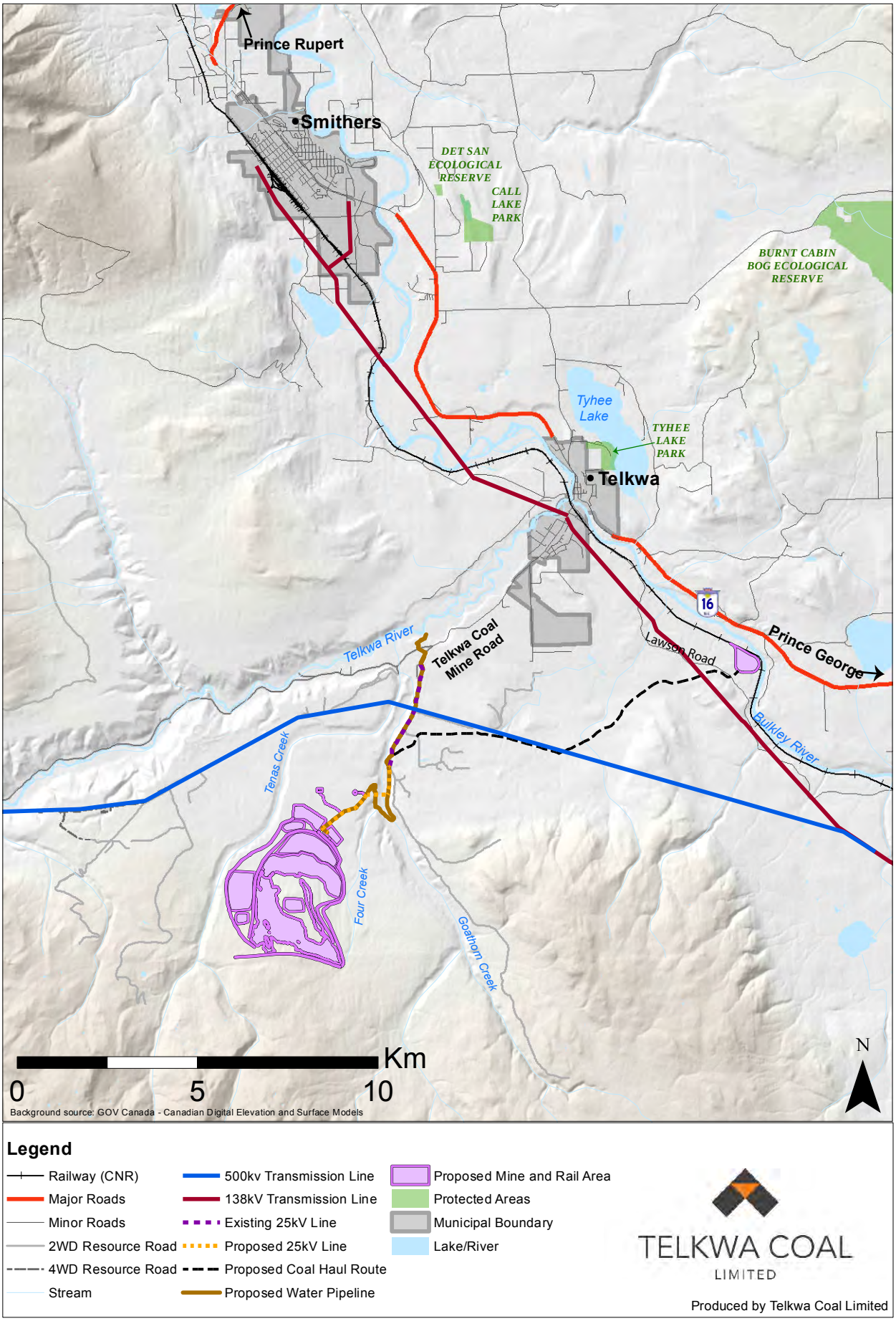


Figure 3: Project Area



Mark Gray is the Managing Director of the Project. Mark is an indigenous Maori of Te Arawa descent with 20 years of experience overseeing mining entities, including underground coal operations in Australia. Mark has also practiced law, including representing the Maori in negotiations with forestry and energy companies to develop resources on Maori lands.

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Jonathan Reynolds is the Chief Financial Officer with more than 25 years of experience as an accountant. Jonathan has been the CFO and held directorships of many exploration and producing operations across several commodities, in multiple jurisdictions and stock exchanges.

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Matthew Wall is a Senior Advisor, with 40 years of experience in logistics and marketing including over 28 years in the coal business. As Marketing and Logistics Manager at Rio Tinto for nearly 17 years, Matt was responsible for coal sales and marketing strategies into Europe, South East Asia and South Asia. He was also responsible for developing the company's risk management policies and execution of price risk management strategies. More recently, Matt was the Global Co-head of Metals and Mining Sales and Marketing at Wood Mackenzie. He holds directorships with other mining entities.

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David Fawcett (P.Eng., B.Sc.) is the Non-Executive Chairman with over 40 years of experience in the coal industry, primarily in Western Canada. During his career he has had a broad range of responsibilities from early stage exploration, through feasibility and regulatory processes, operations and management of major, intermediate and start-up companies. His roles have included co-founder and president of Western Canadian Coal Corporation, CEO of NEMI Northern Energy and Mining and Senior Vice President of Hillsborough Resources Limited. Mr. Fawcett was the recipient of the Coal Association of Canada's Award of Distinction in 2015.

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Dan Farmer (P.Eng.) is the Chief Operating Officer with more than 25 years of coal mining experience. Dan is formerly the Operations Manager of Anglo American's coal mines in BC, a Pit Foreman for Teck Resources Cheviot Mine in Alberta and Senior Mine Engineer for Cardinal River Coal's Luscar Mine. He has overseen projects from exploration stage to production. He holds a B.A.Sc. from the University of British Columbia's Mining and Mineral Engineering School.

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Angela Waterman is the Director for Environment and Government Affairs, with over 23 years of experience in mining and environmental-regulatory matters. Angela has permitted two coal mines in BC, one for NEMI Northern Energy and Mining and another for Anglo American. She also led the Roman Coal Project environmental assessment (EA) before leaving to become the Vice President of Environment for the Mining Association of BC. She holds a B.Sc. in biology from the University of British Columbia. Angela is the main contact for the purposes of this Project Description and the EA process.

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1.3 Corporate Policies

TCL is guided by the following corporate policies:

- **Health and Safety:** Safety is a core value of our company. We believe that all activities can be completed with zero harm to personnel and that all incidents and injuries are preventable. We will provide resources to manage health and safety and expect all employees and contractors to share in the responsibility.
- **Indigenous People:** We acknowledge and respect the unceded rights, title, interests, culture and aspirations of the Wet'suwet'en to 22,000 square kilometres (km^2) of traditional territory. In April 2017, we signed a Community and Engagement Agreement as an initial, formal step in our commitment to the Wet'suwet'en.
- **Environment:** We will ensure that its activities are responsible and protective of the environment. Our design and operational activities will adhere to the mitigation hierarchy to avoid and minimize impacts, restore on-site and offset, where necessary.
- **Community:** Integrity is fundamental to how we operate. We will engage with the community and stakeholders with the aim of understanding and addressing their socio-economic priorities and goals.

1.4 Qualifications

Drafting of the Project Description was informed by baseline studies undertaken by a number of consultants. Appendix A identifies baseline study consultants and their qualifications.

2. REGIONAL OVERVIEW

2.1 Indigenous Groups

2.1.1 The Wet'suwet'en

Prior to European contact, the Wet'suwet'en people occupied the vast majority of what is now known as the Bulkley and Morice River drainage, as well as the western Fraser Basin headwaters (Budhwa 2005, OW 2013). Known as the "people of the lower drainage", the Wet'suwet'en, once considered part of the Carrier and Sekani, speak a dialect of Babine-Wit'suwet'en which is part of the Na-Dene (Athabaskan) language group. The Wet'suwet'en are governed by two different systems, hereditary and band level.

2.1.1.1 Wet'suwet'en Hereditary System

The overarching hereditary system of the Wet'suwet'en follows matrilineal descent in which members belong to one of five clans:

- Gil_seyhu (Big Frog);
- Laksilyu (Small Frog);
- Gitdumden (Wolf/Bear);
- Laksamshu (Fireweed); and
- Tsayu (Beaver Clan).

Within each clan, a hereditary Chief and subsidiary wing Chiefs hold responsibility for individual House territories on behalf of their kin-based *Yikhs* (or House groups), with each house holding authority over their respective geographical territories. This system of governance is continually conferred through the *Baht'lat*. *Bah'lat's, or feasts, are the primary form of governance and central to Wet'suwet'en government, law, social structure and worldview.* Many major governing and management decisions for Wet'suwet'en territories and resources are made during the *Bah'laht*. For resource management purposes, the hereditary system is generally represented by the OW.

Within the Wet'suwet'en traditional territory there exists five bands:

1. Hagwilget Village Council;
2. Moricetown Band (or Witset First Nation);
3. Nee-Tahi-Buhn Band;
4. Skin Tyee Band; and
5. Wet'suwet'en First Nation.

These bands were created under the *Indian Act,* which prescribes the governance operations of these groups.

2.1.1.2 Wet'suwet'en Bands

Hagwilget Village is governed by a Chief and four councillors elected under the *Indian Act*. The primary reserve community is located at Hagwilget 1, adjacent to New Hazelton. The band has a total registered population of 788 peoples, 200 of whom live on their own reserve.

The Moricetown Band (or Witset First Nation) is governed by a Chief and 12 councillors elected under the *Indian Act*. The primary reserve community of Moricetown 1 is located approximately 30 km north of Smithers. The band has a total population of 2,041 peoples, 657 of whom live on their own reserve.

Moricetown Band and Hagwilget Village Council make up the Wet'suwent'en treaty group, which is engaging with community members as part of a multi-year Treaty Related Measure on governance and constitutional development within the BC treaty process.

The Nee-Tahi-Buhn Band is governed by a Chief, Deputy Chief and two councillors elected under a custom electoral system. The primary reserve community of Uncha Lake 13A is located approximately 33 km south of Burns Lake. The band has a total registered population of 151 peoples, 38 of whom live on their own reserve. The Nee-Tahi-Buhn band is engaged with the Province in discussions associated with land and resource use within its asserted traditional territory outside of the B.C. treaty process.

The Skin Tyee band is governed by a Chief and two councillors under a custom electoral system. The primary reserve community of Skins Lake 16B is located approximately 27 km southwest of Burns Lake. The band has a total registered population of 186 peoples, 54 of whom live on their own reserve. The Skin Tyee Band is engaged with the Province in discussions associated with land and resource use within its asserted traditional territory outside the BC treaty process.

Wet’suwet’en First Nation, formerly known as the Broman Lake Band, is governed by a Chief and two councillors elected under a custom electoral system. In addition to membership in the Office of the Wet’suwet’en, Wet’suwet’en First Nation is a member of the Carrier-Sekani Tribal Council. In 1960, the members of the Francois Lake Tribe (Skin Tyee Band, the Decker Lake Band, Francois Lake Band, and Maxim Lake Band) merged to form the Omineca Band. The Omineca Band then divided into the Broman Lake Band (now Wet’suwet’en First Nation) and Nee-Tahi-Buhn Band in 1984. The Skin Tyee Band separated from the Nee-Tahi-Buhn Band in 2000 (DMCS and Skin Tyee First Nation 2015). Wet'suwet'en First Nation is negotiating an agreement in principle in the B.C. treaty process as part of the Carrier Sekani Tribal Council treaty table (negotiations are currently on hiatus).

2.1.1.3 Wet’suwet’en Reserves

Table 1 identifies the size of each of the Wet’suwet’en thirty-one reserves, which total approximately 3,013 hectares (ha) within the communities of Hagwilget, Witset, Nee Tahi Buhn, Skin Tyee and Browman (Indigenous and Northern Affairs [INAC] 2018a, 2018b, 2018c, 2018d, 2018e, Office of the Wet’suwet’en [OW] 2018). Figure 4 identifies the location of Wet’suwet’en reserves. Reserves are primarily occupied by residential and agricultural land uses, with some commercial and industrial use. Reserves classified as forest can also be considered occupied through traditional land use.

There are 3,421 registered Wet’suwet’en members, with 1,165 living on-reserve and 2,256 living off-reserve (INAC 2018a, 2018b, 2018c, 2018d, 2018e). Witset (Moricetown 1, Coryatsaqua 2, Bulkley 19, and Bulkley 17) and Hagwilget are the most populated reserves.

2.1.1.4 Wet’suwet’en Economic Development

There are many programs and economic initiatives being developed and implemented by the Wet’suwet’en within the five communities. For example, the OW holds culture camps throughout the year to promote traditional knowledge. Browman’s Yinka Dene Economic Development Limited Partnership manages business and economic development projects within the community (OW 2018; Yinka Dene Economic Development 2018). The Moricetown Band is currently in Phase 2 of their Land Use Plan for the community of Witset (Moricetown Band 2018).

Table 1: Wet'suwet'en Reserves

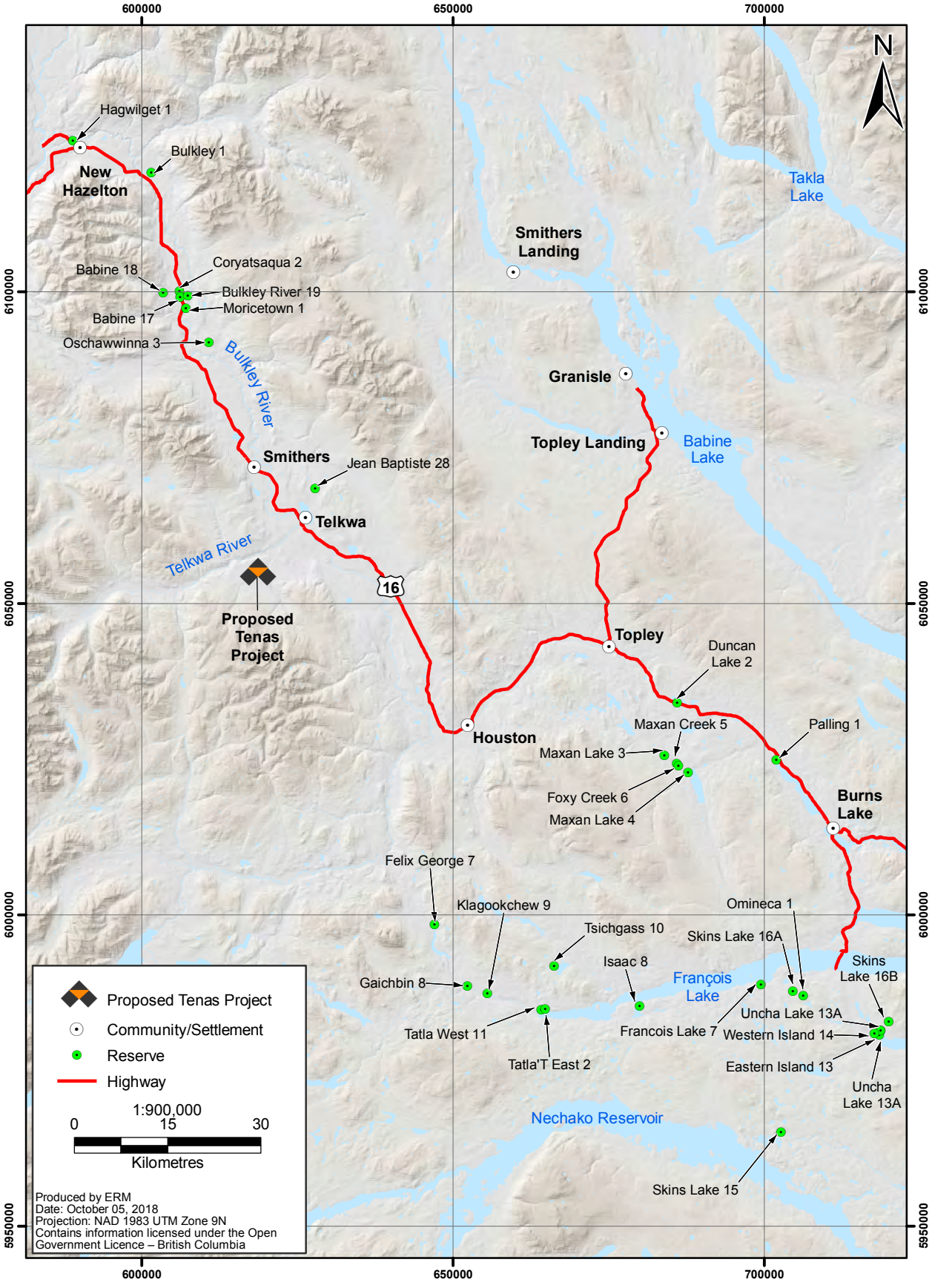
Community	Reserve	Hectares
Witset	Babine 17	64.80
	Babine 18	259
	Bulkley River 19	242.80
	Coryatsaqua 2	126.40
	Jean Baptiste 28	129.50
	Moricetown 1	539.50
	Oschawwinna 3	65
Skin Tyee	Skins Lake 15	183.70
	Skins Lake 16A	64.70
	Skins Lake 16B	64.70
	Tatlat't East 2	56.10
	Uncha Lake 13a	24.10
	Western Island 14	3.30
Hagwilget Village	Bulkley 1	34.80
	Hagwilget 1	123.80
Browman (Wet'suwet'en First Nation)	Duncan Lake 2	78
	Felix George 7	94.40
	Foxy Creek 6	16.20
	Gaichbin 8	97.90
	Klagookchew 9	62.70
	Maxan Creek 5	15.60
	Maxan Lake 3	64.70
	Maxan Lake 4	67.20
	Palling 1	70.70
	Tatla West 11	56.50
	Tsichgass 10	76.90
Nee-Tahi-Buhn	Eastern Island 13	7.70
	Francois Lake 7	153.80
	Isaac (Gale Lake) 8	85
	Omineca 1	58.70
	Uncha Lake 13 A	24.10 3

2.2 Communities

2.2.1 Smithers

The town of Smithers is located within Electoral Area A of RDBN, approximately halfway between Prince Rupert and Prince George and approximately 25 km north of the Project (Figure 1). Smithers is the regional service centre for the Bulkley Valley, and it provides a range of commercial, business, administrative, recreational, and cultural services. In 2016, Smithers' population was 5,401, virtually unchanged from the 2011 census.

Figure 4
Wet'suwet'en Reserves near the Project



2.2.2 Telkwa

The village of Telkwa is located approximately 11 km southeast of Smithers and approximately 7 km northeast of the Project. The community is dependent on the resource-based economy, including mining, agriculture and forestry (Figure 1). The Village also functions as a satellite community, housing workers who commute to Smithers, Houston or other surrounding areas. In 2016, Telkwa's population was 1,327, a small decrease of 1.7% from the 2011 census.

2.2.3 Houston

The district municipality of Houston is located approximately 65 km southeast of Smithers and approximately 41 km from the Project (Figure 1). The community was founded on farming and remains economically dependent on agriculture, mining and forestry. In 2016, Houston's population was 2,993, a 4.9% decrease from the 2011 census.

2.3 Regional Environmental Studies

Under section 74 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the Minister may enter into an agreement or arrangement with a jurisdiction to establish a committee to conduct a regional study of the effects of existing or future physical activities carried out in a region that is composed in part of federal lands or in a region that is entirely outside of federal lands. TCL is unaware of any such current or planned studies in the vicinity of the Project.

2.4 Federal Lands and Funding

There are no federal lands existing within the Project area. The nearest federal lands to the Project is the Witset First Nation's (Moricetown Band) Jean Baptise 28 reserve, located 18 km northeast of the Project (Figure 4). No federal funding is being sought or provided for the Project. No Project-related effects to federal lands are anticipated.

3. PROJECT OVERVIEW

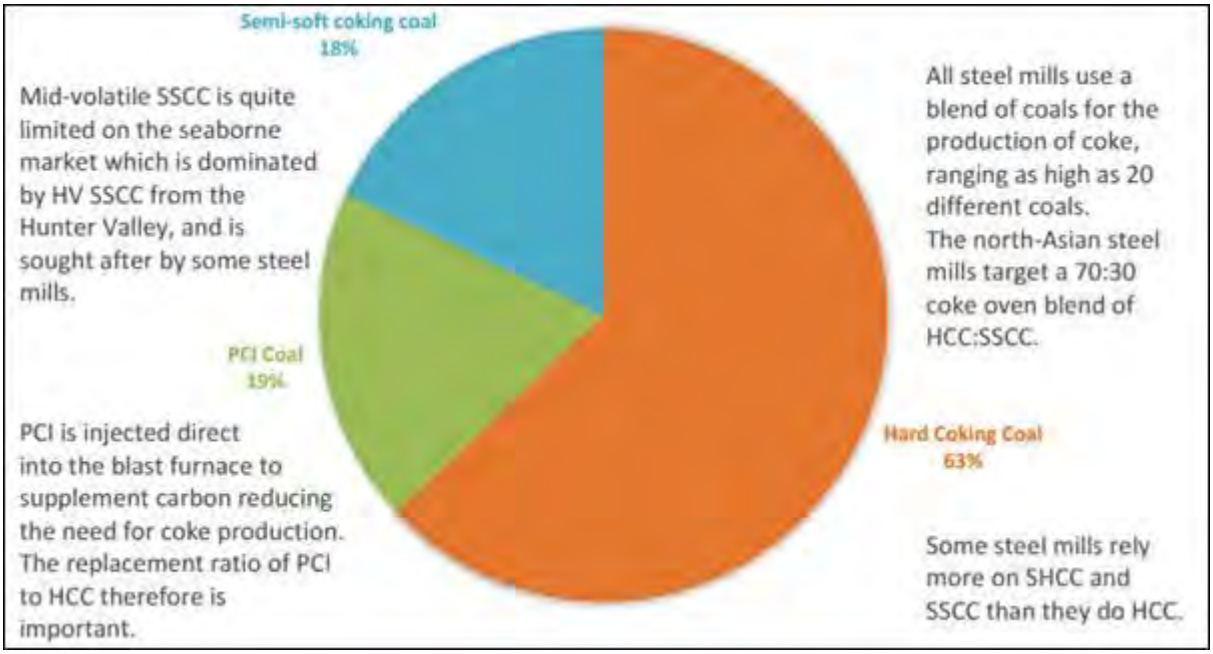
3.1 Project Purpose and Rationale

The Project will produce a total of approximately 15.0 million tonnes (Mt) of washed product metallurgical (coking) coal for use in overseas steel mills as either a blending coal to produce coke, or as a heating agent, both applications used in blast furnace steel production. The Project is unique in both its product quality and low cost of production. Its proximity to existing infrastructure such as power, rail and port results in an extremely low initial capital expenditure of projected to be CDN$82.4 million and production cost of CDN$73.33 per tonne, allowing the Project to withstand global market pressures. Both the rail and powerlines are less than 10 km from the minesite while the port is approximately 375 km away. This compares with coal mines in the northeast and southeast BC which are well over 1,000 km from tidewater. The specific coal quality is in low supply globally, and therefore expected to be in high demand.

Global steel production was 1,691 Mt in 2017, a 5.3% increase over the previous year with steady growth forecast over the next five years (World Steel Association 2018). Currently, 70% of world steel production uses coking coal in the blast furnace process. Each tonne of steel produced through this process requires approximately 600 kilograms (kg) of coke, which is produced from 770 kg of coking coal. In addition, some coking coals are injected direct into blast furnaces to provide heat for the smelting process.

Global metallurgical coal production was 1,100 Mt in 2017, with around 330 Mt traded on the seaborne metallurgical coal market, the market that British Columbia historically and currently supplies (and which the Project is intended to serve). The seaborne metallurgical coal market comprises three products: hard coking coal; semi-soft coking coal (SSCC); and pulverised coal injection (PCI) coal, as shown in Figure 5.

Figure 5: Seaborne Metallurgical Coal Market Product Types



Source for distribution of seaborne metallurgical coal 2017: Wood Mackenzie.

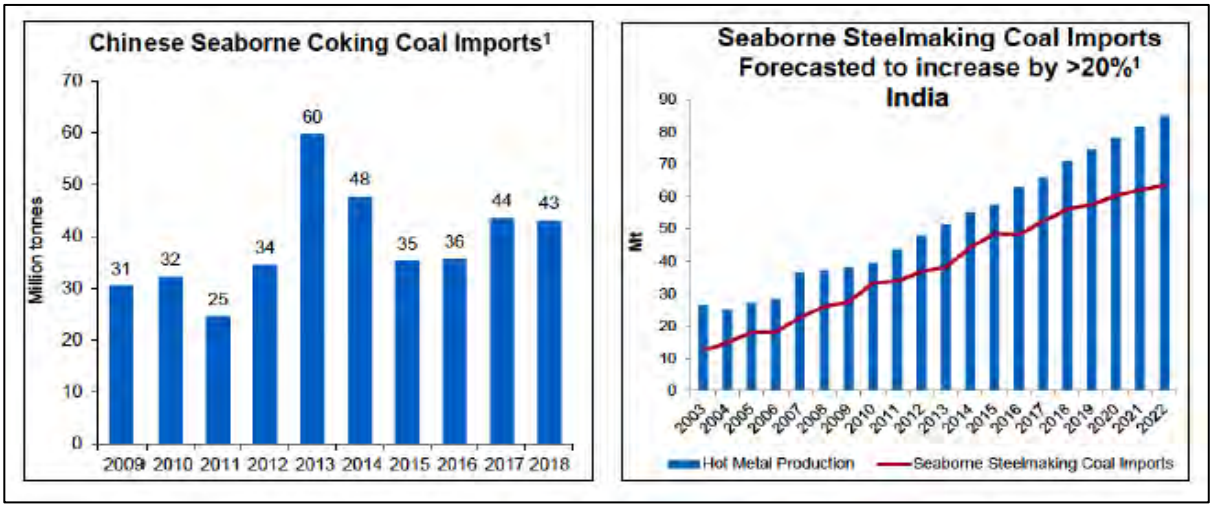
The seaborne market is dominated by Australia accounting for 65%, the US second with around 15%, and Canada third with around 10%. Canadian metallurgical coal is important to the north Asian steel mills seeking to diversify supply away from Australia because of growing concerns around supply disruptions in Australia. The north Asian steel mills view Canada as a more reliable source of supply and any new production out of Canada, therefore, is of keen interest to these steel mills. Tenas is one such Project.

Tenas coal is expected to be highly sought after on the seaborne market. It is characterised by the steel mills as a 'medium-volatile (mid-vol or MV) semi-soft coking coal'. Such coals are limited in supply on the seaborne market and are preferred by the steel mills as a blending coal for their lower volatiles. The typical semi-soft coking coals supplied to the seaborne market are higher in volatiles (HV SSCC) which creates blending problems for the steel mills in trying to keep volatiles below a certain threshold.

There are only three operating mines (soon to be reduced to two), both in Australia, that produce a mid-volatile semi-soft coking coal on the seaborne market. Following the closure of Teck's Coal Mountain Mine, it is understood that there is no producer of mid-volatile semi-soft coking coal in Canada. The Tenas Project, therefore, will be the only producer of mid-volatile semi-soft coking coal in Canada, and one of only three suppliers to the seaborne market. It will provide a metallurgical coal very limited in supply, to a market very high in demand, for its quality specifications.

Both China, and increasingly India, are supporting demand for seaborne metallurgical coal, with India poised to become the largest importer of metallurgical coal (Figure 6). This coupled with a lack of capital investment over the last five years, is supporting strong short to medium term forward prices for metallurgical coal.

Figure 6: Seaborne Coal Imports in China and India



Source: Teck Resources Presentation October 2018.

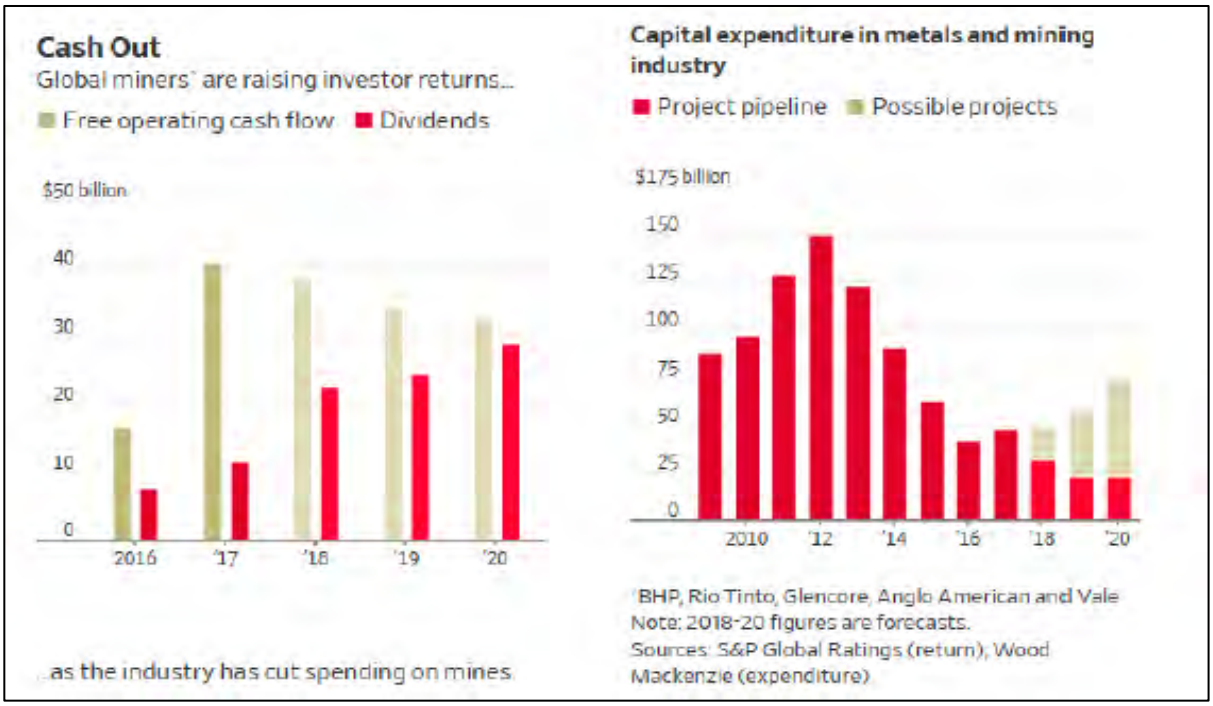
With a retention of profits to reduce debt following the last downturn in the coal market, coupled with a focus on increasing returns to shareholders, global coal miners have ignored capital investment causing a tightening in supply of metallurgical coal in the short to medium term (Figure 7).

The Project is well positioned to take advantage of the strong current, and medium-term market fundamentals. Equally important however, the Project is also positioned to be one of the lowest cost producers on the seaborne market. Based on the results of the two pre-feasibility studies undertaken by TCL in 2017, the Project's forecast all in FOB (free on board) cash cost, ex-Ridley Terminals, is CDN$73.33 per saleable tonne.

The Project will provide employment and economic opportunities to Indigenous groups, the Bulkley Valley and the surrounding region, as well as CDN$250 million in tax revenues for local, provincial, and federal

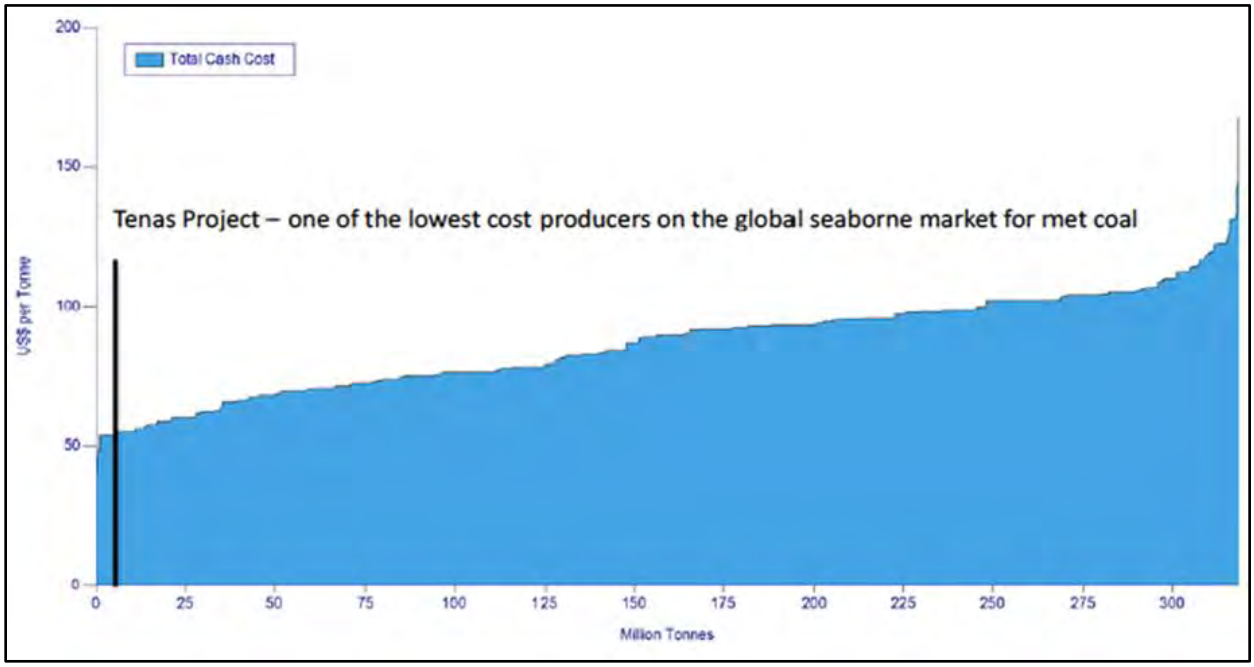
governments. But it is important to TCL that in doing so, it can also provide certainty of business continuity to its staff and key stakeholders. The Project's position on the seaborne metallurgical coal cost curve provides a natural hedge to the volatility and unpredictability of metallurgical coal prices (Figure 8).

Figure 7: Global Trends in Mining Investor Returns and Capital Expenditures in the Metal and Mining Industry



Source: Wall Street Journal, 8 August 2018.

Figure 8: Tenas Project Position on the Seaborne Export Metallurgical Curve



Source: Wood Mackenzie Ltd. Dataset, May 2018.

3.2 Exploration and Mining History

Coal was reportedly discovered in the Telkwa area around 1900. The Geological Society of Canada's (GSC) Report No. 988, entitled *The Telkwa River and Vicinity, BC* (Leach 1907), included the first geological map of the area and documented the geology and coal occurrences in the area.

Small-scale underground and surface mining began in the Telkwa area in 1918 and continued into 1985. Sporadic production since 1918 has resulted in the recovery of over 400,000 tonnes of coal, which was used to heat industrial, public and private buildings in the region. Modern exploration of the Project started with Cyprus Anvil mining in 1978. Since then, over 800 exploration drillholes and 3 bulk samples have been carried out on the Telkwa property. Other ancillary activities, such as trenching, geological mapping, and surface geophysics, have also been carried out. TCL also completed an exploration program in 2018 to augment the geochemistry, hydrogeology, and geotechnical database for the property.

Between 1918 and 1980, coal licenses for the Telkwa property were held by Bulkley Valley Collieries and Crowsnest Resources. In 1981, Manalta Coal purchased the Telkwa property and coal licenses. Manalta Coal was purchased by Luscar Limited (Luscar) in 1999, and in 2002, Luscar decided to put their project on hold. In 2004, Sherritt purchased the non-producing and mine mouth properties from Luscar, which were in turn purchased by Altius Minerals in 2014. In 2015, TCL signed a farm-in agreement with Altius to purchase the Telkwa property. In late 2017, TCL also acquired the coal licenses, and in early 2018, the freehold land private property was transferred from Altius Minerals.

3.3 Geology

The Skeena Group sediments within the Project area unconformably overlie Jurassic Hazelton volcanics. Where the Skeena unit is complete; it has a cumulative thickness of approximately 500 m throughout most of the study area. Marine and non-marine sandstones and siltstones, with lesser amounts of mudstone, conglomerate, and coal dominate the stratigraphic sequence. Two main coal sequences dominate the succession over the entire property and are referred to as Coal Zone 1 and Coal Zone 2. Coal units commonly occur as multiple seams in each zone. Main seams often correlate over long lateral distances. The lower Coal Zone 1 (Seams 1A to 1F) is separated from upper Coal Zone 2 (Seams 2 through 11) by as much as 140 m of mainly marine sediment. Coal Zone 2 is absent from the Project area. Figure 9 illustrates the generalized stratigraphic section for the entire Telkwa coal field. The Project's coal resources are all contained within 13 distinct coal seams within Coal Zone 1, of which 5 are shown in Figure 9, and of which 3 are mineable due to their thickness and low rock content.

The coal measures rank is considered medium-high volatile bituminous A, as determined by petrographic analysis of coal core samples in 1989 and again in 2018, where the maximum mean vitrinite reflectance ranged from 0.92 to 1.10.

Overburden generally consists of coarse sand and gravel material and is present in thicknesses ranging from a low of 5 m on the southwest side of the proposed pit to a high of 25 m northeast side. Silt and clay dominate overburden is located on the northeast and eastern side of the proposed pit area. Thin deposits of silty sand and gravel overlying bedrock are present on the pit's south side.

3.3.1 Geochemistry

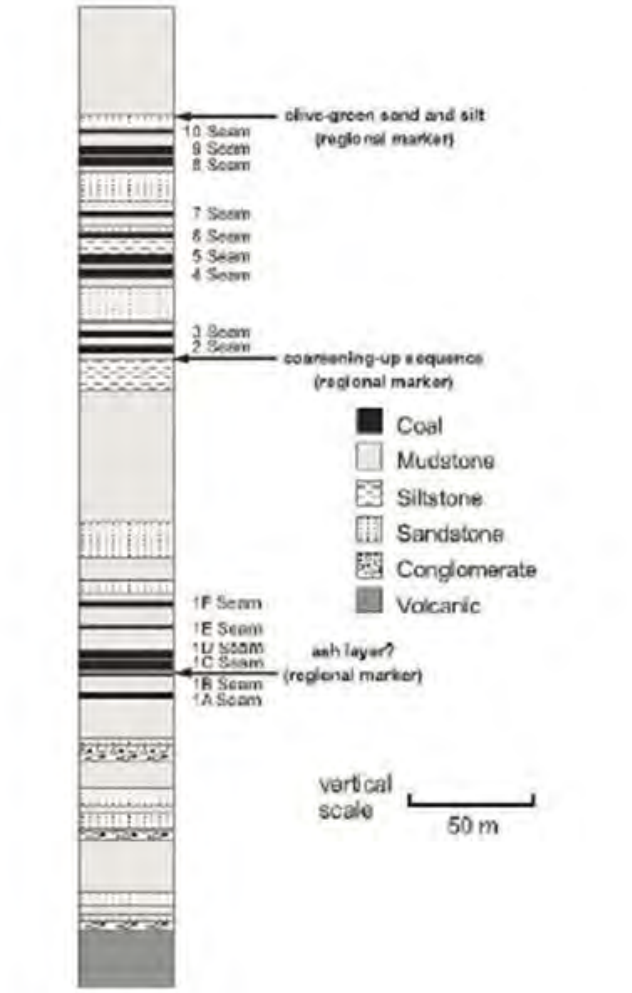
Extensive work on the geochemical characterization of the Project geology has been completed by prior owners of the property and this work is currently being extended by additional field work being carried out by TCL.

3.3.1.1 Acid Mine Drainage

The waste rock types within the Project area average around 0.4% sulfur content, with a number of samples above 1% sulfur content. Potential for acid mine drainage (AMD) at the Telkwa Coal Project was studied

extensively in the 1990s to support feasibility studies and environmental impact assessments (Norecol Dame & Moore 1999). This work showed that Telkwa hosts topsoil, overburden, low sulfur rock, and higher sulfur rock material types. Further test work was conducted in 2018 using more up-to-date methods for determining acid and neutralizing potential, and the historical data was updated to conform to current methodology (as described below). Kinetic tests on the material recovered during the exploration program have commenced and final results are expected in the second quarter of 2019. The results will then be compared to the Project kinetic data from the 1990s.

Figure 9: Generalized Stratigraphic Column for the Tenas Project



The ratio of Neutralization Potential (NP) to Acidity Potential (AP), or neutralization potential ratio (NPR), was used as the basis for classifying each rock zone as non-acid generating (non-PAG) or potentially acid generating (PAG). Methods used to estimate NP and AP in the 1990s are different from those used currently and to varying degrees overestimate both NP and AP, resulting in uncertainty in the threshold NPR used to delineate PAG and NAG strata. One of the main reasons the drilling program was completed in 2018 was to address this uncertainty by using modern methods for determining NP and AP and correlating the historical information to match current methodology. With this work completed, it is now possible to be more accurate in the NPR ratios used by the Project. The ratio selected to define PAG rock was an NPR of less than or equal to 2.0, and NAG as material with an NPR of greater than 2.0. This threshold value is consistent with current practice and regulatory expectations for other proposed and operating mines. During the operations phase,

additional testing will be conducted to further refine and confirm AP and NP values. With further data it may be possible to further lower the NPR ratio to a value less than 3.0 to more effectively segregate PAG from NAG.

Much of the interburden units, the rock types between the coal seams, for the Project are classified as PAG, while the majority of the overburden units are classified as NAG. Based on this information, a robust material management strategy will be implemented in the mine design and scheduling plan.

3.3.1.2 Metal Leaching

Elements of potential concern, including selenium, are being evaluated as part of the additional static geochemical characterization program for the Project currently underway. Shake flask extraction (SFE) testing has been conducted on samples of the primary geological materials present at the site (mudstone, siltstone, sandstone, and coal) to evaluate the potential of the geologic materials at the site to leach these elements. Current results have shown selenium values for most of the rock units to be below 0.1 ppm, significantly lower than other coal-producing regions in western Canada, which are around 2 ppm. Kinetic tests in progress will provide further information on metal leaching. These results will be compared to the existing kinetic data.

3.4 Project Tenure and Freehold Land

The Project is located on provincial Crown Land, three freehold land parcels owned by TCL, and nine coal licences, held by TCL and Bulkley Valley Collieries Ltd. (BVCL), issued under the BC *Coal Act* (Table 2; Figure 10). TCL has an agreement with BVCL to access their licences for mine infrastructure.

The majority of the mine components, including the pit, material storage piles, coal processing plant, sedimentation ponds, mine administration and maintenance buildings will be located on five coal licenses held by TCL, four coal licences held by BVCL, and three freehold parcels owned by TCL. Other Project components including the proposed water discharge line, proposed bypass road, and proposed power line will also be located on TCL and BVCL coal licenses and TCL freehold land. The proposed rail loop and rail loadout will be located on Crown land (Figure 10). The existing 25 kilovolt (kV) distribution power line, north of the Project and on the east side of Goathorn Creek, is located on provincial Crown land, north of the Project (Figure 10).

Current access to the Project is via the Telkwa Coalmine Road. Following construction of the Project, coal haul will be via a portion of a forest service road (FSR; Figure 10) through the Goathorn Creek valley and a new 11 km dedicated coal haul road.

Table 2: Project Tenure and Freehold Land

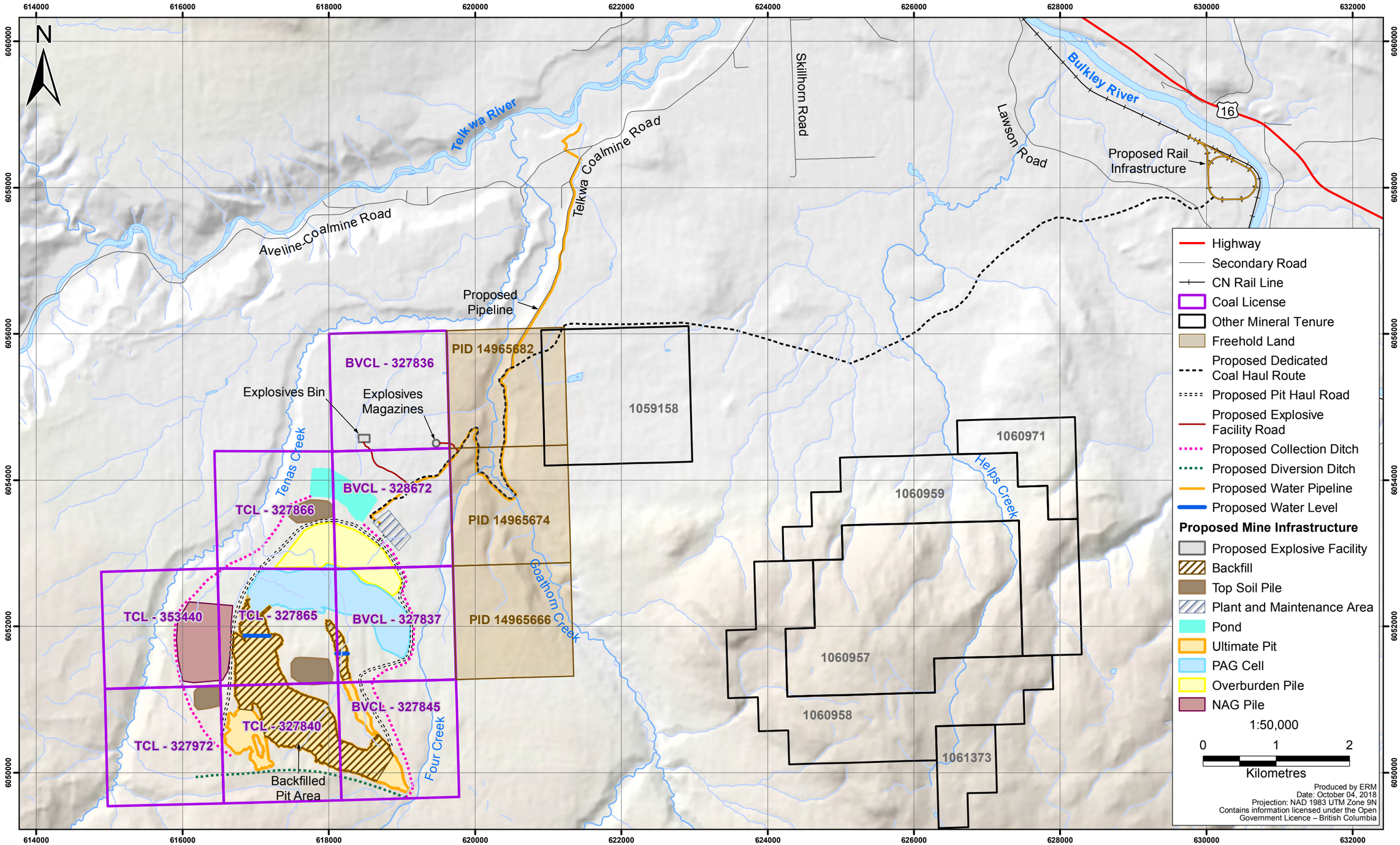
Identifier	Description	Owner or Holder	Hectares
DL 389; PID – 014965666	Freehold	TCL	262.0
DL 391; PID – 014965674	Freehold	TCL	262.0
DL 401; PID – 014965682	Freehold	TCL	261.1
327836	Coal license	BVCL	259.0
327837	Coal license	BVCL	259.0
327845	Coal license	BVCL	259.0
328672	Coal license	BVCL	259.0
353440	Coal licence	TCL	259.0
327972	Coal licence	TCL	259.0
327840	Coal License	TCL	259.0
327865	Coal License	TCL	259.0
327866	Coal License	TCL	259.0

PID = property identification number

Figure 10

Tenas Project Coal Licences and Freehold Land

TELKWA COAL LIMITED



3.5 Project Components

This Project Description is based on pre-feasibility or conceptual level of engineering design. A feasibility study is underway and will be completed by mid 2019. The components and activities described in this Project Description do not comprise an initial stage or sub-component of a larger project or planned later expansion.

The Project will include the following major components:

- surface mine pit;
- coal processing plant;
- rock, overburden, plant rock and topsoil storage piles;
- materials handling systems for raw coal, coarse and fine rock and washed product coal, including plant conveyors, storage bins and stockpiles;
- administration, first aid, maintenance, bath house, coal and rock laboratory and warehouse buildings;
- surface water management features, including ditches, sedimentation and storage ponds;
- propane storage facilities;
- water supply wells, storage and distribution system;
- fuel and lube storage facilities;
- explosives magazine, storage silos and vehicle wash facilities;
- mine haul roads and access roads within the mine site;
- 3.5 km long 25kV power line;
- 25 kV to 600V substation adjacent to the processing plant.
- approximately 2.5 km rail loop connecting to the existing main Canadian National Railway (CN) line;
- rail loadout facility and rail loop;
- a steel girder bridge over Goathorn Creek to permit super B-train off-highway truck;
- improvements to approximately 6.5 km of existing roads; and
- 11 km dedicated coal haul road.

Figures 3 and 10 show the locations of the mine components and rail infrastructure. The final location, size and dimensions of these facilities will be determined once the detailed mine plan has been completed in 2019.

The estimated total area disturbed by the Project (i.e., the area of an outline containing all Project components) is 1,040 ha. Table 3 provides the areas of individual Project components.

Table 3: Area of Project Components

Component	Area (ha)
Mine pit	234.32
Pit backfill	185.19
Topsoil piles	41.92
PAG cell	126.46
Overburden pile	80.75
NAG pile	73.78
Processing plant / administration	13.03

Component	Area (ha)
Sediment pond	42.50
Explosive magazines	0.73
Explosive site facilities	1.50
Explosive facilities roads	3.07[1]
Pit haul roads	15.99[1]
Diversion ditches	15.71[1]
Rail loop, siding, and stockpiles	33.26
Access road	16.631
Haul road	21.651
Pipeline	9.232
Total (not including backfill)	**750.53**

Notes:
[1] Area includes 10 m buffer.
[2] Area includes 5 m buffer.

3.6 Project Activities

3.6.1 Mining Method

The Project will be a conventional shovel and truck operation similar to other rock quarry and surface mine operations in the region. The surface mining method will be bench-by-bench (5 to 15 m), which will include salvage of topsoil, excavation of overburden, drilling and blasting of rock, ripping and dozing of coal, loading these materials with a hydraulic excavator and/or a front-end loader, and moving coal to the plant or material piles with 100-ton capacity rigid frame haul trucks.

Mining will commence with a box cut and proceed up-dip. A box cut often serves as the first step in the excavation of most mining areas. It consists of a single rectangular cut made in the surface of the earth, forming a box shape. While still utilizing truck and shovel, the site geology and corresponding topography allows for lower cost mining. This mining method includes shorter material hauls, the use of bulldozer push and blast casting for some material. Blasting is the use of explosives to break rock as one step in mining. Cast blasting is when explosives can be used to break and move rock to one side and permit the mining of what was under the rock. This is in contrast with the need to use equipment to move rock aside after the blast. Cast blasting is more efficient and less expensive when the geology and topography allows, than blasting plus the use of machines to move materials. This lower cost mining method provides the ability to backfill the majority of excess rock and overburden material back within the pit. The strip ratio will vary by year with an expected average 4.5 bank cubic metres per washed product tonne produced over the life of the Project. The entire open pit mine is located within the measured/indicated resource portion of the Tenas coal deposit.

Auxiliary equipment will be used at the mine, including bulldozers, graders, front-end loaders, service trucks, forklifts, smaller excavators, and general equipment to support mining operations and conduct maintenance. Based on the level of production and the strip ratio, the mining fleet planned for the operation consists of two hydraulic shovel/excavators, ten haul trucks, two diesel rotary drills, three front-end loaders, three graders, and five bulldozers.

At mine closure, the area of the proposed open pit will be approximately 386 ha and extend about 1,300 m from north to south, 1,000 m from west to east, and 100 to 150 m below the current topographic surface.

3.6.2 Coal Processing

The washed product coal will leave the mine site with 9.0% moisture content, allowing for another 1% of moisture to be added at Ridley Terminals in Prince Rupert, BC. A conceptual coal processing circuit has been developed to achieve the above quality (Figure 11). The proposed coal processing plant will be similar to other coal plants operating in the province.

Run of mine (ROM) coal will be stockpiled at the processing plant and fed into a hopper with a 305 by 305 mm grizzly (a type of screening device) to limit the maximum lump size. The ROM stockpile will be uncovered and have an approximate size of 35,000 tonnes. The crushing station is designed to have a maximum capacity of 175 tonnes per hour, and will include an interconnecting conveyor, scalping screen, a cone crusher, and a dust suppression system. Crushed 50 mm coal will be conveyed to the processing circuits.

The processing plant will initially employ two circuits: heavy media cyclones for coal in the size range between 0.5 and 50 mm, and froth flotation for coal less than 0.5 mm in size. A third circuit may be added for material between 0.25 mm and 1.5 m, which will allow the floatation and heavy media cyclone circuits to be operated more efficiently (at <0.25 mm and 50 mm to 1.5 mm, respectively).

Coal dewatering will be done mechanically to avoid the use of thermal dryers, to prevent coal from direct contact with flames, and to limit stack emissions of particulate matter and other pollutants into the surrounding environment from the processing plant. TCL will employ screenscroll centrifuges, screenbowl centrifuges and belt filter presses to achieve the final washed product coal moisture content. There will be two uncovered washed product coal stockpiles located beside the processing plant, with a target size of 30,000 tonnes between both stockpiles.

The processing plant will be constructed north of the mine pit on the west side of Goathorn Creek and will employ a closed water system. All process plant water fed into the plant will be reused or recycled, and the fine rock will be dewatered and combined with coarse rock material. The plant will require makeup water to replace any water that is entrained in the washed product coal or the coarse and fine rock. The plant's fine rock reject stream will be dewatered by the thickener, and a belt filter press will be used to produce a rock product with a moisture content of 20-22% and after combining with coarse rock is able to be stored in piles.

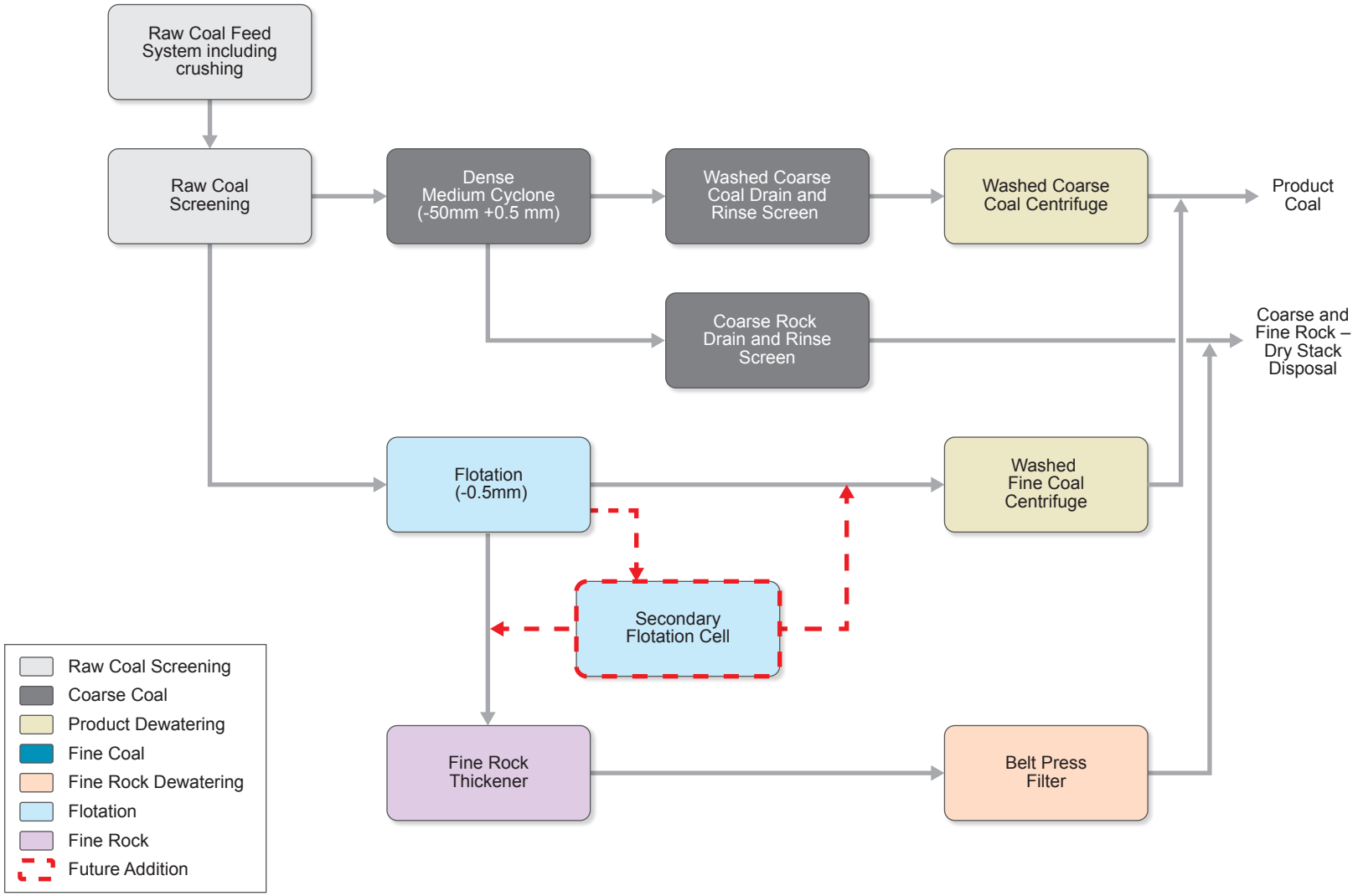
3.6.3 Material Management and Storage Piles

The number and location of material storage piles will be affected by the material types present at the site. Based on the work completed to date, TCL has identified several types of material associated with coal extraction that will need to be managed:

- **Topsoil:** the top 0.30 m of material that contains the bulk of organic material and material acceptable for the growth of vegetation. There are approximately 1.9 million m^3 of this material.
- **Overburden:** this is the non-rock material between topsoil and rock that consists of gravel and till material with almost no organic material. There are approximately 22 million m^3 of this material.
- **High Sulfur Rock (PAG):** some of the rock present in the Project's pit area has sulfur levels that are elevated and will have a higher potential to cause acid rock drainage. This material is also known as potentially acid-generating (PAG) rock. This rock has a ratio of Neutralizing Potential to Acid Potential ratio (NPR) that is less than 2.0. There is approximately 25 million m^3 of this material. With additional test work conducted during the operations phase, the NPR may be reduced to a value below 2.0 used to classify PAG material and will result in less of the rock within the pit deemed as PAG.

Figure 11
Conceptual Coal Processing Circuit

TELKWA COAL LIMITED



- **Low Sulfur Rock (NPAG):** more than half of the rock present in the Project's pit area has sulfur levels with little potential to cause acid rock drainage. This material is also known as non-acid-generating (NPAG) rock. This rock has a ratio of NPR that is greater than 2.0. There is approximately 30 million m^3 of this material.
- **Coarse and Fine Plant Rock:** during coal processing to produce a washed product suitable for the marketplace, coarse and fine rock will be separated from the coal through gravity separation methods, such as cyclones. This material is classified as PAG material, as its NPR ratio is <2.0. There are approximately 3.5 million m^3 of this material.

Per the proposed material management plan, the majority of PAG material from the pit will be placed in external flooded storage cells or within flooded portions of the pit immediately after the rock is mined. This material management option allows all water to be captured and collected from high sulfur rock utilizing the storage cells or the pit itself as management structures. To understand the potential for blending PAG with NAG, two mine-scale piles will be constructed using NPR ratios of 2 to 1 and 3 to 1 and monitored to analyze their geochemical stability.

All topsoil salvaged will be temporarily stored in storage piles for use in reclamation or will be "direct placed" on reclaimed external or backfilled rock storage piles. The heights of topsoil storage piles will be limited to 15 m and will be developed with a 3 to 1 (horizontal to vertical) slope to ensure stability. The topsoil storage piles will be seeded to mitigate potential erosion.

Approximately two million cubic metres of overburden will be used as cover for the fine and coarse rock reject piles, to provide an additional barrier to limit oxygen ingress. The remaining overburden will be stored with the low sulfur rock storage piles or backfilled into the pit. These piles will have an overall horizontal to vertical slope of 2.5 to 1.

All plant coarse rock generated from the processing plant will be backfilled within the pit or placed into storage piles near other external material piles. This material will be placed in compacted lifts and periodically capped with overburden to limit oxygen ingress. Moisture will be added to the piles during the compaction process to further reduce oxygen ingress.

All external storage piles are located on flat terrain, where much of the area has recently been harvested by forestry (i.e., West Fraser Mills Ltd. and Northern Engineered Wood Products Inc.). The external storage pile locations were selected and designed to minimize environmental disturbance and to promote geotechnical and geochemical stability. The external storage piles will be built from the bottom up, using 5 to 15 m lifts (5 m lifts will be used for topsoil), in contrast to the conventional end-dump approach, where a pile is constructed from the top, which is more common in BC mining operations. This construction method provides additional control in the design and development of the external material storage piles and reduces the infiltration of oxygen and moisture into the pile. To minimize the potential of materials being mobilized from the storage piles at the Project, the following features have been incorporated into the design:

- external material storage piles will be located on flat terrain away from existing watercourses to minimize subsurface flow through the rock material;
- the mining method allows for the maximum amount of excess material to be backfilled within the existing pit shell;
- upslope diversion ditches will divert non-contact water away from the material storage piles and surface mine areas;
- downslope collection ditches will collect runoff from the material storage areas and divert it into sedimentation ponds;

- valley fills and watercourses will be avoided for all external material piles;
- sedimentation ponds will be designed with a single point of discharge, with the option for transfer by pumping to a pond to allow for water treatment if required;
- the bottom-up approach for external material storage pile construction will allow drainage/ impervious layers to be included in the material storage piles, if required; and
- external and backfilled rock, overburden and topsoil storage piles will be temporarily and/or permanently reclaimed as mining allows.

TCL continued a geochemical characterization program for the Project that was started by Crowsnest Resources and Manalta Coal to assist with the development of material management plans. This program will be maintained during mine operations. Depending on the results of ongoing analytical work completed during the operations phase, rock with NPR values of less than 3.0 will be placed within storage cells or flooded portions of the pit.

3.6.4 Water Supply and Management

Water for site services, including process water make-up and wash-down and utility requirements, will come from groundwater wells or ponds located adjacent to the plant and pit areas. Preliminary hydrogeological and hydrology studies indicate that water sources within the Project area are adequate to meet the Project's needs. More detailed information on average and maximum daily water demand for the Project will be developed during the detailed design stage; but is estimated at 15,000 litres per hour. Potable water will be sourced from groundwater and surface run off where possible. If sufficient supplies are not present, it will be sourced from Goathorn Creek. If required, this will be supplemented from potable water providers in the RDBN.

Surface water management for the Project includes collecting and managing surface water from disturbed areas (contact water) on the mine site and diverting surface water from undisturbed as well as upslope areas around the Project (non-contact water) into existing natural watercourses. Contact water drainage ditches will convey water from disturbed areas to ponds for sediment treatment.

The location of the water management features is illustrated in Figure 10. The location and design of diversion ditches and collection ditches will be developed in more detail once the locations of the major Project components have been refined.

3.6.5 Hazardous Materials Management

3.6.5.1 Fuel and Oils

Diesel fuel for mining equipment and haul trucks will be transported to site via the dedicated haul road by a licensed third-party vendor. Diesel fuel will be stored in in one or two 45 m^3 above-ground, double-walled fuel storage tanks located near the maintenance shop. All lubes will be stored in either a purpose-designed lube sea can or in several 5 m^3 double-walled storage tanks within the maintenance shop complex.

3.6.5.2 Explosives

The primary explosives used during mine operation will be a combination of ammonium nitrate fuel oil (ANFO) and emulsion. Blasting activities will be contracted out to a qualified third-party company. All required explosives will be obtained through an explosives' supply contractor and stored on-site in silos and magazines. The location of the silos and magazines are presented on Figure 10. The estimated size of the silos is 60,000 kg for ammonium nitrate and 50,000 kg for emulsion. Two magazines will be required, each

with a storage capacity of approximately 2,500 kg. Explosives will be manufactured on-site by the third-party contractor. The transportation of explosives to and from the mine site will comply with federal and provincial legislation related to the transportation of dangerous goods. Licenses and permits for an explosive magazines and storage facility will be required from Natural Resources Canada and the EMPR.

3.7 Emission, Discharges, and Waste Management

3.7.1 Airborne Emissions

Airborne emissions generated by the Project may include:

- criteria air contaminants and greenhouse gases (GHG) due to the operation of vehicles and heavy machinery, including CO2, NOx, SOx, and particulates;
- fugitive dust emissions (TSP, PM_{10}, $PM_{2.5}$) associated with blasting, coal crushing and material handling by mining equipment and transfer activities, coal stockpiles, and road use; and
- methane gas associated with the coal deposit.

An air quality and dust control management plan will be in place prior to the start of construction. Mitigation for airborne emissions may include measures such as the use of cyclones and wet scrubbers for particulate collection, stabilization and revegetation of soil stockpiles, the watering of haul roads during non-freezing conditions, covers on loaded and empty coal haul truck beds, and minimization of the use of diesel generators.

3.7.2 Liquid Waste

Liquid wastes from the Project include wastewater associated with processing and vehicle washing, as well as site runoff from areas disturbed by mining.

Process water will be recycled or reused as much as possible. Coarse and fine rock reject streams will be dewatered using centrifuges and filter presses, with excess water being recycled at the plant. The coarse and fine rock will be trucked and backfilled within the pit or placed into external storage piles.

Site runoff from mining will be diverted into sedimentation ponds that are sized and designed appropriately for flood events. Water quality will be monitored at the point of discharge and in the receiving environment. A compliance point downstream will be determined during permitting.

No water treatment is anticipated for the Project beyond normal sediment control systems, applying approved flocculants to reduce total suspended solid levels and will be determined during permitting. This will be confirmed by water quality model results for subaqueous PAG management. Discharge water from the site will achieve water quality criteria required to protect drinking water and fish and aquatic life downstream of the Project. Site-specific water quality limits will be set during the permitting process for parameters that already exceed guidelines under baseline conditions.

3.7.3 Solid Waste

Solid waste streams will be segregated according to standard industry practices. Recyclable materials will be separated and collected on site and shipped to the nearest suitable recycling facility. Industrial waste materials that can be recycled, including lubricants, fuels, oils, and batteries, will be shipped to an appropriate facility for disposal. Organic wastes will be composted on site or shipped offsite for disposal.

A proposed miscellaneous garbage disposal site will be incorporated within the non-PAG pile for dealing with all material generated by the mine that cannot be recycled or composted or consist of hydrocarbons. This site will move as the non-PAG pile expands and will be incorporated into the individual lifts of the pile on as required basis. No liner will be required for the material planned to go into the disposal site. An alternative that will be investigated is using an existing facility in the region.

A proposed landfarm for small onsite hydrocarbon spills will be incorporated near the coal processing plant. This will be a lined facility and will use best practices to encourage bacterial growth to deal with hydrocarbons present. Testing will be done to ensure compliance with levels and material will be used for reclamation purposes when material meets regulatory requirements.

3.7.4 Hazardous Waste

Contaminated materials, such as soils or materials containing hydrocarbons will be disposed of at a suitable hazardous waste facility.

On site, grey water produced from the administration facility and/or maintenance shop will be directed towards the processing plant to be used for the washing of coal. All black water produced on site will either be trucked off site for disposal at a licensed facility or a dedicated tertiary sewage treatment plant will be constructed to treat all sewage effluent with discharge being directed through creek systems to the surrounding environment

3.7.5 Potential Accidents and Malfunctions

The potential for accidents and malfunctions to occur during the construction and operation of the Project will be assessed in the EA, including the potential effects on the physical, biological, and human environment, and mitigations and management plans. These measures and programs will be appropriately linked with plans implemented by local agencies, such as emergency response plans.

3.8 Utilities and Infrastructure

3.8.1 Power Supply

An existing 25 kV power line south of the site will provide a tap-in point for a new 25 kV power line to be brought to site over Goathorn Creek. Preliminary discussions with BC Hydro indicate that this line can accommodate the 4 megavolt-amphere load required by the mine (Figure 3). The new power line connecting the mine to the existing distribution line will be approximately 3.5 km long, and will require crossing the Goathorn Creek floodplain, a span of approximately 50 m. The detailed design and location of the power line have not been determined at this point. The substation and power line are envisioned to be constructed, owned and maintained by TCL. A 25 kV to 600 kV substation will be required on the west side of the Goathorn Creek, adjacent to the plant site. Vegetation management along the 25 kV power line corridor will follow practices developed by BC Hydro. Vegetation will be actively managed to ensure that plants to not encroach within 5 m of the corridor, based on the circuit's "limits of approach" (i.e., the distance a person, machine, or conductive material can safely approach energized conductors).

A riparian management zone will be established within the power line corridor where it crosses over Goathorn Creek so that impacts to riparian vegetation and fish habitat are minimized.

Propane will be trucked to site using a licensed third-party contractor and stored in tanks for the use of various buildings on site for heat and hot water tanks.

3.8.2 Site Roads, Bridges and Other Stream Crossings

Site roads will include a mine haul road from the pit area to the raw coal stockpile, and haul roads from the pit to the various material storage piles. All roads, except the concrete aprons adjacent to some structures, will be compacted gravel suitable for heavy industrial use. Detailed alignments of haul and access roads will be completed during the detailed design phase. Access to the mine site from the Telkwa Coalmine Road or the Lawson Road may be gated and monitored. Wherever possible, existing roads will be used and incorporated into the mine planning and access designs.

One major stream crossing will be required over Goathorn Creek. The crossing will consist of a steel bridge with a span of 30 m and width of 5 m to accommodate loaded super B-train on highway trucks. Minor crossings will be required over other small watercourses such as Helps Creek and other unnamed watercourses along the dedicated haul road.

3.9 Transportation and Shipping

3.9.1 Roads

A portion of an existing FSR through the Goathorn Creek valley and a new 11 km dedicated coal haul road will be used as primary access to the mine site. In total, 17.5 km of road will be required to connect the mine to the rail loop and Lawson Road. During the construction of the dedicated coal haul road, the existing Telkwa Coalmine Road and the existing FSR will be used for access. This road was used for forestry operations in the past and current recreational use of this road is low due to a washout of the Goathorn Bridge over ten years ago.

The proposed 17.5 km road will include single- and double-lane sections to allow for the safe transportation of people and materials to the mine site. A super B train off-highway truck will be used to transport washed product coal and will be covered to mitigate fugitive coal dust emissions. A dust management plan will be developed for the dedicated coal haul road. It is estimated that between four and eight trucks per hour, seven days a week, will be required to deliver washed product coal to the rail loadout location to meet the annual production requirements. To reduce traffic on the Telkwa Coalmine Road and dedicated haul road, employees will be bused to the mine site from Telkwa, as is the practice at other mine operations in the province. Some upgrades to the existing road maybe required during the operations phase if concerns are raised by the users of the road. Personal pick-up trucks will be limited to pit supervisors and the mine manager. Furthermore, freight and fuel deliveries will be scheduled to avoid busy periods on the Telkwa Coalmine Road and shift change at the mine.

3.9.2 Rail Loop and Rail Loadout

Washed coal will be shipped by rail to coal terminals in Prince Rupert. The nearest rail line is operated by CN, located 7 km northeast of the Project near Telkwa. An approximately 2.5 km rail loop will be constructed and connected on one end to the CN rail line. The entire loop and associated stockpiles will be on Crown Land on the west side of the Bulkley River. The preliminary rail loop and loadout is shown on Figure 10. A detailed alignment of the loop will be completed during the detailed design phase. TCL has had preliminary discussions with CN regarding the rail loop and the capacity of the CN network to accommodate the additional shipping volume. No concerns were raised by CN, given the long lead time associated with the Project's first coal production.

The rail loadout will include an uncovered washed product coal storage stockpile, and a dust control/ suppression system. The stockpile at the rail loadout is targeted to be approximately 30,000 tonnes. The loadout will service approximately 1 train consisting of 116 cars per week. The preferred option for the rail

loadout is to locate it adjacent to the rail loop, which will require super B highway trucks to transport washed product coal between the plant site and the loadout via the existing Caribou FSR and proposed dedicated haul road. Direct loading of the trains from the stockpile utilizing a front-end loader (FEL) will be carried out seven days a week, during dayshift hours between 0600 and 1700 hours as much as possible.

3.10 Costs

Based on the feasibility study in progress, the estimated initial capital cost of the Project is CDN$82.4 million. This includes construction costs and costs for mining equipment, the processing plant, the administrative and maintenance buildings, the rail loop and rail loadout, construction of the 11 km dedicated haul road, any improvements to approximately 6.5 km of existing roads, construction of a bridge over Goathorn Creek, engineering, and owner's costs. The Project will not require any financial support from federal, provincial, or municipal governments. The estimated annual operating cost of the Project is $42 million and the estimated decommissioning cost is $10 million.

3.11 Employment and Accommodation

The Project is expected to generate 100 person-years of direct employment during the 1- to 1.5-year construction phase. During the subsequent 20-year operations phase, the Project is anticipated to require between 90 and 110 full-time employees and generate 2,000 person-years of employment. A further five to ten full-time employees will be required during the estimated three-year reclamation phase. At the end of reclamation, a part-time employee will be required for annual monitoring requirements for water and geotechnical aspects.

Workforce accommodation is expected to be procured within the Village of Telkwa, the Town of Smithers and, if necessary, Houston, especially as it is envisioned that the mine will be able to fill most, if not all of its workforce requirements locally. As such, no work camp is planned.

3.12 Alternatives Assessment

An alternatives assessment for various Project components has been completed as presented in Table 4. The preferred alternatives are presented in the Project Description; however, during additional consultations on the Project during the pre-Application stage, it is expected that further alternatives may be identified and investigated. When TCL undertook initial consultation with the community, the proposed coal haul road was to be the existing Telkwa Coal Mine Road. After 18 months of early consultation, TCL decided to change its plan and is proposing to build a dedicated haul road at the Project outset rather than use the Telkwa Coal Mine Road.

Table 4: Summary of Alternatives Assessment

Component	Alternatives Considered	Preferred Option
Mining Method	Surface vs. underground vs. highwall	Surface-only, due to the lack of coal available by underground and highwall mining methods and the geologic complexity of the deposit
Infrastructure	Siting of some components in Telkwa vs. on-site	Majority of components will be on-site with the main administration office in Telkwa
Coal Transport	Designated haul road vs. use of existing road network	Dedicated haul road to reduce potential traffic effects

Component	Alternatives Considered	Preferred Option
Coal Transport	Truck haul vs. conveyor haul	Truck haul due to the complexity of building a conveyor through the Goathorn Creek valley. Furthermore, given the low production rate, a conveyor is uneconomic
Washed Product Coal Storage	Covered storage vs. open stockpiles with dust mitigation	Open stockpiles with dust mitigation
Acid Mine Drainage Management	Water treatment vs. storage cells	Storage cells to reduce treatment requirements
Acid Mine Drainage Management	Storage cells vs blending	Given the NPR of some of the PAG material, it is not practical to blend all of the PAG material to achieve a stable geochemical state

4. PROJECT PHASES AND SCHEDULING

4.1 Construction

Planning for construction will begin in 2019, with construction beginning in Q3 2020 once the required authorizations, permits and licenses have been obtained. Construction, commissioning and pre-mine development is projected to take approximately one year. Major activities during construction include site clearing, pre-stripping, building construction, road development, rail loop construction, bridge construction, and development of onsite utilities and services.

4.2 Operations

Initial coal production is anticipated to begin in Q3 2021 with full production at the 0.75 Mt clean coal annual rate anticipated to begin by the end of 2021 and continue for the remaining 20 years of the projected mine life. In the early stage of operations, the pit and material storage piles will be developed. Topsoil and other material suitable for reclamation or construction uses will be stockpiled in designated areas. Coal processing, and the temporary stockpiling of raw coal prior to processing, and washed product coal prior to shipping, will occur. Aquatic effects monitoring, wildlife studies, and reclamation studies will also be ongoing during the operations period to monitor changes to the environment and develop or improve upon the approved mitigation measures provided during the regulatory process.

4.3 Closure and Reclamation

The timing and duration of mine closure and mine reclamation activities will be determined in more detail when a reclamation plan is submitted in the permitting process and updated in advance of projected mine closure. Post-closure reclamation activities are anticipated to require two to three years, with continued monitoring ongoing beyond this time frame to ensure successful reclamation.

4.3.1 Infrastructure

All buildings and other infrastructure on the mine site, including conveyors, powerlines, substations, pipelines (except for the discharge pipeline), will be dismantled or demolished and removed from the site. The one exception is the flocculation station that will be kept operational to deal with possible sediment levels in closure. All salvageable material will be reused or recycled. All material will be disposed of according to applicable legislation and regulations. Contaminated materials, such as soils or materials containing hydrocarbons will be disposed of at a suitable hazardous waste facility. Once the buildings and infrastructure have been removed, the areas will be contoured, and re-vegetated with appropriate plant species for the region.

4.3.2 Material Storage Piles

The external and backfilled material storage piles will be sloped and graded as required, covered with topsoil and re-vegetated using appropriate plant species. It is anticipated that some of the material storage areas will be reclaimed during the mine operation period rather than at the end of the mine life once a pile reaches capacity and no longer needs to receive new material. Conceptual reclamation plans include roughening the surface and allow natural ecosystem process to occur.

4.3.3 Pit

A combination of re-vegetation of backfilled spoils and an end pit lake is being considered for the pit's reclamation plan. The sequence for mining the pit does not allow the entire pit to be backfilled to a point where there would be no residual water. Some of the materials that are backfilled within the pit footprint will be both above and below the final closure water elevation. In the areas of the pit where backfill cannot be at an elevation above this water level, an end pit lake will be left.

Pit reclamation will include sloping of the overburden portions of the walls and placing growth medium in the littoral regions of the in-pit lake. Slopes will be graded to allow the pit to fill from surface runoff and groundwater inflows into the pit area. A controlled outlet will be installed to allow water overflow to leave the pit and be discharged either into the discharge pipeline to the Telkwa River or into the Goathorn and Tenas Creeks. Water quality in the receiving environment will be protective of environmental values and meet permit criteria. Slopes above the final water elevation will be covered in topsoil and re-vegetated with appropriate plant species. Prior to the reclamation of the pit, water balance and water quality will be updated for the pit. Water sampling of the pit as it fills will also be conducted to verify model accuracy. Sampling of the pit outflow will also occur on a periodic basis.

4.3.4 Roads

Roads, culverts, and bridges on the mine site will all be reclaimed appropriately. This will include re-contouring and establishing natural drainage patterns, removal of all stream crossings, and rehabilitation and re-vegetation of roads, stream banks and riparian areas. The crossing of Goathorn Creek will be left in place until the water sampling results from site show permit limits are being met.

4.3.5 Rail Loop

The rail loop will be decommissioned and reclaimed, unless there is interest in retaining it from other users in the region, such as CN.

5. REGULATORY CONTEXT

5.1 British Columbia *Environmental Assessment Act*

Pursuant to Part 3, Section 8 of the Reviewable Projects Regulation of the BC *Environmental Assessment Act* (BCEAA), the Project's proposed production capacity exceeds the threshold for a new coal project mine as follows:

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

The proposed Project will produce 750,000 tonnes (t) of clean metallurgical coal per year and the Project will require an EA certificate under the BCEAA.

5.2 Concurrent Approvals Regulation

TCL intends to apply for concurrent review of BC *Mines Act* and BC *Environmental Management Act* permit applications pursuant to the Concurrent Approvals Regulation (BC. Reg. 371/2002) of the BCEAA. Under the Regulation, permit applications will be reviewed at the same time as TCL's Application for an Environmental Assessment Certificate. Provincial review of concurrent permit applications will be coordinated through the Major Mines Permitting Office of the Ministry of Energy, Mines and Petroleum Resources. No decisions on permits can be made until a positive decision is made by the Minister of Energy, Mines and Petroleum Resources and the Minister of Environment and Climate Change Strategy to issue an EA Certificate.

5.3 Proposed EA Schedule

The proposed EA schedule is provided in Table 5.

5.4 *Canadian Environmental Assessment Act, 2012*

According to the Regulations Designating Physical Activities (S.O.R 2012-147) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the proposed Project does not exceed the threshold for a new coal mine as follows:

> *The construction, operation, decommissioning and abandonment of a new:*
>
> *(d) coal mine with a coal production capacity of 3,000 tonnes per day or more.*

The proposed Project will have a production rate of approximately 2,050 tonnes of washed product coal per day. Consequently, the Project does not meet the threshold specified in the Regulation. TCL will be seeking a determination from the Canadian Environmental Assessment Agency (CEAA) on whether the Project is a designated project.

Table 5: Proposed Environmental Assessment Schedule

Tenas Project – EA Schedule	2018						2019												2020								
Task	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Project Description					■																						
Section 10 Order					■																						
Section 11 Order							■																				
Valued Component (VC) draft					■																						
VC finalization					▒	▒	▒	■																			
AIR[1] draft						■																					
AIR finalization						▒	▒	▒	▒	▒	▒	▒	▒	■													
EA/Concurrent MAPA[2] - EMA PA[3]															■												
EA screening																■											
EA acceptance																	■										
EA review																	▒	▒	▒	▒	▒	▒	▒	▒	▒		
EA decision																									■		
Permit																											■

Notes:
[1] AIR = Application Information Requirements or Terms of Reference
[2] MAPA = Mines Act *Permit Application*
[3] EMA PA = Environmental Management Act *Permit Application*
[4] BC Government EA Revitalization Process is in progress, with new legislation and regulation expected in the fall of 2019.

5.5 Indigenous Treaties and Agreements

Wet'suwet'en bands have economic and community development agreements with the provincial government relating to forestry, mining and natural gas projects.

The Project is not located within a settled Indigenous treaty area and no EA or regulatory requirements pursuant to a treaty or related agreement currently apply to the Project.

5.6 Federal, Provincial, and Municipal Authorizations

Table 6 identifies the key federal, provincial and municipal authorizations, licenses and permits that may be required for the Project. These permit applications have not yet been drafted. This list is not intended to be comprehensive. TCL will meet with the appropriate federal and provincial government agencies and local governments to discuss permitting requirements for the Project.

No regulatory authorizations that would enable the Project to proceed may be issued until a positive EA has been made to issue an EA certificate. The review of provincial permit applications for the Project will be coordinated through EMPR's Major Mines Permitting Office.

Table 6: Preliminary List of Federal and Provincial Authorizations Likely Required for the Project

Authorization	Responsible Agency	Legislation	Purpose
Permit	Natural Resources Canada	*Explosives Act*	Explosives authorizations are required during construction and operations. Authorization required to manufacture and operate an explosives storage facility. Licences are required by either the company or a blasting contractor. (Note: A third party will apply for the authorization and own the facility to be located on TCL tenure. TCL will acquire the explosives from this third party).
Authorization	Transport Canada	*Canadian Transportation Act*	Authorization required to construct and operate the rail loop (Canadian National Railway will apply for this).
Authorization	Fisheries and Oceans Canada	*Fisheries Act*	May require authorization(s) if the Project causes serious harm to fish or fish habitat (e.g., watercourse crossings and clearing riparian vegetation).
Authorization	Environment Canada	*Migratory Birds Convention Act*	May require an authorization if the Project is shown to affect nesting habitats used by migratory birds or if activities occur during the nesting season (e.g., clearing of vegetation, disturbance to nests).
Permit	Environment Canada	*Species at Risk Act*	Permits may be required if the Project has the potential to affect a species listed on Schedule 1 of the Act, including any part of its critical habitat, or the residences of its individuals.

Authorization	Responsible Agency	Legislation	Purpose
Permit	Transport Canada	*Navigation Protection Act*	May require authorization(s) if it the Project activities includes works built in, on, over, under, through or across any navigable water that may interfere with navigation.
EA Certificate	EAO	*Environmental Assessment Act*	To minimize or avoid adverse environmental, heritage, health, social and economic effects and incorporate environmental factors and Indigenous and stakeholder consultation into decision making.
Mine Permit	BC Ministry of Energy, Mines and Petroleum Resources	*Mines Act* and Health, Safety and Reclamation Code for Mines in BC	Authorizes development, operations, closure, and reclamation and abandonment.
Coal Lease	BC Ministry of Energy, Mines and Petroleum Resources	*Coal Act*	Converts lease to a lease for production purposes.
Effluent Permit	BC Ministry of Environment and Climate Change Strategy	*Environmental Management Act*	Authorizes discharge of liquid effluent to the environment.
Air Permit	BC Ministry of Environment and Climate Change Strategy	*Environmental Management Act*	Authorizes discharge of airborne emissions to the environment.
Hazardous Waste Registration	BC Ministry of Environment and Climate Change Strategy	*Environmental Management Act* Hazardous Waste Regulation (BC Reg. 63/88)	Authorizes temporary storage of hazardous waste.
Water License	BC Ministry of Environment and Climate Change Strategy	*Water Sustainability Act*	Authorizes storage, use or diversion of surface water, including installation of works.
Approval for Works in and about a Stream	BC Ministry of Environment and Climate Change Strategy	*Water Sustainability Act*	Approval to work in and about a stream (i.e., stream crossings).
Investigative Permit	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development	*Heritage Conservation Act*	Authorizes mitigation of impacts to sites (should any be identified) through systematic data recovery after an impact assessment has been completed.
Site Alteration Permit	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development	*Heritage Conservation Act*	Authorizes alteration or removal of site (should any be identified and impacted by the Project.)

Authorization	Responsible Agency	Legislation	Purpose
Occupant License to Cut	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development	*Forest and Range Practices Act*	Authorizes cutting and removal of trees of merchantable size.
Road Use Permit	BC Ministry of Forests, Lands, and Natural Resource Operations and Rural Development	*Forest and Range Practices Act*	Authorizes use of a FSR.
Special Use Permit	BC Ministry of Forests, Lands, and Natural Resource Operations and Rural Development	*Forest and Range Practices Act*	Authorizes the construction of and use of a new road. Authorizes occupation of Crown land.
License of Occupation	BC Ministry of Forests, Lands, and Natural Resource Operations and Rural Development	*Land Act*	Authorizes occupation of Crown land.

6. EXISTING ENVIRONMENT

6.1 Overview

The Project is centered on a remnant land terrace, rising approximately 75 m above Goathorn Creek and Tenas Creek and is south of the Telkwa River and west of the Bulkley River. The Bulkley River Valley is a north-south trending valley that lies at an elevation of 510 masl approximately 6 km east of the Project area. Adjacent to the east side of the Project, Goathorn Creek is a moderately wide, extensively braided creek with a floodplain approximately 20 to 100 m wide. Large terraces approximately 75 to 100 m above Goathorn Creek's floodplain are adjacent to the creek on either side. The Goathorn Creek valley bottom itself is approximately 200 m wide. Adjacent to the west and north sides of the Project, Tenas Creek is a smaller watercourse than Goathorn Creek that has a moderately wide flood plain between 5 and 25 m wide. Tenas Creek flows into Goathorn Creek. Photographs of the Project area are provided in Appendix B.

Baseline studies in the Project area were initiated by Crowsnest Resources in 1983 and continued in 1996 when Manalta Coal began more extensive exploration. These studies are listed chronologically in Table 7. The studies ceased when the project was placed on hold in 2002.

TCL restarted baseline studies in 2016 and have focused on the area surrounding the proposed Project, between Tenas Creek to the north and west, and Goathorn Creek to the east. The new studies add to the substantial historical database and bring terrestrial, water quality, and wildlife data up to current federal and provincial standards.

Studies include meteorology and climate, noise and dustfall, surficial geology, soils and terrain, geochemistry, surface water and groundwater quality and quantity, fisheries and aquatic habitat and biota, terrestrial ecosystems, vegetation and wildlife, traditional land use and traditional knowledge, land use, land status and land capability, heritage resources, and socioeconomics.

The results of the historical information as well as the new baseline are summarized in the following sections. The baseline program for the Project is still on-going. Given the considerable body of existing information plus the current baseline data collection program, TCL will submit a robust baseline database in support of its regulatory applications.

Table 7: Baseline Studies Undertaken on Behalf of the Project

Year	Study Subject	Study Title	Undertaken By	On Behalf Of
1983	Fish	1982 Investigations of Adult Coho Salmon in the Telkwa River	Dave Bustard and Associates	Crowsnest Resources Ltd.
1983	Aquatics	Telkwa Coal Project Aquatic Resources Assessment	Dave Bustard and Associates	Crowsnest Resources Ltd.
1984	Fish	Benthic Invertebrate and Juvenile Fish Populations in Goathorn and Tenas Creeks and the Lower Telkwa River	Dave Bustard and Associates	Crowsnest Resources Ltd.

Year	Study Subject	Study Title	Undertaken By	On Behalf Of
1984	Aquatics	Assessment of Benthic Invertebrate and Juvenile Fish Populations in Goathorn and Tenas Creeks and the Lower Telkwa Rivers	Dave Bustard and Associates	Crowsnest Resources Ltd.
1984	Soils	Soil Survey and Land Capability Evaluation of the Telkwa Coal Project	Pedology Consultants	Crowsnest Resources Ltd.
1985	Soils	Geochemical Evaluation of Soils and Overburdens for Crowsnest Resources, Ltd. Telkwa Coal Project	Sturm Environmental Sciences	Crowsnest Resources Ltd.
1985	Aquatics	Telkwa Coal Project Aquatic Resources Assessment	Dave Bustard and Associates	Crowsnest Resources Ltd.
1985	Vegetation Wildlife	Telkwa Project: Vegetation – Forestry – Wildlife. Stage II Report for Crows Nest Resources Ltd.	Transamerica Environmental Science Consultants (TAESCO) Ltd.	Crows Nest Resources Ltd.
1990	Wildlife	Wildlife North of the Telkwa River: A Stage II Assessment for the Proposed Telkwa Project	David F. Hatler	Crowsnest Resources Ltd.
1990	Culture and Heritage	Telkwa Coal Project Heritage Resource Inventory and Impact Assessment, Permit 1990-0011	Rick Budhwa	Blue Pearl Mining
1994	Surface Water and Groundwater	Baseline Data – Surface Water and Groundwater, Telkwa Coal Project	Piteau Engineering Ltd	Manalta Coal Ltd.
1996	Soils and Terrain, Vegetation, Wildlife, and Wildlife Habitat	Summary of Fisheries, Aquatic Habitat, and Water Quality Information for the Telkwa Project Area: A Literature Review	SKR Consultants Ltd.	Manalta Coal Ltd.
1996	Surface Water and Groundwater	Preliminary Assessment of Potential Groundwater Inflows and Dewatering Requirement in the Tenas Creek Region, Telkwa Coal Project	Piteau Engineering Ltd	Manalta Coal Ltd.
1997	Groundwater	Baseline Hydrogeological Investigations in the Tenas Pit, Waste Piles, and Mine Pit 3, Telkwa Coal Project	Piteau Engineering Ltd	Manalta Coal Ltd.
1998	Wildlife	Moose Habitat Capability/Suitability Mapping – Telkwa Coal Project	A.Edie and Associates	Manalta Coal Ltd.
1998	Wildlife	Wildlife Assessment – Telkwa Coal Project	A.Edie and Associates	Manalta Coal Ltd.
1998	Groundwater	Baseline Hydrogeological Conditions in the Telkwa Coal Project Area – Volumes I and II	Piteau Engineering Ltd	Manalta Coal Ltd.
1998	Surface Water Hydrology	Baseline Hydrological Conditions in the Telkwa Coal Project	Piteau Engineering Ltd	Manalta Coal Ltd.
1999	Geochemistry	Draft Report – Assessment of ARD Potential and Water Quality Predictions, Telkwa Coal Project	Norecol Dames & Moore	Luscar Coal Ltd.

Year	Study Subject	Study Title	Undertaken By	On Behalf Of
1999	Ecosystems	Telkwa Coal Terrestrial Ecosystems	Oikos Ecological Services Ltd.	Luscar Ltd.
2000	Surface Water	Telkwa Coal Project 1999 Baseline Surface Flow and Water Quality Final Data Report	AGRA Earth & Environmental	Luscar Ltd.
2000	Wildlife	Habitat selection and calf survival in the Telkwa caribou herd, British Columbia 1997-2000	Astrid Stronen	University of Calgary
2006	Culture and Heritage	Wet'suwet'en Resource Use: An Ethno-historical Overview of Past and Present	Rick Budhwa	Blue Pearl Mining
2018	Meteorology, Air Quality, Noise, Groundwater, Surface Water Quality, Sediment Quality, Aquatic Resources, Fish and Fish Habitat, Visual Quality	Tenas Project: 2017 to 2018 Baseline Report	ERM	TCL
2018	Soils and Terrain, Vegetation, Wildlife and Wildlife Habitat	Tenas Coal Project: Terrestrial Baseline Studies *(pending)*	Ardea Biological Consulting Ltd.	TCL

6.2 Physical Environment

6.2.1 Air Quality

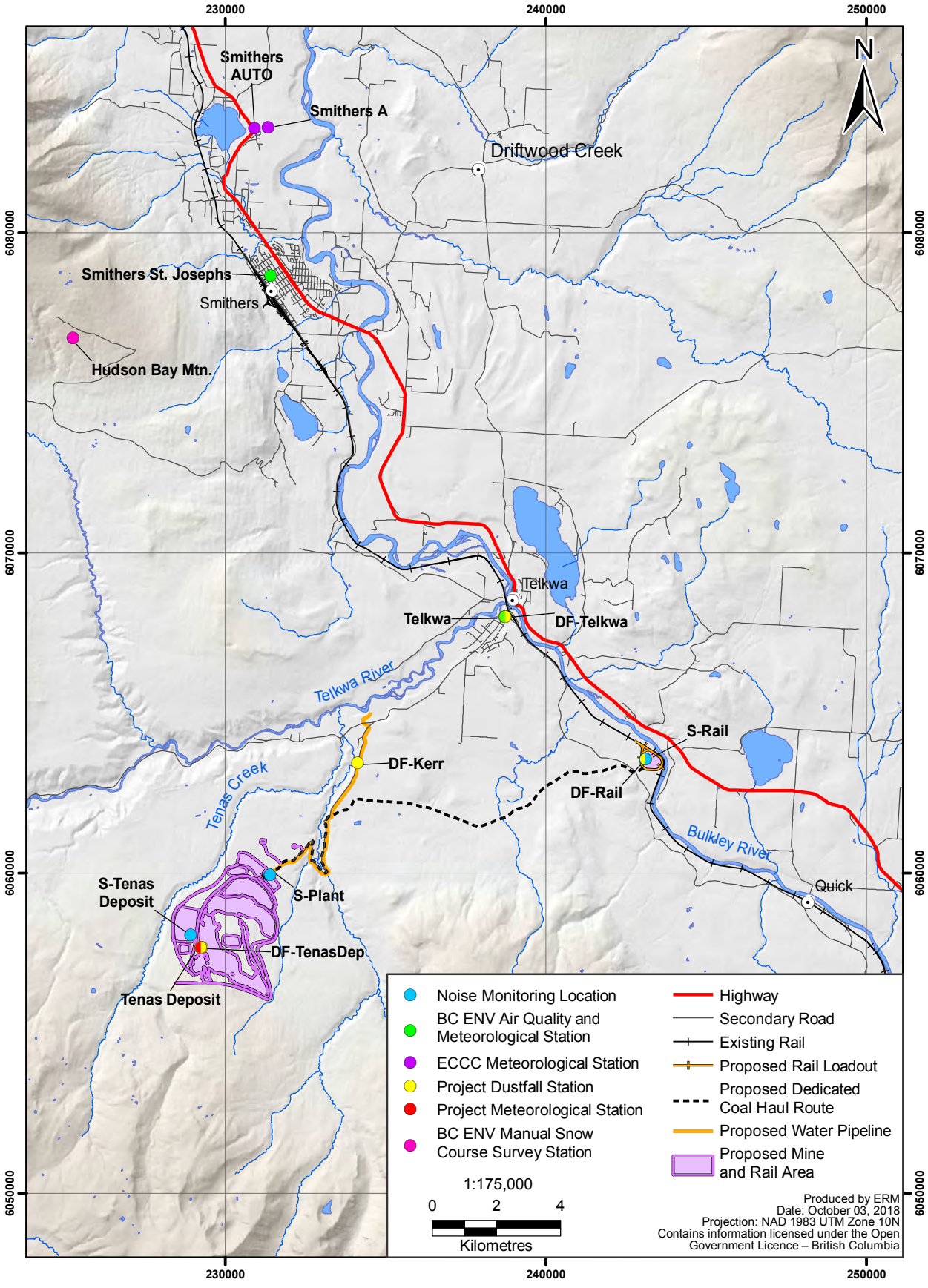
The Project is located within the Bulkley Valley Airshed. Airborne particulate matter has been identified as having the largest impact on the existing air quality in the Bulkley Valley region (BC Lung Association 2016, 2017; Bulkley Valley – Lakes District Airshed Management Society 2012). Some examples of existing air emission activities of concern for the airshed include residential wood burning (for heating), forestry-related open burning (e.g., slash piles), wood processing facility emissions, fugitive dust from paved and unpaved roads, and natural forest fires.

The geography and meteorological conditions in the Bulkley Valley Airshed also have a large impact on the ambient air quality. Most emissions sources (and human receptors) are located in valley bottoms and generally experience low wind speeds that reduce emission transport and dilution. Air temperature inversions are common, especially during the colder months of the year, which trap emissions closer to the valley bottom and prevent vertical mixing and dilution.

Historical air quality monitoring data are available from ENV monitoring stations located in Smithers, Telkwa, and Houston. Current monitoring data are available from stations in Smithers and Houston. Recent site-specific baseline dust deposition monitoring has been conducted for the Tenas Project at four locations (Figure 12) starting in late September 2017. One station is located in the coal deposit area, two stations are located adjacent to the proposed haul route along public roads and one station is at the proposed rail loadout.

Figure 12

Meteorological, Air Quality Monitoring and Noise Monitoring Stations



6.2.2 Climate

The climate in the Project area and Bulkley Valley is characterized by four prominent seasons typical of northern interior BC.

The meteorological station with the longest data record closest to the Project is the Smithers airport, with data starting from 1942. Data covering shorter periods are available from regional stations closer to the Project (e.g., ENV Telkwa station).

Climate normal air temperatures recorded at the Smithers airport station range from a daily maximum of 22°C in July to a daily minimum of -11°C in January. The absolute maximum temperature was 36°C in July 2009 (not incorporating humidex) and the absolute minimum temperature was -44°C in January 1950 (not incorporating windchill).

The average amount of annual precipitation is 509 mm per year, with 33% snowfall and 67% rainfall. September to November typically has the most precipitation, and February to April has the least. The most precipitation to fall in one day was 74 mm on October 24, 2017. The previous daily precipitation record was 61 mm on January 16, 1947. Maximum annual snow depths at this station are normally around 30 cm in January or February. The maximum daily snow depth was 103 cm recorded on February 8, 2018. The previous record was 102 cm in March 1972. Normal monthly average wind speeds are light between 4 and 7 km/h. The maximum hourly average wind speed was 66 km/h in January 1976 and the maximum wind gust speed was 120 km/h in February 1988.

A standard meteorological monitoring station was installed in the Project's coal deposit area (Figure 12) in September 2017. The station measures wind speed and direction (10 m height), air temperature and humidity, precipitation (solid and liquid), snow depth, incoming solar radiation, and barometric pressure. On October 24, 2017 (the day of highest precipitation at the Smithers Airport station ever recorded; 74 mm), the Project station recorded 72.8 mm of precipitation. On February 8, 2018 (the day of highest snow depth at the Smithers Airport station ever recorded; 103 cm), the on-site station recorded 124 cm of snow.

6.2.3 Noise and Vibration

Noise sources in the Project area are typical of a small rural community with nearby forestry operations. Specific common anthropogenic noise sources include aircraft, vehicles, transport trucks and mobile equipment, trains, farming activities and outdoor recreational activities from all-terrain vehicles (ATVs), snowmobiles, and hunting. Natural noise sources include wind, rain, rivers, and wildlife.

Recent site-specific baseline environmental noise monitoring has been conducted for the Tenas Project at three locations (3) starting in October 2017. Monitoring stations are located on the property; at the coal deposit area, the proposed coal processing plant, and the proposed rail loadout.

There are no significant persistent sources of ambient ground vibration in the Project area. The greatest amount of ambient vibration occurs close to roadways when heavy vehicles (transport trucks, logging trucks, etc.) pass by, and close to railways when trains are operating (especially when trains begin to start moving).

6.2.4 Soils and Terrain

The soils of the Project area are organized into eight principal map units based on soil parent material and drainage. Well to moderately drained morainal tills characterized by fine-textured compact Grey Luvisols to coarse loamy Eutric and Dystric Brunisols make up the most widespread map unit. Where drainage is imperfect to poor in these tills, gleying or humic enrichment occurs. At upper elevations south of the

proposed pit, bedrock outcrops with well to rapidly drained till veneers occur to a limited extent. North of the pit, the predominantly flat morainal landscape is interrupted by narrow linear depressions in-filled with wet and humic fine-textured fluvial veneers. Coarse-textured fluvioglacial materials with Brunisolic soil development also occur across the morainal plateau. Organic soils are limited in extent, occurring in a few small bogs and fens.

The Project area is underlain by thick, fine-textured morainal deposits that form gently undulating and gently sloping terrain in the lower Telkwa River valley. To a lesser extent, morainal deposits form a thin mantle over irregularly hummocky bedrock. Glaciofluvial and glaciolacustrine deposits occur scattered throughout the morainal landscape, as low ridges and in depressions, respectively.

Goathorn Creek and Tenas Creek are 40 m to 80 m deep incised into the subdued morainal landscape and are flanked by steep, locally unstable valley walls. Slope instability on the steep creek-side valley walls includes soil creep, small shallow debris slides, a recent large landslide related to upslope drainage concentration and pre-historic slumping.

Fluvial deposits form the narrow floodplains of Tenas Creek and Goathorn Creek which are subject to active channel changes. The Project area extends north to the Telkwa River and east to the Bulkley River, two wandering gravel-bed rivers with wide floodplains characterized by progressive bank erosion and back channels.

Terrain stability and bioterrain and soils assessments were conducted in 2017 within the pit and rail loadout area, with additional assessments completed in 2018. Bioterain and terrain stability polygon delineation and attribute labels are being completed for the pit and rail loadout areas.

6.2.5 Surface Water Hydrology

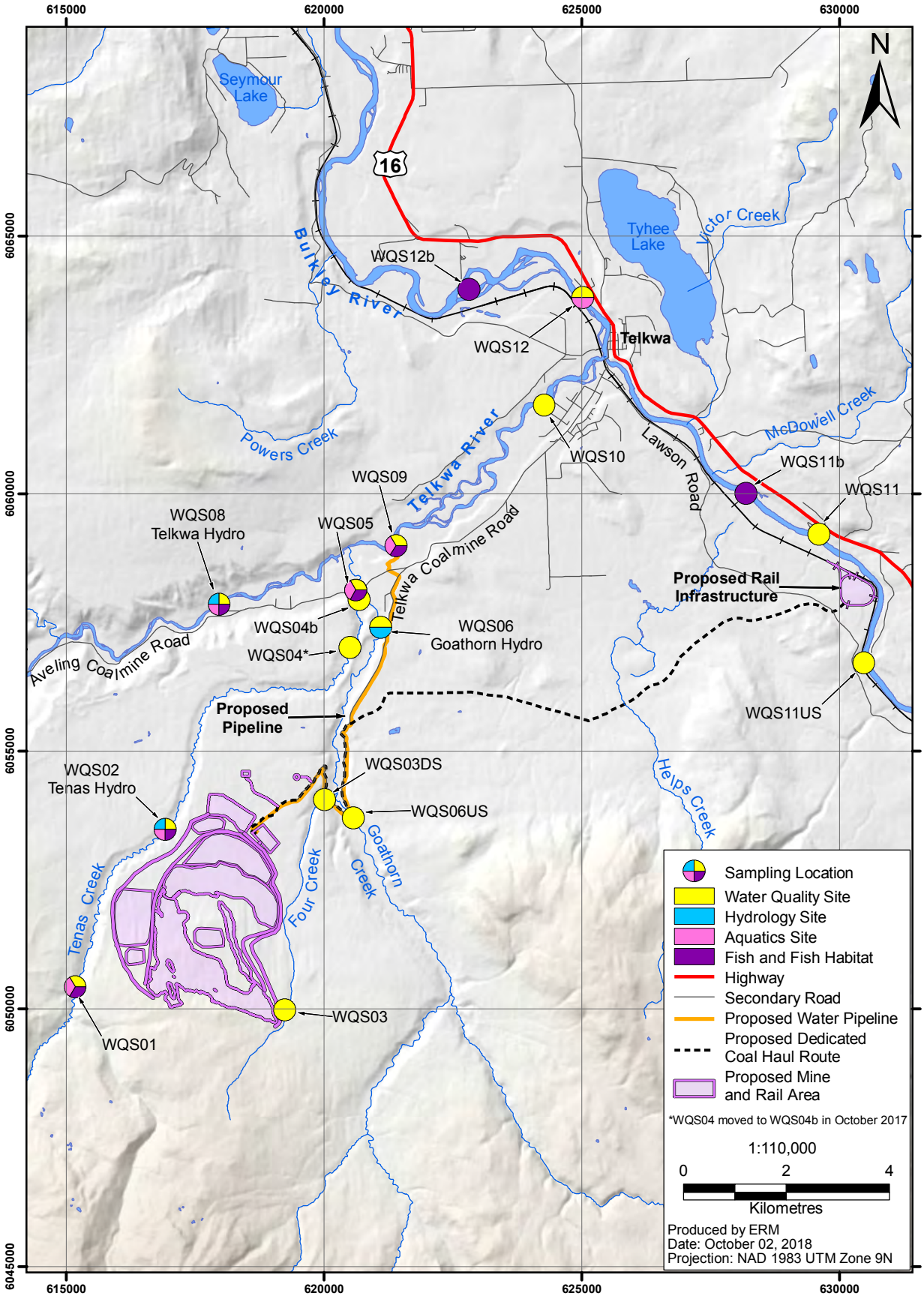
The Project is located in the transition zone between the wetter Coast Mountains and the drier Interior Plateau. The streamflow regime of the area is nival (snowmelt) with the majority of runoff occurring in the spring and early summer due to the melting winter snowpack. Following the snowmelt-driven high flow, there is typically a period of low flow throughout the late summer and early fall, when inputs from snow have diminished. Throughout the fall period, short duration high intensity rain events may produce substantial peak events, such as those associated with the October 24, 2017 storms. Annual low flows occur during the winter, when air temperatures remain below freezing and snowfalls are stored in the snowpack until spring. During the winter low flow period, most streamflow is dominated by baseflow from groundwater discharge. Some streams in the region have glacial inputs, but this is less prominent in the regional streamflow regime, as most of the substantial glacier coverage lies to the west of the Project.

The Project is bounded by the Goathorn and Four Creeks to the east, and Tenas Creek to the north and west. Downstream of the Project, Tenas Creek joins Goathorn Creek, which in turn flows into the Telkwa River. The Telkwa River flows northwest approximately 6 km from the confluence with Goathorn Creek before meeting the Bulkley River. The proposed railway loop and loadout is located just east of the Bulkley River, approximately 10 km upstream of the confluence with the Telkwa River. The rail loadout and loop are not intersected by any identified watercourses draining east into the Bulkley River.

Hydrometric stations have been installed on Tenas Creek, Goathorn Creek, and the Telkwa River to obtain site-specific data for the Project (Figure 13). Additionally, in the general vicinity of the Project, several Water Survey of Canada (WSC) hydrometric stations have data available for the Telkwa and Bulkley Rivers (active stations) and historic data for Goathorn Creek (inactive station).

Figure 13

Water Quality, Aquatics, Hydrology and Fish and Fish Habitat Monitoring Locations



6.2.5.1 Bulkley River

The Bulkley River is a tributary of the Skeena River. It originates southeast of the Project and flows northwest through the village of Telkwa before discharging into the Skeena, approximately 100 km downstream from its confluence with the Telkwa River. The entire Bulkley River watershed encompasses an area of 12,400 km^2.

There are two active WSC hydrometric stations located on the Bulkley River in the area. Approximately 14 km upstream of the confluence of the Bulkley and Telkwa rivers, WSC station *Bulkley River at Quick* (08EE004) has 89 years of continuous discharge data available, from 1930 to present. Similarly, approximately 14 km downstream of the confluence of the Bulkley and Telkwa rivers, WSC station *Bulkley River Near Smithers* (08EE005) has 20 years of discharge data available for intermittent periods between 1915 and present. The mean annual discharge averaged over the period of record for station 08EE004 near Quick is 135 m^3/s, with the maximum daily peak flow recorded at 1,020 m^3/s, and the minimum daily flow at 10.5 m^3/s.

6.2.5.2 Telkwa River

The Telkwa River is a substantial tributary to the Bulkley River. It originates west of the Project and flows east, discharging into the Bulkley River approximately 6 km east of the confluence with Goathorn Creek; Goathorn Creek drains from the Project area into the Telkwa River.

There is one active WSC hydrometric located on the Telkwa River approximately 25 km upstream of the confluence with Goathorn Creek. WSC station *Telkwa River Below Tsai Creek* (08EE020) has 44 years of continuous discharge data available from 1975 to present. The mean annual discharge averaged over the period of record at the station is 14.25 m^3/s, with the maximum daily peak flow recorded at 231 m^3/s, and the minimum daily flow at 0.68 m^3/s.

The watershed for the Project station (Telkwa-Hydro) covers 966.9 km^2. The station recorded a mean annual discharge in 2017 of 29.98 m^3/s, with a maximum instantaneous peak flow of 455.71 m^3/s, a maximum daily peak flow of 385.51 m^3/s, and an annual low flow of 4.38 m^3/s.

6.2.5.3 Goathorn Creek

Goathorn Creek is a tributary to the Telkwa River. It drains from the south along the east side of the Project, converges with Tenas Creek, which then discharges into the Telkwa River approximately 8 km downstream of the proposed pit.

There is one deactivated WSC hydrometric station (08EE008) located on Goathorn Creek approximately 2 km upstream of the confluence with the Telkwa River. This station has 54 years of continuous discharge data available from 1960 to 2014. The mean annual discharge averaged over the period of record at the station is 1.76 m^3/s, with the maximum daily peak flow recorded at 55 m^3/s, and the minimum daily flow at 0.03 m^3/s.

The watershed for the Project station (Goathorn-Hydro) covers 121.6 km^2. The station recorded a mean annual discharge in 2017 of 1.76 m^3/s, with a maximum instantaneous peak flow of 55.72 m^3/s, a maximum daily peak flow of 42.94 m^3/s, and an annual low flow of 0.16 m^3/s.

6.2.5.4 Tenas Creek

Tenas Creek is a tributary to Goathorn Creek. It drains from the southwest along the northwest side of the Project, discharging into Goathorn Creek approximately 8 km downstream of the proposed pit. The

watershed for the Project station (Tenas-Hydro) covers 47.4 km^2. The station recorded a mean annual discharge in 2017 of 0.68 m^3/s, with a maximum daily peak flow of 24.38 m^3/s (maximum instantaneous peak flow is unavailable), and an annual low flow of 0.10 m^3/s.

6.2.5.5 Four Creek

Four Creek is a very small tributary to Goathorn Creek. It drains northeast, bordering the Project to the east before discharging into Goathorn Creek in the immediate vicinity of the Project.

6.2.5.6 Helps Creek

Helps Creek is the main stream in the watershed directly east of the Project mine site components, and west of the rail loadout area. It generally drains northwest into the Bulkley River, approximately 4 km upstream of the confluence with the Telkwa River.

6.2.6 Surface Water Quality

Water quality in Goathorn Creek, the Bulkley River, the Telkwa River, Tenas Creek, and Four Creek has been monitored on a monthly or quarterly basis since 2017 (Figure 13). Project-specific monthly sampling was initiated in May 2017 at 12 sites on these watercourses, with locations upstream and downstream of proposed Project infrastructure. A site was added on the Bulkley River in November 2017 upstream of the proposed rail loadout. While historical data exists, the discussion below focuses on the results of the May 2017 to January 2018 monthly water quality sampling. Sampling was initiated in May 2018 at a downstream station on Four Creek, and an upstream station on Goathorn Creek; note that the results below do not include data from these stations.

The water in these watercourses had alkaline pH (range: 7.5 to 8.4 pH), moderately high conductivity (range: 50.8 to 332 µS/cm), and total alkalinity greater than 20 mg $CaCO_3$/L. Tenas and Goathorn Creeks had soft to moderately hard water, while Four Creek had moderately hard to hard water. The Telkwa and Bulkley Rivers had soft water. Sulfate was the dominant anion in Project area streams, with particularly high concentrations in Goathorn Creek. Nitrogen was principally in the form of organic nitrogen (high total Kjeldahl nitrogen and low ammonia concentrations).

Water quality parameters were compared to relevant provincial and federal guidelines for the protection of aquatic life. In May 2017 to January 2018, Project area sites were above water quality guidelines for eight metals: aluminum (total and dissolved), cadmium, chromium, copper, iron, lead, silver, and zinc. Aluminum and iron concentrations were above guidelines at every site, with the highest concentrations typically being in Tenas Creek and the Telkwa River. Over the monitoring period, total aluminum concentrations ranged from 0.029 to 2.7 mg/L, compared to the Canadian Council of Ministers of the Environment guideline of 0.1 mg/L ($pH \geq 6.5$). Chromium and copper concentrations were above guidelines at every Tenas Creek site, and concentrations were sporadically above guidelines in other monitored streams and rivers. Total cadmium, lead, and zinc were only above guidelines in the Telkwa River, both upstream and downstream of the Project, and one sample was above the silver guideline.

Many parameters were below detection limits in samples collected from May 2017 to January 2018, including cyanide (total, free, and weak acid dissociable; sampled May, June, and August), polycyclic aromatic hydrocarbons (PAHs; sampled monthly), and benzene, toluene, ethylbenzene, and xylene (BTEX; sampled May, June, July, and November). Phenols have also been below detection limits, except two samples collected in September 2017 from the Telkwa River.

6.2.7 Groundwater

The groundwater flow system can be divided into two sub-systems: a deep bedrock flow system, and a shallow overburden flow system:

- The deep system encompasses all the bedrock units. Groundwater flows are controlled by the hydraulic properties of the bedrock units and by the degree and orientation of fractures, joints, and faults. They are also influenced by the bedding orientations of the siltstones, sandstones, mudstones and shale strata composing the Skeena Group sedimentary rock sequence. A total of 53 hydraulic conductivity (K) measurements were completed in bedrock over the entire property; 27 specifically within the Tenas area. The bedrock K ranges from less than $1x10^{-10}$ m/s to $6x10^{-6}$ m/s with a geomean of $5x10^{-8}$ m/s. The coal seams and the sandstones K are generally higher, respectively with a geomean of $8x10^{-7}$ m/s and $3x10^{-7}$ m/s, compared to the mudstones and volcanics, both with a geomean of $3x10^{-8}$ m/s.

  The bulk of recharge to the bedrock system is expected to occur in the upland area of the Tenas Creek and Goathorn Creek watersheds, with total drainage areas of about 60 and 120 km^2, respectively. Groundwater flows from the upland areas in a northerly direction towards the major drainage features of the area, namely the Telkwa River and its tributaries, the Tenas Creek and the Goathorn Creek. This system has a large lateral extent and is characterized by relatively long residence times in the subsurface, with associated higher levels of dissolved solids in groundwater.

- The shallow system includes potentially high-yielding local aquifers composed of glaciofluvial or fluvial materials deposited in topographic lows and stream valleys, and to a lesser extent along Tenas, Four, and Goathorn Creek valleys. Occurrences of thick sand and gravel outwash deposits in bedrock depressions may also form local water bearing units, potentially connected with the overburden deposits located in stream valleys. A total of 26 K measurements were completed in overburden, 23 in till and 5 in non-till overburden (generally sand and gravel with a fine matrix). The till K ranges from less than $1x10^{-10}$ m/s to $1x10^{-6}$ m/s with a geomean of $2x10^{-8}$ m/s. The non-till K ranges from $5x10^{-7}$ m/s to $1x10^{-5}$ m/s with a geomean of $2x10^{-6}$ m/s.

  The shallow system is characterized by groundwater flows from topographic highs (areas of downward vertical hydraulic gradient or groundwater recharge) to adjacent topographic lows (areas of upward vertical hydraulic gradient or groundwater discharge). It is characterized by relatively short residence times and lower levels of dissolved solids in groundwater.

Manual level measurements were collected from 13 existing monitoring wells and 9 newly installed wells in 2017 and 2018. Generally, bedrock wells showed lowest water levels in July to September, and highest levels in January to April. Overburden wells were often dry, similar to historical data from 1996 and 1997. For overburden wells that were not dry, the timing for the highest water levels varied. Bedrock wells showed a north-northeast flow with a horizontal hydraulic gradient of approximately 0.09, which is consistent with data from 1997. Shallow overburden wells showed a northern groundwater flow and a horizontal hydraulic gradient of 0.04, again similar to data from 1997.

Results from two quarterly sampling events (nine wells in August/September 2017 and five wells in January 2018) in the current groundwater quality program include a pH range between the provincial guideline of 6.5 and 9.0 (ENV 2018), with turbidity below the provincial guideline in all but one sample. Bedrock wells are generally considered to be ‘soft’ and overburden wells to be ‘hard’. Historical results from the 1990s for pH and hardness are similar to current results. There are no historical data for turbidity.

Fluoride was the only anion or nutrient with elevated levels. Others, such as chloride, nitrate, nitrite, and sulfate were often below detection limits. Ammonia was detected in most wells, with lower concentrations occurring in the overburden wells.

Of the total and dissolved metals, total arsenic, total copper, total iron, total barium, and total chromium were elevated during the January 2018 sampling event from a bedrock well; this was likely due to high turbidity, as the dissolved metals values for the same metals at this same well and sampling event were generally below detection limits. Dissolved iron, however, often exceeded guidelines in bedrock wells.

Historical data pertinent to the Project are available for both groundwater quantity and quality from the 1990s (Piteau Engineering Ltd 1997, 1998).

6.3 Biological Environment

6.3.1 Fish and Fish Habitat

Several fish-bearing streams surround the Project area, including Tenas Creek, Goathorn Creek, Four Creek, the Telkwa River, and the Bulkley River. Table 8 summarizes the known species present in these streams based on information collected from Habitat Wizard (BC MOE 2009).

Table 8: Fish Species in Tenas Project Area Streams

Stream	Common Name	Scientific Name
Goathorn Creek	Chinook salmon	*Oncorhynchus tshawytscha*
	Coho salmon	***Oncorhynchus kisutch***
	Pink salmon	*Oncorhynchus gorbuscha*
	Rainbow trout/Steelhead	***Oncorhynchus mykiss***
	Dolly Varden	***Salvelinus malma***
Four Creek	Dolly Varden	*Salvelinus malma*
	Unidentifiable trout	*Oncorhynchus* spp.
Tenas Creek	**Dolly Varden**	***Salvelinus malma***
	Bull trout	***Salvelinus confluentus***
	Mountain whitefish	*Prosopium williamsoni*
	Rainbow trout/Steelhead	***Oncorhynchus mykiss***
Telkwa River	Chinook salmon	*Oncorhynchus tshawytscha*
	Coho salmon	***Oncorhynchus kisutch***
	Pink salmon	*Oncorhynchus gorbuscha*
	Rainbow trout/Steelhead	***Oncorhynchus mykiss***
	Dolly Varden	***Salvelinus malma***
	Mountain whitefish	***Prosopium williamsoni***
	Peamouth chub	*Mylocheilus caurinus*
	Sucker (general)	*Catostomus* spp.
Bulkley River	Chinook salmon	*Oncorhynchus tshawytscha*
	Coho salmon	***Oncorhynchus kisutch***
	Pink salmon	***Oncorhynchus gorbuscha***
	Sockeye salmon	*Oncorhynchus nerka*

Stream	Common Name	Scientific Name
	Chum salmon	*Oncorhynchus keta*
	Rainbow trout/Steelhead	***Oncorhynchus mykiss***
	Coastrange sculpin	*Cottus aleuticus*
	Redside shiner	*Richardsonius balteatus*
	White sucker	*Catostomus commersonii*
	Brassy minnow	*Hybognathus hankinsoni*
	Lake chub	*Couesius plumbeus*
	Burbot	*Lota lota*
	Dolly Varden	*Salvelinus malma*
	Bull trout	*Salvelinus confluentus*
	Longnose sucker	***Catostomus catostomus***
	Longnose dace	*Rhinichthys cataractae*
	Prickly sculpin	*Cottus asper*
	Slimy sculpin	*Cottus cognatus*
	Lamprey (general)	***Lampetra* spp.**
	Cutthroat trout	*Oncorhynchus clarkii*
	Threespine stickleback	*Gasterosteus aculeatus*
	Lake trout	*Salvelinus namaycush*
	Lake whitefish	*Coregonus clupeaformis*
	Largescale sucker	*Catostomus macrocheilus*

*Note: **Bold text** indicates species that were captured during baseline studies in 2017.*
Source: Habitat Wizard (BC MOE 2009).

Additional fish and fish habitat studies have been completed to expand on existing information. Fish habitat and population studies were conducted on Goathorn Creek, Tenas Creek, Telkwa River, and Bulkley River in 2017 (Figure 13). These studies focused on the collection of baseline fish habitat data, as well as assessments of species composition, fish health, and tissue metal concentrations. Additional studies focused on identifying critical habitat areas (e.g., spawning grounds). The collection of additional fish health and tissue metal concentrations was conducted in 2018. Reconnaissance surveys of smaller, unnamed drainages within the Project area was surveyed to ensure that the extent of fish habitat and fish use is fully understood.

6.3.2 Aquatic Resources

Aquatic resources have been sampled from six sites on three primary creeks that flow from the Project area, Tenas Creek Goathorn Creek, and Four Creek, since 2017 (Figure 13). In addition, historical aquatic resources data from studies conducted between 1987 and 2006 are available, including benthic invertebrate samples from Tenas Creek, Goathorn Creek, and the Bulkley River, and periphyton biomass data from the Bulkley River.

Periphyton biomass, as chlorophyll *a*, is higher in the larger rivers than the smaller tributary creeks. One sampling site on the Telkwa River had the highest mean biomass and density and was dominated by

diatoms, primarily *Achnanthidium* and *Fragilaria* spp. Conversely, mean biomass and density were lowest in Goathorn Creek. The historical periphyton biomass data for the Bulkey River displayed considerable inter-annual variability. Periphyton biomass was well below the BC guideline and the Bulkley River provisional objective.

Benthic invertebrate abundance displayed high temporal and spatial variability. Abundances were highest in Tenas Creek and lowest in upper Goathorn Creek.

Benthic invertebrate communities were dominated by the pollution-sensitive taxa, Ephemeroptera (mayflies) and Plecoptera (stoneflies). Ephemeroptera were largely represented by *Baetis*, and Plecoptera by *Zapada* and *Taenionema*. A third pollution-sensitive taxon, Trichoptera (caddisflies), was abundant in the lower Bulkley River. Ephemeroptera, Plecoptera, and Trichoptera, collectively termed EPTs, generally comprised the bulk of the community at most sites, except lower Tenas Creek, upper Goathorn Creek, and the Telkwa River where Diptera (true flies), and particularly Chironomidae (non-biting midges), were more abundant.

Benthic invertebrate richness ranged from 11 to 25 families/sample, with EPTs comprising a large portion. Family richness was generally higher in the larger Telkwa and Bulkley rivers compared to the smaller tributary streams. Benthic invertebrate family diversity was high, and comparable across sites.

6.3.3 Terrestrial Resources

Three biogeoclimatic subzones/variants (collectively called BGC units) within two biogeoclimatic (BGC) zones are present within the immediate Project area. These include: Sub-Boreal Spruce dry cool subzone (SBSdk), Sub-Boreal Spruce moist cold subzone (SBSmc2), and Englemann Spruce - Subalpine Fir moist cold subzone (ESSFmc). The SBSmc2 subzone is wetter than the SBSdk and found at higher elevations, with the ESSFmv found above the SBSmc2 (Meidinger and Pojar 1991). The majority of the Project area is forested and is found within the SBSmc2 subzone followed by the SBSdk, with a very minor portion found in the ESSFmc. Timber harvesting has occurred over much of the Project area, with large areas harvested approximately 40 years ago, and the most recent harvesting occurring approximately 10 years ago.

Wetlands are dynamic, low-lying areas on the landscape that are saturated with water long enough to promote wetland or aquatic processes as indicated by poorly-drained soils, hydrophytic vegetation, and various kinds of biological activity adapted to a wet environment (Warner and Rubec 1997). They include both the wet basin and surrounding transitional areas between wetter zones and upland vegetation (Huel 2000). Wetlands fulfill a wide range of ecological, hydrological, biochemical, and habitat functions (Environment Canada 2003). They maintain water quality, regulate water flow on the landscape, provide erosion control, and provide habitat for a wide variety of wildlife, including many economically important game species.

Terrestrial ecosystem and wetland mapping is nearing completion with limited amounts of riparian and wetland ecosystems found within the Project area. Project infrastructure will overlap small amounts of riparian and wetland habitats, with the majority overlapping a mix of young (less than 40 years old) and old (greater than 120 years old) forested terrestrial ecosystems that are common in the region. Several small forested wetland bogs were identified within the proposed pit area (Black spruce - Creeping snowberry - peat-moss [Wb01] and Black spruce - water sedge - peat-moss [Wb05]), with the largest one being 3.5 ha and the others ranging from 0.3 to 0.8 ha. Other small wetlands such as fens (e.g., Water sedge - Beaked sedge [Wf01]), marshes (e.g., Beaked sedge - water sedge [Wm01]) and swamps (e.g., Sitka willow - Pacific willow - Skunk cabbage [Ws51]) were also found within the mapping area but are not expected to be affected by any proposed development.

6.3.4 Wildlife and Wildlife Habitat

6.3.4.1 Mammals

The Project area supports a wide range of wildlife species typical for northcentral BC, with many species of interest to regulatory agencies, Indigenous groups and the public due to potential for Project effects. These include:

- Woodland caribou (*Rangifer tarandus caribou*), which in the Project area are part of the northern ecotype, also referred to as northern caribou. Northern caribou are provincially blue-listed (BC CDC 2018) and federally listed under Schedule 1 of the *Species at Risk Act* (SARA; 2002b; Government of Canada 2018) as Threatened. Overall, the Telkwa herd has been declining over the last several decades and is currently estimated at less than 25 animals (Theissen 2013). Factors contributing to this decline include predation, recreational activities, habitat alteration and disturbance related to industrial development and forestry, and hunting. A closure of licensed hunting of caribou from the Telkwa herd has been in place since 1973 (Cichowski 2014).
- Moose (*Alces americanus*) use the Project area year-round and have a cultural importance for Indigenous communities and contribute to regional biodiversity as they provide prey and carrion to predators (e.g., grizzly bear, wolf, and wolverine). Moose occur throughout BC's forested areas with an estimated population size of 120,000 to 205,000 animals (BC MFLNRO 2014) and are yellow-listed (BC CDC 2018). Over 70% of the province's moose population resides in northern BC (Blood 2000a) and across the Skeena Region, as of 2014, the population estimate is 30,000 - 50,000 moose (BC MFLNRO 2014).
- Elk (*Cervus elaphus*), white-tailed deer (*Odocoileus virginianus*), and mule deer (*Odocoileus hemionus*) all occur in the Bulkley Valley and are important species for Indigenous harvest and recreational harvest for resident and non-resident hunters. However, none are listed with COSEWIC or SARA (Government of Canada 2018) and they are currently yellow-listed in the province (BC CDC 2018). Mule deer are more numerous than elk or white-tailed deer, with the latter species being relatively new to the Bulkley Valley, increasing in populations due to land clearing from forestry and for farming and ranching.
- Several grizzly bears and observations of their sign have been found in the Project area during baseline studies since 2017. Grizzly bears are considered a species of Special Concern by COSEWIC and SARA (Schedule 1) and are blue-listed in BC (Government of Canada 2018; BC CDC 2018). There are an estimated 13,800 grizzlies in the province (Gyug et al. 2004). The Project area is within the Bulkley-Lakes Grizzly Bear Population Unit (GBPU), a 2,388,391 ha area containing approximately 22,554 ha of useable habitat. The 2012 population was estimated at 439 bears, with a density of 19 bears per 1,000 km^2 in this GBPU (BC MOE 2012).
- Black bears are common and widespread in BC, and baseline studies initiated in 2017 recorded black bear commonly using the Project area. Black bears will utilize a wide variety of foods during the spring, summer and fall seasons, including sedges, grasses, insects, various herbaceous plants, fish, carrion and berries.
- Furbearers are an important ecological and economic resource, with trapping in the Bulkley Valley being a traditional activity for Indigenous residents for many years and having important cultural significance (Bulkley Valley Community Resources Board Interagency Planning Team 1998). Furbearers that are known to use the Project area include American marten, coyote, ermine, fisher, grey wolf, lynx, red squirrel and wolverine. Wolverine (*Gulo gulo luscus*) is provincially blue-listed (BC CDC 2018) and federally listed as Special Concern with COSEWIC and SARA Schedule 1 (COSEWIC 2014; Government of Canada 2018); and fisher (*Pekania pennanti*) is provincially blue-listed (BC CDC 2018).

- Several species of bats have been listed provincially and federally due to large decreases in their populations due to disease in other parts of Canada as well as removal of important roosting habitats (e.g., old buildings, old forests). Within the Project area, baseline studies have found through initial automated classifications the potential presence of several bat species, including the little brown myotis (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), western small-footed myotis (*Myotis ciliolabrum*), western long-eared myotis (*Myotis evotis)* and long-legged myotis (*Myotis volans*). The northern myotis is provincially blue-listed, while the little brown myotis is provincially yellow-listed (BC CDC 2018). Both species, however, are federally designated as *Endangered* by COSEWIC and appear on Schedule 1 of SARA (Government or Canada 2018). Further work will be completed in 2018 to confirm the bat species present within the Project area.

6.3.4.2 Birds

Terrestrial breeding birds include passerines, hummingbirds, swifts, woodpeckers, grouse, and ptarmigan. In addition to migratory bird and species at risk protection, active breeding bird nests are protected under the BC *Wildlife Act* (1996b).

In the baseline studies initiated in 2017, the only listed species found within the general Project area is the olive-sided flycatcher (*Contopus cooperi*). It is provincially blue-listed (BC CDC 2018), has a COSEWIC status of *Special Concern*; and a SARA Schedule 1 *Threatened* status (Government of Canada 2018).

Waterbirds include waterfowl and wading birds, such as ducks, geese, swans, loons, and grebes. Waterbirds are an important game species for resident hunters and Indigenous peoples. Migratory waterbirds and their nests are protected under the federal *Migratory Birds Convention Act* (1994) and identifying species of conservation concern meets the obligations of SARA (2002b) and the BC *Wildlife Act* (1996b).

There are no lakes within the Project area. Open water ponds have areas of less than 1 ha, resulting in limited waterbird habitats and waterbird habitat use. The only evidence of waterbird breeding obtained during the 2017 baseline studies was a single record of Wilson's snipe.

Raptors, or birds of prey, encompass a wide range of species including osprey, eagles and hawks, owls, and falcons. All raptors and their nests are legally protected under the BC *Wildlife Act* (1996b) and several raptors are listed federally and provincially. Baseline studies initiated in 2017 provide evidence for the presence of great-horned owls *(Bubo virginianus*), saw-whet owls (*Aegolius acadicus*), long-eared owls (*Asio otus*), great-horned owl, red-tailed hawk (*Buteo jamaicensis*) and Northern goshawk (*Accipiter gentilis*) in the general Project area.

6.3.4.3 Amphibians and Reptiles

Amphibians require water for breeding and are closely associated with wetlands, open water ponds and other permanent water sources. Based on the known distribution of amphibian and reptile species in BC, only two species have the potential to occur in the areas near the Tenas Project: coastal tailed frog (*Ascaphus truei*) and western toad (*Anaxyrus boreas*). Both of these species are currently federally listed species of *Special Concern* protected under COSEWIC and Schedule 1 of SARA (Government of Canada 2018), and yellow-listed provincially (BC CDC 2018).

Baseline studies initiated in 2017 identified western toads in the general Project area, along with Columbia spotted frog (*Rana luteiventris*) and long-toed salamander (*Ambystoma macrodactylum*). No tailed frogs were found within the Project area during visual and eDNA surveys. In 2018, a female common garter snake (*Thamnophis sirtalis*; provincially yellow-listed) and an unidentified snake were also observed.

6.3.4.4 Invertebrates

Terrestrial invertebrates include a wide array of insects such as butterflies, ants, and dragonflies, as well as spiders and terrestrial snails and slugs. There is potential for the presence of 11 listed terrestrial invertebrates in the Project area, though in baseline studies initiated in 2017, none of these species have yet been observed:

- nine-spotted lady beetle (*Coccinella novemnotata*): COSEWIC *Endangered*;
- transverse lady beetle (*Coccinella transversoguttata*): COSEWIC *Special Concern*;
- gypsy cuckoo bumble bee (*Bombus bohemicus*): provincially red-listed, COSEWIC and SARA Schedule 1 *Endangered*;
- western bumble bee, *mckayi* subspecies (*Bombus occidentalis mckayi*): COSEWIC *Special Concern*;
- western bumble bee, *occidentalis* subspecies (*Bombus occidentalis occidentalis*): COSEWIC *Threatened*;
- western bumble bee, *mckayi* subspecies (*Bombus occidentalis mckayi*): COSEWIC *Threatened*;
- yellow-banded bumble bee (*Bombus terricola*): provincially blue-listed, COSEWIC and SARA Schedule 1 *Special Concern*;
- western meadow fritillary*, sigridae* subsepecies (*Boloria epithore sigridae*): provincially blue-listed;
- large marble, *ogilvia* subspecies (*Euchloe ausonides ogilvia*): provincially blue-listed;
- draco skipper (*Polites draco*): provincially blue-listed; and
- Kennedy's emerald dragonfly (*Somatochlora kennedyi*): provincially blue-listed.

6.3.5 Rare and Endangered Species

Table 9 summarizes the listed plant and fungi species, vegetation communities and wildlife species that may be found near or within the Project area.

Table 9: Listed Plants, and Ecosystems, and Wildlife Potentially Found within the Tenas Project Area

Common Name	Scientific Name	Within Region* or Confirmed** in Project Area	BC Status		Federal Status		Global Status
			BC List	Identified Wildlife	COSEWIC	SARA Schedule	
Plants and Fungi							
American Sweet-flag	*Acorus americanus*	R	Blue				G5
Back's sedge	*Carex backii*	R	Blue				G5
Baltic Peatmoss	*Sphagnum balticum*	R	Blue				G5
Long-leaved Aster	*Symphyotrichum ascendens*	R	Red				G5
Meesia Moss	*Meesia longiseta*	R	Blue				G5
Northern Gooseberry	*Ribes cognatum*	R	Red				G5T4
Snow Pearlwort	*Sagina nivalis*	R	Blue				G5

Common Name	Scientific Name	Within Region* or Confirmed** in Project Area	BC Status		Federal Status		Global Status
			BC List	Identified Wildlife	COSEWIC	SARA Schedule	
Two Coloured Sedge	*Carex bicolor*	R	Blue				G5
Rugged Collar-moss	*Splachnum vasculosum*	R	Blue				G4G5
Wedge-leaf Primrose	*Primula cuneifolia ssp. saxifragifolia*	R	Blue				G5TNR
Whitebark Pine	*Pinus albicaulis*	R	Blue		E (Apr 2010)	1-E (Jul 2012)	G3G4
Grimmia dry rock moss	*Grimmia mollis*	R	Blue				G5
Terrestrial Ecosystems							
Balsam poplar - Black Cottonwood - Spruces / Red-Osier Dogwood (SBSdk 08, Fm02)	*Populus spp. (balsamifera, trichocarpa) – Picea spp. / Cornus stolonifera*	R	Red				GNR
Black Spruce / Buckbean / Peat-mosses (Wb11)	*Picea mariana / Menyanthes trifoliata / Sphagnum spp.*	R	Blue				GNR
Few-Flowered Spike-rush / Hook-mosses (Wf09)	*Eleocharis quinqueflora / Drepanocladus spp.*	R	Red				GNR
Hudson Bay Clubrush /Rusty Hook-moss (Wf10)	*Trichophorum alpinum / Scorpidium revolvens*	R	Red				G2
Lodgepole Pine / Few-Flowered Sedge / Peat-mosses (Wb10)	*Pinus contorta / Carex pauciflora / Sphagnum spp.*	R	Blue				G2G3
Narrow-leaved Cottongrass – Shore Sedge	*Eriophorum angustifolium - Carex limosa*	R	Blue				G3
Sandberg's Bluegrass - Slender Wheatgrass (82)	*Poa secunda ssp. secunda - Elymus trachycaulus*	R	Red				GNR
Saskatoon / Slender Wheatgrass (81)	*Amelanchier alnifolia / Elymus trachycaulus*	R	Red				G2
Scheuchzeria / Peat-mosses (Wb12)	*Scheuchzeria palustris / Sphagnum spp.*	R	Blue				G3
Scrub Birch / Water Sedge (Wf02)	*Betula nana / Carex aquatilis*	R	Blue				G4

Common Name	Scientific Name	Within Region* or Confirmed** in Project Area	BC Status		Federal Status		Global Status
			BC List	Identified Wildlife	COSEWIC	SARA Schedule	
Shore Sedge - buckbean / Hook-mosses (Wf08)	*Carex limosa - Menyanthes trifoliata / Drepanocladus spp.*	R	Blue				G3
Slender Sedge / Common Hook-Moss (Wf05)	*Carex lasiocarpa / Drepanocladus aduncus*	R	Blue				G3
Terrestrial Invertebrates							
Draco Skipper	*Polites draco*	R	Blue				G5
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	C	Red		E (May 2014)	1-E (Jun 2018)	
Kennedy's Emerald Dragonfly	*Somatochlora kennedyi*	R	Blue				G5
Large Marble, *ogilvia* subspecies	*Euchloe ausonides ogilvia*	R	Blue				G5TNR
Nine-spotted Lady Beetle	*Coccinella novemnotata*	R			E (Apr 2016)		G2
Transverse Lady Beetle	*Coccinella transversoguttata*	R			SC (Nov 2016)		
Western Bumble Bee, *mckayi* subspecies	*Bombus occidentalis mckayi*	R			SC (May 2014)		
Western Bumble Bee, occidentalis subspecies	*Bombus occidentalis occidentalis*	R			T (May 2014)		
Western Meadow Fritillary, *sigridae* subspecies	*Boloria epithore sigridae*	R	Blue				G5T3
Yellow-banded Bumble Bee	*Bombus terricola*	R	Blue		SC (May 2015)	1-SC (Jun 2018)	G5
Amphibians / Reptiles							
Coastal Tailed Frog	*Ascaphus truei*	R	Yellow	Y (May 2004)	SC (Nov 2011)	1-SC (Jun 2003)	G4
Western Toad	*Anaxyrus boreas*	C	Yellow		SC (Nov 2012)	1-SC (Jun 2018)	G4
Birds							
American Bittern	*Botaurus lentiginosus*	R	Blue				G5
Bank Swallow	*Riparia riparia*	R	Yellow		T (Apr 2013)	1-T (Nov 2017)	G5

Common Name	Scientific Name	Within Region* or Confirmed** in Project Area	BC Status		Federal Status		Global Status
			BC List	Identified Wildlife	COSEWIC	SARA Schedule	
Barn Swallow	*Hirundo rustica*	R	Blue		T (May 2011)	1-T (Nov 2017)	G5
Black Swift	*Cypseloides niger*	R	Blue		E (May 2015)		G4
Common Nighthawk	*Chordeiles minor*	R	Yellow		SC (May 2018)	1-T (Feb 2010)	G5
Eared Grebe	*Podiceps nigricollis*	R	Blue				G5
Evening Grosbeak	*Coccothraustes vespertinus*	R	Yellow		SC (Nov 2016)		G5
Great Blue Heron, *herodias* subspecies	*Ardea herodias Herodias*	R	Blue	Y (Jun 2006)			G5T5
Horned Grebe	*Podiceps auritus*	R	Yellow		SC (Apr 2009)	1-SC	G5
Northern Goshawk, *atricapillus* subspecies	*Accipiter gentilis atricapillus*	C	Blue		NAR (May 1995)		G5T5
Olive-sided Flycatcher	*Contopus cooperi*	C	Blue		SC (May 2018)	1-T (Feb 2010)	G4
Red-necked Phalarope	*Phalaropus lobatus*	R	Blue		SC (Nov 2014)		G4G5
Rough-legged Hawk	*Buteo lagopus*	R	Blue		NAR (May 1995)		G5
Rusty Blackbird	*Euphagus carolinus*	R	Blue		SC (Apr 2017)	1-SC (Mar 2009)	G4
Short-eared Owl	*Asio flammeus*	R	Blue	Y (May 2004)	SC (Mar 2008)	1-SC (Jul 2012)	G5
Swainson's Hawk	*Buteo swainsoni*	R	Red				G5
Western Grebe	*Aechmophorus occidentalis*	R	Red		SC (May 2014)	1-SC (Nov 2017)	G5
Mammals							
Caribou (northern mountain population)	*Rangifer tarandus* (population 15)	C	Blue	Y (May 2004)	SC (May 2014)	1-T/SC (Jan 2005)	G5T4T5
Fisher	*Pekania pennanti*	C	Blue	Y (Jun 2006)			G5
Grizzly Bear	*Ursus arctos*	C	Blue	Y (May 2004)	SC (May 2002)	1-SC (Jun 2018)	G4
Little Brown Myotis	*Myotis lucifugus*	C	Yellow		E (Nov 2013)	1-E (Dec 2014)	G3
Mountain Goat	*Oreamnos americanus*	R	Blue				G5
Northern Myotis	*Myotis septentrionalis*	C	Blue		E (Nov 2013)	1-E (Dec 2014)	G1G2

Common Name	Scientific Name	Within Region* or Confirmed** in Project Area	BC Status		Federal Status		Global Status
			BC List	Identified Wildlife	COSEWIC	SARA Schedule	
Wolverine, *luscus* subspecies	*Gulo gulo luscus*	C	Blue	Y (May 2004)	SC (May 2014)	1-SC (Jun 2018)	G4T4

Notes:
** Region (R) was defined as the Bulkley Timber Supply Area of the Skeena-Stikine Forest District*
*** Confirmed (C) use based on recent (2017/2018) or historic baseline data collection within the last 25 years.*
COSEWIC/SARA statuses: E=Endangered; NAR=Not At Risk; SC=Special Concern; T=Threatened.
Global statuses: G2=Imperiled; G3=Vulnerable; G4=Apparently Secure; G5=Secure; GNR=Unranked.
G#G# is used to indicate a range of uncertainty in the status of a species or community, while T# is used following the global rank to indicate the status of intraspecific taxa.

6.3.6 Environmentally Sensitive Areas

No ecological reserves, protected areas, or parks are found in the Project area. The closest ecological reserves to the Project are the Det San Ecological Reserve (about 16 km north-northeast) and Burnt Cabin Bog Ecological Reserve (about 20 km northeast). The Babine Mountain Park Trails Protected Area, approximately 25 km to the northeast, is the nearest protected area. Five provincial parks are located within 50 km of the Project; these are Tyhee Lake Park (about 11 km northeast), Call Lake Park (about 15 km northeast), Driftwood Canyon Park (about 24 km northeast), Babine Mountains Park (about 25 km northeast) and Tazdli Wyiez Bin/Burnie-Shea Park (32 km southwest; Figure 1).

The Project is located within Wildlife Habitat Area WHA 6-333 for northern caribou, as well as within southern mountain caribou critical habitat in the Telkwa Local Population Unit (Telkwa herd; see Figure 14). As specified in WHA 6-333, all applications for mineral or coal exploration and development activities within the WHA must include a caribou mitigation and monitoring plan that outlines measures to avoid, minimize and restore impacts to caribou and caribou habitat. A mountain goat ungulate winter range (U-6-003) is located approximately 10 km south of the Project (Figure 15). Ungulate winter range U-6-003 provides general wildlife measures related to forestry activities.

6.4 Human Environment

6.4.1 Heritage

Heritage is inclusive of archaeological and cultural resources and considers tangible and intangible aspects. Tangible, or material, aspects of heritage are often represented by archaeological remains.

An archaeological site is the physical remains of an event of human activity and may only represent certain aspects of cultural activity, such as food gathering, processing and preservation (Rabnett 2000:5-7). Archaeological sites are traditional use sites (and therefore the pursuit of archaeological evidence is the pursuit of traditional use); but a traditional use site is not necessarily an archaeological site. For First Nations, there is no difference in “importance” between an archaeological site and a traditional use site or area (Budhwa 2006; Rabnett 2000:5-7; Nicholas 2006).

Indigenous cultural heritage requires sensitive and thoughtful management. The OW considers all cultural heritage resources of high value, regardless of their protection status under the *Heritage Conservation Act*. Therefore, OW do not recognize 1846, or any date for that matter, as a critical date for protection of cultural heritage resources.

Figure 14: Telkwa Caribou Herd Wildlife Habitat Area

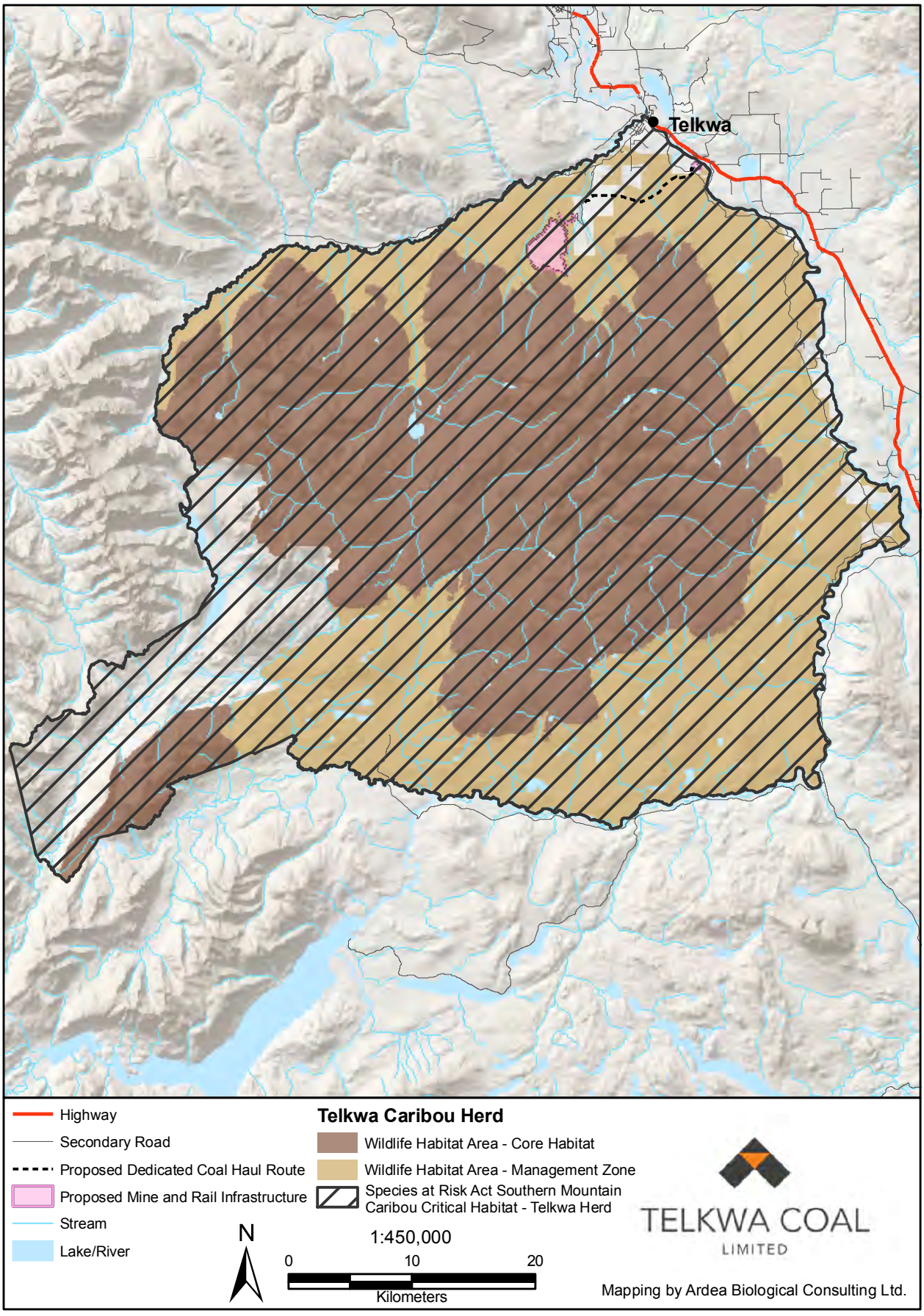
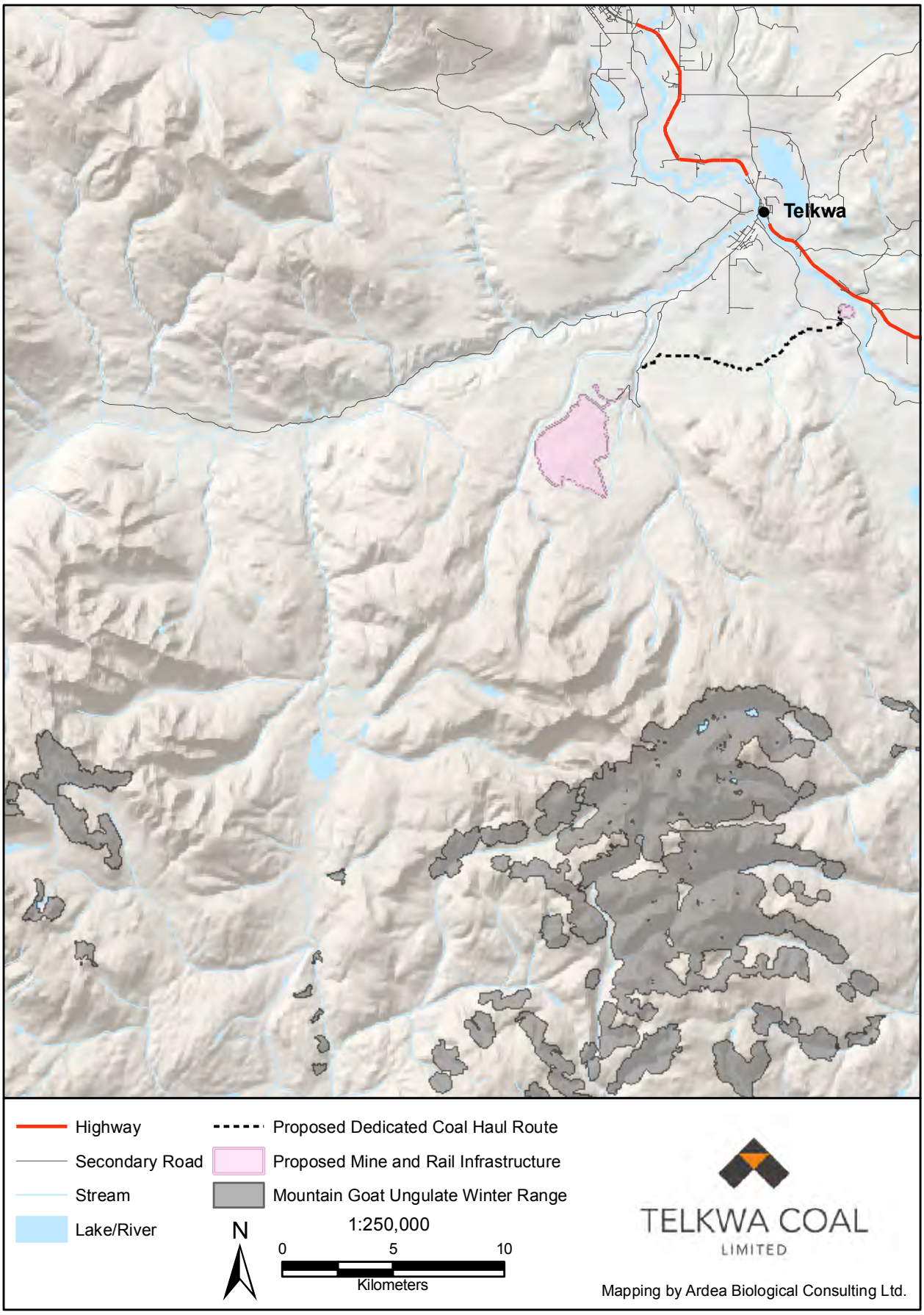


Figure 15: Mountain Goat Ungulate Winter Range



During the archaeological overview assessment, a records' search in RAAD and previous archaeological investigations were examined. RAAD identified four registered archaeological sites (GdSs-1, GdSs-2, GdSs 3, GdSr-8) within a 2-kilometre radius of the study area. Previously archaeological investigations identified two further sites (GdSs-4 and GdSs 5), which may no longer exist.

GdSs 1, GdSs 2, GdSs 3, and GdSs 4 indicate that historic mining and logging activity occurred in the area in the early to mid-1900s. In an archaeology assessment conducted in 1984, artifacts found include metal objects, timbers, glass, boots and concrete foundations. Archaeological inventory and impact assessments in 1997 determined that most of what was recorded in 1984 is no longer identifiable. In the general vicinity of GdSs 1, three historic CMTs were identified and recorded, all being lodgepole pine trees.

GdSs 5 was located 350 m east of Goathorn Creek. Road construction by previous tenure holders exposed a cache of three obsidian bifaces on a high terrace above Goathorn Creek. All subsequent shovel tests were negative. A chert cobble and some basalt shatter were identified nearby. Site may have been a hunting blind or an isolated artifact cache. A recent spruce CMT (1998 investigation) was recorded near GdSs 5, while previous attempts to relocate the archaeological were unsuccessful.

GdSr 8 is located within the proposed rail loadout area. The site was originally recorded in 1975 as 4 cultural depressions. Archaeological surveys in 1997 resulted in 6 additional cultural depressions, as well as a CMT being identified and recorded. The larger of the depressions is likely a subterranean pithouse structure, with the smaller depressions likely acting as a cache or possibly cooking or roasting pits (Hewer 1998). Previous project plans were changed due to the presence of this site and no further archaeological investigations occurred in the vicinity.

6.4.2 Traditional Land Use

The Project is located in the traditional territory of the Wet'suwet'en. The Wet'suwet'en traditionally harvested resources within a seasonal round, travelling in extended family groups to specific house territories according to the seasonal availability of resources, including animals, fish, berries and plants (Budhwa 2006; Kennedy 2007; Pacific Trail Pipelines Limited Partnership 2007; Office of the Wet'suwet'en 2011; Office of the Wet'suwet'en 2013). During summer months, the Wet'suwet'en gathered in large settled village sites which were located at summer fishing locations, including Hagwilget and Witset. In the fall, the Wet'suwet'en travelled to the mountains to hunt large game, such as caribou, mountain goat and marmot in the subalpine and alpine, berries were also picked at this time. During the winter, the Wet'suwet'en occupied winter villages, where they would continue to practice subsistence activities. Species that were harvested in the winter included: rabbit, porcupine, moose, caribou, deer and bear and trap species including lynx, fox, marten and beaver. Spring activities included fishing targeted for species such as trout and trapping beaver, lake char and whitefish. In the summer, the Wet'suwet'en would return to their summer fishing villages.

Currently, the Wet'suwet'en hunt and trap primarily from April to December, although hunting and trapping can take place at any time of the year. Main targeted species include moose, deer, bear and beaver. Other species harvested include marmots, beaver, snowshoe hares, rabbit, muskrats, squirrel, marten, weasel, lynx, groundhogs, and blue grouse. Mountain goat and caribou are generally not hunted for conservation reasons. Chinook salmon are traditionally the first salmon species to be harvested during the year, followed by sockeye in late June and early July. Other important fish species include kokanee, whitefish, trout, char, suckers, and freshwater lingcod. Plants are harvested for food, materials and medicines from forest and woodland settings. Plant foods include green vegetables, fruits and berries, inner bark–cambium, roots and rhizomes, and beverages. Huckleberries, soapberries, cranberries, raspberries, saskatoon berries, high-bush blueberries, gooseberries, salmonberries, juniper berries, and thimbleberries are harvested during late summer and autumn at a large scale. Medicines are derived from leaves or foliage, roots, and inner barks and are harvested according to season. The Wet'suwet'en also harvest plant material, including fibrous plants, bark, wood, sap, and dyes and pigments.

6.4.3 Non-traditional Land Use

The dominant land use in the region is forestry, although mineral, coal, and coalbed gas exploration has occurred in the area. Approximately 57% of the proposed mine and associated infrastructure areas have been harvested since 1987, and the forests are in different stages of regrowth. The regional economic base is also supported by tourism, including fishing, hunting, downhill, cross-country and backcountry skiing, all terrain vehicles, snowmobiling, bird watching, and hiking. The area is well used for hunting of bears, moose and deer, with historic use for trapping of marten, although recent trapping activity has been limited.

6.4.3.1 Provincial Land Use Plans

The Project falls within the Bulkley Land and Resource Management Plan (Bulkley LRMP; BC ILMB 1998), which was approved by the BC Ministers of Forests; Energy and Mines; and Environment, Lands and Parks in April 1998 (BC ILMB 1998; Figure 16). Some objectives for the Bulkley LRMP were legally established in 2000 through the *Bulkley LRMP Higher Level Plan Order Establishing RMZ and RMZ Objectives* (BC ILMB 2000). The objectives in Appendix 1 of the LRMP were cancelled in 2006, but the remaining objectives in Appendices 2-4 are still in effect. Additional objectives were legally established through the Order Establishing Land Use Objective: Bulkley TSA - 2006 and can be found in the Bulkley Valley LRMP Objectives Set by Government (BC ILMB 2006).

The Bulkley LRMP directs the management of 760,000 ha of Crown land and provides general management direction related to eleven categories: biodiversity, access, timber, water quality, fish and wildlife habitat, visual quality, range, outdoor recreation and tourism, subsurface resources, cultural heritage resources, and future planning processes. The LRMP also establishes six resource management zones and new protected areas. The Project is located within the Integrated Resource Management Zone, in Planning Unit 11 (Telkwa) and Sub-unit 11-4 (Goathorn Creek). The Bulkley LRMP indicates that the intent of this zone is to “recognize a full range of resource values and activities, including timber harvesting, mining, grazing, tourism, wildlife and recreation” (BC ILMB 1998, p. 41). The specific management direction for subsurface resources for this sub-unit is to “maintain opportunities for coal exploration and extraction” (ILMB 1998, p. 99).

The Project is outside of the Bulkley Valley Sustainable Resource Management Plan (Figure 16).

6.4.3.2 Parks and Protected Areas

The Project does not overlap any federal or provincial parks or protected areas (Figure 1). The closest provincial park to the Project is Tyhee Lake Provincial Park, approximately 11 km to the northeast. Section 6.3.6 describes the parks and protected areas in region.

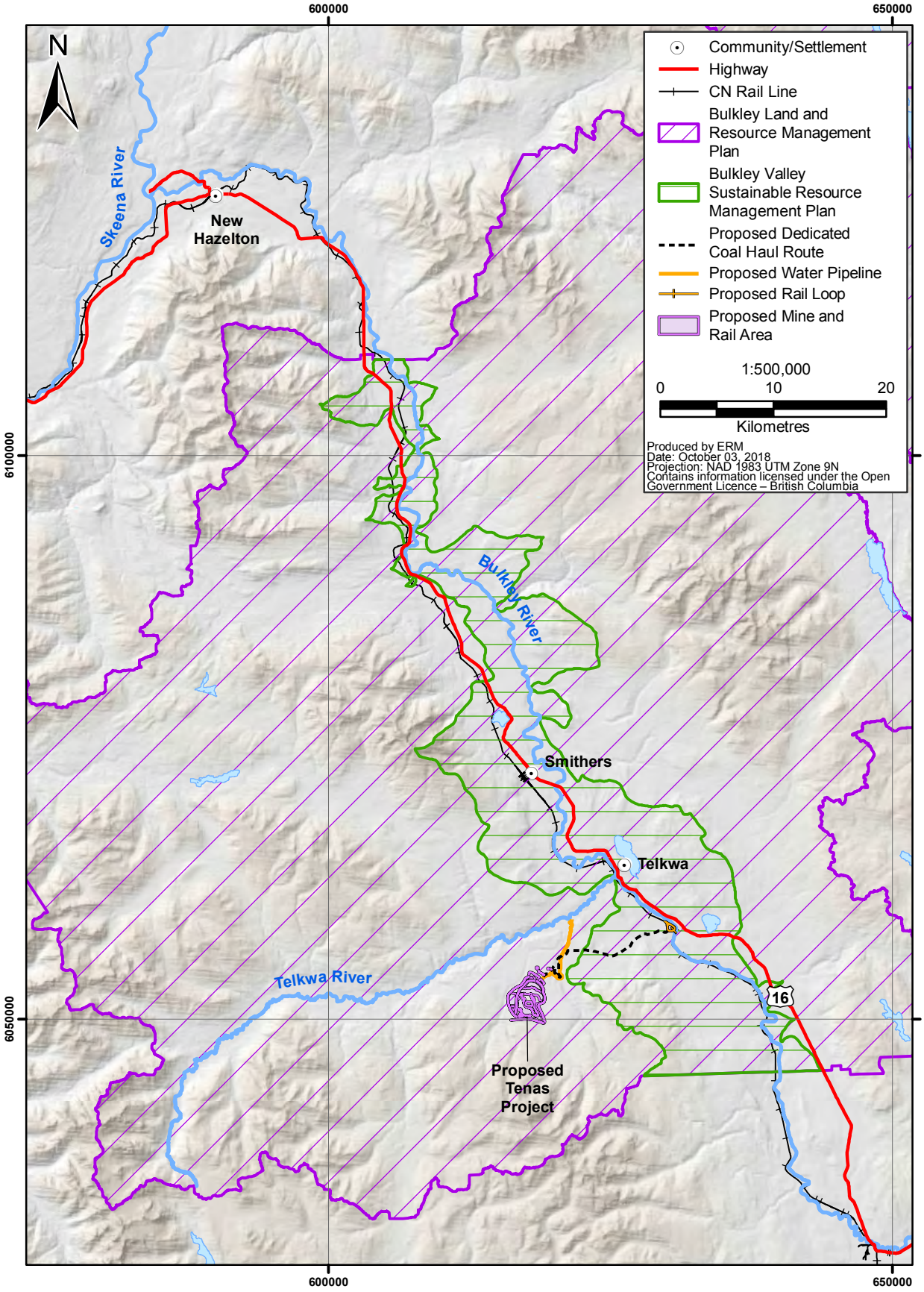
6.4.3.3 Private Land

There is private land near to the Project, including along the proposed pipeline and the rail loadout and rail loop (Figure 17).

6.4.3.4 Guide Outfitting and Trapping

For the purposes of administering the *Wildlife Act*, and BC Hunting and Fishing Regulations, the province is divided into Wildlife Management Areas. The Project falls in Wildlife Management Unit 6-9, and overlaps one provincially-registered trapline (TR0609T026; Figure 18). Other traplines near to the Project include: TR0608T017 (approximately 6 km northwest of the Project) and TR0608T014 (approximately 13 km east of the Project). The Project overlaps the one guide outfitting licence (601044; Figure 18). Guide outftting licence 601057 is to the northwest of the Project.

Figure 16
Resource Management Plans



6.4.3.5 Agricultural Land Reserve and Range Tenures

Figure 19 identifies Agricultural Land Reserves overlapping part of the dedicated haul road and the rail load out. The Mine site overlaps one range tenure (RAN077588) issued under the BC *Range Act* and the proposed dedicated haul route overlaps two range tenures (RAN0726242 and RAN075745). The proposed rail loop overlaps one range tenure (RAN076255).

6.4.3.6 Mineral Tenures

There are two mineral claims to the east of the Project (Figure 10). These claims are registered under the BC *Mineral Tenure Act*.

6.4.3.7 Forestry

The Project is in the Bulkley Valley Timber Supply Area covering the eastern drainage of the Skeena River and covering approximately 736,000 ha (Figure 20). Pacific Inland Resources, a division of West Fraser Mills Limited, operates a sawmill in Smithers and is actively logging in the region.

6.4.3.8 Water Use

There are wells and licences to draw surface water near the Telkwa River and along the Telkwa Coalmine Road.

6.4.3.9 Provincial Recreation Sites

The Project does not overlap any provincial recreation sites and/or public trails. Recreation sites in the Project area include: Jonas Creek Recreation Site: approximately 16 km west of the Project; Bulkley River Recreation Site: approximately 20 km east of the Project; Ptarmigan Recreation Trail: approximately 11 km north of the Project; Microwave-Sinclair snowmobile trail: approximately 14 km west of the Project; and Pine Creek Connector snowmobile trail: approximately 17 km northwest of the Project.

6.4.4 Visual Aesthetics

A visual quality study completed in 2017 developed a viewshed for the Project using a digital elevation model based on a subset of The Canadian Digital Surface Model. Fifteen sites in the Bulkley LRMP were visited and subsequently scoped out of further study, as they did not have any view of the Project area. Based on important corridors identified in these plans, an additional 18 sites were established. Of these 18 sites, four sites were found in subsequent field visits to have vegetative screening that completely obscured any view of the Project site. The remaining 14 sites were photographed.

A separate viewshed was developed for the rail loadout area, though no photographs were taken. Due to uncertainty surrounding component heights, additional viewsheds were developed to investigate the visual consequences of Project component heights from ground level to 120 m above the current land surfaces. Construction of the Project components was found to have little visual consequence, and there were no changes in visibility from the LRMP viewpoints.

6.4.5 Economics and Socio-community Health

The three main population centres in the Bulkley Valley are Terrace, Smithers, and Houston, located approximately 150 km north, 25 km north, and 55 km south of the Project, respectively. All communities include a number of tourism and service facilities. Services within the communities of Terrace, Smithers, and Houston include general and industrial contracting, excavating, construction, welding, electrical, irrigation, business services, catering, as well as recreation facilities. Several specialized mining equipment suppliers are also located in these communities, including Finning (Houston), and SMS (Houston). The local communities are generally well-positioned to support the Project and the needs of the employees.

Figure 17
Private Land near the Tenas Project

TELKWA COAL LIMITED

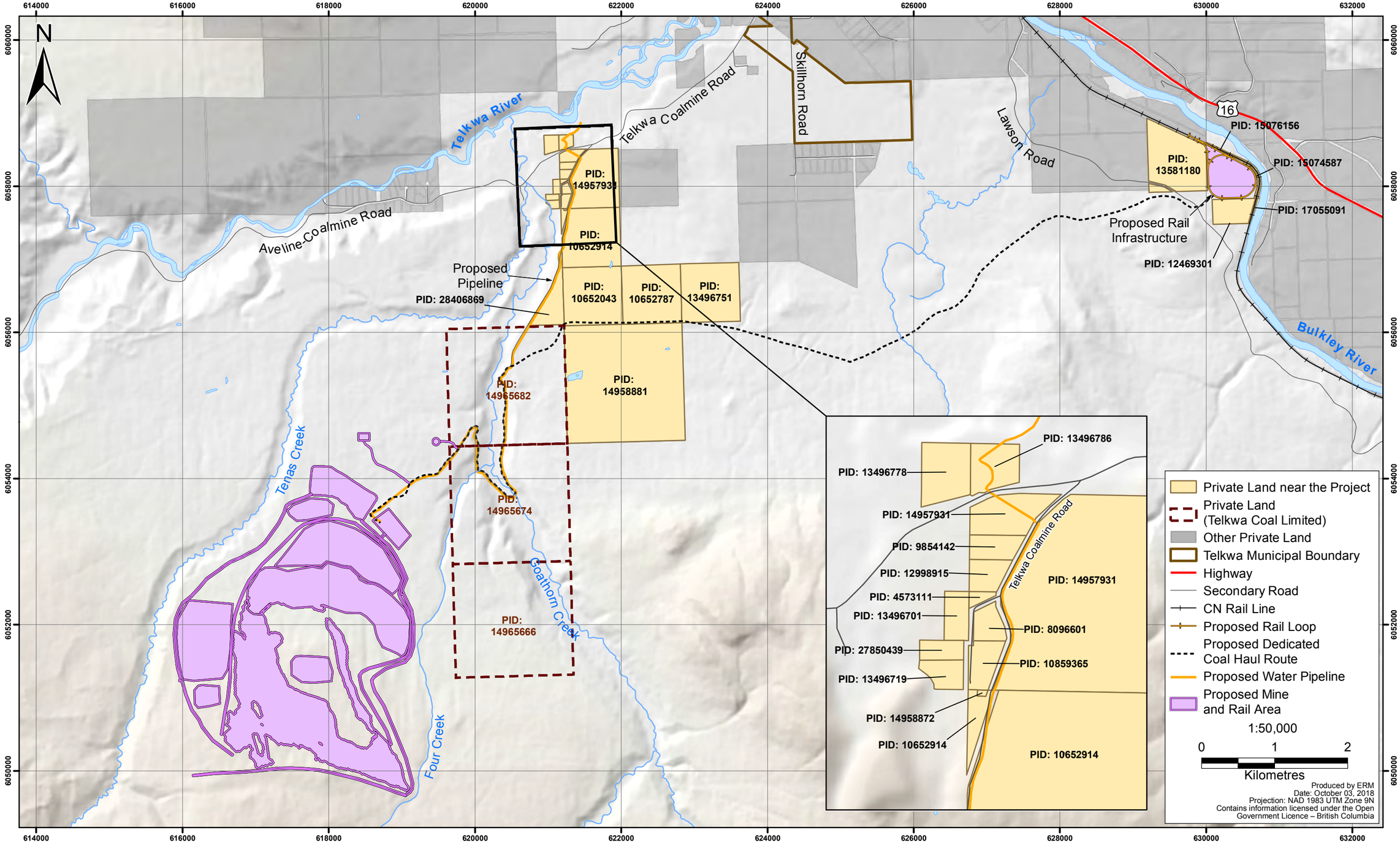


Figure 18
Guide Outfitting and Trapping near the Tenas Project

TELKWA COAL LIMITED

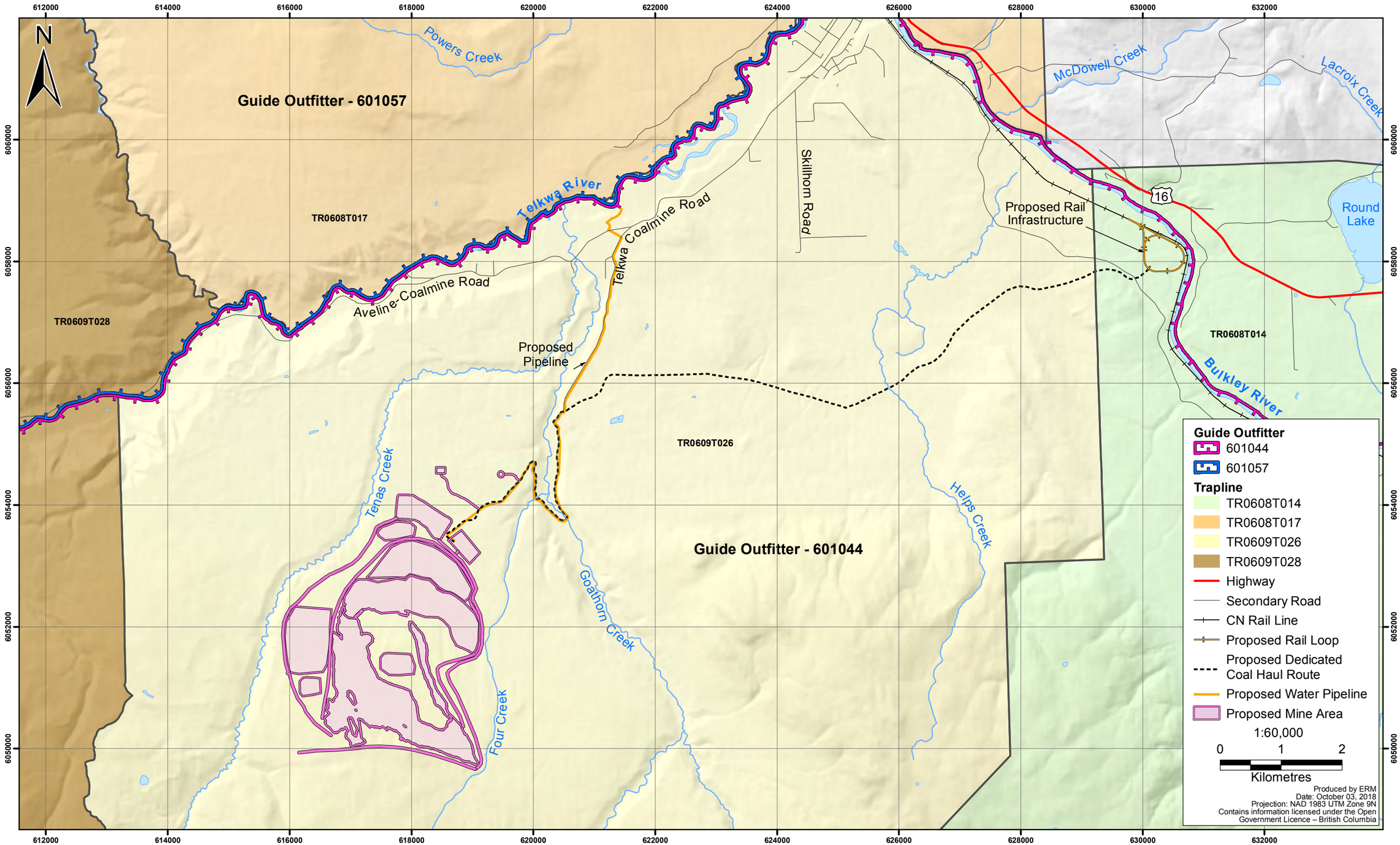


Figure 19
Agricultural Land Reserve and Range Tenures near the Tenas Project

TELKWA COAL LIMITED

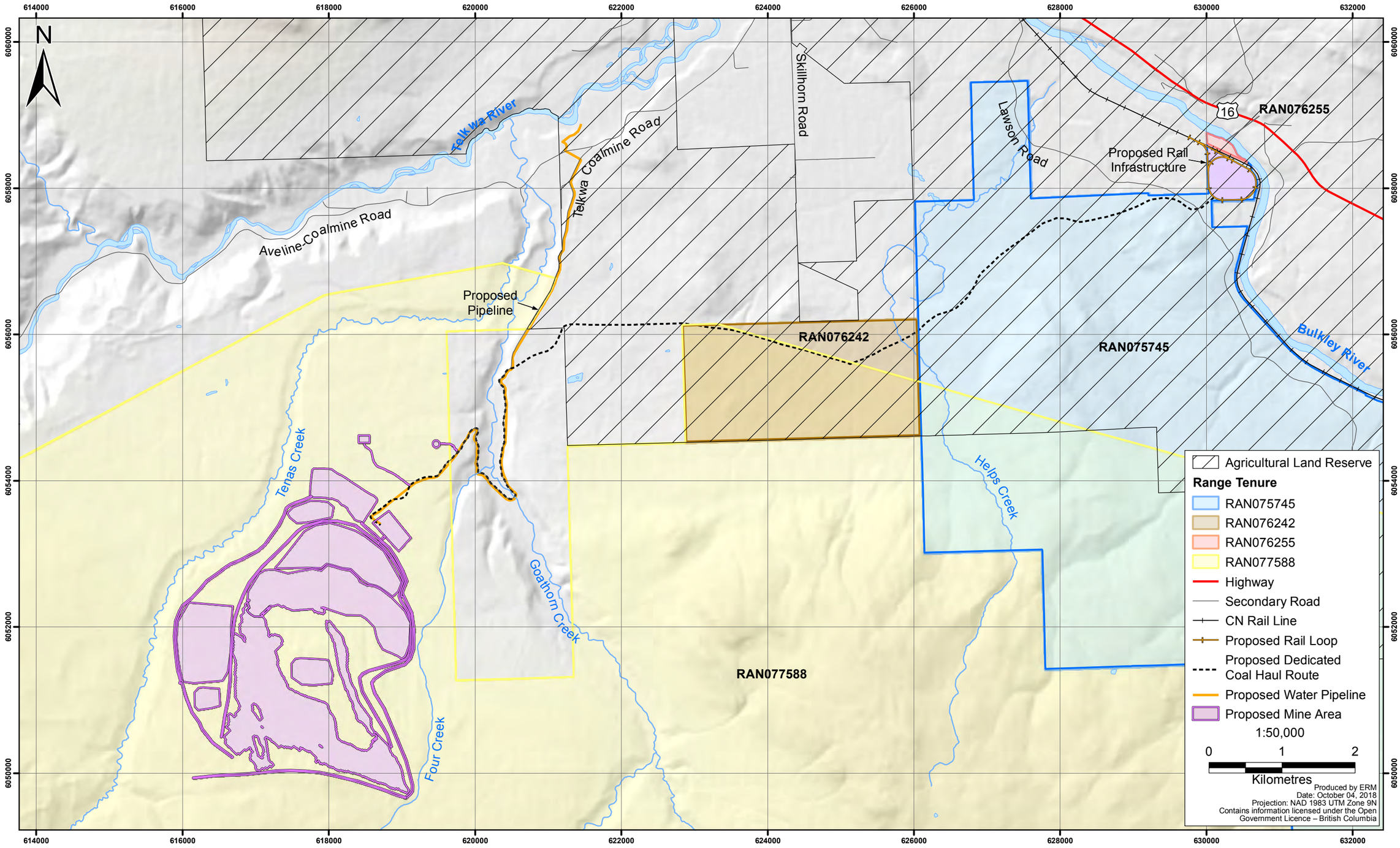
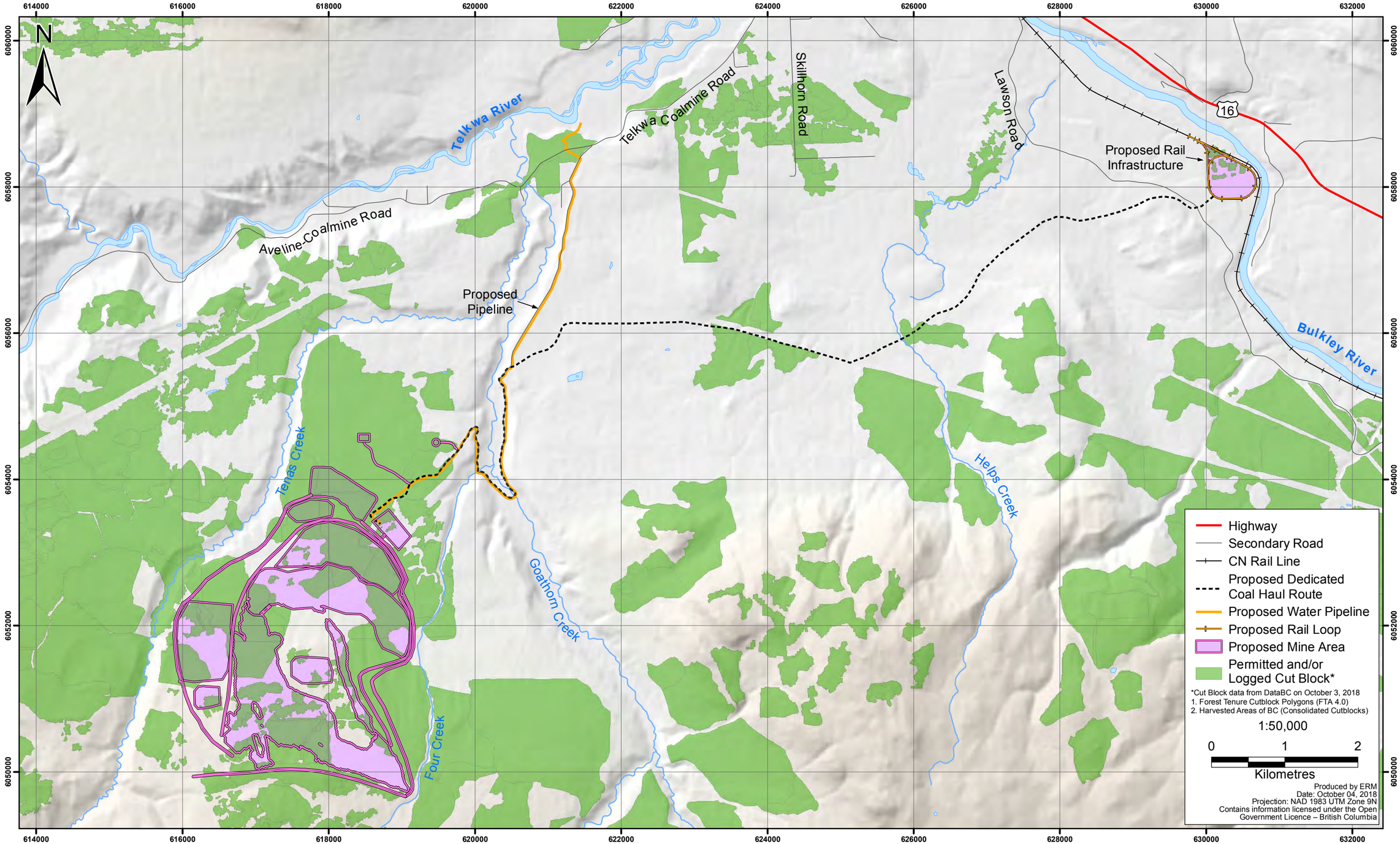


Figure 20
Forestry Use near the Tenas Project

TELKWA COAL LIMITED



7. POTENTIAL PROJECT EFFECTS, MITIGATION, AND MONITORING

7.1 Potential Project Effects

The descriptions in Table 10 provide a brief overview of key potential environmental, social, economic, heritage, and health effects, and effects on Indigenous interests as they are currently understood, that may arise from construction, operations and closure and reclamation of the Project. Measures to mitigate effects are also provided. These issues, and others that are identified through further study and engagement, will be addressed in the EA.

As part of the pre-application stage of the EA process, TCL will prepare a Valued Component (VC) Scoping Document. In developing the proposed VCs[1] for consideration in the assessment, TCL will use information and input obtained from engagement and consultation with Indigenous groups, government agencies, local governments, stakeholders, and the public as well as land use plans, VCs used for similar projects, information gathered through baseline and modelling studies and other relevant information. The process and rationale for selecting VCs will be included in the Application for an Environmental Assessment Certificate. TCL expects the EAO will consult the public, Indigenous groups, government agencies and local governments on the proposed VCs.

The potential effects of the Project on human health will be identified as part of a Human Health Risk Assessment to be conducted by TCL in accordance with the guidance set out by Health Canada (2017).

7.2 Potential Trans-Boundary Effects

The Project is located approximately 200 km from the BC-Alaska border and no trans-boundary effects are expected.

7.3 Potential Cumulative Effects

The potential for the Project to contribute to cumulative effects will be considered in the EA. As part of the EA's Cumulative Effects Assessment (CEA), the residual environmental and socio-economic effects directly associated with the Project will be evaluated in terms of their potential to combine with the likely residual effects arising from other projects and activities that have been or will be carried out in the Project's study areas. The CEA will be informed by approved land use plans, baseline studies and historical data, and the predicted effects of both present development in and around the Project area, and of future developments that are sufficiently certain to proceed.

As described in the land use chapter, existing activities in the vicinity of the Project include forestry, agriculture, ranching, rail transportation, and electricity and gas distribution. The other projects and activities to be included in the CEA, as well as the detailed methodology and rationale used to select them, will be identified as the EA process progresses. These projects and activities may include forestry, mining (metal, mineral or coal), energy generation or transmission, resource exploration, transportation infrastructure, agriculture, and tourism-related activities (including fishing and hunting).

[1] Valued Components are specific attributes within the broader categories of environmental, heritage, economic, health and social matters that may be affected by the proposed Project. They are generally selected with regard to their importance to people and ecosystems, and the potential for the proposed project to interact with them. The selected VCs and associated indicators provide useful categories on which to evaluate potential impacts of the proposed project and inform baseline data collection and analysis.

Table 10: Preliminary Identification of Potential Interactions of the Project with Biophysical and Human Environments

Component	Potential Effect	Examples of Potential Mitigation
Environment		
Air Quality	▪ Fugitive dust emissions from material handling, blasting, vehicle and processing can result in increases in ambient particulate matter concentrations that can affect human and wildlife health, and increases in dust fall deposition that can affect vegetation and waterbodies ▪ Combustion emissions from vehicles and equipment can result in increases in ambient concentrations of nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and other contaminants that can negatively affect human health and vegetation	▪ Implementing an air quality and dust control management plan ▪ Use of cyclones and wet scrubbers for particulate collection ▪ Stabilizing and re-vegetating soil stockpiles ▪ Watering of haul roads during non-freezing conditions ▪ Covering loaded and empty coal haul truck beds used for highway transport while in transit ▪ Minimizing the use of emergency diesel generators
Climate	▪ Increases in greenhouse gas emissions	▪ Efficient operation of the vehicle fleet, equipment to minimize GHG emissions ▪ No coal dryer will be used. Coal dewatering will be done mechanically using screenscroll and screenbowl centrifuges and belt filter presses to limit generation of particulate matter and other pollutants.
Noise and Vibration	▪ Noise from mining can result in increases in noise levels for human and wildlife receptors ▪ Vibrations from blasting and equipment may affect human and wildlife receptors ▪ Specific impacts of noise on human health will be identified as part of the Human Health Risk Assessment	▪ Use of noise minimization equipment where appropriate ▪ Installation of engineering controls on equipment (e.g., mufflers, buildings or enclosures, air intake treatments) ▪ Maintain equipment on a regular basis (e.g., replace worn parts, lubricate as required) ▪ Using waste material to create berms and barriers ▪ Implementing noise management plans to schedule blasting events during daytime hours
Soils and Terrain	▪ Loss of soils and changes to terrain from vegetation and overburden removal and development of the surface mine ▪ Changes to and in soil quality due to changes in chemical and physical characteristics during mining and reclamation activities	▪ Implementing design features to avoid, when possible, and minimize Project disturbances ▪ Implementing an environmental management plan that incorporates best management practices (BMPs) for soil erosion control, soil quality maintenance and soil contamination mitigation (BC MWLAP 2004a) ▪ Implementing a progressive reclamation and closure plan incorporating targeted end land use objectives

Component	Potential Effect	Examples of Potential Mitigation
Surface Water Hydrology	▪ Changes in flow regime in streams near to the Project ▪ Erosion/deposition associated with changes in surface water flow regime ▪ Change in sediment loading	▪ Implementing surface water management plans during construction and operation ▪ Implementing a reclamation and closure plan, including a drainage closure plan ▪ Implementing erosion control and sediment management plan (e.g., sedimentation ponds). ▪ Implementing a storm water runoff control plan, as needed
Surface Water Quality	▪ Changes in water quality in Tenas Creek, Four Creek, Goathorn Creek, Telkwa River, and Bulkley River resulting from geochemical loading of water quality constituents from waste rock spoils and reject piles ▪ Changes in underground/surface water interactions	▪ Implementing water management plans or strategies ▪ Implementing a reclamation and closure plan, including a drainage closure plan ▪ Management of PAG rock in external cells or flooded areas of the pit to minimize acid generation
Groundwater	▪ Changes to groundwater quality and alternation of groundwater regime	▪ Implementing groundwater management and monitoring plans during construction and operation ▪ Maximizing water reuse ▪ Implementing a reclamation and closure plan, including a drainage closure plan
Fish and Fish Habitat / Aquatic Resources	▪ Loss and/or alteration of fish habitat resulting from stream crossings, changes in sediment loading and stream flows ▪ Health effects to fish and aquatic resources due to changes in water quality	▪ Implementing BMPs (e.g., Chilibeck, Chislett, and Norris 1993) and environmental management plans ▪ Maintaining stream flows and habitat values where possible ▪ Implementing sediment and erosion control measures ▪ Implementing a drainage closure plan consistent with end land use objectives
Terrestrial Ecosystems (e.g., plant species at risk, ecosystems at risk, wetlands)	▪ Loss and /or alteration of ecosystems vegetation and wetlands from land clearing and mine construction ▪ Health effects on vegetation due to changes in air, water, soil quality and dust deposition ▪ Deposition of dust on plants and soil, which can result in uptake from coal dust to plants, which are then consumed by wildlife	▪ Implementing appropriate management practices and environmental management plans ▪ Implementing a reclamation and closure plan incorporating targeted end land use objectives ▪ Implementing an air quality and dust control plan, as needed ▪ Implementing a storm water runoff control plan, as needed

Component	Potential Effect	Examples of Potential Mitigation
Wildlife and Wildlife Habitat	▪ Loss and/or alteration of wildlife habitats, including potential losses to caribou and migratory bird habitat, from land clearing and mine construction ▪ Sensory disturbance of wildlife from lighting and mining equipment ▪ Disruption of wildlife (e.g., moose, elk, deer or potentially caribou) movement patterns in regional landscape ▪ Direct mortality of wildlife due to vehicle-wildlife collisions ▪ Changes to population dynamics, including potentially moose, elk, deer or caribou due to changes to predator-prey dynamics ▪ Health effects on wildlife due to changes in air, water and soil quality ▪ Health effects to aquatic resources (e.g., water birds and amphibians) due to changes in water quality ▪ Loss of riparian habitats affecting water bird and amphibians that use lentic and lotic environments	▪ Implementing appropriate management practices and wildlife management plans. ▪ Minimize Project interaction with wildlife ▪ Implementing a reclamation and closure plan incorporating targeted end use objectives (e.g., wildlife habitat) ▪ Mitigate habitat loss to migratory birds by reusing existing disturbances, where possible, and timely reclamation ▪ Implementing erosion control and sediment management plan (e.g., sedimentation ponds). ▪ Conduct habitat clearing outside of the migratory bird nesting period wherever possible to avoid effects on nesting birds and comply with Avoidance Guidelines and other provisions of the *Migratory Birds Convention Act* ▪ Observing applicable BMPs for wildlife (e.g., BC MWLAP 2004b).
Heritage		
Heritage Resources (archaeology sites, historical sites)	▪ Effects to heritage resources due to land clearing, mining and associated infrastructure	▪ Conduct archaeological impact assessment to discover previously undocumented archaeological sites within the Project area ▪ Develop an archaeology chance find procedure ▪ Where possible, avoid ground disturbing activity within archaeological sites. If disturbance to archaeological site is anticipated to occur, implement mitigative strategies to salvage pre-contact cultural heritage information
Paleontological Resources	▪ Effects to paleontological resources due to land clearing, mining and associated infrastructure	▪ Paleontology to be covered under chance find procedure
Indigenous Rights, Titles and Interests		
Indigenous Rights and Title	▪ Changes to current use of lands and resources for traditional purposes (e.g., fishing, hunting, gathering) ▪ Changes to Wet'suwet'en use of Wet'suwet'en trail system ▪ Changes to Wet'suwet'en spiritual sites and areas of cultural significance	▪ Work with Indigenous groups to mitigate effects to current use of lands and resources ▪ Incorporation of traditional knowledge and traditional land use in Project planning ▪ Participation agreements with Indigenous groups

Component	Potential Effect	Examples of Potential Mitigation
Indigenous interests	▪ Changes to Wet'suwet'en socio-economic status ▪ Changes to Wet'suwet'en community well-being ▪ Changes to Wet'suwet'en cultural sustainability	▪ Work with Indigenous groups to mitigate effects to current use of lands and resources ▪ Incorporation of traditional knowledge and traditional land use in Project planning ▪ Participation agreements with Indigenous groups
Social		
Non-traditional Land Use	▪ Changes to opportunities associated with public and tenured land and resources, including changes to use of and/or access to certain public lands and waters and availability of certain species	▪ Seeking and implementing input on recreational access and end land use objectives ▪ Implementing reclamation and closure plans consistent with end land use objective
Visual Aesthetics	▪ Alteration of visible landforms	▪ Retaining and rehabilitating vegetation to provide screening of the Project area ▪ Implementing dust suppression techniques during construction and operations
Socio-community Health and Well-being	▪ Changes to and/or maintenance of community and individual health and well-being ▪ Provincial and local economic stimulus ▪ Employment, income, local government revenue generation and gross domestic product benefits ▪ Health and safety of workers and public ▪ Changes to wage and non-wage economy due to Project-driven changes in hunting, trapping, and gathering ▪ Changes to local population and demographics due to Project-driven labour market changes ▪ Changes to local community services and infrastructure due to either Project demand or Project-driven population change	▪ Community management planning with Indigenous groups and stakeholders to address provision of services and effects to community health and well-being ▪ Seeking input on recreational/tourism access and end land use objectives ▪ Implementing reclamation and closure plans consistent with end land use objectives ▪ Skills inventory, training and skills development ▪ Employee occupational health and safety plans ▪ Employment planning ▪ Plan for local procurement of goods and services ▪ Work with local government authorities and health, protective, and emergency service organizations to plan for and adjust to anticipated changes in population and associated changes in service demand ▪ Implement a traffic management plan

Component	Potential Effect	Examples of Potential Mitigation
Health		
Human Health	▪ Change to particulate matter concentrations (e.g., $PM_{2.5}$ and PM_{10}) which may cause health risk to local communities ▪ Deposition of dust to plants and soil, which can result in uptake from coal dust to plants which are then consumed by people ▪ Health effects due to changes in water quality ▪ Increased levels of noise and traffic causing stress or harm, such as sleep disturbance	▪ Implementing an air quality and dust control plan, as needed ▪ Implementing a storm water runoff control plan, as needed ▪ Noise mitigations
Economic		
Economic	▪ Provincial and local economic stimulus via Project procurement and contracting for goods, services, and personal services, and consumer spending of employees ▪ Changes to employment, employment income, and training ▪ Changes to gross domestic product (GDP) ▪ Changes to output (e.g., economic activity) in forestry and outdoor recreation and tourism sectors ▪ Changes to local government revenues and expenditures	▪ Implementing employment and training plans ▪ Supporting efforts on the part of employees to upgrade their education as a means towards job advancement ▪ Co-operating with local educational authorities and institutions in the development and implementation of high school and college training with mining sector content

7.4 Monitoring

The environmental management system for the Project will include management and follow-up plans. These plans will be based on the principles of prevention and adaptive management and will be designed to address any issues that may emerge during the Project's construction, operation, closure, and reclamation phases. Management plans will be included in the Application/EIS, and any requirements for follow-up monitoring will be identified in the Application/EIS. The plans will be developed to meet the specifications of the EAO and other appropriate regulatory agencies. Follow-up monitoring will include measures to evaluate (1) the accuracy of the predictions contained in the EA and (2) the effectiveness of TCL's mitigation measures, as well as appropriate strategies to apply in the event that predictions prove inaccurate or mitigation measures are not as effective as anticipated. These strategies may include further mitigation or involvement of stakeholders such Indigenous groups or government agencies.

These plans may include variations of the following which collectively form the Project's Environmental Management Plan.

1. Traffic and Access Management Plan;
2. Air Quality Management Plan;
3. ML/ARD Management Plan;
4. Wildlife Management Plan (caribou, moose);
5. Vegetation Management Plan (includes invasive species management);
6. Water Management Plan (includes surface erosion, sediment, effluent, groundwater monitoring);
7. Reclamation Plan (includes soil salvage and management and biodiversity plan);
8. Explosives Management Plan;
9. Noise Control Management Plan;
10. Waste Management Plan, (garbage, recycling, compost, hazardous waste, chemicals);
11. Spill Response Plan;
12. Occupational Health and Safety Plan; and
13. Mine Emergency Response Plan.

8. ENGAGEMENT AND CONSULTATION

TCL's Consultation Policy and Engagement Framework is governed by the following principles.

1. Prioritizing the relationship with Indigenous peoples by engaging early and working directly with the indigenous community during the regulatory process through to mine closure;
2. Seeking early and ongoing engagement with community and government; and
3. Providing meaningful opportunity for input to the Project design and continued dialogue throughout the life of the Project.

TCL's approach includes active listening, discussion and working to understand and address concerns, ensuring that the Project is developed in a responsible and respectful manner.

After 22 months of engagement with the community, TCL has made two significant changes to the Project design based on community feedback. Initially, TCL proposed a Project with a production capacity of 240,000 t/year which did not automatically trigger an EA under the BCEAA. The proposed Project capacity now exceeds the BCEAA threshold of 250,000 t/year and the Project is reviewable under the BCEAA. TCL initially intended to haul coal along the existing Telkwa Coalmine Road. TCL is now proposing to build a dedicated coal haul road from the outset. Adding this by-pass haul road at the outset increases the initial capex by a significant amount, approximately $5 million. Both changes demonstrate TCL's responsiveness to the community.

As the Project progresses, TCL will continue to employ engagement strategies that promote effective communication and relationship-building. The following section describes the preliminary engagement efforts on behalf of the Project thus far and provides an overview of TCL's plan to consult with Indigenous groups and stakeholders during the EA review. TCL will develop detailed engagement and communication plan to be implemented as part of the EA process.

8.1 Engagement Efforts to Date

8.1.1 Indigenous Groups

The Project is located within the traditional territory of the Wet'suwet'en. TCL acknowledges and respects the unceded rights, title, interests, culture and aspirations of the OW to 22,000 square km of traditional territory within which the Project is situated.

TCL's Project and engagement efforts are led by its Managing Director, Mark Gray, an indigenous person of Maori descent, who has spent his legal career protecting and developing the rights of his people. Engaging early and meaningfully with the Indigenous people within whose traditional territory the Project is located is of the highest priority to Mr. Gray. As such, the OW was naturally his first stop when the company commenced engagement with the community.

TCL has been actively engaging with the OW since December 2016, including face-to-face meetings, site tours, workshops, phone calls and information sharing by emails and letters (Table 11). Between December 2016 and August 2018, TCL has had over 10 meetings with the OW and exchanged nearly 100 emails and phone calls; these are described in the following sections.

TCL has an inclusive and transparent consultation approach with the OW and is committed to upholding this approach throughout the regulatory process. This approach is founded upon frequent communication and ensuring the OW has the opportunity to review, comment on and provide input to important documents before finalization.

Table 11: Wet'suwet'en Meetings

Meeting Date	Discussion Topics
December 1, 2016	Introduction to the Project and Managing Director.
February 14, 2017	Discussions to advance Communication and Engagement Agreement and review pre-feasibility and baseline consultant teams.
April 11, 2017	Introduction to Project Management Team. Discussions on Communications and Engagement Agreement status, approval of baseline sub-consultant team, outline of baseline studies program, review of exploration program (*Mines Act* Notice of Work), Goathorn Creek bridge, general Project and wider stakeholder and community consultation considerations. Separate helicopter site tour.
September 27, 2017	Discussion regarding the exploration program, including the temporary bridge at Goathorn Creek; and prefeasibility results, Project components; separately, and with the EMPR.
November 9, 2017	Environmental Workshop #1 – all-day meeting to review baseline programs.
February 6, 2018	Meeting to discuss mine planning progress and wider Wet'suwet'en consultation.
April 11, 2018	Brief interaction to introduce TCL's new Community Liaison and delivery of information brochures.
May 8, 2018	Meeting to discuss Project assessment process and mine permitting process.
July 26, 2018	Environmental Workshop #2 – all-day meeting to review baseline results.
August 7, 2018	Meeting to discuss baseline report results, process for the review of the project description draft and wider Wet'suwet'en community consultation in the fall.
September 18, 2018	Meeting to discuss the project description draft, the water quality and fish baseline, the regulatory process.

Further details of the topics discussed are provided in the following paragraphs. At each meeting, the OW were represented by one or more of the following individuals:

- Natural Resources Manager;
- Environmental Assessment Coordinator;
- Resource Referral Coordinator; and
- Mineral Liaison.

To date, TCL has shared technical reports including the pre-feasibility studies, baseline data report, project shape files, Notice of Work applications, temporary stream crossing applications related to the exploration programs, maps and plans for review and comments. A draft version of the project description was provided to the OW for review and comment prior to submission to the EAO and CEA Agency.

8.1.1.1 December 2016 Meeting with the OW

At the initial meeting in December 2016, the OW explained its three-step agreement process for resource development proposals:

1. Communications and Engagement Agreement, which facilitates exploration and allows the parties to get to know each other; the OW is provided with exploration results;

2. Project Assessment Agreement, in which the OW participates in the EA process, including undertaking its own effects assessment; and
3. Assuming the Project has the OW's approval, a Socio-economic Agreement.

At the same meeting, the OW acknowledged that the Project is advanced in terms of historical exploration data, and communicated that the Wet'suwet'en is not opposed to development of natural resources, provided the development protects:

- Wildlife;
- Salmon and aquatic habitat;
- Water quality; and
- Archaeological and culturally import sites.

8.1.1.2 February 2017 Meeting with the OW

TCL presented environmental baseline and exploration programs in February 2017, for OW comment and input. The OW reviewed and provided input to the proposed list of largely local consultants. The OW reviewed the freshet surface water quality program and requested additional testing parameters, including of BTEX.

8.1.1.3 April 2017 Meeting with the OW

In April 2017, TCL signed a Communications and Engagement Agreement as an initial, formal step in its commitment to the OW. In the same month, TCL and the OW had a helicopter tour of the property. TCL presented the exploration program and conceptual mine plan both during the site tour as well as at the meeting which followed. No specific concerns were raised concerning the Project and the exploration program. In general, the OW expects any development to consider the protection of wildlife, salmon, water quality and culturally important sites. On the helicopter tour, the OW noted sites of cultural significance, direct and indirect signs of wildlife use (specifically moose and grizzly in the vicinity of the Tenas and Goathorn deposits), areas of wild onion harvest and mineral licks and game trails near the Telkwa North deposit. TCL will continue to work with the OW to obtain a detailed understanding of the Wet'suwet'en use of the Project area. A cultural resources baseline study is underway.

8.1.1.4 September 2017 Meeting with the OW

TCL presented updated mine plans based on the pre-feasibility studies to the OW in September 2017, and accompanied by the OW, presented the same mine plan to officials at EMPR.

8.1.1.5 November 2017 and July 2018 Meetings with the OW

In November 2017 and July 2018, TCL held baseline study workshops with its environmental and socio-cultural consultants and the OW. The OW asked questions to clarify information presented on the mine plan and the environmental programs including the water quality data collection sites. The OW encouraged the use and sharing of historical data reports and committed to facilitating information exchange with third-parties holding relevant documents. The OW noted the limitations of reports older than 1990s being in largely paper form only. The OW emphasized the importance of data management, especially in consideration of assessing the potential for cumulative effects. The regulatory process was discussed. The OW stated that the face-to-face interactions were valuable and enjoyable, and that there would be much more to discuss with TCL.

8.1.1.6 February and May 2018 Meetings with the OW

The February 2018 and May 2018 meetings focused on understanding the regulatory process and discussing both Wet'suwet'en community engagement and the wider community engagement. In June 2018, TCL informed the OW that, based on early community feedback, the company changed the production plan to include building the dedicated haul road, and that it will enter the EA process rather than just the *Mines Act* and *Environmental Management Act* processes.

8.1.1.7 August 2018 Meeting with the OW

Several items were discussed in the August 2018 meeting seeking clarification of details regarding water quality, particularly in Goathorn Creek and fish baseline data. The process for the OW review of the project description was discussed. It was agreed that TCL would provide a draft to the OW two weeks prior to TCL lodging the project description officially with the EAO. As discussed in the next section, the draft project description was provided to the OW on September 11, 2018.

8.1.1.8 September 2018 Meeting with the OW

There were five agenda items for the September 2018 meeting; the project description, the regulatory process, baseline water quality for Goathorn Creek, the fish studies and maps. The OW requested a more detailed map of the mine site and additional upstream water quality sampling sites on Goathorn Creek tributaries. TCL agreed to these requests. The process for fish toxicity testing was discussed and it was agreed that TCL's fish consultant would provide a technical memo to explain the process. The OW provided comments on the project description, mainly with respect to the regulatory process and typographical errors. These were corrected in the final version of the project description.

8.1.1.9 Ongoing Engagement Efforts

Engagement with the wider Wet'suwet'en community, and in particular with the House groups on whose territory the project sits, will be planned in the fall with the guidance of the OW.

The Project is expected to provide positive socio-economic impacts to the community including employment and contracting opportunities during the mine construction, operations and reclamation phases. TCL will work with existing regional training providers to provide training for Wet'suwet'en community members interested in working on the Project. Courses will be designed in consultation with the Wet'suwet'en and may range from trades and other technical areas to supervisory and management. The skills gained will serve the project and will also be transferable to other industrial sectors. Local employment and contracting created by the project will allow community members to remain in the traditional territory instead of travelling elsewhere to pursue careers. TCL is committed to engaging with the OW throughout the regulatory process and beyond, to identify these opportunities to provide lasting benefits to the community based on their needs and interest.

8.1.2 Government Agencies and Local Governments

TCL has contacted and/or met with the following government representatives or entities to provide information on the Project:

- Village of Telkwa;
- Town of Smithers;
- Regional District of Bulkley-Nechako (RDBN);

- Provincial Member of Legislative Assembly for Stikine (and Minister of FLNRORD);
- Federal Member of Parliament for Skeena-Bulkley;
- EAO;
- EMPR;
- ENV; and
- FLNRORD.

8.1.2.1 Village of Telkwa

TCL has had seven meetings with representatives of the Village of Telkwa: six in-person meetings on April 11, September 27, September 28, November 8, November 28, 2017; and June 18, 2018. The village was represented at each meeting by one or more of the following individuals: the mayor, deputy mayor, chief administrative officer, and councillor(s).

The topics discussed at these meetings included:

- project scope;
- coal haul route:
  - potential alternative alignments for a new road,
  - truck traffic,
  - route and potential for community forest collaboration, and
  - recommended communications with the Ministry of Transportation;
- the regulatory process;
- TCL's applications for Investigative Use Permits for the rail loadout; and
- TCL's applications for geotechnical work along the infrastructure alignment;
- the format for public meetings; and
- the desire for long-term, direct benefits to the Village community and local business.

8.1.2.2 Town of Smithers

TCL has had two meetings with representatives of the Town of Smithers. The first meeting, on March 13, 2018, was with the mayor and the second, on May 22, 2018, was a Town Council meeting which was attended by the mayor and councillors.

The topics discussed at these meetings included:

- project scope;
- coal haul route;
  - potential alternative alignments for a new road,
  - truck traffic,
  - noise,
  - safety, and
  - alignment;

- the regulatory process;
- fish and water;
- caribou; and
- the coal market, including product quality.

8.1.2.3 Regional District of Bulkley-Nechako

TCL had four meetings with RDBN representatives: three in-person meetings on September 28 and December 7, 2017; and June 11, 2018, and a conference call on February 1, 2018. Each meeting was represented by one of more of the following individuals: the Area A Director (Smithers / Telkwa Rural), the Director of Planning, and the RDBN Planner.

The topics discussed at these meetings included:

- project scope;
- coal haul route and truck traffic;
- the regulatory process;
- TCL's applications for Investigative Use Permits for the rail loadout; and
- TCL's applications for coal licenses for geotechnical work along the infrastructure alignment and if there were any intended coal exploration at these sites.

8.1.2.4 Provincial Government

Table 12 provides a list of meetings between TCL and the provincial government.

Table 12: Provincial Government Meetings

Meeting Date	Entity	Location	Discussion Topics
December 6, 2016	EMPR	Victoria	Introduction to TCL and conceptual project scope
December 7, 2016	EMPR	Vancouver	Proposed regulatory process and schedule
April 11, 2017	EMPR, ENV, FLNRORD	Smithers	Introduction to the proponent and conceptual project scope, proposed regulatory process and schedule
September 26, 2018	EMPR	Vancouver	Updated project scope per pre-feasibility study
September 27, 2017	EMPR	Smithers	Updated project scope per pre-feasibility study (with OW)
November 2, 2017	EMPR	Victoria	Geology, mine plan, waste sequencing, processing, Geochemistry, hydrogeology, water quality, ARD and water management.
November 8, 2017	EMPR	Smithers	Exploration permit and bridge crossing applications for baseline work related to the project
November 9, 2017	FLNRORD	Smithers	Project Overview
November 10, 2017	FLNRORD	Smithers	Exploration permit and bridge crossing applications for baseline work related to the project. Project Overview.
December 8, 2017	ENV, FLNRORD	Smithers	Overview of environmental baseline programs (terrestrial, atmospherics and aquatics)

Meeting Date	Entity	Location	Discussion Topics
January 23, 2018	EMPR	Vancouver	Project regulatory process
January 24, 2018	EAO	Vancouver	Project scope, regulatory process, indigenous and community engagement
March 12, 2018	EMPR, EAO	Victoria	Environmental baseline review and project schedule
May 3, 2018	EMPR	Victoria	Update to mine plan, project schedule, ARD Management and Reclamation Bonding.
May 10, 2018	FLNRORD	Smithers	Managing Director introduction to Assistant Deputy Minister
May 23, 2018	EAO	Smithers	Helicopter and truck site tour of project area. Public Open House.
July 2, 2018	EMPR	teleconference	Project scope and regulatory process update
July 19, 2018	EAO, ENV	teleconference	Project schedule and regulatory process update
July 27, 2018	FLNRORD	Smithers	Update of project scope and schedule. Caribou mitigation discussion.
July 27, 2018	ENV	Smithers	Project proponent, scope and schedule overview.
August 23, 2018	EMPR, EAO, ENV	Vancouver	Project scope and regulatory process update. Concurrent Approval Regulations, project schedule
August 24, 2018	EMPR, EAO, MJTT, MIRR	Vancouver	General mandate and process of EAO, MIRR, EMPR, MJTT
September 14, 2018	ENV	Telkwa	Tour of proposed site for installation of partisol sampler

Over 20 meetings have been held with provincial ministries and offices since December 2016. Further details of the topics discussed at key meetings are provided in the following paragraphs. Power Point presentations were reviewed at many of these meetings. At each meeting, the provincial government was represented by one or more of the following individuals:

- Deputy Minister, Associate Deputy Minister, Assistant Deputy Minister
- Deputy Chief Inspector of Mines, Executive Directors
- Project Directors, Regional Directors, Senior Project Manager (Mining Operations, Smithers)
- Manager of Environmental Geoscience and Permitting, Manager of Reclamation
- Senior Project Lead, Senior Environmental Geoscientists, Senior Geotechnical Inspector
- Section Head (Skeena Ecosystems), Section Head (Smithers Mining Operations), Meteorologist
- Northwest Caribou Team Lead, Caribou Recovery Biologist

Meetings with Ministry of Energy, Mines, and Petroleum Resources

Twelve meetings were held with the EMPR since December 2016 including eleven in-person and a conference call. Subject matter presented by TCL included introductions to the proponent, the company's commitment to indigenous people, project scope, regulatory process and schedule. An initial technical meeting was held on November 2, 2017 to review environmental baseline data, in particular, geochemistry, geology, surface and groundwater flow and quality. ARD and water management strategies were reviewed and reclamation bonding assumptions were discussed. EMPR feedback included a desire to see site liability reduced with an ARD Management strategy not requiring long term water treatment as the preferred

scenario, mine waste materials alternative assessment included in the permit application and a justification of mine designs including rationale for surface as opposed to underground mining. As second technical meeting was held on May 3, 2018 to discuss mining method assessment, highwall and underground, PAG mitigation assessment, PAG cell water retention for operations, closure, contingency plan, PAG cell geotechnical considerations for operations and closure, electrical and mechanical detailed design drawings and liability calculations. The most recent meeting was to discuss the Concurrent Approval Regulations and the approach to developing the concurrent *Environmental Assessment Act*, *Mines Act* and *Environmental Management Act* applications.

MEETINGS WITH THE MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT

There have been six meetings with the FLNRORD since April 2017. Subject matter presented by TCL included introductions to the proponent, the company's commitment to indigenous people, project scope, regulatory process and schedule. Technical meetings were held to review environmental baseline programs, in particular, the wildlife, vegetation and soils components. A key wildlife species of interest is the caribou. FLNRORD outlined potential caribou mitigation expectations and habitat restoration strategies.

MEETINGS WITH THE MINISTRY OF ENVIRONMENT

Six meetings including four in-person and two teleconferences have taken place with ENV since April 2017. Subject matter presented by TCL included introductions to the proponent, the company's commitment to indigenous people, project scope, regulatory process and schedule. Technical meetings were held to review environmental baseline programs including wildlife, vegetation and soils, atmospherics and aquatic components. Regulatory process and requirements was the main topic of several meetings as well as the baseline data collection requirements specified by ENV technical guidance documents. The most recent meeting in September 2018 was a site visit to finalize the location for the installation of the partisol sampler requested by ENV.

MEETINGS WITH THE ENVIRONMENTAL ASSESSMENT OFFICE

TCL has had six meetings with the EAO since January 2018. Subject matter presented by TCL included introductions to the proponent, the company's commitment to indigenous people, project scope, regulatory process and schedule. A meeting was held to review environmental baseline programs including wildlife, vegetation and soils, atmospherics and aquatic components. In May 2018, TCL provided the Assistant Deputy Minister and the Project Assessment Manager with a helicopter tour of the site and included a landing at a groundwater monitorin well to observe a baseline groundwater level measurement. A truck tour focussing on several surface water quality and flow sampling sites were also provided to the Project Assessment Manager and the Project Assessment Officer. All three personnel attended TCL's first public Open House in Telkwa. There have been many discussions related to indigenous and community engagement. There have been several discussions related to regulatory process. The most recent meeting was to discuss the Concurrent Approval Regulations and the approach to developing the concurrent *Environmental Assessment Act, Mines Act*, and *Environmental Management Act* applications.

In addition to these face to face meetings, many more communications with all three ministries and EAO took place by phone and email.

8.1.2.5 Federal Government Communications

TCL contacted the CEA Agency on July 23, 2018, and a meeting was held on September 6, 2018. Present at the meeting for the CEA Agency were the Acting Regional Director and the Team Lead, Regional Operations, Pacific and Yukon. TCL presented its project plan. The CEA Agency representatives noted that

the project was not on federal land, not a transboundary project and under the threshold set out in its Regulations Designating Physical Activities. As such, it is the expectation that the project would not be reviewed under the CEAA.

To date, despite numerous attempts to connect with the Member of Parliament for Skeena-Bulkley Valley by email, letter and by telephone through the Member's constituency office since September 2017, a meeting has yet to be executed.

8.1.3 Public

TCL has a multi-faceted approach to public engagement. Members of the general public may choose how they wish to obtain information and/or engage with TCL from a variety of options. First, members of the public may drop in to obtain project information or speak to a TCL representative at TCL's local Telkwa office. Second, the public may wish to access project information online either through TCL's website or TCL's social media accounts. Third, TCL provides information bulletins on a variety of related topics. In addition, TCL engages with various community and stakeholder groups. If a member of the public belongs to such a community or stakeholder group, they may wish to engage as part of that group. Finally, TCL will hold Open Houses on a regular basis leading up to the submission of and during the review of the environmental assessment and permit applications.

The Project is managed from TCL's office in Telkwa, located on Hankin Avenue. To facilitate information access, the office has an open-door policy, where community members are encouraged to drop in during office hours and/or make an appointment, at their preference. Members of the public may connect with any one of three local TCL representatives. TCL's Managing Director, Mark Gray, is based in the Telkwa office and resides in the RDBN. TCL's office manager, Jeannette Dash, has lived in Telkwa for over ten years and TCL's Community Liaison, Rob Maurer, is a second generation Bulkley Valley resident.

To further facilitate information distribution, TCL has Project information posted on its website (at www.allegiancecoal.com.au), on Twitter (with the handle @TelkwaCoal), and on its Facebook page (Telkwa Coal Limited).

As part of TCL's information sharing program with our neighbours, information bulletins have been released since March 2018. These titles include:

1. "Tenas Project Brochure April 2018"
2. "Steel Making Coal";
3. "Coal: How we use it" http://coalalliance.ca
4. "Coal: Health Facts" http://coalalliance.ca
5. "Coal: Local Economies" http://coalalliance.ca
6. "Basic Coal Facts" https://www.worldcoal.org/basic-coal-facts

These bulletins were distributed electronically to interested parties. As well, hard copies are available at the TCL Telkwa office, at the Smithers Exploration Group, at the Northwest Community College as well as at the Smithers Library. Additional titles will be released to cover further topics of interest.

TCL initiated consultation with the community in April 2017. Conversations have taken multiple forms, including group meetings, informal discussions, phone calls, emails and an Open House.

TCL has engaged with the following community, stakeholder, and other groups to date:

- Community groups:
  - Cottonwood Residents; and
  - Bulkley Valley Residents (includes residents in RDBN and the Village of Telkwa, Town of Smithers and Houston).
- Stakeholder groups:
  - Backcountry Horsemen of BC – Northwest Chapter;
  - Bulkley Valley Community Resources Board;
  - Bulkley Valley Research and Monitoring;
  - Bulkley Valley Kinsmen Club;
  - Northwest BC Resource Benefits Alliance;
  - Skeena Watershed;
  - Smithers Chamber of Commerce;
  - Smithers Exploration Group;
  - Smithers Rodeo Club; and
  - Telkwa Museum.
- Other industrial groups:
  - BC Hydro;
  - CN;
  - Pacific Inland Resources and West Fraser Timber Company;
  - Pacific Northern Gas Ltd.; and
  - Ridley Terminals Inc.

On November 15, 2017, TCL held a neighborhood meeting at the Cointe River Inn for the Cottonwood subdivision, the closest neighborhood to the project area, comprising a dozen families. Many more community members attended the event than expected, including several dozen community members living outside the Cottonwood subdivision. At this neighbourhood meeting, TCL provided its conceptual project plan.

Topics discussed at the meeting included:

- project scope;
- coal haul route;
  - truck traffic,
  - noise,
  - safety, and
  - dust;
- the regulatory process;
- fish;
- water quality and use;
- caribou;
- forestry;
- recreational use of the area; and
- the coal market, including product quality.

As an indication of TCL's commitment to early community engagement, it held its first Open House in the spring of 2018. On May 23, 2018 TCL hosted an Open House in Telkwa, with roughly 120 attendees (105 people signed in). This Open House was the first in a series of five TCL plans to host throughout the regulatory process to share information, answer questions, track Project concerns, and form meaningful relationships with community members. The second Open House will take place in November 2018. Through the initial Open House, and other points of engagement, residents and community stakeholder groups identified concerns relating to:

- haul road:
  - traffic,
  - noise,
  - dust,
  - safety, and
  - maintenance;
- wildlife:
  - caribou and habitat, and
  - salmon and aquatic habitat;
- water:
  - water use, and
  - water quality;
- regulatory process and type of permit;
- mining practices;
- hunting access;
- impacts to property value;
- recreation; and
- AMD management.

TCL commenced early consultation with the Office of the Wet'suwet'en and the local community in 2016/2017 with a conceptual Project Description for a 240,000 t/year operation and plans to use the existing Telkwa Coalmine Road for haulage of clean coal.

Through 18 months of early discussions, two key concerns emerged. The first related to the Project's use of the Telkwa Coalmine Road for coal haulage. Community members, stakeholders and the public stated their preference for construction of a new road to bypass the community rather than using the existing road for coal haul, citing their apprehension about:

- the potential safety risks to people walking or children playing on or near the existing road, as there are no sidewalks;
- the potential degradation of the gravel road due to weight of truck and frequency of truck traffic;
- the potential for dust generation and impairment of air quality to human health, as well as impacts to vegetable and fruit gardens; and
- the potential for noise.

The second key concern related to the regulatory process for the Project. While some community members did not have a preference for either the EAO or the EMPR to administer a project review, most of the community preferred the EAO administer the project review. Community members and stakeholders overwhelmingly preferred TCL to be assessed under the BCEAA.

Based on this early feedback, TCL now plans to build a dedicated haul road at the outset of the Project, and has changed major Project parameters, including increasing the production capacity to enter the BC EA process.

TCL is currently continuing mine planning, consultation with Indigenous groups and the public, engineering, and environmental studies for the Project. These activities will continue through the pre-application phase of the concurrent permitting.

In addition to its public consultation efforts, TCL has been actively supporting the community in various ways in the past 18 months through donations, in-kind contributions and use of Bulkley Valley scientists, cultural experts and contractors. These include:

- $4,000 to the Telkwa Kinsmen for sponsorship of the 106th Annual Telkwa BBQ beef;
- $1,500 to the Telkwa Museum for their summer research intern;
- $2,500 to the Smithers Rodeo Club for the rodeo at the Bulkley Valley Exhibition;
- Allowing the Backcountry Horsemen ongoing use of the Telkwa Core Shack area for riding camps; and
- More than $2 million contribution to the Bulkley Valley economy from use of local companies.

8.2 Proposed Consultation and Engagement Plan

The ongoing engagement plan for the Project will meet provincial requirements and guidance established by the EAO, including the Section 11 order, pursuant to the BCEAA. The BC EAO will also invite Indigenous groups to participate in a Working Group established as part of the EA review of the Project. A Public Consultation Plan and Indigenous Consultation Plan (provided to Indigenous groups for review and comment prior to finalization) will be developed and deferred to throughout the EA process. The Section 11 order will require that reports on Indigenous and public consultation activities be submitted during the EA review.

The objective of TCL's engagement plan will be to work to address issues and concerns of Indigenous groups, stakeholders and the public. TCL is committed to continuing to work with the OW throughout the regulatory process to ensure potential Project-related impacts to their established interests are appropriately addressed. Several members of the OW have been a part of the surface, groundwater, hydrology and atmospheric baseline field programs. TCL will continue to share information, request guidance from the OW, perform appropriate studies, design and execute management plans and monitoring programs. These will minimize impacts to the OW's Indigenous and treaty rights through construction, operations and closure, of the Project.

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Appendix A Qualifications of Baseline Study Consultants

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APPENDIX A: QUALIFICATIONS OF BASELINE STUDY CONSULTANTS

Name	Qualifications	Responsibility
Ardea Biological Consulting		
Laurence Turney, B.Sc., R.P.Bio. Owner, Ardea Biological Consulting	Registered Professional Biologist with over 30 years experience in the field of wildlife biology and terrestrial ecosystems, primarily in northern BC. Managed and conducted over 12 baseline terrestrial programs for mines and hydro projects in northern BC, the Yukon, Northwest Territories and Nunavut.	Writer – Existing Environment: Terrestrial Resources, Wildlife and Wildlife Habitat, Rare and Endangered Species, Environmentally Sensitive Areas Potential Effects: Terrestrial Resources
Adrian de Groot, M.Sc., R.P.Bio.	Registered Professional Biologist with 19 years of experience in ecosystem classification and mapping, working on a wide variety of projects throughout BC.	Writer – Existing Environment: Ecosystem Mapping, Rare and Invasive Plants
Frank Doyle, M.Sc., R.P.Bio.	Professional Biologist with over 25 years of experience working with resource development projects, providing terrestrial baseline ecosystem information (flora and fauna), and identifying and mitigating the impacts to sensitive species, species at risk and their habitats.	Writer – Existing Environment: Terrestrial Resources, Wildlife and Wildlife Habitat, Rare and Endangered Species
Irene Ronalds, B.A., R.P.Bio.	Registered Professional Biologist with over 15 years of experience in ecosystem field classification and mapping, with a focus on both soils and vegetation.	Writer – Existing Environment: Soils
Irene C. Weiland, P.Geo., Eng.L, M.Sc., EGBC	Professional Geoscientist registered with EGBC and has more than 25 years of experience in terrain mapping and geohazard identification, particularly in northern BC. Involved in numerous terrestrial ecosystem mapping projects, including bioterrain mapping, terrain stability mapping, and terrain stability field assessments in northwest BC. Experience in identifying hydrogeomorphic hazards.	Writer – Existing Environment: Terrain
Lis Rach, B.Sc., E.P.	Wildlife Habitat Ecologist / GIS Specialist with 14 years experience working in the field of wildlife habitat ecology. Involved in numerous baseline terrestrial projects in northern BC, Yukon and Nunavut. Registered Environmental Professional.	Writer – Existing Environment: GIS Mapping and Support, Breeding Birds, Amphibians and Reptiles, and Wetland Function
Lynn Westcott, M.Sc. Entomologist and Owner, Westcott Environmental Services	Entomologist with 21 years experience conducting invertebrate studies and surveys, including invertebrate identification and technical and scientific report writing for public and private sector clients.	Writer – Existing Environment: Terrestrial Invertebrates

Name	Qualifications	Responsibility
Cassiar Geoscience Consulting Ltd.		
Cody Cameron, B.Sc., P.Geo. Owner, Cassiar Geoscience Consulting Ltd.	Registered Professional Geoscientist with over 15 years of experience in the geoscience industry including mine permitting, groundwater supply, contaminated sites (physical and chemical hydrogeology), landfill design and monitoring, geotechnical engineering, and geoexchange.	Writer – Existing Environment: Groundwater
ERM Consultants Canada Ltd.		
Anne Currie, B.Sc., M.P.A. Senior Partner, ERM	30 years of experience in environmental impact assessment and permitting in BC. Former BC Environmental Assessment Office Director and BC Chief Gold Commissioner.	Senior Reviewer
Jackie Lerner, Ph.D. Senior Consultant, ERM	20 years of environmental consulting as a project manager, reviewer, author, and editor in the preparation of environmental impact assessments for major Canadian development projects both inside and outside British Columbia, as well as in international contexts.	Writer
Justin Page, Ph.D., M.E.S. Senior Consultant, ERM	Expertise in Canadian environmental policy, impact assessment and Indigenous rights and interests. 18 years of experience in Canadian environmental policy research and impact assessment, working within both the private and academic sectors.	Writer
Coby Hall, B.Sc. Consultant, ERM	Water resources consultant with seven years of experience in baseline hydrometric studies to support environmental assessment and permitting processes in BC.	Writer – Existing Environment: Surface Water Hydrology
Dan Casanova, B.Sc., E.P. Consultant, ERM	Registered Air Quality Environmental Professional with over 9 year of atmospheric science experience, focusing on meteorology, climate change, air quality and noise for environmental impact assessments and permitting.	Writer – Existing Environment: Air Quality, Climate, Noise and Vibration
Elizabeth Boyle, M.Sc., R.P.Bio. Consultant, ERM	Registered Professional Biologist with over 9 years of experience as a freshwater scientist in northern British Columbia and the arctic. Experience includes baseline studies, aquatic effects monitoring programs (AEMP), Metal Mining and Effluent Regulations (MMER) studies, and environmental assessments.	Writer – Existing Environment: Surface Water Quality, Aquatic Resources
Kirsten Seymour, M.Sc., R.P.Bio. Senior Consultant, ERM	20 years of experience in fish and fish habitat assessments in British Columbia and northern Canada, including environmental impact assessment, study design, and fish habitat compensation planning.	Reviewer – Existing Environment: Fish and Fish Habitat
Michael Stead, B.Sc. Consultant, ERM	15 years experience as a GIS Analyst on numerous projects in northern British Columbia and throughout the world. Responsible for conceiving and implementing a wide variety of analyses to provide graphical and tabular products intended to aid in spatial aspects surrounding decisions required to progress development or address existing conditions.	Writer – Existing Environment; Visual Aesthetics

Name	Qualifications	Responsibility
Hemerra, an Ausenco Company		
Trevor Welton, R.P.Bio. Consultant, Hemerra, an Ausenco Company	Registered Professional Biologist with over 17 years of progressive project management and environmental planning experience in western Canada. Extensive experience in assessment, restoration and offsetting of fish habitat and addressing project risks to local fish populations. Known for his ability for anticipating and characterizing potential environmental effects followed by developing and implementing effective mitigation measures.	Reviewer – Existing Environment: Fish and Fish Habitat
SRK Consulting (Canada) Inc.		
Michael Herrell, P.Geo. Consultant, SRK Consulting	Senior Consultant with 15 years of experience on geochemical investigations. Main focus is conducting geochemical characterization studies for proposed, existing and closed mine site facilities. These studies involve assessing the ARD potential and metal mobility from mine materials (i.e., waste rock, tailings and marginal ore, etc.) and evaluating the results of the geochemical characterization in the context of mine water management strategies to predict site effluent water quality and evaluate potential impacts on the receiving environment surface water and groundwater quality.	Reviewer – Executive Summary; Project Overview: Geology, Project Components, Water Supply and Management; Alternatives Assessment; Potential Cumulative Effects
Gregory Fagerlund, M.Sc., P.Geo. Consultant, SRK Consulting	Over 10 years of experience, specializing in physical hydrogeology, aquifer characterization, and numerical modelling. Participated in numerous groundwater and geotechnical investigations for both underground and open pit mines. Managed groundwater components for projects at all levels of engineering study, from preliminary economic assessments to feasibility studies, as well as permitting studies, from environmental assessments to mine permit applications.	Reviewer – Executive Summary; Existing Environment: Surface Water Hydrology and Surface Water Quality, Groundwater
Kristin Poux, P.Eng. Consultant, SRK Consulting	Senior Consultant (Water Management) with 10 years experience in the fields of industrial water and wastewater treatment for the mining and mineral processing industry, for both greenfield and redevelopment projects. Expertise spanning desktop study and process modeling, laboratory-scale and pilot plant investigations, engineering, regulatory and permitting support, risk assessments, and commissioning, operator training, and operational support.	Reviewer – Executive Summary, Project Overview: Project Components, Project Activities, Liquid Waste, Alternatives Assessment; Project Phases and Scheduling: Pit; Existing Environment: Surface Water Hydrology and Surface Water Quality, Groundwater

Name	Qualifications	Responsibility
Ryan Burgess, M.Sc. Consultant, SRK Consulting	Over 5 years of experience, specializing in physical hydrogeology, aquifer characterization, and numerical modelling. Focused on technical supervision of field investigations carrying out soil and rock logging, hydraulic aquifer tests, and water quality sampling, hydrogeochemical analysis and numerical modelling to characterize and investigate mine dewatering, pit slope stability, rock mass characterization, and groundwater resource assessment.	Reviewer – Existing Environment: Surface Water Hydrology and Surface Water Quality, Groundwater, Potential Project Effects, Mitigation, and Monitoring
Sarah Portelance, P.Eng. Consultant, SRK Consulting	Hydrotechnical Engineer with ten years of experience. Specializes in hydrology, hydraulics and mine water management studies. Experience in baseline hydrology and hydraulic analyses for diversions, pond sizing, spillway designs and floodplain modelling, and has worked on several mine water management projects from pre-feasibility level to detailed design.	Reviewer – Existing Environment: Surface Water Hydrology and Surface Water Quality
Stephen Day, P.Geo. Consultant, SRK Consulting	Corporate Consultant (Geochemistry) with 29 years of experience in geochemical characterization of mine wastes, water chemistry predictions and development of conceptual waste management plans to address metal leaching and acid rock drainage at proposed, operating and closed mines. Extensive experience with coal mining in British Columbia, including development of management plans for most open pit mines in the province.	Reviewer – Project Overview: Geochemistry

Appendix B Project-Specific Photographs

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APPENDIX B: PROJECT-SPECIFIC PHOTOGRAPHS

Photo B-1: Looking southwest towards the proposed Project from the road along the north-east portion of Tyhee Lake.

Photo B-2: Water sampling on Tenas Creek looking downstream. October 16, 2017.

Plate B-3: Water sampling on Goathorn Creek looking upstream.
August 16, 2017.

Plate B-4: Hydrology station on the Telkwa River looking downstream.
July 23, 2018.

Plate B-5: Water quality sampling on the Bulkley River looking downstream. July 24, 2018.

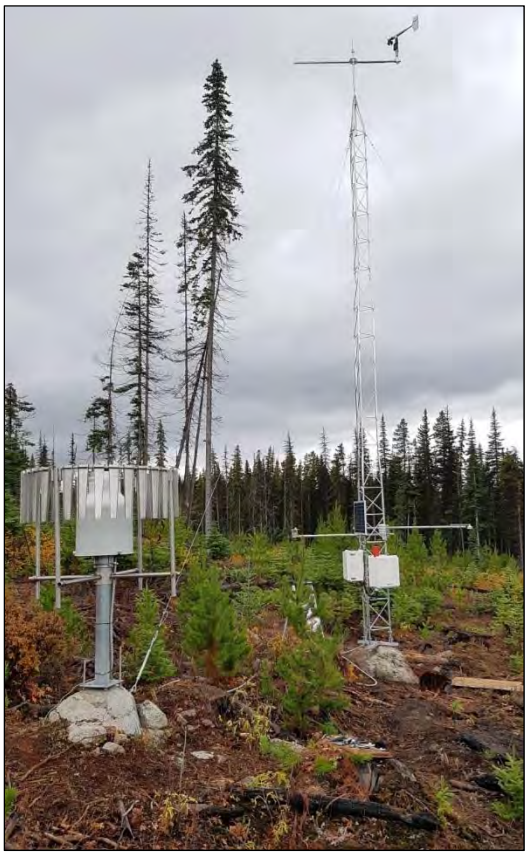

Plate B-6: Meteorology station at the Project site looking northeast. September 29, 2017.